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Three Essays On Diversification Strategy, Diversification Performance, And Corporate Misconduct

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THREE ESSAYS DIVERSIFICATION STRATEGY, DIVERSIFICATION PERFORMANCE, AND CORPORATE MISCONDUCT

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ABSTRACT

The first essay investigates the relationship between diversification strategy and firm performance in the U.S. property-liability insurance industry. Prior literature has evaluated the effect of total diversification on insurer performance; however, there is an absence of evidence on the effect of diversification strategy for multi-line insurers. Theory suggests that related diversifiers should benefit from economies of scope while unrelated diversifiers should benefit from uncorrelated earnings streams. We test for the net effect of diversification strategy and find that relatedness negatively impacts accounting performance. However, we find that the relatedness penalty is confined to stock insurers while mutual insurers' profitability appears to be unaffected by diversification strategy. Our article is the first to document the strategy-performance effect within U.S. property liability insurers.

The second essay measures the impact government enforcement actions have on investor confidence by examining changes in market quality in the firms investigated by the Securities and Exchange Commission for fraud. The market quality measures we test include returns, price volatility, spreads, and Amihud's (2002) illiquidity measure. We find that returns improve and price volatility reduces during an SEC investigation. However, spreads widen and illiquidity significantly increases after controlling for the known

determinants of liquidity. Our work highlights some of the benefits and costs of having an active regulator of the US securities market.

This article investigates the source of the diversification discount commonly found in the literature pertaining to corporate diversification (Berger and Ofek, 1995). Prior studies have had difficulty identifying the source of the discount due to data limitations from traditional sources. We use a sample of U.S. property casualty insurers with performance data (loss ratio) available at the segment-level, we are able to track the performance of existing segments before and after the firm acquires a new business line. This allows us to determine whether the discount is due to the underperformance of the newly acquired segments and/or if the addition of a new line actually affects the performance of the existing lines. We find evidence that diversifying firms underperform in the three years before the diversification event, and that the performance disparity between diversifying and non-diversifying firms dramatically widens in the post-diversification period. We document that the existing business segment's loss ratios increase by 5.4% (worsens) in the year the firm diversifies, and remains consistently higher for the next 3 years. We also find that the new lines significantly outperform the existing business lines by an average margin of 6% in the post-diversification period. Our multivariate tests confirm these results. Therefore, we trace the source of the diversification discount to the declining performance in the existing business segments following the addition of a new line, supporting the notion that corporate diversification destroys value.

DEDICATION

To Tiffany, Brody, Kylie, Ashlynn, and Katie

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1.1 Introduction

Prior literature has defined a diversified insurer as one that has moved from being a one-product insurer (auto, homeowners, life) to a multi-product insurer. The extant literature has focused on explaining the performance differences between focused and diversified insurers (Liebenberg and Sommer, 2008; Elango, et al., 2008; Cummins et al., 2010). What has been largely ignored is the performance variations within diversified insurers. The goal of our research is to fill this gap by examining how an insurer's portfolio of business lines, or diversification strategy, affects accounting performance. This is of particular importance given the relation between a firm's diversification strategy and firm value (Chatterjee and Wernerfelt 1991; Berger and Ofek 1995; Fan and Lang 2000).

Diversification strategy represents the degree to which a firm participates among related or unrelated products and/or business segments. Two business lines or products are considered to be related if they have similar production characteristics. For instance, auto insurance and homeowners insurance are very similar in several aspects such as clientele, marketing channels, and underwriting processes. On the other hand, product liability insurance and earthquake insurance do not share as many similar production characteristics. There has been much written on the advantages and disadvantages of related versus unrelated diversification (Hill, Hitt, and Hoskisson, 1992; Palich et al., 2000). The advantages of related diversification have been argued to arise from the ability of firms to exploit economies of scope (Teece, 1982). "[E]conomies of scope simply means that for two outputs, X1 and X2, the value created by their joint production is greater than the value created if they are produced separately (Hill, Hitt, and Hoskisson, 1992: 502)." However, inefficient resource sharing, resource overstretching, and over utilized management (congestion) could lead to increased costs in a related diversification strategy (Teece, 1982; Porter, 1987). The advantages of unrelated diversification have been argued to stem from two sources, efficient internal governance economies (Williamson, 1975, 1985) and imperfectly correlated income streams (Barney, 1997). The efficient internal governance argument implies that top management can address division-level inefficiencies, terminate underperforming managers, and better allocate capital than can outside investors. In this respect the individual divisions can run more efficiently than comparable single-division firms (Hill, Hitt, and Hoskisson, 1992). Imperfectly correlated income streams may also help reduce insurer risk, improve risk pooling, and reduce the negative effects the business cycle may have on primary income sources. The main contribution of our paper is to distinguish which set of economic benefits equate with better performance that, to the best of our knowledge, has yet to be examined within the U.S. property-liability insurance industry.

This article investigates the relationship between diversification strategy and financial performance to test which strategy, related strategy (synergistic gains) or unrelated strategy (efficient governance and uncorrelated income streams), is associated with better performance. We quantify diversification strategy using a new measure of line-of-business relatedness introduced by Berry-Stölzle, Liebenberg, Ruhland, and Sommer (2012, BLRS 2012 hereafter). We then analyze how well this measure explains the variation in ROA among U.S. property-liability insurers controlling for other determinants of profitability and possible endogenous choice of diversification strategy. The empirical tests indicate that insurers employing an unrelated diversification strategy exhibit stronger accounting performance than insurers employing a more related diversification strategy. This finding is confirmed in both univariate and multivariate tests. Although our tests confirm that the average firm benefits from an unrelated strategy, this finding is not universal across all firm types. Specifically, diversification strategy appears to affect stock insurer performance, while mutual insurer's performance did not exhibit any significant relationship with diversification strategy. Furthermore, our primary finding is robust to firms changing diversification strategy and an alternate measure of relatedness. Our paper offers the first evidence that, among U.S. insurers, firms who employ a more unrelated strategy experience higher profitability than firms employing a more related strategy.

The remainder of this article is organized as follows. First, we discuss the relevant literature as it relates to diversification, diversification strategy, and insurer financial performance. Next we present our hypotheses as well as discuss the methodology and variables employed in the study. Empirical results follow, and then we conclude.

1.2 Prior Literature

Diversification-performance relationship

Financial economists have been studying the implications of diversification and diversification strategy for many years. Lang and Stultz (1994) and Berger and Ofek (1995; 1999) initially provided strong evidence that the market discounts firms operating in multiple industrial segments. However, researchers have recently posited that the finding of a diversification discount may be the result of irregularities in segment-level data and that diversification may actually lead to a diversification premium (Villalonga 2004). Furthermore, Hyland and Diltz (2002) and Campa and Kedia (2002) argue that a priori firm characteristics, namely low growth opportunity and excess cash reserves, account for the diversification discount identified in Berger and Ofek (1995). More recently, Santalo and Becerra (2008) find that the performance-diversification relationship was not homogeneous across industries, but that diversification was associated with positive performance in industries dominated by diversified firms, and negative in industries dominated by single segment firms.

The diversification literature related to property-liability (P/L) insurers appears to be more unified in its assessment of a negative diversification-performance relationship than the general finance literature. Hoyt and Trieschmann (1991) report that while both specialized and diversified firms outperform market benchmarks, specialized firms outperformed diversified firms from 1973 to 1987. Tombs and Hoyt (1994) also report higher risk-adjusted returns for specialized insurers' equities. More recently, Liebenberg and Sommer (2008) provide evidence of a performance penalty and market discount among diversified P/L insurers. Elango, Ma, and Pope (2008) also identify a diversification-performance penalty, but noted that this relationship was nonlinear in nature. Cummins et al. (2010) find that more focused firms are more efficient than diversified firms using data envelopment analysis. Shim's (2011) empirical results also suggests a performance disparity in product-diversified firms, with more focused insurers outperforming product-diversified insurers. Taken together, the diversification literature that has focused explicitly on the insurance industry generally finds that diversification has a negative impact on firm performance.

Diversification strategy-performance relationship

There is ample literature on the effects of diversification on insurer performance; yet to date little research exists on the performance implications of diversification strategy within the P/L insurance industry. To the best of our knowledge, Li and Greenwood (2004) is the only other study that empirically tests relatedness and performance in an insurance setting. Using a sample of 276 diversified Canadian insurers, Li and Greenwood found the extent of diversification to be an insignificant predictor of firm performance, but that market niche relatedness to be positively associated with performance. Berger and Ofek (1995) found that the value loss from conglomerate diversification was mitigated by high levels of relatedness. Berger and Ofek explain that the additional loss in value among unrelated diversifiers may be due to overinvestment, consistent with Jensen (1986) and Stulz (1990).

Firms that choose to diversify can select a strategy of related diversification or unrelated diversification. Prior literature suggests that firms will select related diversification when the costs of producing separate outputs exceed the costs of joint production (i.e., economies of scope). For insurers, the benefits gained through economies of scope can be achieved by employing a senior management team to make business decisions across multiple segments, by taking advantage of existing marketing channels (e.g. multi-policy sales and distribution), taking advantage of multi-loss adjustors, by combining underwriting and claims services, transferring brand name and reputation across products/services, or exploiting closely related technologies (underwriting or actuarial). Alternatively, insurers may select a strategy of unrelated diversification which may provide some unique advantages of its own derived primarily from financial synergies and greater risk reduction (Amit and Livant 1988a; Barney 1997). Portfolio theory suggests that overall risk can be reduced with a collection of assets with imperfectly correlated values. In an insurance setting, having uncorrelated premium and claim flows can improve qualities of risk pooling and stabilize profits during business cycle slumps. For example, an insurer can exploit unrelated diversification when a business line is subject to market contractions by allocating human resources and capital to business lines that may be unaffected by the contraction. In many cases, firms diversify by means of acquisition rather than product creation. A related strategy would look to acquire firms that strategically fit within their existing book of business, where an unrelated strategy would look to acquire undervalued firms, perhaps financially distressed with promising prospects irrespective of strategic fit or value chain enhancements.

While prior literature has recognized that firms may select different diversification strategies, research on the costs and benefits of these strategies is far from conclusive. Numerous studies have found support for the superiority of related diversification over unrelated diversification (Rumelt 1974, 1982; Christensen and Montgomery 1981; Palepu 1985; Bae, Kwon, and Lee 2011). While there are many explanations as to why a strategy of relatedness improves performance, most cite the creation of synergies as a result of efficient resource sharing (e.g., Teece 1980; Teece, Rumelt, Dosi, and Winter 1994).

Although previous studies have found a positive relation between relatedness and firm performance, other studies have reported conflicting results. Michel and Shaked's (1984) evidence suggests that firms diversifying in unrelated sectors are able to generate statistically superior performance over those with business segments that are related. Fan and Lang (2000) reported that firms with vertically related segments are, on average, associated with lower value during the 1980's and 1990's. Fan and Lang use the Berger and Ofek (1995) SIC measure of relatedness and find "strong evidence" that firm value is negatively associated with relatedness. Based on this evidence, Fan and Lang rejected the notion that related diversification always improves firm value. Using perceptual survey data from top industry executives as his basis for relatedness, Pehrsson (2006) identified a negative relationship between "high relatedness" and firm performance. Teece (1982) suggests that when firms attempt to leverage the same resources for an increased number of activities can lead to poorer performance due to congestion. Li and Greenwood (2004) posit that congestion may be higher in an intra-industry setting due to similarities across customer groups and profit inputs.

Other studies have found no significant relationship between diversification strategy and performance after controlling for industry characteristics, lagged performance, or using different relatedness measures (Christensen and Montgomery 1981; Grant, Jammine, and Thomas 1988; Hill 1983; Hill, Hitt, and Hoskisson 1992)

1.3 Hypothesis Development

Diversification Strategy Hypothesis

The most common theoretical rationale supporting the dominance of a related diversification strategy are the benefits derived from economies of scope (Teece 1982; Markides and Williamson 1994; Seth 1990). Related diversifiers capture advantages by sharing inputs in the production of several similar goods. However, costs may also arise from a related strategy. Nayyar (1992) states that for a related strategy to enhance performance, business units must efficiently communicate and cooperate in order to generate synergies. Bureaucratic distortions, intra-firm competition for resources, problems allocating joint costs, or technological inadequacies may all attenuate performance benefits of a related strategy (Palich et al. 2000).

Unrelated strategies, on the other hand, may generate their own financial synergies. One such advantage stems from portfolio theory, where benefits can arise from uncorrelated units of business. When we extend these benefits to an insurance setting, uncorrelated lines of business could bring uncorrelated income streams, and uncorrelated losses among policyholders. Insurers with uncorrelated income streams should also realize reduced cash flow risk, reduced regulatory risk, and lower insolvency risk. Low risk insurers can also charge higher prices, where insurers with high insolvency risk must compensate policyholders for holding additional risk (Sommer 1996). In addition to a reduction in operational risk, impacts from industry-wide shocks and catastrophic events will have a less severe impact on a more unrelated book of business than a related book. Therefore, with theory supporting both arguments, we offer our first hypothesis on the diversification strategy-performance relationship in null form as follows:

H1: Diversification strategy will have no effect on the performance of diversified firms.

Organizational Form Hypothesis

Within the population of insurance firms exists several significant subgroups with contradistinct management, capital, and organizational structures. Stock and mutual insurers are two of these distinct groups. Differences between these groups have been the subject of many investigations. One primary difference is that stock insurers have a stronger mechanism to control managerial opportunism than mutual insurers (Meyers and Smith, 1981, 1982). The market for corporate control, equity based compensation, and shareholder monitoring all contribute to controlling agency costs and aligning managers interests with ownership's, however, these controls are not present in mutual insurers. Therefore, mutual insurers should limit the operational freedom of management (managerial discretion), where managers of stock insurers should be allowed more discretion in pursuing possible value maximizing projects (Meyers and Smith 1982). It is reasonable to assume that firms perusing a related diversification strategy are inherently limiting managerial discretion via choice of similar business products whereas firms must allow managers more operational freedom when operating with an unrelated business strategy.

The empirical evidence in BLRS (2012) document a significant difference in the diversification strategies mutual and stock insurers employ. Mutual insurers exhibit significantly higher levels of related diversification, which requires less managerial discretion, than stock insurers. As expected, mutual insurers actively limit managerial scope by choosing more related business lines, where stock insurers allow managers more operational freedom. What remains an open question is whether performance is affected when mutual or stock insurers deviate from their recommended diversification strategy. Hence we offer our second testable hypotheses:

H2a: Mutual insurers will benefit from a related diversification strategy.

H2b: Stock insurers will benefit from a unrelated diversification strategy.

1.4 Data and Methodology

Sample Selection

Our initial sample includes all firms in the NAIC property-liability Infopro database for the years 1995 through 2009. The sample period is chosen to include both 'hard' and 'soft' insurance markets, allowing for our results to not be artifacts of market conditions. Prior to the year 2000, insurance markets were characterized by low prices and increased supply. Tighter underwriting standards and higher prices followed until late 2005 when markets began softening again (Insurance Information Institute, 2008)[1].

The focus of our investigation is to determine the effects of diversification strategy among P/L insurers. In order to employ a diversification "strategy", one must first be diversified; therefore our first screen removes insurers operating in only one line of business. Next, we exclude firms that are under any regulatory scrutiny. We then aggregate affiliated insurers at the group level. This aggregation controls for potential double counting of intra-group shareholdings and accounts for the likelihood that diversification decisions are made at the group-level (Lamm-Tennant and Starks 1993; Berger et al. 2000; Liebenberg and Sommer 2008; BLRS 2012). We also exclude groups with substantial L/H premium (at least 25 percent of total premiums) so as to focus on P/L insurers. Firms with

[1] http://www.iii.org/

organizational structures other than stock and mutual are also removed. Finally, we exclude firms with fewer than the five years of historical data needed to compute our risk variable (Grace 2004, Liebenberg and Sommer 2008).

Our final sample includes 760 unique P/L insurers, of which 317 are unique group insurers and 443 are unique unaffiliated insurers. Our initial sample included years 1995 through 2009, however because five years of historical data are required for the calculation of our risk variable, our sample period is limited to 2000 through 2009. We report 5,439 insurer-year observations, of which 2,448 are group-year observations and 2,991 are unaffiliated observations.

Performance Measure Selection

Because each of the aforementioned hypotheses tests the relation between diversification strategy and firm performance, a proxy for performance must be selected. Of the various performance measures used in the insurance literature, the most common is return on assets (ROA).[2] However, high performance may be (in-part) attributed to the risks associated with an insurers opportunity set; thus we follow Hamilton and Shergill (1993), Limpaphayom (2003), Grace (2004), Liebenberg and Sommer (2008) and use the standard deviation of ROA for the past five years as a risk control in our models (SDROA5).[3]

[2]See: Amit and Livant (1988); Grant, Jammine, and Thomas (1988); BarNiv and McDonals (1992), Pottier and Sommer (1999), Browne, Carson, and Hoyt (2001); Green and Segal (2004); Wang, Jeng, and Peng (2007).
[3] Hamilton and Shergill (1993) and Lai and Limpaphayom (2003) also use a similar method to account for observation-specific risk.

Diversification Strategy Measure

Historically, financial economists have found it difficult to objectively measure relatedness on large samples (Fan and Lang, 2000). Caves et al., (1980), Morck, Shleifer, and Vishny (1990), Berger and Ofek (1995) measure relatedness by counting differing two-, three-, or four-digit SIC coded segments. Fan and Lang (2000) argued that the SIC classification was not suited to measure differences between segments because they do not reveal relatedness types and cannot hope to measure the degree to which segments are related.[4] Rumelt (1974, 1982) uses a combination of objective and subjective criteria which can lead to measurement inconsistencies. Fortunately, U.S. insurance regulation has afforded robust internal data which we use to capture the extent of U.S. insurers diversification strategy.

We avoid the shortcomings of discrete measures of relatedness by using a proxy developed by Berry-Stölzle, Liebenberg, Ruhland, and Sommer (2012) that assigns a relatedness score to each insurer based on their own book of business. Critical to the formation of our firm relatedness measure is an industry by-line relatedness score, R_{cj}, that captures how each of the 24 lines of business we monitor are related to one another, that is each line c with each line j. R_{cj} is the result of applying the Bryce and Winter (2009) relatedness index approach to the P/L insurance industry, it is interpreted as the percentile rank score that identifies where each pair of business lines lie in the distribution of all pairs

[4] Montgomery (1982), Davis and Duhaime (1989), Nayyar (1992), Villalonga (2004) also note limitations using SIC classifications.

of business lines. For example, a R_{cj} score of .94 for two particular lines implies that 94 percent all other combination of lines are less related and 6 percent are more related. The process to calculate each inter-line relatedness score begins by counting the number of insurers writing in each pair of business lines while adjusting for random paring due to managerial experimentation (Teece et al., 1994):

$$\tau_{cj} = \frac{J_{cj} - \mu_{cj}}{\sigma_{cj}}, \tag{1}$$

where

$$\mu_{cj} = \frac{n_c n_j}{K}, \tag{2}$$

and

$$\sigma_{cj}^2 = \mu_{cj}\left(1 - \frac{n_c}{K}\right)\left(\frac{K - n_j}{K - 1}\right). \tag{3}$$

J_{cj} denotes the number of insurers writing both lines c and j, n_c is the number of insures writing in c, and K denotes the total number of insurers. Next the relatedness measure, τ_{cj}, is adjusted for economic importance. This process involves converting the output of equation 1 to a weighted distance matrix Λ, where each cell represents each τ_{cj} distance from maximum τ weighted by the average of insurers' premiums written that are attributable to a specific (c and j) combination of business lines:

$$\Lambda_{cj} = \left\{\frac{\max(\tau) - \tau_{cj}}{S_{cj}}\right\}, \tag{4}$$

and

$$S_{cj} = \frac{\sum_i min_i(NPW_c, NPW_j) I_{cji}}{\sum_i I_{cji}}. \tag{5}$$

Where I_{ijk} is equal to 1 if insurer i writes both business lines c and j, and 0 otherwise. NPW_i denotes total net premiums written in line c.

The next step is to solve a shortest path algorithm to estimate the relatedness of business line combinations not observed in the sample. Afterwards, the newly formed shortest path matrix is converted to a similarities matrix by subtracting all cells from the maximum distance score in the previous step. Finally, the similarities matrix scores are transformed into percentile relatedness ranks, or our by-line relatedness score R_{cj}. We then calculate each insurer's relatedness score computing how each insurer-line is related to its remaining book of business. The weighted-average relatedness scores for each line of business is calculated as:

$$WAR_{ict} = \frac{\sum_{j \neq c} R_{cj} \, NPW_{ijt}}{\sum_{j \neq c} NPW_{ijt}} \tag{6}$$

Where WAR_{ict} is the weighted-average relatedness score of line c for insurer i at time t. NPW_{ijt} denotes the net premiums written for each insurer i in line j in year t. Aggregate relatedness scores are then multiplied by the net premiums written for that line, and scaled by total net premiums written, resulting in a final relatedness score for each insurer-year, WAR_{it}:

$$WAR_{it} = \frac{\sum_c NPW_{ict} \times WAR_{ict}}{\sum_c NPW_{ict}} \tag{7}$$

The resulting score increases as insurers' write in more related lines and decreases as premiums are spread across more unrelated lines of business.

Diversification extent. Our study uses a sample of firms with varying degrees of diversification. While our focus is on the performance effects of diversification *strategy*, it is important to control for the degree to which an insurer is diversified. We follow the standard approach used in BLRS (2012) and measure total diversification using a Herfindahl index of net premiums written across 24 separate lines of business (LOBHERF). We define LOBHERF for firm *i* in year *t* as:

$$LOBHERF_{it} = \sum_{j=1}^{24} \left(\frac{NPW_{ijt}}{NPW_{it}} \right)^2 \tag{8}$$

where NPW_{ijt} is firm *i*'s net premiums written in line *j* in year *t*.[5]A LOBHERF close to zero would indicate a relatively diversified firm where a value closer to one would indicate a more concentrated firm.

[5] We follow the line of business convention as established by BLRS (2012). We use the Underwriting and Investment Exhibit (Part 1B – Premiums Written) of an insurers' annual statutory filing as the basis of diversification and relatedness measures. Several lines are logically combined in the following ways:

1. Fire and Allied lines is defined as the sum of "Fire" (line 1) and "Allied lines" (line 2).
2. Accident and Health is defined as the sum of "Group Accident and Health" (line 13), "Credit Accident and Health" (line 14), and "Other Accident and Health" (line 15).
3. Medical Malpractice is defined as the sum of "Medical Malpractice–Occurrence" (line 11.1) and "Medical Malpractice–Claims Made" (line 11.2).
4. Products Liability is defined as the sum of "Products Liability–Occurrence" (line 18.1) and "Products Liability–Claims Made" (line 18.2).
5. Auto is defined as the sum of "Private Passenger Auto Liability" (line 19.1, 19.2),"Commercial Auto Liability" (line 19.3, 19.4), and Auto Physical Damage (line 21).
6. Reinsurance is defined as the sum of "Nonproportional Assumed Property" (line 30),"Nonproportional Assumed Liability" (line 31), and "Nonproportional Assumed Financial Lines" (line 32).

The final 24 lines are as follows: Accident and Health, Aircraft, Auto, Boiler and Machinery, Burglary and Theft, Commercial Multi Peril, Credit, Earthquake, Farmowners', Financial Guaranty, Fidelity, Fire and Allied lines, *Size.* Hardwick (1997) suggested that large insurers are likely to perform better than small insurers because they can economize on unit cost associated with product innovation and process improvement. Larger insurers may also have lower insolvency risk which Sommer (1996) suggests can translate into higher prices *ceteris paribus*. Cummins and Nini (2002) relate insurer size to market power, where we would expect larger insurers to find greater revenue efficiencies than smaller insurers. Consistent with the extant literature we expect size to be positively related to performance. We measure size as the natural logarithm of total assets (SIZE). Because we aggregate insurers at the group level, we adjust group assets downward by the total intra-group common and preferred stock holdings.[6]

Capitalization. When P/L insurers have a strong surplus position, they can become more competitive by reducing premiums and loosening underwriting standards. Insurers with greater capital can sustain unfavorable underwriting cycles for longer periods of time thus giving them the opportunity to increase market share. In addition, Sommer (1996) found that safer insurers are able to command higher prices. Therefore, we suspect a positive relationship between insurer capitalization and performance. CAPASSETS is measured as the ratio of policyholder surplus to total admitted assets.

Homeowners, Inland Marine, International, Medical Malpractice, Mortgage Guaranty, Ocean Marine, Other, Other Liability, Products Liability, Reinsurance, Surety, and Workers' Compensation.

[6] If we did not adjust assets, all intra-group holdings would be double counted. For example, if insurer A and B are in a group, and insurer B owns all of insurer A's stock, the group's assets would effectively double count A's assets if we did not adjust for B's intra-group holdings.

Ownership Structure. Our sample contains insurers classified as one of two different organizational forms; namely, mutual insurers and stock insurers. Agency theory suggests that self-interested managers will maximize their utility at the expense of the firms' owners (Jensen and Meckling 1976). The market for corporate control aligns the owner-manager conflict in stock insurers, where the mutual form is not as efficient. However, the mutual form does align the interests of managers and owners (policy holders) thus reducing some agency costs; although the owner-manager agency costs are thought to be higher (Mayers and Smith 1981). The empirical evidence on the cost efficiency is mixed, where Cummins, Weiss and Zi (1999) find mutual insurers are less cost efficient than stock insurers while Greene and Segal (2004) find no difference in cost efficiencies between the two forms. More recent literature suggests that stock insurers outperform mutual insurers when using accounting based performance measures (Liebenberg and Sommer 2008; Elango, Ma, Pope 2008). Therefore we expect the binary variable MUTUAL to control for the costs and benefits associated with organizational form and to be negatively associated with performance.

Geographic Diversification. Controlling for the geographic spread of business is accomplished through the use of geographic Herfindahl index, calculated using the proportion of premiums written across fifty U.S. states and the District of Columbia (GEODIV). Liebenberg and Sommer (2008) and Elango, Ma, and Pope (2008) found geographic diversification to be negatively related to firm performance, thus we expect our measure to be negative as well.

Industry Concentration. We follow Liebenberg and Sommer (2008) and measure industry concentration as follows:

$$WCONC_{it} = \sum_{J=1}^{24} w_{ijt} \times HHI_{jt} \quad (9)$$

where w_{ijt} is the weight of premiums written in line *j* in year *t* and HHI_{jt} is an industry-wide, line-specific Herfindahl, that measures the relative competitiveness of each line. Insurers with smaller relative values for WCONC are writing in competitive business lines, whereas larger values would indicate higher business concentration and less relative competition. We expect WCONC to be positively related to performance.

Other control variables. The remaining control variables (percent life (PCTLIFE), line of business dummies, time dummies, and state dummies) are all employed to capture substantial firm-specific or market characteristics but are not pertinent to our investigation. We also control for group participation in this specification. To conserve space, we do not report the coefficients on the year, line of business, and state indicator variables. The definitions and summary statistics are included in Table 1.

[Table 1 about here]

Given that our dataset consists of repeated firm observations over a ten year period, we follow Liebenberg and Sommer (2008) and Elango, Ma, and Pope (2008) and employ a fixed-effect model using time-specific intercepts to test the relationship between diversification strategy and firm performance. The use of time fixed effects allows us to control for time-dependent variation in ROA. Because firm-level clustering may result in inflated *t* statistics due to understated standard errors, we account for repeated firm observations in our analysis and report significance levels with cluster-corrected standard errors on all our estimates (Petersen 2009). With the possible endogenous choice of diversification strategy based on concurrent profits, we use a number of measures to ensure consistent estimators. The first method we use to control this possible endogenous choice is to simply use once lagged relatedness scores as proxies for concurrent firm-level relatedness (equation 10):

$$\begin{aligned} ROA_{it} = {} & \beta_0\alpha_{it} + (\beta_1 WAR_{it} \; or \; \beta_1 WAR_{it-1}) + \beta_2 LOBHERF_{it} + \beta_3 SIZE_{it} + \beta_4 CAPASSETS_{it} \\ & + \beta_5 GEODIV_{it} + \beta_6 WCONC_{it} + \beta_7 PCTLIFE_{it} + \beta_8 SDROA5_{it} \\ & + \beta_9 MUTUAL_{it} + \beta_{10} GROUP_{it} + \beta_{11-20} Year\ fixed\ effects_i \\ & + \beta_{21-43} Line\ controls_{it} + \beta_{44-94} State\ controls_{it} + \varepsilon_{it} \end{aligned} \tag{10}$$

Our next approach to deal with potential endogeneity bias is to use a two-stage least squares and two-stage GMM estimators. The instrumental variable is the fitted value from the following cross-sectional model:

$$WAR_{it} = \delta_{0t} + \delta_{1t}Age_{it-1} + \delta_{2t}WVOLA_{it-1} + \delta_{3t}WLINESIZE_{it-1} + \boldsymbol{\delta X} + \varepsilon_{it} \tag{11}$$

In equation (11), Age_{it-1} is firm age. $WVOLA_{it-1}$ can be defined as the weighted average of an insurer's business lines' loss ratio volatilities. The weights used to compute this variable are the insurer's fraction of premiums written for each business line. We then apply the weights to the industry-level loss ratio standard deviations which we use as our measure of business line loss ratio volatility. $WLINESIZE_{it-1}$ captures the growth opportunities in an insurer's book of business. $WLINESIZE_{it-1}$ is the weighted average of the relative business line sizes in which the insurer competes. Again, we use line of business participation rates as the weights, where relative business line size is that business line's total industry premiums divided by total industry premiums across all 24 lines. This measure is similar to the industry size variable Santalo and Becerra (2008) use to capture its effect on the diversification-performance relationship. Finally, we include the vector of independent variables, $\boldsymbol{X}$, as described in equation (10). Our choice of instruments are based on known determinants of related diversification (BLRS, 2012).

1.5 Empirical results

Diversification Strategy Hypothesis

A univariate ROA analysis across relatedness quartiles is presented in Table 2. Likewise, Figure 1 displays a graphical representation of ROA across relatedness deciles, where the first decile contains firms exhibiting the greatest level of unrelated diversification, and the tenth decile contains firms exhibiting the greater level of related diversification. The results of Table 2 and Figure 1 highlight an inverse relationship between performance and relatedness. On average, we find that insurers with unrelated books of business outperform insurers with more related books. The results from the univariate analysis suggests a statistically significant difference in performance between firms in the first quartile and firms in the fourth quartile, with the firms in the first quartile (i.e., the most unrelated books of business) experiencing an average ROA of 2.5%, compared to an ROA of 1.5% for those in the fourth quartile (i.e., the most related books of business).

[Table 2 about here]

[Figure 1 about here]

The estimates in Table 3 are parameters from four regression specifications of *ROA* on weighted-average relatedness and several control variables. Columns 1 and 2 report standard OLS regression estimates of equation 10 where relatedness is measured with the raw relatedness score both concurrently and once lagged. Two-stage least squares and two-stage GMM estimates are also reported in columns 3 and 4. The empirical results show a negative relationship exists between relatedness (*WAR*) and firm performance (*ROA*) across each of the four model specifications. The coefficients on the raw WAR scores average -3%, and after controlling for the possible endogenous choice of diversification strategy, the diversification-performance relationship appears much steeper with coefficients averaging -9.2%. These results are consistent with the initial univariate results and indicate that related diversification has, on average, a negative effect on firm performance. We therefore reject null hypothesis 1, and provide some of the first evidence that related diversification reduces accounting performance among P/L insurers. These findings are consistent with those of Michel and Shaked (1984), Fan and Lang (2000) and Pehrsson (2006).

[Table 3 about here]

Benefits to a related strategy depend on the ability of firms to create synergies among similar resources (Teece 1980). However, these benefits require a high degree of managerial cooperation, and communication between business segments. Inefficiencies and other costs can manifest when firms attempt to leverage the same resources for an increased number of activities, and thus poorer performance (Teece 1982). Counter to related benefits, the economic benefits of unrelated diversification are based on efficiency gains due to strong internal systems that can allocate resources and shift risk to performing sectors (Williamson 1985). Our results indicate one of two things: (1) the costs associated with a related strategy outweigh the benefits, or (2) 'flexibility' in resource allocation is more valuable than synergy gains from core competencies.

Among other control variables, the coefficients on the SIZE variable are positive and significant in each specification in Table 3. This finding is consistent with the extant literature suggesting that larger firms can take advantage of economies of scale or lower insolvency risk (Sommer 1996). *CAPASSETS* is positive and significant, indicating that financial flexibility is associated with improved performance. *GEODIV* is negative and significant, consistent with prior research (Elango, Ma, Pope 2008). We find limited evidence that diversified mutual insurers underperform diversified stock insurers across our sample period. The coefficient on *MUTUAL* is negative and significant in the first two specifications, but is insignificant in the more robust specifications (columns 3 and 4). Our findings also indicate that group-affiliated insurers underperform unaffiliated insurers. This negative relation may be due to lower the costs of conglomeration, costs of managerial discretion, or inefficient resource sharing between affiliates. Overall, we reject hypothesis 1, and find that firms following a related diversification strategy underperform those that follow a more unrelated diversification strategy.

Organizational Form Hypothesis

Two primary organizational structures exist among insurers, mutual insurers and stock insurers. Agency costs should rise quicker within mutual insures than stock insurers with the amount of discretion given to management because of the lack of market and shareholder monitoring (Mayers and Smith 1982). Therefore, limiting the discretion of mutual insurer managers should produce lower costs and improved performance. Following a more related strategy is one method to reduce the managerial discretion required by management, and should lead to performance gains for mutual insurers when compared to stock insurers who do not need to limit managerial discretion. The results reported in Table 4 are supportive of this notion, we find that stock insurers following a more related strategy display weaker profitability compared to mutual insurers following a more related strategy. Each specification, OLS and 2SLS, report negative and significant coefficients (columns 1 and 2) for the stock subsample. And within the mutual subsample specifications (columns 2 and 3), related diversification appears to be a nonfactor in determining profitability. In short, the general finding on the relatedness-performance relationship from Tables 2 and 3 apply to stock insurers (negative performance relationship), and does not apply to mutual insurers. The difference in effect between the two subsamples may be due to the reduced agency costs mutuals realize when they limit managerial discretion by means of a related diversification strategy.

[Table 4 about here]

Robustness

To ensure the robustness of our primary result that diversification is associated with lower performance in U.S. based insurers, we utilize three robustness tests. First we verify our result against a market-based performance measure, second we compare firm performance after firms' change their diversification strategy, and third we use cluster analysis as an alternative measure of line relatedness.

Market-Based Performance Measure. If employing a related diversification strategy leads to worse performance, market value should reflect our claim. Therefore, we use a subsample of publicly traded insurers and repeat equation 10 using the natural log of Tobin's Q as a proxy for firm value to assess whether our finding extends to a market-based performance measure. We follow Christophe (1997), Shin and Stulz (2000), and Cummins et al. (2006) in defining Tobin's Q as the market value of equity plus the book value of liabilities divided by book value of assets. The multivariate results in Table 5 provide some evidence that the relatedness of the firm's insurance business is negatively related to firm value. In each specification, relatedness is negative, but only significant in the OLS specification.

[Table 5 about here]

Changing Diversification Strategy. To further validate our results, we explore profitability differences among newly diversified firms. Again we model profitability with equation 10 and replace WAR with variables that measure the change in diversification strategy. The first variable is the absolute change in WAR:

$$\Delta WAR_i = |WAR_t - WAR_{t-1}|. \quad (12)$$

For our sample of newly diversified firms, prior year's relatedness score is equal to one ($WAR_{t-1} = 1$), and the concurrent relatedness score is below one making any change in diversification strategy negative. For ease of interpretation, we use the absolute value as our measure of change in strategy, where larger values equate to a more unrelated strategy. We expect ΔWAR to be positively related to performance, that is, the more *unrelated* strategy employed the more profitable firms should be. The second measure is a set of dummy variables indicating which change-quartile the firm belongs to. Firms with the smallest change in strategy, $\Delta WARQ1$, are the omitted group. If our initial findings hold, firms in $\Delta WARQ2, \Delta WARQ3, \Delta WARQ4$ should have higher profit margins as compared to firms in $\Delta WARQ1$, therefore we expect positive parameter estimates for each indicator variable. We identified 262 firms changing their diversification strategy during our sample period. Because of the small sample, we do not use year, line, or state fixed effects.[7]

The results in Table 6 are consistent with the negative relatedness-performance relationship found in Table 3. The absolute change in relatedness score is positive and significant at the 1% level in the OLS and 2SLS specifications. These coefficients indicate that larger changes in diversification strategy are associated with higher performance. We also find similar results using the change-quartile indicators. As expected, all of the coefficients are positive however, only $\Delta WARQ4$ is significant at the 1% level. These results

[7] The number of control variables was reduced from 95 to 12. Our findings in Table 7 are not substantially different using the full set of controls.

indicate that firms in the largest change-quartile were 7.7% more profitable than firms in the lowest change-quartile on average.

[Table 6 about here]

Alternative Measure of Relatedness. The essence of 'relatedness' is finding the commonalities in our several lines of business. A method available for deciphering commonalities and bundling like business lines together is factor analysis. Both Mayers and Smith (1988) and Liebenberg and Sommer (2008) use cluster analysis to bundle like business. We follow the Liebenberg and Sommer (2008) cluster analysis method by applying the VARCLUS procedure in SAS to the matrix of direct premiums written per line for all firms in our sample. This procedure identifies lines that tend to be written together and therefore are assumed to be more related. After the related lines are identified, we use a Herfindahl index to measure firm level concentration across the pools of related-business. Firms with related business will have a CLUSHERF score close to 1 while firms with more unrelated business will have smaller CLUSHERF scores. We expect the coefficient on CLUSHERF to be negative.

[Table 7 about here]

The results of our cluster analysis regressions are contained in Table 7. We test the affect relatedness has on ROA using the full sample and a subsample of public insurers using Tobin's Q as the dependent variable. Like in the previous tables, we model performance using equation 10, however multicollinearity was an issue when we used CLUSHERF and LOBHERF in the same model, therefore as a proxy for diversification extent, we use a straight forward count of the number of business lines an insurer participates in

(LINES). For both the full sample and public sample, the 2SLS specifications provide significant results (columns 2 and 4), where the OLS specifications report no effect (columns 1 and 3) between performance and our alternative relatedness measure, CLUSHERF. Overall, CLUSHERF appears to have a negative effect on performance, although significance levels are lower than in our previous models, the evidence does verify our primary result. The variable LINES is significant and negative in each model, consistent with the previous findings in Liebenberg and Sommer (2008) and Elango, Ma, and Pope (2008) that diversification is associated with lower performance among P/L insurers.

1.6 Conclusion

This article investigates the relationship between the relatedness of product diversification and firm performance using a sample of diversified U.S. property-liability insurance insurers over a ten year period. Prior literature has evaluated the effect of total diversification on insurer performance; however, there is an absence of evidence on the effect of diversification strategy for multi-line insurers. We are the first to test this relationship using the relatedness measure developed by Berry-Stölzle, Liebenberg, Ruhland, and Sommer (2012). Theory suggests that related diversifiers should benefit from economies of scope while unrelated diversifiers should benefit from uncorrelated earnings streams.

The primary result of this study is that related diversification negatively impacts accounting performance, *ceteris paribus*. We also find that the relatedness-performance penalty does not apply to mutual insurers while stock insurers are subject to it. We explain that agency costs are reduced within mutuals that employ a related diversification strategy possibly offsetting the relatedness-performance penalty found in the full sample analysis. This finding is consistent with the managerial discretion hypothesis as posed by Mayers and Smith (1982)

Table 1.1

Summary Statistics and Variable Definitions (N = 5,439)

Variable	Definition	Mean	Median	Std. Dev.
WAR	Weighted average relatedness	0.85	0.91	0.14
ROA	Return on assets, calculated as the ratio of net income to total assets	0.02	0.03	0.05
SDROA5	Standard deviation of ROA over the previous five years	0.03	0.02	0.03
SIZE	Natural logarithm of total assets	18.47	18.33	2.26
LOBHERF	Line of business Herfindahl index	0.53	0.45	0.26
CAPASSETS	Ratio of total policyholders surplus to total assets	0.47	0.44	0.20
GEODIV	Herfindahl index applied to geographic participation across 51 regions	0.60	0.32	0.38
WCONC	Sum of industry concentration scores multiplied by line-specific participation	0.06	0.66	0.38
PCTLIFE	Percentage of total premiums in life and health lines of business	0.01	0.00	0.03
MUTUAL	Binary variable equal to 1 for mutual insurers, and 0 otherwise	0.51	1.00	0.50

Cont.

GROUP	Binary variable equal to 1 for insurance groups, and 0 otherwise	0.45	0.00	0.50

Notes: Sample period covers 1995 – 2009. Five years of lagged consecutive data are required for the computation of SDROA5; thus our analyses begin in year 2000. All relevant variables are in aggregated at the group level (Berger et al., 2000). Total assets are adjusted downward by the total intra-group holdings. ROA is trimmed at the 1% and 99% levels. The key independent variable, WAR measures the "relatedness" of a firm's diversification strategy. This variable is bound between 0 and 1, where values closer to 1 represents high levels of relatedness between the insurer's business lines (Berry-Stölzle, Liebenberg, Ruhland, and Sommer 2012).

Table 1.2

Pairwise Comparison of ROA Between WAR Quartiles

Panel A: ROA across WAR quartiles

	Unrelated Strategy		Related Strategy	
	Q1	Q2	Q3	Q4
ROA	0.025	0.021	0.021	0.015

Panel B: Pairwise ROA t-tests (row minus column)

	Q1	Q2	Q3	Q4
Q1	1.000			
Q2	0.004***	1.000		
Q3	0.004***	<-0.001	1.000	
Q4	0.010***	0.006***	0.006***	1.000

Q1 - Q4 are the weighted average relatedness quartiles (WAR). Quartile 1 contains firms with the most unrelated books of business, while quartile 4 contains firms with the most related books of business. WAR measures the relatedness of firm-level diversification. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, * respectively.

Table 1.3
Diversification Strategy Effect: Full Sample Analysis

	Dependent Variable = *ROA*			
Model	OLS	OLS	2SLS	2SGMM
WAR	-0.031***		-0.094***	-0.089***
	(0.011)		(0.026)	(0.026)
WAR_{t-1}		-0.026***		
		(0.009)		
LOBHERF	-0.004	-0.004	-0.006	-0.005
	(0.006)	(0.006)	(0.006)	(0.006)
SIZE	0.007***	0.007***	0.008***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
CAPASSETS	0.064***	0.064***	0.067***	0.066***
	(0.007)	(0.007)	(0.007)	(0.006)
GEODIV	0.008*	0.008*	0.009*	0.008*
	(0.004)	(0.004)	(0.005)	(0.004)
WCONC	-0.006	0.001	-0.052	-0.057
	(0.049)	(0.048)	(0.055)	(0.054)
PCTLIFE	0.043	0.043	0.049	0.043
	(0.031)	(0.031)	(0.032)	(0.032)
SDROA5	-0.054	-0.053	-0.039	-0.044
	(0.045)	(0.045)	(0.046)	(0.045)
MUTUAL	-0.004*	-0.004*	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
GROUP	-0.012***	-0.012***	-0.013***	-0.013***
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	-0.112***	-0.115***	-0.075***	-0.075***
	(0.022)	(0.022)	(0.027)	(0.027)
Observations	5,439	5,439	5,360	5,360
R-squared	0.179	0.179	0.173	0.175

Notes: Sample period is 2000 – 2009. In columns 1 and 2, coefficients are estimated by OLS. Columns 2 and 4 report two-stage SLS and GMM coefficients where in the first stage WAR is estimated by:

$$\widehat{WAR}_{it} = \delta_{0t} + \delta_{1t}Age_{it-1} + \delta_{2t}WVOLA_{it-1} + \delta_{3t}WLINESIZE_{it-1} + \boldsymbol{\delta X}$$

Standard errors (in parentheses) are corrected for clustering at the firm level. All models include year, line of business, and state fixed effects. The key independent variable, WAR measures the relatedness of firm-level diversification (Berry-Stölzle, Liebenberg, Ruhland, and Sommer, 2012). LOBHERF is a line of business Herfindahl index. SIZE is the natural log of total admitted assets, CAPASSETS is the ratio of surplus to total admitted assets. GEODIV is equal to a Herfindahl index of premiums written across all reported geographic areas (schedule T). WCONC is a line weighed metric of industry concentration (Liebenberg and Sommer, 2008). PCTLIFE is the percentage of premiums collected in life and health lines. GROUP is equal to 1 if the firm is an aggregated group, 0 if it is a single, unaffiliated insurer. SDROA5 is the standard deviation of ROA over the past 5 years. Binary year controls are included but not reported with 2009 being the excluded year. Also not reported are 23 line-of-business and 50 state binary controls. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, * respectively.

Table 1.4
Diversification Strategy Effect: Stock and Mutual Analysis

	Dependent Variable = *ROA*			
	Stock		Mutual	
VARIABLES	OLS	2SLS	OLS	2SLS
WAR		-0.079**		-0.349
		(0.031)		(0.215)
WAR_{t-1}	-0.022*		-0.020	
	(0.011)		(0.018)	
LOBHERF	-0.001	-0.002	-0.011	-0.022
	(0.008)	(0.008)	(0.011)	(0.016)
SIZE	0.005***	0.006***	0.010***	0.009***
	(0.002)	(0.002)	(0.001)	(0.002)
CAPASSETS	0.063***	0.074***	0.072***	0.077***
	(0.012)	(0.010)	(0.009)	(0.011)
GEODIV	0.016***	0.017***	0.001	0.012
	(0.006)	(0.006)	(0.006)	(0.012)
WCONC	-0.010	-0.065	0.011	-0.088
	(0.057)	(0.067)	(0.073)	(0.109)
PCTLIFE	0.116***	0.120***	-0.037	-0.023
	(0.044)	(0.044)	(0.038)	(0.052)
SDROA5	-0.125**	-0.130**	0.110*	0.162**
	(0.051)	(0.055)	(0.061)	(0.080)
Group	-0.010**	-0.011**	-0.015***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.006)
Constant	-0.084***	-0.068*	-0.177***	0.091
	(0.030)	(0.036)	(0.029)	(0.170)
Observations	2,659	2,607	2,780	2,753
R-squared	0.185	0.192	0.247	0.037

Notes: Sample period is 2000 – 2009. In columns 1 and 3, coefficients are estimated by OLS. Columns 2 and 4 report 2SLS coefficients where:

$$\widehat{WAR}_{it} = \delta_{0t} + \delta_{1t}Age_{it-1} + \delta_{2t}WVOLA_{it-1} + \delta_{3t}WLINESIZE_{it-1} + \boldsymbol{\delta X}$$

Standard errors (in parentheses) are corrected for clustering at the firm level. All models include year, line of business, and state fixed effects. The key independent variable, WAR, is a weighted ratio of related premiums to total net premiums written (Berry-Stölzle, Liebenberg, Ruhland, and Sommer, 2012). LOBHERF is a line of business Herfindahl index. SIZE is the natural log of total admitted assets, CAPASSETS is the ratio of surplus to total admitted assets. GEODIV is equal to a Herfindahl index of premiums written across all reported geographic areas (schedule T). WCONC is a line weighed metric of industry concentration (Liebenberg and Sommer, 2008). PCTLIFE is the percentage of premiums collected in life and health lines. GROUP is equal to 1 if the firm is an aggregated group, 0 if it is a single, unaffiliated insurer. SDROA5 is the standard deviation of ROA over the past 5 years. Binary year controls are included but not reported with 2009 being the excluded year. Also not reported are 23 line-of-business and 50 state binary controls. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, * respectively.

Table 1.5
Robustness: Market-Based Performance Measure

	Dependent Variable = *ln(q)*	
Model	OLS	2SLS
WAR		-0.206
		(0.207)
WAR_{t-1}	-0.143*	
	(0.084)	
LOBHERF	-0.008	-0.009
	(0.061)	(0.057)
SIZE	0.006	0.008
	(0.012)	(0.012)
CAPASSETS	-0.115	-0.117
	(0.097)	(0.087)
GEODIV	-0.046	-0.041
	(0.055)	(0.051)
WCONC	0.245	0.189
	(0.499)	(0.481)
PCTLIFE	0.004	0.002
	(0.161)	(0.145)
SDROA5	-0.416	-0.391
	(0.485)	(0.474)
MUTUAL	0.056**	0.058**
	(0.028)	(0.026)
GROUP	0.092**	0.090**
	(0.040)	(0.038)
Constant	0.048	0.042
	(0.272)	(0.256)
Observations	555	555
R-squared	0.563	0.563

Notes: The dependent variable is the natural log of Tobin's Q where $Tobin's\ Q = \frac{Market\ Value\ of\ Equity + Book\ Value\ of\ Liabilities}{Total\ Assets}$. Sample period is 2000 – 2009. In column 1, coefficients are estimated by OLS. Column 2 reports 2SLS coefficients where:

$$\widehat{WAR}_{it} = \delta_{0t} + \delta_{1t} Age_{it-1} + \delta_{2t} WVOLA_{it-1} + \delta_{3t} WLINESIZE_{it-1} + \boldsymbol{\delta X}$$

Standard errors (in parentheses) are corrected for clustering at the firm level. All models include year, line of business, and state fixed effects. The key independent variable, WAR, measures the relatedness of firm-level diversification (Berry-Stölzle, Liebenberg, Ruhland, and Sommer, 2012). LOBHERF is a line of business Herfindahl index. SIZE is the natural log of total admitted assets, CAPASSETS is the ratio of surplus to total admitted assets. GEODIV is equal a Herfindahl index of premiums written across all reported geographic areas (schedule T). WCONC is a line weighed metric of industry concentration (Liebenberg and Sommer, 2008). PCTLIFE is the percentage of premiums collected in life and health lines. GROUP is equal to 1 if the firm is an aggregated group, 0 if it is a single, unaffiliated insurer. SDROA5 is the standard deviation of ROA over the past 5 years. Binary year controls are included but not reported with 2009 being the excluded year. Also not reported are 23 line-of-business and 50 state binary controls. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, * respectively.

Table 1.6
Analysis of Change in Diversification Strategy

	Dependent Variable = *ROA*		
Model	OLS	2SLS	OLS
ΔWAR = $\lvert WAR_t - WAR_{t-1} \rvert$	0.145***	0.330***	
	(0.049)	(0.112)	
ΔWARQ2			0.033
			(0.024)
ΔWARQ3			0.038
			(0.025)
ΔWARQ4			0.077***
			(0.025)
LOBHERF	0.053	0.015	0.055
	(0.044)	(0.051)	(0.044)
SIZE	0.005	-0.002	0.005
	(0.006)	(0.007)	(0.006)
CAPASSETS	0.113***	0.042	0.117***
	(0.036)	(0.043)	(0.036)
GEODIV	0.014	0.022	0.009
	(0.024)	(0.026)	(0.024)
WCONC	-0.109	-0.242	-0.105
	(0.212)	(0.224)	(0.213)
PCTLIFE	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
SDROA5	-0.532***	-0.595***	-0.531***
	(0.126)	(0.126)	(0.126)
MUTUAL	0.045**	0.046**	0.042*
	(0.022)	(0.023)	(0.023)
GROUP	0.013	0.026	0.012
	(0.020)	(0.022)	(0.020)
Constant	-0.187	-0.044	-0.191
	(0.121)	(0.135)	(0.122)
Observations	262	242	262
R-squared	0.148	0.098	0.151

Notes: Sample period is 2000 – 2009. Sample firms were single line insurers in year $t-1$ who added additional lines in year t. In columns 1 and 3 coefficients are estimated by OLS. Column 2 report 2SLS coefficients where the possible endogenous variable WAR is estimated by: $\Delta\widehat{WAR}_{it} = \delta_{0t} + \delta_{1t}Age_{it-1} + \delta_{2t}WVOLA_{it-1} + \delta_{3t}WLINESIZE_{it-1} + \boldsymbol{\delta X}$. The third model compares the differences in ROA across relatedness quartile ($\Delta WARq$), where $\Delta WAR1$ (firms with the highest relatedness levels) is the omitted group. Standard errors (in parentheses). Models 2, 4, 6 include year, line of business, and state fixed effects. The key independent variable, WAR measures the relatedness of firm-level diversification (Berry-Stölzle, Liebenberg, Ruhland, and Sommer, 2012). LOBHERF is a line of business Herfindahl index. SIZE is the natural log of total admitted assets, CAPASSETS is the ratio of surplus to total admitted assets. GEODIV is equal to a Herfindahl index of premiums written across all reported geographic areas (schedule T). WCONC is a line weighed metric of industry concentration (Liebenberg and Sommer, 2008). PCTLIFE is the percentage of premiums collected in life and health lines. GROUP is equal to 1 if the firm is an aggregated group, 0 if it is a single unaffiliated insurer. SDROA5 is the standard deviation of ROA over the past 5 years. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, * respectively.

Table 1.7
Robustness: Alternative Measure of Related Diversification

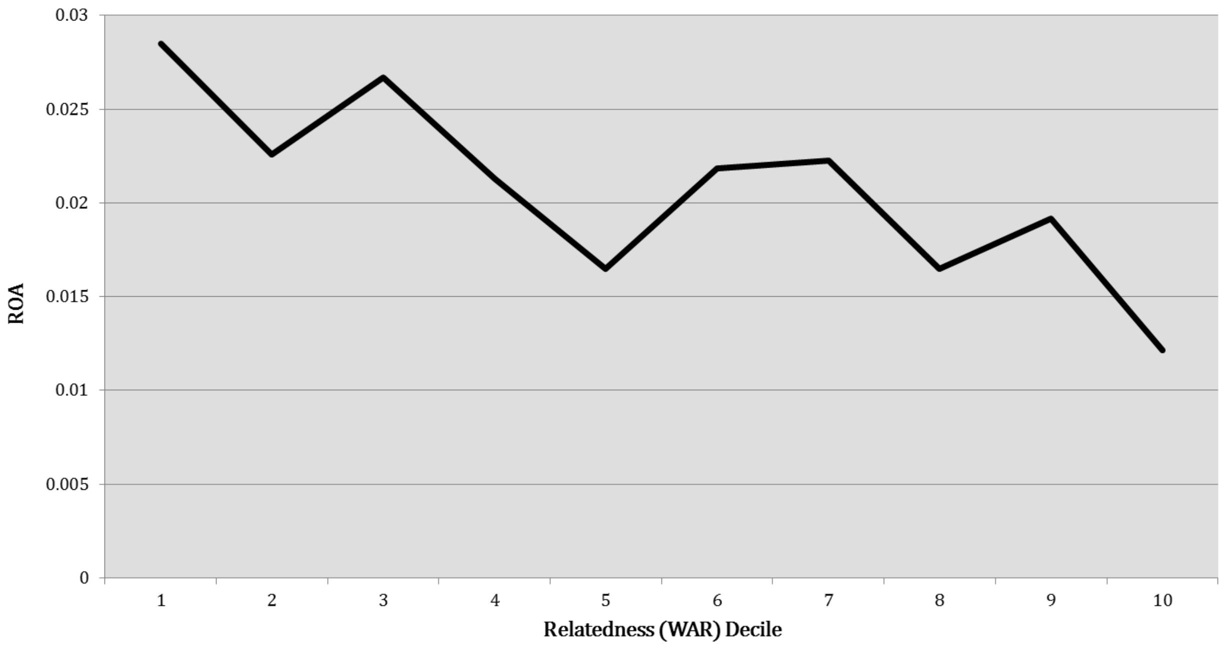
	Dependent Variable = *ROA*		Dependent Variable = *ln(q)*	
Model	OLS	2SLS	OLS	2SLS
CLUSHERF	-0.007	-0.030*	-0.017	-0.589*
	(0.006)	(0.017)	(0.059)	(0.355)
LINES	-0.006**	-0.008***	-0.063*	-0.109**
	(0.002)	(0.003)	(0.037)	(0.047)
SIZE	0.007***	0.008***	0.006	0.026
	(0.001)	(0.002)	(0.012)	(0.017)
CAPASSETS	0.064***	0.070***	-0.109	-0.161
	(0.007)	(0.006)	(0.098)	(0.118)
GEODIV	0.007	0.007	-0.084	0.090
	(0.004)	(0.005)	(0.059)	(0.137)
WCONC	0.004	0.006	0.359	0.259
	(0.048)	(0.049)	(0.460)	(0.547)
PCTLIFE	0.041	0.046	0.010	0.263
	(0.030)	(0.030)	(0.170)	(0.315)
SDROA5	-0.058	-0.054	-0.428	-0.200
	(0.044)	(0.041)	(0.493)	(0.502)
MUTUAL	-0.005**	-0.004*	0.054*	0.069*
	(0.002)	(0.002)	(0.027)	(0.036)
GROUP	-0.013***	-0.014***	0.087**	0.123**
	(0.003)	(0.003)	(0.037)	(0.054)
Constant	-0.134***	-0.139***	-0.034	0.038
	(0.021)	(0.022)	(0.275)	(0.290)
Observations	5,439	5,360	555	555
R-squared	0.177	0.179	0.569	0.427

Notes: Sample period is 2000 – 2009. Two samples are presented, columns 1 and 2 are all diversified insurers, and columns 3 and 4 are publicly traded insurers. In columns 1 and 3, coefficients are estimated by OLS. Columns 2 and 4 report 2SLS coefficients where:

$$\widehat{CLUSHERF}_{it} = \delta_{0t}+\delta_{1t}Age_{it-1} + \delta_{2t}WVOLA_{it-1} + \delta_{3t}WLINESIZE_{it-1} + \boldsymbol{\delta X}$$

Standard errors (in parentheses) are corrected for clustering at the firm level. All models include year, line of business, and state fixed effects. The key independent variable, CLUSHERF, is the result of a Herfindahl index applied to a cluster analysis of insurer-line participation. LINES is the number of business lines. SIZE is the natural log of total admitted assets, CAPASSETS is the ratio of surplus to total admitted assets. GEODIV is equal to a Herfindahl index of premiums written across all reported geographic areas (schedule T). WCONC is a line weighed metric of industry concentration (Liebenberg and Sommer, 2008). PCTLIFE is the percentage of premiums collected in life and health lines. GROUP is equal to 1 if the firm is an aggregated group, 0 if it is a single, unaffiliated insurer. SDROA5 is the standard deviation of ROA over the past 5 years. Binary year controls are included but not reported with 2009 being the excluded year. Also not reported are 23 line-of-business and 50 state binary controls. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, * respectively.

Figure 1:
ROA across relatedness deciles



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ESSAY 2: RETURN AND LIQUIDITY RESPONSE TO SEC INVESTIGATION ANNOUNCEMENT

2.1 Introduction

The Securities and Exchange Commission (SEC) was originally designed to restore investor confidence in capital markets by providing investors and the markets with reliable financial information and clear rules of honest dealing.[8] Crucial to the SEC's effectiveness is its ability to enforce securities regulation. Though the SEC has been actively enforcing regulation and combatting financial misconduct for many years, very little is known about the impact SEC actions have on firms during the enforcement process. This paper seeks to examine the effects the SEC has on firms during the investigation process. Specifically we examine changes to investor confidence by evaluating market quality metrics of investigated firms from the announcement of an investigation to the resolution of it.[9]

Academics contest whether the benefits of equity regulation outweigh the costs as the empirical evidence appears to be mixed (Zingalas, 2009; Christensen, et al., 2011). Moreover, critics of the SEC argue that market forces and other exogenous technological changes have rendered the agency "obsolete" (Macey, 1994), or that the agency is ineffective due to inherent flaws due to its relationship with the U.S. Congress such that securities regulation is vulnerable to cyclical patterns of neglect and "hysterical overreaction" (Pritchard, 2004). A bi-partisan report on the 2008 financial crisis blames the SEC for "widespread failures in financial regulation" and cites the SEC as a major

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[8] http://www.sec.gov/about/whatwedo.shtml
[9] Market quality measures have often been used to evaluate investor uncertainty (Jain, Kim, and Rezaee, 2008).

contributor of the recession (The Financial Crisis Inquiry Commission, 2011). Others in the media have also called for the abolishment of the SEC due to its ineffectiveness.[10] The mission of the SEC is clear, however many question the agency's ability to provide the market with economic benefits that justify its existence. One of the goals of this paper is to show that securities regulation, by way of enforcement proceedings, can provide measurable benefits to firms and market participants. If the current function of the SEC is to simply deliver additional fines and punishment over and above market imposed penalties, then enforcement proceedings are likely to further damage investor confidence. Conversely, the SEC's actions could reassure traders that additional corrective forces and transparency are likely to correct bad behavior and force improvement within firms accused of fraud. This paper focuses on the benefits and costs of SEC investigations, and to the best of our knowledge, our study is the first to directly test the impact government enforcement actions have on market quality through the investigation process.

To address this issue we examine market quality during various periods of the enforcement process. We compare changes in average daily returns, daily price volatility, spreads, and illiquidity in three different time periods that relate to the major stages of the enforcement process. We classify the three stages of the enforcement process as: (1) the violation period, which is the period of time that the company engaged in misconduct until it was initially revealed to the market; (2) the trigger period, which is the time period immediately following the market learning of the misconduct to when it was announced that the SEC had opened a formal investigation; and (3) the investigation period, which is

[10] http://www.bloombergview.com/articles/2011-08-30/one-more-reason-to-shut-sec-and-start-over-commentary-by-william-d-cohan

the time period in which the SEC investigated the target firm to the resolution of the investigation. The impact of SEC enforcement actions will be evident in the changes in our proxies between the trigger period and investigation period. If government enforcement improves market quality, then returns should increase while price volatility, spreads and illiquidity should decrease.

Using a sample of 327 SEC investigation announcements from 1977 through 2011[11], we find that during the investigation period, returns and price volatility improve while liquidity is harmed. Specifically our univariate tests show significant improvements as daily returns improve by 15 basis points and daily price range tightens by 12%. Spreads show an increase of 2.2%, and illiquidity is 8.4% higher. Although trading costs are higher following the SEC's involvement, the massive improvements in risk and returns bolster the argument for federal regulation of financial misconduct in that the current regulating authority has been successful in restoring investor confidence in the firms it investigates.

Our paper makes several contributions to the literature. First, while previous studies focus on large negative stock market reactions to the announcement of fraud or subsequent enforcement actions (Feroz et al., 1991; Dechow et al., 1996; Karpoff et al. 2008a; Leng et al., 2011), our paper shows how equity values change across the entire enforcement process. This is often overlooked and might explain the divergent results in papers that exclusively look at other related events such as restatement announcements, shareholder class-action lawsuits, and fraud-related news announcements as these events often happen in different stages of the enforcement process (Karpoff, et al., 2012). Second,

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[11] We thank Karpoff, Lee, and Martin for graciously providing the data on SEC enforcement proceedings.

the extant literature has not established whether an investigation increases or decreases firm value, equity volatility, or trading costs. As the investigation period is when the SEC becomes heavily involved with an accused firm, the patterns in equity movements and trading costs during this period can show the agency's impact on investor confidence. Third, we show that the SEC has an overall positive impact on firm value and equity volatility. This finding provides support for SEC proponents showing that in this area, the SEC is providing an important benefit to the traders of the firms accused of fraud.

This paper is organized as follows. Section II is an overview of the securities enforcement process. Section III reviews the literature and establishes a set of hypothesis to guide our empirical analysis. Section IV describes the data and sample selection. Empirical results are presented in Section V and we conclude in Section VI.

2.2 SEC Investigation Process

Of the SEC's five divisions, the Enforcement Division is responsible for detecting and investigating firms that violate US securities laws. Fraudulent conduct can be prosecuted in both civil and criminal court, however the SEC is only responsible for civil enforcement and administrative actions. Criminal conduct is referred to the Department of Justice and/or the appropriate U.S. Attorney's office.

"Most enforcement actions follow a conspicuous *trigger event* that publicizes the potential misconduct and attracts the SEC's scrutiny. Common trigger events include self-disclosure of malfeasance, restatements, auditor departures, and unusual trading (Karpoff and Lou, 2010:1882)." Investigations begin with a general inquiry, or "informal" investigation where investigators work with the cooperation of the target firm. Informal investigations are not made public by the SEC so as to not harm the target firm's reputation if no fraud occurred. Information and testimony are volunteered rather than subpoenaed.

If there is enough evidence to suggest fraud, the SEC's staff will seek authorization to conduct a formal investigation. Following a "formal order" from the SEC the investigators are then authorized to compel testimony from witnesses and subpoena documents. At this point, managers of the firm generally disclose to the public that the SEC has opened a formal investigation. If the investigators determine that they have collected enough evidence to indicate fraud occurred, the SEC then formally files an enforcement action, known as an AAER, against the target firm. These enforcement actions are the first information released by the SEC to the market. Following the enforcement action, the SEC will then file charges in civil court to disgorge improperly earned returns, assess fines, and levy other administrative punishments.

To help illustrate the full enforcement process, consider Nvidia Corp.'s enforcement experience. In early 2000 Nvidia was lagging in performance projections. Nvidia management entered into an agreement with a supplier that granted a $3.3 million in cost savings for the current quarter, but Nvidia agreed to pay significantly higher prices in the following quarter to compensate the supplier for the current-quarter savings. By failing to account for the increase liability expected in the next quarter, Nvidia overstated gross profits and quarterly earnings. Nvidia's share price surged 18% on May 17, 2000, the day after the company reported earnings. In November 2011, several Nvidia employees were under investigation for insider trading. During that investigation, details began to emerge about the overstated financial statements. Nvidia launched an internal investigation and issued a restatement of their financial reports on February 14th, 2002. The next day the SEC began an informal inquiry which graduated to a formal investigation in June 2002. SEC regulatory proceedings ended in September 2003, Nvidia's CFO was fined $671,694 and was prohibited from serving as an officer or director of a public company for five years. Figure 1 summarizes the corresponding sequence of events specific to Nvidia's SEC enforcement experience and highlights the three regulatory periods we examine in our study.

Figure 1 about here

2.3 Literature Review

Government Regulation

There exists a broad literature on the effects of government securities regulation and litigation. “The academic debate on the costs and benefits of securities regulation is controversial and the evidence is fairly mixed. Whether or not securities regulation is beneficial to the economy appears to be largely an empirical matter (Christensen et al., 2011).”[12] Early theories by Stigler (1964) and Peltzman (1976) argue “that regulatory agencies will not exclusively serve a single economic interest” (Peltzman, 1976 p. 1), and that “the costs [of regulation] probably exceed even a reasonably optimistic estimate of benefits” (Stigler, 1964 p. 124). This rational is sometimes explained as the “no-effect hypothesis”, in that the costs and benefits of regulation reach equilibrium in Peltzman’s model. Though, evidence of the no-effect hypothesis is mixed. Bowman’s (1983) findings support Stigler’s no-effect theory in that SEC regulation has no impact on the risk or returns of firms accused of financial statement fraud. Bowman compares firms accused of fraud before and after the Securities Exchange Act of 1934, and concludes that disclosure requirements have no measurable positive effect on NYSE traded securities. However, empirical studies by Jain and Rezaee (2006), Jain et al.(2008), and Li et al.(2008) suggest

[12] Christensen et al. (2011) cite evidence of the debate in Coffee (1984), Easterbrook and Fischel (1984), Shleifer (2005), Mulherin (2007), Leuz and Wysocki (2008), and Zingales (2009).

that some market regulation has produced economic benefits. Both Jain and Rezaee (2006) and Li et al. (2008) find positive equity market reactions to the passing of the Sarbanes-Oxley Act (SOX) which indicates that stronger market-place integrity and regulation promotes investor confidence. Jain et al. (2008) also report improved investor confidence as measured by long-run positive trends in spreads and liquidity following the passage of SOX.

SEC enforcement actions have been shown to have large negative effects on the firms it investigates. Prior research often focuses on Accounting and Auditing Enforcement Releases or AAERs when measuring the costs and benefits of SEC enforcement actions. Dechow et al. (1996) document negative returns and increases to the cost of capital to firms subject to an AAER. Leng et al. (2011) find significant negative abnormal returns in the three years following an AAER, and that firms are more likely to fail post-AAER announcement.

While AAER announcements are the first time the SEC publicizes the target's violation of fraud, this is not the first the market learns of the financial misconduct. Firm managers are required to publicly disclose material information related to the equity value of a firm.[13] Studies that evaluate public disclosures of SEC investigations find significant negative market reactions to these announcements. Feroz et al. (1991) observe a -6%

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[13] Feroz et al. (1991) p. 111:

> "The 1934 *Act Release No. 5092* requires the public disclosure of material information; this would include formal investigations by the enforcement division. An anonymous SEC enforcement lawyer (WSJ [September 22, 1983], p. 35) explains, 'When the SEC tells a company it's a target, securities laws require disclosure to shareholders. This turns a private investigation into a public one... and if the investigation shows the party was innocent, the notification and forced disclosure could have blown a public offering or a reputation needlessly."

abnormal return at the disclosure of an investigation. Using a more comprehensive data source, Karpoff et al. (2008a) document a -13.74% return on investigation disclosure days. Negative market reaction to investigation announcements implies that the investigation itself is a viable sanction that the SEC can use to maintain credible financial markets.

Another line of research evaluates how effective the SEC is in its mission to improve investor confidence by documenting changes in returns and volatility following passage of Regulation Fair Disclosure (RFD). This literature offers conflicting results. The SEC implemented RFD in October 2000, where the motivation for RFD was to improve the information flow to all types of investors and to improve the confidence of individual traders. Some literature on this event finds improved or no effect to stock price volatility or analyst dispersion post-RFD (Heflin et al., 2001; 2003; Defusco et al., 2010). On the other hand, many articles cite worsening conditions post-RFD as price volatility and analyst dispersion increase (Mohanram and Sunder, 2002; Irani and Karamanou, 2003; Bushee et al., 2004). These conflicting findings indicate that the SEC was partly successful in accomplishing its stated goals as information did appear to fairly reach all trading participants, however if investor confidence was measured with volatility and analyst dispersion, then some of the research indicates that the SEC failed to improve investor confidence. Similar to prior research, we are testing one of the stated goals of the SEC's Division of Trading and Markets which is to maintain fair, orderly, and efficient markets.[14] We test the agency's capacity to maintain efficient markets by evaluating the effect its

[14] http://www.sec.gov/about/whatwedo.shtml#org

presence has on daily returns, price volatility, spreads, and illiquidity of firms accused of fraud.

To the best of our knowledge Murphy, Shrieves, and Tibbs (2009) is the only research that directly tests the change in risk following an allegation of corporate misconduct. They find significant increases in the standard deviation of returns and analyst dispersion following the initial revelation of fraud (the trigger event), but offer no evidence as to the mitigating effect the presence the SEC may have on their measures. Our research is different in that we evaluate the effects on volatility and other measures after the SEC investigation announcement.

The mission of the largest securities regulating body in the world, the Securities Exchange Commission is to promote investor confidence. One strategy the SEC employs to accomplish its mission is investigating firms that violate securities law (Casey, 1973). Theory suggests that regulator action may result in limited or no benefits, and the empirical evidence to this effect is mixed. If the investigations make investors more concerned about internal problems or future prospects, then we should observe deterioration in investor confidence measures as measured by market quality metrics. However, if through the SEC's investigation process the firm corrects internal problems and bad behavior, then market participants may respond positively during the investigation thereby improving market quality. This leads us to the following testable null hypothesis that SEC investigations will have no effect on investor confidence.

2.4 Research Design

Timeline of events. To evaluate to what extent investor confidence reacts to the inclusion of SEC enforcement proceedings, we compare four common measures of market quality from the time the accused firm violates securities law until the resolution of the enforcement process. The four measures we use include daily returns, daily price volatility, spread, and illiquidity.[15] Figure 1 also highlights the three major regulatory time periods used in our study: (1) the violation period, the period of time that the company engaged in misconduct until the trigger event, or when it was initially revealed to the market; (2) the trigger period, the time period immediately following the market learning of the misconduct to when it was announced that the SEC had opened a formal investigation; and (3) the investigation period, the time period in which the SEC became involved with the target firms until the resolution of the enforcement process. The impact SEC enforcement actions have on investor confidence will be evident in the changes in our proxies between the trigger period and investigation period.

Daily Returns and Daily Price Volatility. In our univariate tests, we compare average and median daily returns and daily price volatility between the three regulatory time periods in Figure 1. Because intraday transaction-level data are not available for our entire sample we

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[15] Each measure has been used extensively in the literature as proxy for investor confidence or investor uncertainty, different sides of the same coin (Ozoguz, 2009). A non-exhaustive list is as follows:

1. Returns: Jain and Rezaee (2006), Li et al. (2008), Sturm (2003)
2. Volatility: Leahy and Whited (1996), Heflin et al. (2001), (2003), Defusco et al. (2010), Mohanram and Sunder, (2002), Irani and Karamanou, (2003), Bushee et al. (2004)
3. Spread: Bhattacharya and Spiegelman (1991), Saar (2001), and Palmrose et al. (2004)
4. Amihud (2002) illiquidity: Bardos (2011)

follow O'Hara, Yao, and Ye (2011) in measuring volatility using the daily price range scaled by closing price.

$$PVOL_{it} = \frac{High\ Price_{it} - Low\ Price_{it}}{Closing\ Price_{it}} \tag{1}$$

We use regression analysis to estimate the changes in our proxies of investor confidence to three major regulatory periods while controlling for several significant market and firm specific characteristics. We model returns and daily price range using the Fama and French (1993) three factor model and add two binary variables (VioPeriod and InvPeriod) to estimate the conditional change in the dependent variable with respect to the period of time where the market was responding to the news of misconduct (TrigPeriod) and the inclusion of the SEC (InvPeriod). A positive and significant InvPeriod would suggest that investors earned positive excess returns during the period the SEC was investigating the firm compared to the period that the market had alpha in the return model would indicate that investors experienced more positive or more negative returns compared to the trigger period:

$$Return\ Measure_{it} = \alpha_0 + \delta_1(RM_t - RF_t) + \delta_2 SMB_t + \delta_3 HML_t + \delta_4 VioPeriod_{it} + \delta_5 InvPeriod_{it} + \delta_6\ TrigCAR_i + \varepsilon_{it}. \tag{2}$$

Our dependent variables are $PVOL_{it}$ and $R_{it} - RF_t$, where RF_t is the risk free rate (one month T-bill), RM_t is the market return, SMB is the average return of a portfolio of small cap stocks minus the return of a portfolio of high cap stocks, HML is the average return of a portfolio of firms with high book-equity to market-equity minus a similar portfolio of low book-equity to market-equity. We also include a variable to account for the magnitude of the fraudulent event, TrigCAR, which is the two day cumulative abnormal return of the trigger event (-1, 0). If the SEC is successful in reducing investor uncertainty in these firms then we should see δ_5 as positive and significant in the return models and negative in the price range models.

Spread and illiquidity. We follow Jain et al. (2008) in measuring changes in investor confidence following major regulatory events with changes in market quality using spreads and Amihud's (2002) illiquidity measure. Corwin and Schultz (2012) develop a low frequency bid-ask spread estimator using daily high and low prices. With a sample of U.S. stocks from 1993 through 2006, Corwin and Schultz show that their CRSP based spread measure is highly correlated with high frequency effective spreads where the average cross-sectional correlation coefficient between the two variables is as high as 0.93. We further investigate the liquidity aspect by using Amihud's (2002) price impact measure, Illiq, which is defined as daily absolute stock return divided by daily dollar volume scaled by 10^6. It measures the dollar trading volume needed to move stock prices. Illiq is computed as follows:

$$Illiq_{it} = \frac{|RET_{it}| * 10^6}{DVol_{it}} \tag{3}$$

As with many proxies, estimates can produce very large or very small outliers. To minimize the influence of outliers, all proxies are winsorized at the 1% and 99% levels. We model our two liquidity measures with the well-known determinants of spread, Size, Price, Volume, and volatility as measured by the past 5 day standard deviation of returns, RSTD (McInish and Wood, 1992). We add our two binary variables of interest to measure the average change in liquidity over the regulatory process:

$$Liquitity\ Measure_{it} = \alpha_0 + \beta_1 Size_{it} + \beta_2 Price_{it} + \beta_3 Volume_{it} + \beta_4 RSTD_{it} + \beta_5 VioPeriod_{it} + \beta_6 InvPeriod_{it} + \beta_7\ TrigCAR_i + \varepsilon_{it}. \tag{4}$$

2.5 Sample Selection

Data on SEC enforcement actions was provided by Karpoff, Lee, and Martin (2008a, b KLM database hereafter). It consists of SEC and Department of Justice (DOJ) enforcement events for financial misrepresentation from April 1976-Setember 2011 (1,105 events). Enforcement events are violations of one of the three provisions of the Securities and Exchange Act of 1934: (i) 15 U.S.C. §§ 78m(b)(2)(A), which requires firms to make and keep books, records, and accounts which accurately and fairly reflect the transactions and keep and maintain books and records that accurately reflect firm assets; (ii) 15 U.S.C. §§ 78m(b)(2)(B), which requires firms to devise and maintain a system of internal accounting controls sufficient to assure that transactions are recorded accurately and scrutinized regularly; and (iii) 15 U.S.C. §§ 78m(b)(5), which states that no person shall knowingly circumvent or knowingly fail to implement a system of internal accounting controls or knowingly falsify any book, record, or account.[16] From the KLM database, we restrict our sample to firms with a complete set of identifying dates that correspond with the three regulatory periods which are pertinent to our study. The identifying dates are the misconduct begin date (viobegdt), the trigger event date (trigdt), the investigation announcement date (invdt), and the date in which the enforcement proceedings ended

[16] See Karpoff, Koester, Lee, and Martin (2012) for a full description of the hand-collection processes, sources, and aggregation of these data.

(regenddt). We also require that firms have matching market and financial data in CRSP and Compustat. These restrictions leave us with 390 unique firms. However, in order to evaluate the effect SEC investigations have on return and liquidity metrics, we require firms to have actively traded during all three regulatory periods. Of the 390 unique firms, 63 stopped trading before the investigation announcement and are thus removed from our sample. Therefore, our final sample consists of 327 firms subject to securities enforcement due to fraud.

Table 1 about here

Panel A of Table 1 reports summary statistics for key variables and control variables for firms in our sample. Note that the number of daily firm observations are heavily weighted in the violation period and the investigation period making up 47% and 42.3% respectively. This is not surprising as Panel B shows that the median violation period is 2.63 years, the median trigger period is just over 9 months long, and the median investigation period is 2.69 years.

Panel C of Table 1 highlights the frequency of investigations over time. The earliest SEC investigation announcement is April 4, 1977, where the Ralph M. Parsons Corp violated the Foreign Corrupt Practices Act when two payments of $300,000 and $6,000,000 went to union officials and overseas recipients as bribes for large commercial contracts, respectively. The payments were recorded as "employee welfare expense" on the books.[17] Panel C also shows that investigation events ramped up in the early 2000s, corresponding with the SEC's expansion from 2002-2005. During that time Congress doubled the SEC's budget resulting in the hiring over 1,000 new employees in response to public concern over the wave of corporate fraud and corruption. Our sample is not reflective of all SEC enforcement actions, but rather enforcement actions on public companies that violated the Securities and Exchange Act of 1934 and meet our data requirements as discussed above.

[17] http://www.sec.gov/news/digest/1978/dig081078.pdf

2.6 Results

Before analyzing the cross-sectional determinants of changes in investor confidence following an SEC's investigation announcement, we first examine the changes to the means and medians in returns, return volatility, spreads, and illiquidity between the regulatory events illustrated in Figure 1 including the violation period (VioPeriod), the trigger period (TrigPeriod), and the investigation period (InvPeriod). We use parametric t-statistics, calculated from the cross-sectional standard error to compare means, and report Mann-Whitney Sum Rank differences and Z scores to test the difference in medians.

Univariate results

Table 2 reports changes in returns and price volatility, and Table 3 reports changes in spreads and illiquidity from the beginning of the violation to the end of the enforcement proceedings. Panel A in Table 2 show that average daily returns drop 15 basis points following an announcement of financial misconduct. The announcement of fraud has a similar negative effect on price volatility, where daily price volatility is shown to be 31% higher during the trigger period than during the violation period. Because each of these regulatory events can last several years for some firms, we limit the sample in Panel B to a maximum of 365 days before the trigger event, 365 days following the trigger event, and

365 days following the investigation announcement. We follow a similar procedure for Panel C and limit the sample to 6 months before/after the trigger and investigation announcement dates. In this way overly represented firms (firms with very long regulation periods) do not bias our results. Panels B and C confirm the result in the full sample analysis, that when firms' financial misconduct is publicized, returns and price volatility are worse in the trigger period than in the violation period, consistent with Karpoff, et al. (2008).

While these findings conform with earlier findings, the primary contribution of this study lies in the change in market quality between the trigger period and the investigation period, which is the period where the market reacts to the news that the SEC has opened a formal investigation. Our univariate results offer mixed evidence regarding the total effect SEC enforcement proceedings have on returns and volatility. As reported in Panels A, B, and C the mean daily return has significantly improved during the investigation period, though the sum-rank tests on returns report higher (Panel A), lower (Panel B), and then insignificant (Panel C) changes in returns across our samples. The impact on firm price volatility is also highly dependent on the sampling criteria. The full sample analysis shows that equity price volatility improved following the investigation, where Panel B and Panel C show that equity prices were mover volatile during the investigation period than the trigger period. Therefore, armed with only univariate statistics, we cannot say whether the SEC is successful in restoring investor confidence in firms under investigation.

Table 2 about here

We further analyze the impact of an SEC investigation by evaluating changes in liquidity in Table 3. Spreads are estimated using the low frequency method of Corwin and Schultz (2012) and illiquidity is measured using Amihud's (2002) price impact metric. Results therefore must be interpreted with caution as we do not directly observe daily liquidity per se. Our two estimates in Table 3 are inverse liquidity measures, that is, an increase to either will indicate worsening conditions. We find that liquidity is harmed following the announcement of fraud. In each panel, spreads and illiquidity are significantly higher in the trigger period than in the violation period. Panel A shows that average spreads substantially increases by 38% and illiquidity doubles in the period following the public announcement of fraud. Following investigation announcements however, we see more mixed results. In the full sample, mean spreads show improvements compared to the trigger period, where mean illiquidity appears higher in the investigation period. Panels B and C also indicate that spreads and illiquidity are higher in the investigation period. Overall, our univariate tests fail to yield consistent results as to the effect that SEC enforcement actions have on the market quality of the firms it investigates.

Table 3 about here

Regression analysis

To further explore whether investor confidence improves following government enforcement actions, we test for a systematic relationship between our proxies of investor confidence and the major regulatory time periods controlling for firm and market determinants. In Table 4 we model daily returns using the Fama and French (1993) 3 factor model and use dummy variables to indicate regulatory periods, with the omitted period being the trigger period. Thus we interpret the coefficients on VioPeriod and InvPeriod as the difference in returns from trigger period returns. The primary variable of interest, InvPeriod, represents the effect SEC enforcement actions have on the dependent variable, daily stock returns. The coefficients reported in Table 4 for VioPeriod are positive and significant in all three return models and increase in magnitude with the limited samples. In the full sample model, the coefficient of 0.00145 suggests that the average daily return during the violation period was 36.29% higher than the daily return during the trigger period. This finding was expected and confirms the findings of Karpoff et al. (2008) and Murphy et al. (2009) who find large negative market reactions to the revealing of fraud. As for the investigation period (InvPeriod), the coefficients are also positive and significant, and nearly the same magnitude as the VioPeriod coefficients suggesting that during the investigation period daily returns rebound to what they were before the market discovered the financial misconduct. These results strongly support the notion that the enforcement proceedings positively impact firm equity value. The full sample results in the daily price volatility model suggest that the volatility in daily prices also improves during the investigation period as the coefficient is negative and significant on InvPeriod. However, the coefficients become positive and significant when we limit the sample to 365 days and 6 months from the investigation announcement. This result implies that although returns are improving during these windows, the risk associated with these returns have also substantially increased for at least the first year.

Table 4 about here

The results reported in Table 5 support the univariate findings that liquidity is harmed following an announcement of financial misconduct. Both spread and ILLIQ are inverse measures of liquidity, therefore the negative and significant estimates for VioPeriod confirm that spreads were lower and ILLIQ was lower during the violation period (coefficients of -0.0026 and -0.3145 for the full sample models respectively). While these findings are not unexpected, we are the first to document the changes in liquidity following the public announcement of fraud. The coefficients on InvPeriod suggest that both spreads and illiquidity are substantially higher following SEC involvement. This finding is consistent with Bardos (2011) and Firth, Rui, and Wu (2011) who find significantly higher illiquidity and wider spreads for up to one year following other regulatory-related events.

Our multivariate results on the effect of SEC enforcement actions on several market quality measures offer some mixed results. With our return metrics, our results suggest that after the SEC gets involved with a firm accused of fraud, daily returns and daily price volatility improve to almost the pre-trigger period levels. However, when we examine the liquidity response, it would appear that liquidity providers are charging higher rates to make markets in these accused firms. Moreover, the Amihud (2002) illiquidity also increases suggesting that prices are far more sensitive to trading activity following SEC involvement.

Table 5 about here

As a robustness measure, we divide our sample into decades based on the year of the trigger event and report the results in Table 6. The sequence of the regressions is identical to that in Table 3 and 4, for brevity, we only report the coefficients and standard errors for VioPeriod and InvPeriod. Panel A of Table 6 show that daily returns and price volatility through are higher during the violation period and investigation periods, though in Panel B, price volatility isn't significantly different from the trigger period price volatility. Spreads and illiquidity show the same patterns as in Tables 4 and 5, where we find significant increases during the investigation time period.

Table 6 about here

2.7 Conclusion

Previous literature on financial misconduct often focuses on the legal and reputational penalties following an announcement of malfeasance, which is important as that line of work highlights the direct costs of fraud. The purpose of our work is to empirically test the collective changes in investor confidence following U.S. Securities Exchange Commission investigation announcements. We ask whether there are added benefits to the SEC investigating firms accused of fraud? Specifically, how effective is the SEC in accomplishing its original purpose – to restore investor confidence? To answer these questions we empirically examine four proxies of investor confidence (returns, price volatility, spreads, and illiquidity) across three major regulatory periods (the violation period, the trigger period, and the investigation period). We employ both univariate and multivariate tests to determine the net effect of SEC enforcement proceedings.

In examining the average daily returns across the regulatory periods, we find that a significant 19 basis point drop in the average daily return following the trigger event. However, in the period in which the SEC is investigating the firm, average daily returns are 15 basis points higher. Daily price volatility follows this same pattern, decreasing by 12% during the investigation period. Our multivariate analysis confirms this result using the Fama and French (1993) three factor model. This initial finding confirms that the SEC is successful in restoring investor confidence in firms accused of fraud in terms of returns and return variance. However, our liquidity proxies indicate that the SEC's investigation diminished investor confidence. In the multivariate models, using spreads and illiquidity as the dependent variable, we find that spreads were wider and illiquidity was worse during the investigation period.

This paper helps shed light on the effectiveness of the SEC in accomplishing its mission to restore investor confidence. The economic benefit of the SEC's involvement can easily be seen by the improvements in risk and returns of these firms, though market participants can expect to see higher acquisition and liquidation costs when establishing their position in these firms. Overall, our findings are supportive for the proponents of federal regulation of equity markets.

Table 2.1
Summary Statistics

Notes: The sample contains 327 firms subject to an SEC investigation from 1977 to 2011, observations are at the daily level. SIZE is the log of market cap. PRICE is the CRSP daily closing stock price. VOLUME is log of daily trading volume. RET is the daily return as reported in CRSP. PVOL is the daily high price minus the daily low price scaled by the closing price. SPREAD is the daily spread estimate using the Corwin and Schultz (2012) simple spread measure. ILLIQ is Amihud's (2002) illiquidity measure which is absolute return divided by dollar volume. RSTD is the five day rolling standard deviation of returns. TrigCAR is the 2-day cumulative abnormal return at the trigger event (day -1 and day 0). VioPeriod is the regulatory period preceding the public announcement of fraud. TrigPeriod is the time following the announcement of fraud until the SEC investigation announcement, and InvPeriod is the time period following the investigation announcement to the resolution of all regulatory proceedings.

Panel A: Summary Statistics

	N (firm days)	Mean	Median	STD
SIZE	516,074	20.1935	20.2191	2.2869
PRICE	516,074	22.7363	15.7500	23.9042
VOLUME	513,016	12.1343	12.3967	2.7762
RET	515,973	0.0006	0.0000	0.0477
PVOL	516,074	0.0522	0.0359	0.0627
SPREAD	502,566	0.0155	0.0069	0.0240
ILLIQ	504,761	0.4304	0.0021	2.2769
RSTD	514,798	0.0348	0.0255	0.0334
TrigCAR	327	-0.1764	-0.1221	0.2002
VioPeriod	250,559	47.05%		
TrigPeriod	53,299	10.63%		
InvPeriod	225,615	42.32%		

Panel B: Regulatory Period Length (days)

		Mean	Median	STD
VioPeriod	Days from the beginning of the violation period to the trigger date	1,208.8	959.0	930.8
TrigPeriod	Days from the trigger event to the investigation announcement	254.5	158.0	281.1
InvPeriod	Days from the investigation announcement to the end of the enforcement process	1,453.8	1,227.0	982.0

Panel C: Investigation events by year

Years	Frequency	Cumulative Frequency	Cumulative Percent
1976-1980	1	1	0.92%
1981-1985	17	18	5.50%
1986-1990	20	38	11.62%
1991-1995	47	85	25.99%
1996-2000	44	129	39.45%
2001-2005	135	264	80.73%
2006-2011	63	327	100%

Table 2.2
Changes in Returns and Price Volatility

The sample contains 327 firms subject to an SEC investigation form 1977 to 2011, observations are at the daily level. Return is the daily return as reported in CRSP. Price Volatility is the daily high price minus daily low price scaled by closing price. T-statistics for means and approximate Z-statistic for medians are reported in parentheses.
a – significantly larger than the Trigger Period
b – significantly larger than the Violation Period
c – significantly smaller than the Trigger Period
d – significantly smaller than the Violation Period

Panel A: Means and Medians – Full Sample

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Return	0.0007[a]	-0.0008[d]	0.0007[a]
	(7.40)	(7.40)	(5.84)
Median Return	0.0000[a]	0.0000[d]	0.0000[c]
	(6.24)	(6.24)	(3.74)
Mean Price Volatility	0.0477[c]	0.0623[b]	0.0551[c]
	(57.61)	(57.61)	(20.50)
Median Price Volatility	0.0349[c]	0.0423[b]	0.0356[c]
	(48.92)	(48.92)	(35.68)
N	250,559	53,299	212,216

Panel B: Means and Medians – 365 day limit

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Return	0.0001[a]	-0.0014[d]	0.0006[a]
	(4.61)	(4.61)	(4.93)
Median Return	0.0000[a]	0.0000[d]	0.0000[a]
	(2.84)	(2.84)	(1.87)
Mean Price Volatility	0.0489[c]	0.0631[b]	0.0662[a]
	(39.81)	(39.81)	(5.31)
Median Price Volatility	0.0351[c]	0.0417[b]	0.0408[c]
	(32.74)	(32.74)	(3.86)
N	76,445	38,825	66,156

Panel C: Means and Medians – 6 month limit

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Return	-0.0005[a]	-0.0024[d]	-0.0001[a]
	(4.36)	(4.36)	(4.23)
Median Return	0.0000[a]	0.0000[d]	0.000
	(1.80)	(1.80)	(1.14)
Mean Price Volatility	0.0514[c]	0.0651[b]	0.0706[a]
	(27.21)	(27.21)	(7.31)
Median Price Volatility	0.0366[c]	0.0426[b]	0.0434
	(24.22)	(24.22)	(0.72)
N	39,793	26,419	35,036

Table 2.3
Changes in Liquidity Estimates

The sample contains 327 firms subject to an SEC investigation form 1977 to 2011, observations are at the daily level. Spread is the daily spread estimate using the Corwin and Schultz (2012) simple spread measure. ILLIQ is Amihud's (2002) illiquidity measure which is absolute return divided by dollar volume. T-statistics for means and approximate Z-statistic for medians are reported in parentheses.
a – significantly larger than the Trigger Period
b – significantly larger than the Violation Period
c – significantly smaller than the Trigger Period
d – significantly smaller than the Violation Period

Panel A: Means and Medians – Full Sample

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Spread	0.0130[c]	0.0180[b]	0.0177[c]
	(48.82)	(48.82)	(2.09)
Median Spread	0.0061[c]	0.0078[b]	0.0076[c]
	(25.11)	(25.11)	(1.29)
Mean Illiquidity	0.2665[c]	0.5468[b]	0.5927[a]
	(31.19)	(31.19)	(3.47)
Median Illiquidity	0.0026[c]	0.0025[b]	0.0016[c]
	(31.19)	(31.19)	(3.47)
N	243,741	52,390	208,630

Panel B: Means and Medians – 365 day limit

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Spread	0.0140[c]	0.0179[b]	0.0204[a]
	(26.17)	(26.17)	(13.35)
Median Spread	0.0065[c]	0.0078[b]	0.0085[a]
	(14.65)	(14.65)	(8.25)
Mean Illiquidity	0.3299[c]	0.5065[b]	0.7487[a]
	(13.23)	(13.23)	(13.06)
Median Illiquidity	0.0027[c]	0.0027[b]	0.0030[a]
	(4.38)	(4.38)	(6.48)
N	74,803	38,013	64,832

Panel C: Means and Medians – 6 month limit

	VioPeriod	*TrigPeriod*	*InvPeriod*
Mean Spread	0.0148[c]	0.0179[b]	0.0206[a]
	(15.46)	(15.46)	(11.17)
Median Spread	0.0067[c]	0.0078[b]	0.0086[a]
	(8.33)	(8.33)	(7.37)
Mean Illiquidity	0.3437[c]	0.4636[b]	0.7146[a]
	(7.09)	(7.09)	(11.19)
Median Illiquidity	0.0028[c]	0.0027[b]	0.0034[a]
	(1.71)	(1.71)	(9.30)
N	38,966	25,873	34,235

Table 2.4
Changes in returns and price volatility during SEC investigations

The sample contains 327 firms subject to an SEC investigation from 1977 to 2011, observations are at the daily level. Dependent variables are return minus the risk free rate, and daily price volatility (PVOL) which is the daily high price minus daily low price scaled by closing price. The regressions model the change in average excess return and price volatility before and after the three regulatory periods defined in Figure 1. The omitted period is the trigger period. VioPeriod is a binary variable that equals 1 if the observation was in the time period from when the misconduct happened to when it was publicized to the market. InvPeriod is a binary variable equal to one if the observation date is after the date the SEC launched its investigation, zero otherwise. SMB, HML, and MKRF follow the Fama and French (1993) three factor model. Cluster robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	Full Sample	12 month limited sample	6 month limited sample	Full Sample	12 month limited sample	6 month limited sample
	Dependent Variable = Returns			Dependent Variable = PVOL		
Alpha	-0.00104***	-0.00152***	-0.00212***	0.05711***	0.05291***	0.05235***
	(0.00024)	(0.00029)	(0.00038)	(0.00029)	(0.00036)	(0.00047)
VioPeriod	0.00145***	0.00143***	0.00185***	-0.01429***	-0.01623***	-0.01574***
	(0.00026)	(0.00034)	(0.00045)	(0.00031)	(0.00040)	(0.00052)
InvPeriod	0.00144***	0.00185***	0.00216***	-0.00883***	0.00130**	0.00437***
	(0.00027)	(0.00039)	(0.00051)	(0.00033)	(0.00051)	(0.00070)
SMB	0.71238***	0.76389***	0.73287***	-0.26249***	-0.30122***	-0.26468***
	(0.01288)	(0.02536)	(0.03515)	(0.01815)	(0.03280)	(0.04587)
HML	0.21634***	0.13323***	0.09911**	-0.18690***	-0.21975***	-0.22372***
	(0.01454)	(0.02908)	(0.03956)	(0.01936)	(0.04045)	(0.05820)
MKRF	1.12954***	1.14886***	1.19138***	-0.14876***	-0.16452***	-0.16602***
	(0.00756)	(0.01441)	(0.01977)	(0.01041)	(0.02029)	(0.02921)
TrigCAR	0.00098**	0.00176**	0.00390***	-0.03677***	-0.07049***	-0.08359***
	(0.00040)	(0.00077)	(0.00113)	(0.00055)	(0.00106)	(0.00159)
Observations	510,288	180,444	101,491	510,383	180,484	101,516
R^2	0.077	0.056	0.054	0.019	0.045	0.053

Table 2.5
Changes in liquidity during SEC investigations

The sample contains 327 firms subject to an SEC investigation from 1977 to 2011, observations are at the daily level. Dependent variables are the Corwin and Schultz (2012) CRSP spread estimate and Amihud's (2002) measure of illiquidity which is the absolute return divided by daily dollar volume. The regressions model the change in liquidity before and after the three regulatory periods defined in Figure 1. The omitted period is the trigger period. VioPeriod is a binary variable that equals 1 if the observation was in the time period from when the misconduct happened to when it was publicized to the market InvPeriod is a binary variable equal to one if the observation date is after the date the SEC launched its investigation, zero otherwise. SIZE is the log of market cap, VOLUME is the log of daily volume, and RSTD is the five day return standard deviation. Variables are winsorized at the 1% and 99% levels. Cluster robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

	Full Sample	12 month limited sample	6 month limited sample	Full Sample	12 month limited sample	6 month limited sample
	Dependent Variable = Spread			Dependent Variable = Illiquidity		
Constant	0.05693***	0.06887***	0.06883***	2.77580***	3.64036***	3.45631***
	(0.00077)	(0.00141)	(0.00193)	(0.06822)	(0.12963)	(0.16650)
VioPeriod	-0.00262***	-0.00160***	-0.00121***	-0.31449***	-0.17830***	-0.15905***
	(0.00011)	(0.00015)	(0.00019)	(0.01052)	(0.01325)	(0.01602)
InvPeriod	0.00129***	0.00175***	0.00155***	0.18990***	0.20057***	0.17670***
	(0.00012)	(0.00016)	(0.00021)	(0.01148)	(0.01534)	(0.01894)
Size	-0.00159***	-0.00216***	-0.00203***	0.13412***	0.11695***	0.13366***
	(0.00005)	(0.00009)	(0.00013)	(0.00536)	(0.00994)	(0.01309)
Price	-0.00001***	-0.00000	-0.00001**	-0.00124***	0.00167***	0.00087***
	(0.00000)	(0.00000)	(0.00000)	(0.00014)	(0.00026)	(0.00033)
Volume	-0.00131***	-0.00132***	-0.00150***	-0.44964***	-0.50083***	-0.50716***
	(0.00003)	(0.00006)	(0.00009)	(0.00523)	(0.00937)	(0.01278)
RSTD	0.23688***	0.21852***	0.20228***	19.16890***	20.05839***	17.50777***
	(0.00380)	(0.00645)	(0.00908)	(0.35586)	(0.64976)	(0.85213)
TrigCAR	0.00338***	0.00353***	0.00205***	0.57866***	0.78307***	0.62847***
	(0.00018)	(0.00035)	(0.00050)	(0.01657)	(0.03241)	(0.04450)
Observations	496,929	174,655	98,292	497,891	176,495	99,314
R^2	0.233	0.249	0.233	0.206	0.226	0.215

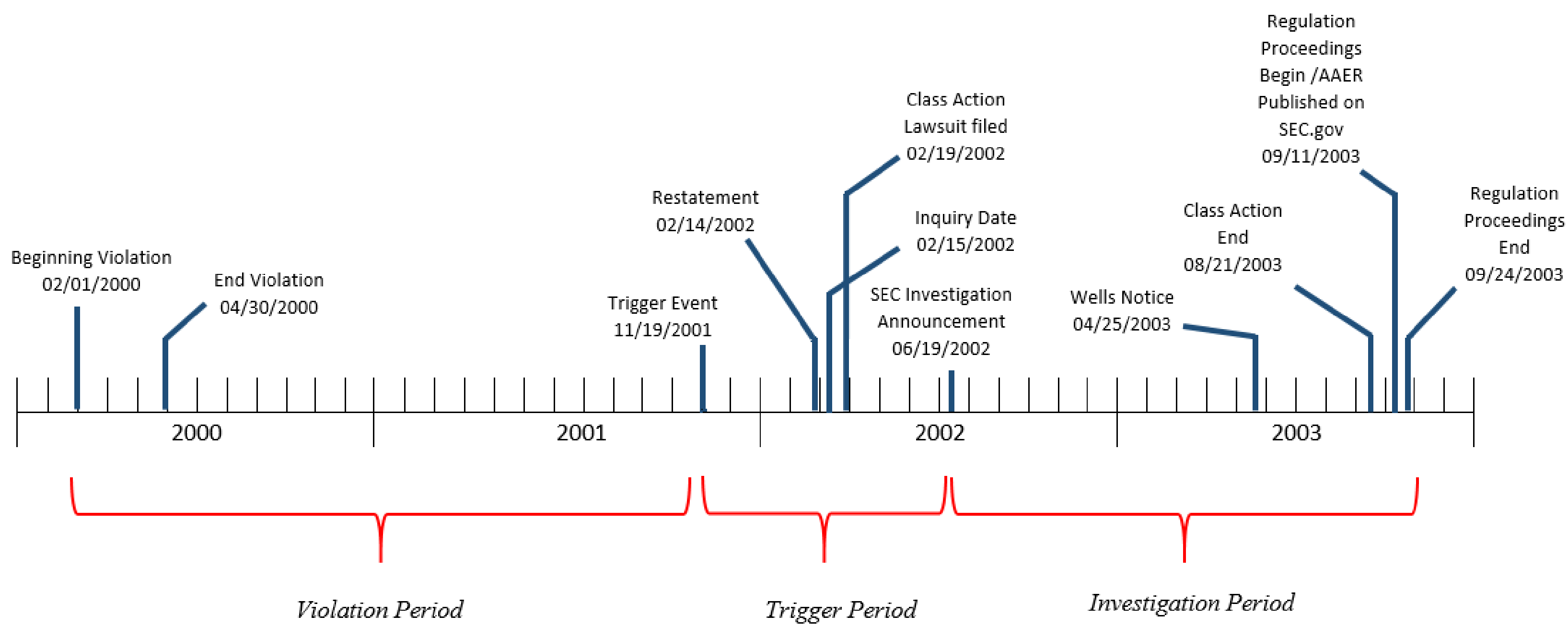
Table 2.6
Time Sorted Regressions

This table presents the coefficients on VioPeriod and InvPeriod for several subsamples based on the year of the Trigger Event. For example, if firm AAA's trigger event occurred in 1981, than all observations for that firm would be included in the 1980's subsample. Estimates for VioPeriod and InvPeriod are the results of equation (2) for Returns and PVOL, and equation (4) for Spread and ILLIQ applied to each subsample. Subsamples in Panel B are based on trigger event dates before and after the date Sarbanes-Oxley Act was passed into law, July 30, 2002. The 1970s and 2010s were excluded due to low trigger events (2 and 1 respectively). Clustered robust standard errors are in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively.

Sample	Returns		PVOL		Spread		ILLIQ	
	VioPeriod	*InvPeriod*	*VioPeriod*	*InvPeriod*	*VioPeriod*	*InvPeriod*	*VioPeriod*	*InvPeriod*
Panel A: 10-year sort								
1970s	-0.0010	-0.0015	0.0204***	0.0020	-0.0001	0.0005	-0.0641	0.1827**
	(0.0023)	(0.0018)	(0.0018)	(0.0014)	(0.0011)	(0.0009)	(0.0565)	(0.0821)
1980s	0.0027**	0.0027*	-0.0189***	0.0015	-0.0033***	0.0094***	-0.0484	0.4117***
	(0.0012)	(0.0014)	(0.0016)	(0.0018)	(0.0006)	(0.0007)	(0.0620)	(0.0734)
1990s	0.0019**	0.0024**	-0.0347***	0.0067***	-0.0037***	0.0039***	-0.2635***	0.1612***
	(0.0008)	(0.0010)	(0.0010)	(0.0015)	(0.0004)	(0.0004)	(0.0386)	(0.0429)
2000s	0.0011***	0.0016***	-0.0098***	-0.0009*	-0.0005***	0.0004**	-0.1523***	0.1817***
	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0001)	(0.0002)	(0.0111)	(0.0143)
Panel B: Pre and Post Sarbanes-Oxley Act								
Pre SOX	0.0019***	0.0026***	-0.0256***	0.0023***	-0.0029***	0.0025***	-0.2453***	0.3284***
	(0.0005)	(0.0006)	(0.0006)	(0.0008)	(0.0002)	(0.0003)	(0.0222)	(0.0253)
Post SOX	0.0009**	0.0008**	-0.0030***	0.0001	0.0003*	0.0003**	-0.0816***	-0.0027
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0001)	(0.0001)	(0.0110)	(0.0107)

Figure 2.1

Timeline of incremental information events in the Nvidia case of financial misrepresentation



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ESSAY 3: EXPLAINING THE DIVERSIFICATION-PERFORMANCE PENALTY: A LONGITUDINAL ANALYSIS OF BUSINESS SEGMENT PERFORMANCE

3.1. Introduction

A large body of research has shown that diversification is linked with significant equity discounts and poor performance. Studies by Lang and Stultz (1994), Berger and Ofek (1995), Laeven and Levine (2007), Berger et al. (2010), Ammann et al. (2012), and Hoechle et al. (2012) all show evidence of negative externalities related to corporate diversification. Though many authors have presented and tested various explanations for the discount, a consensus regarding the cause of the discount is has yet to emerge. One explanation is that diversified firms fail to efficiently allocate corporate resources (Lamont, 1997; Shin and Stulz, 1998; Rajan et al., 2000; Ozbas and Scharfstein, 2010). An alternative explanation links the diversification penalty with agency theory where self-interested managers pursue diversification at the expense of the shareholder. For example, Jenson (1986) argues that managers take on value-destroying projects to increase their own power and prestige (empire building). Jensen and Murphy (1990) and Lamont and Polk (2002) suggest that managers diversify in order to increase their own compensation. Other agency-driven motives include managerial entrenchment[18] (Shleifer and Vishny, 1989) and risk reduction in the manager's personal portfolio (Amihud and Lev, 1981). Still, other papers question whether the diversification discount even exists. Campa and Kedia (2002) argue that firms could choose to diversify in response to poor performance in the existing

[18] When firms take on a unique set of business lines, the top executives then become "specialists" or uniquely qualified to manage that set of business lines. The specialist-manager is then very hard to replace due to the specific skill set required to run the conglomerate firm.

business segments, and that after accounting for the endogenous diversification selection, the discount disappears altogether. Furthermore, Villalonga (2004a) asserts that problems associated with traditional data sources are responsible for the discount found in other studies.[19] She finds that a diversification premium exists when using a more detailed data source.

This paper examines three questions related to the source of the diversification discount. First, is poor pre-diversification performance by diversifiers the source of the observed post-diversification discount? We are not the first to ask this question, however the current evidence is mixed. Weston and Mansinghka (1971), Gort et al. (1985), Lang and Stultz (1994), and Graham et al. (2002) find that diversifying firms display lower performance prior to diversifying while Campa and Kedia (2002) and Hyland and Diltz (2002) find higher performance ratios in diversifying firms prior to a diversifying event. Second, is poor post-diversification performance by existing/original lines the source of the observed post-diversification discount? The resource misallocation hypothesis suggests that the addition of a new business line provides managers an opportunity to misallocate human capital and financial capital across the firm (Harris et al., 1982; Rajan et al., 2000; Lamont and Polk, 2002). If these firms disproportionally allocate attention and resources to the new lines from the old lines then we expect to see falling profit margins in the existing business lines after the firm acquires a new line. Third, is poor performance of newly added lines the source of the observed post-diversification discount? One

[19] The COMPUSTAT Segment file is the most commonly used data source for diversification research. Villalonga (2004a) identifies several shortcomings with these data such as limited business segments, non-uniform reporting standards, or errors due to self-reporting, and lack of profitability metrics.

implication of the agency hypothesis of diversification is that managers are selecting value-destroying or underperforming business lines in order to net personal gains at the shareholders expense (Jensen, 1986). Therefore, if these agency conflicts are the primary drivers of the diversification discount, then we would expect to see low levels of profitability in the new business lines.

To answer our research questions, we use a sample of U.S. property-casualty insurers for the years 2000-2012. Data are obtained from the National Association of Insurance Commissioners (NAIC) annual reporting database. There are several advantages to using the NAIC database to answer our research questions. First, performance data are available at the business-unit level, which allows us to directly test the effects of diversification without the restraints imposed by traditional financial reports such as minimum business unit size, ad-hoc categorization of industries by management, or errors due to self-reporting (Davis and Duhaime, 1992; Villalonga, 2004a).[20] Second, our methodology requires that we are able to accurately identify when a firm diversifies, the clarity of the NAIC data is ideal for our research methods as there is no ambiguity in classifying business units.[21] Lastly, we are able to evaluate both private and public firms as all insurers are required to report to state regulatory offices each year. To-date, the core diversification literature has focused almost exclusively on publicly traded firms. To answer our first research question, we use these data in a longitudinal analysis, centered at the diversification year, and compare the performance of diversifying firms against the

[20] COMPUSTAT Segment data reports only business units that comprise of more than 10% of total firm sales.
[21] Hyland and Diltz (2002) identified that only 72% of the reported changes from one segment to multiple segments are economically meaningful diversification events. Considering the 10% reporting standard, much of the reported changes are due to managerial discretion in classifying segments than actual organizational structure changes.

performance of peer non-diversifying firms.[22] For the second and third research question, we decompose the firm into its new and old business lines and compare the loss ratio of the two components.[23] This method allows us to determine which component is the primary source of the diversification discount. We follow up our univariate statistics with regression analysis to verify the robustness of our primary findings.

The findings related to our three research questions are as follows: First, we find evidence that diversifying firms underperform in the three years before the diversification event compared to their non-diversifying peers. We also find that the performance disparity between diversifying and non-diversifying firms dramatically widens in the post-diversification period, evidence consistent with the diversification discount literature. Second, we find that in the year the firm diversifies, the existing business segment loss ratio increases (worsens) from 58.8% to 64.2%. This finding implies that declining performance in the existing business lines contribute to the diversification discount. Third, we find that the new business line's loss ratio is significantly lower (57.2%) than the existing business line's loss ratio for at least three years following the inclusion of the new line. This evidence is inconsistent with the idea that agency conflicts are responsible for the diversification discount, instead of finding that managers are selecting value-destroying business lines, we find that managers are selecting more profitable lines. However, this evidence also suggests that the inclusion of a new line diverts attention and resources away from the firm's core segments, which then leads to significant declines in the firm's overall operating

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[22] We compare diversifying firms against firms that (1) do not diversify during the sample period and (2) operate in the same primary business line. We use three measures of performance in the longitudinal analysis, ROA, UROA (underwriting return on assets), and the loss ratio.

[23] The segment-level performance measure used in our analysis is the loss ratio, which is the ratio of losses plus expenses to premiums earned. A low loss ratio equates to high profitability.

performance, consistent with the resource misallocation explanation of the diversification discount.

We add to the existing literature on diversification and firm performance by providing a comprehensive analysis detailing a potential source of the diversification discount. One of the unique features of this paper is our ability to separate and individually track the performance of the existing business lines from the new business lines. Prior studies have yet to explicitly test whether the source of the diversification discount is the underperformance of the new or existing line(s) as data limitations leave only industry-level proxies to infer business line characteristics (Berger and Ofek, 1995; Shin and Stulz, 1998; Rajan et al., 2000; Hoechle et al., 2012). To the best of our knowledge, we are the first to provide an empirical analysis showing from which lines (new or existing) the poor performance of diversifying firms originates.

The remainder of the paper is organized as follows. Section II reviews previous literature on the diversification discount. We develop our hypotheses in Section III. Section IV provides a description of our data and control variables. Section V contain our results, and Section VI concludes with a brief summary.

3.2 Prior Literature

3.2.1 The Diversification Discount

The focus versus diversification literature is well established among financial economists, although a consensus has yet to emerge in the debate as to the true valuation and performance implications to firms that diversify. Early inter-industry evidence from Lang and Stulz (1994) suggest that Tobin's Q and firm diversification were negatively related during the 1980s and that diversifying firms underperformed firms that did not diversify. Berger and Ofek (1995) compare the imputed values of diversified firms to their market values (excess value) and report that diversified firms trade between 13% and 15% below their imputed values. Also, Servaes (1996) findings show that the diversification discount was present during the 1960s. The inter-industry evidence almost exclusively uses the COMPUSTAT segment file as the primary source for segment-level data, though much as been written on its limitations. Villalonga (2004b) warns researchers of using the segment file for diversification research as it (1) fails to fully disclose the true extent of diversification for conglomerates, (2) defines business segments too broadly, (3) and that firms frequently change the segments they report when no real change has taken place (Denis, Denis, and Sarin, 1997; Hyland and Diltz, 2002). Using an alternative data source, Villalonga (2004b) reports that diversified firms trade at a significant premium compared to single-segment firms. Her study, as well as others, highlight the importance of accuracy in segment reporting and call into question the robustness of the studies using the COMPUSTAT segment database.

We avoid the drawbacks of using the COMPUSTAT segment file to study the effects of diversification by using a more complete database of diversification activities, the NAIC database. Moreover, the work of Santalo and Becerra (2008) identifies substantial differences in the valuation effects of diversification between industries, therefore an intra-industry study allows us to avoid this confusion. Santalo and Becerra also advocate testing the effects of diversification by means of a longitudinal analysis of diversifying moves, which is the method we employ here.

There has been substantial diversification research that has been done using an intra-industry sample, particularly in banking and insurance. Because our sample is the U.S. property casualty insurance industry, we will limit the intra-industry discussion to the relevant findings in this area. Given that the benefits of diversification are more likely to be pronounced within industry than across industries (creating value by leveraging core competencies), it is striking to see that much of the insurance literature finds support for the diversification discount as documented by the early inter-industry studies. Hoyt and Trieschmann (1991) compare mean returns for focused insurers and those that diversify across both life-health (L/H) and property-casualty (P/C) and find that equity of focused insurers produced superior returns compared to equity of diversified insurers. Tombs and Hoyt (1994) also reported lower risk-adjusted returns for diversified insurers using a Herfindahl index across 10 lines of business. Both Elango, Ma, and Pope (2008) and Liebenberg and Sommer (2008) find strong evidence that multi-line insurers underperform single-line insurers as measured by ROA. Furthermore, both report lower market valuations as measured by Tobin's Q.

3.2.2 Explaining the Discount

Given the substantial research supporting the diversification discount, a new stream of research has set out to explain this phenomenon. A number of plausible explanations have been presented such as capital misallocation and cross subsidization (Lamont, 1997; Shin and Stulz, 1998; Scharfstein, 1998; Rajan et al., 2000) and agency cost theory (Jensen, 1986; Jensen and Murphy, 1990; Shleifer and Vishny, 1989; Amihud and Lev, 1981; Hyland and Diltz, 2002). The latest findings, however, call into question the very existence of the diversification discount and/or report that diversified firms trade at a premium rather than a discount (Villalonga, 2004a; Campa and Kedia, 2002). The work of Graham et al. (2002), Campa and Kedia (2002), Borghesi et al. (2007) all support the notion that diversified firms are systematically different from the average single-segment firm, and that failure to control for these differences can lead to incorrect inferences about the effect of diversification on firm performance.

3.2.3 Resource Misallocation

The negative impact of corporate diversification is often explained in terms of poor allocation of scarce resources across firm divisions. Support for the resource misallocation hypothesis is based on evidence that division-level investment is affected by factors other than investment opportunity. For example, Lamont (1997) finds that investment in non-oil divisions of large petroleum companies was affected by changes in oil prices during the 1980's. Thus, his findings show that capital allocation to a division of a diversified firm depends on the success of the firm's other divisions that are in unrelated industries. Shin and Stulz (1998) show that investments made by one segment of a diversified firm are dependent on the cash flows of the other segments. Scharfstein's (1998) findings supports the notion of capital "socialism". He finds that diversified firms invest less than their industry peers in their high-opportunity segments (high Tobin's Q), and invest more in segments with low-opportunity (low Tobin's Q) than their peers. Rajan et al. (2000) present a model where internal power struggles affect resource allocation and consequently drive investment toward the most inefficient divisions. Consistent with their model, they find that diversified firms tend to overinvest in low Q segments. Mitton's (2012) empirical tests suggest that the lower productivity in diversified firms worldwide is due more to the misallocation of resources than other explanations.

A well-managed diversified firm should be more valuable than single-segment firm because single-segment firms lack the same ability to generate and effectively distribute internal resources (Shin and Stulz, 1998). However, resources should be allocated to divisions with high growth opportunities and performance but the findings in this line of research show that the average diversifier fails to appropriately allocate these scarce resources, thus leading to poor performance and discounted equity.

3.2.4 Agency Cost

A related line of research has argued that agency costs are responsible for the observed discount and lower performance in conglomerate firms. Through the eyes of agency theory, diversification is based on the idea that because ownership is diluted across many parties, individual shareholders lack the motivation and ability to monitor and discipline managers. Managers are then free to pursue their own personal objectives which often times are not in the shareholder's interest (Matsusaka, 2001). For example, Roll (1986) theorized that CEO hubris can lead to overconfidence in merger target evaluations which can subsequently lead to overpayment during acquisitions. Jensen (1986) famously theorized that managers "have incentives to cause their firms to grow beyond the optimal size. Growth increases managers' power by increasing the resources under their control (p. 2)." Jensen's model predicts that diversification programs are more likely to generate losses than gains as managers may seek value-destroying projects to generate personal gains. Other research on this topic argues that managers diversify to increase compensation (Jensen and Murphy, 1990), entrench themselves by diversifying the firm into specialized lines whereby the managers become harder to replace (Shleifer and Vishny, 1989), or reduce the risk of their personal portfolios which cannot be easily diversified (Amihud and Lev, 1981). Hyland and Diltz (2002) present evidence of several agency-driven motives for diversification. They show that top management receive higher compensation following diversification, and that free cash flow variables are strong positive factors that influenced the decision to diversify in probit regression models. All of these results are consistent with the agency costs of free cash flows (Jensen, 1986). In a recent study, Ammann et al. (2012) show that the diversification discount increases with firm leverage and is nonexistent in all equity firms. They explain that this phenomenon is due to managers in levered firms aligning with creditors thereby reducing the risk of the firm at the expense of equity holders. Hoechle et al. (2012) findings suggest that corporate governance variables explain most of the diversification discount, therefore the diversification discount and agency theory appear to be linked.

3.2.5 The diversification-discount debate

Though much has been written to explain the diversification discount, other studies question whether the discount even exists at all. Many of these studies explain that perhaps *a priori* differences, inadequate data, measurement error, specification error, or flawed benchmarks are responsible for the diversification discount found in prior work. For instance, Graham et al. (2002) show that newly acquired segments by diversifying firms were trading at a discount before the acquisition and that this could explain the source of the diversification discount, even if the diversifying acquisition itself creates value. Campa and Kedia (2002) argue that firms self-select into diversification and that failure to control for endogenous choice to diversify is what has led other researchers to conclude that diversification destroys value. For example, "[i]f poorly performing firms tend to diversify, then not taking into account past performance and its effect on the decision to diversify will result in attributing the discount to diversification activity, rather than to the poor performance of the firm (Campa and Kedia, 2002 p. 1732)." After controlling for endogeneity, they find the diversification discount always drops, and in some cases becomes a premium. However, recent work by Ammann et al. (2012) and Hoechle et al. (2012) find that the diversification discount persists even with controls for endogeneity.

Villalonga (2004a) uses propensity score matching and Heckman's (1979) two-stage method to evaluate the valuation differences between diversified and single-segment firms. With each method, the diversification discount disappears. Hund, Monk, and Tice (2010) argue that the perceived diversification discount is an artifact of differences in the uncertainty of growth rates between diversified firms and their focused-firm benchmarks. Hund, Monk and Tice (2012) find that the standard excess value approach in diversification research is flawed due to the inherent differences between diversified and focused firms, and that after controlling for these differences diversified firms trade at a premium compared to similar focused firms.

Table 1 synthesizes the extant literature pertaining to the diversification discount is synthesized in Table1.

[Table 1 about here]

3.3 Hypotheses

The existing literature has yet to directly test whether the source of the diversification discount originates from poor performance in existing lines or from poor performance in the new lines. The lack of segment-level performance data are primarily responsible for the paucity of these explicit tests (Villalonga, 2004b). To fill this gap, we use a sample of U.S. insurers with performance data available at the segment-level. In this section we develop hypotheses related to the potential sources of the diversification discount.

3.3.1 Prior Performance

One line of theoretical work that builds on the benefits of diversification, predicts that firms have an incentive to dynamically change their organizational structure following poor performance in existing business lines. For example, Shleifer and Vishny (1989) argue that when poor performance of the firm threatens a manager's job, he may have incentive to enter a new business line. Matsusaka (2001) models diversification strategy as a dynamic value-maximizing process. His model suggests that poorly performing firms will seek new products that match their organizational capabilities, "[t]hus it is poor performance (the lack of good uses of organizational capabilities in existing businesses) that causes diversification, not the other way around (pg. 410)." Burch et al. (2000)

theorize that diversification can be the result of value-maximizing efforts of managers in response to unfavorable industry conditions. The Gomes and Livdan (2004) model implies that firms diversify after they become relatively unproductive in their current activities. This line of theoretical work motivates our first test of pre-diversification performance, suggesting that diversifying firms should experience low performance before diversifying.

Empirical studies show mixed evidence that diversifying firms underperform in the pre-diversification period. For example, several studies show that diversifying firms exhibit poor performance in the period prior to diversification. The findings of Weston and Mansinghka (1971) and Gort, Grabowski, and McGuckin (1985) show that diversifying firms have lower accounting performance prior to diversification compared to firms that do not diversify. Similarly, Lang and Stulz (1994) show that operating income of diversifying firms is lower relative to firms that do not diversify. May (1995) also finds evidence that firms move into new industries following poor performance in their primary business. However, Servaes (1996) shows that the Tobin's Q of diversifiers and non-diversifiers are not significantly different in the pre-diversification period. Hyland and Diltz (2002) find that diversifying firms were not undervalued and maintained a higher sales multiplier in the pre-diversification period. Also, Campa and Kedia (2002) report that during single-segment years, diversifying firms have higher CAPX/SALES and EBIT/SALES ratios than firms that remained focused. Overall, the empirical evidence is mixed as to whether firms diversify following poor performance.

The theoretical work of Shleifer and Vishny (1989), Burch et al. (2000), Matsusaka (2001), and Gomes and Livdan (2004) suggest that firms will seek new business as a result of poor performance. However, the extant literature has yet to clearly establish whether diversifying firms exhibit poor performance in the years leading up to the diversification event as the empirical evidence is mixed. Thus leading us to our first testable hypothesis:

H1 (prior performance hypothesis): Diversifying firms will have low performance relative to their non-diversifying peers in the pre-diversification period.

3.3.2 Post Performance

Two explanations for poor post-diversification performance has are (1) exacerbated managerial agency problems where the manager diversifies out of self-interest at the expense of the shareholder (Jensen, 1986; Shleifer and Vishny, 1989) and (2) the failure of conglomerate firms to allocate scarce monetary or human resources across divisions (Harris et al., 1982; Lamont and Polk, 2002). One of the unique features of our study is that we can disaggregate the firm into its pre-diversified segments and its new business segments. By tracking the post-diversification performance of the two segments we can isolate the effects diversification have on the existing business segments and, for the first time, directly measure how profitable the new business lines are. If diversifying firms poorly allocate resources, we should see declines in the performance of the existing business segments consistent with Harris et al. (1982) and Lamont and Polk (2002). Furthermore, if the diversification discount stems from managers diversifying to maximize personal gains at the expense of the owners (agency theory), then we would expect the new business segment to underperform compared to the old business segment.

The empirical results of Liebenberg and Sommer (2008), Elango et al. (2008), and others have shown convincingly that diversification is associated with poor performance in the insurance industry. However, the source of the discount has not clearly been identified. While we cannot directly measure resource transfers between divisions, if diversified firms fail to appropriately allocate managerial or monetary resources, then the results of these transfers are likely to be manifested in declining segment-level performance post diversification. As this mechanism could be the source of the diversification discount, we hypothesize that a firm's preexisting business segment's performance will decrease following a diversification event.

<u>*H2 (resource misallocation hypothesis): Preexisting business segment performance will decrease following a diversification event.*</u>

On the other hand, it could be that the source of the diversification discount stems from poor managerial decisions as to what lines these firms diversify into. The agency theory of diversification implies that managers are likely to undertake low-benefit or even value-destroying business segments to increase their own power and prestige (Jensen, 1986), become entrenched inside the firm (Shleifer and Vishny, 1989), increase compensation (Jensen and Murphy, 1990), spend free cash flow (Jensen, 1986), or for other personal motives. Therefore we hypothesize that a firms' new business segments performance will underperform compared to the existing business segment performance levels.

H3 (agency theory hypothesis): New business segment performance will underperform compared to the existing business segment.

3.4 Sample and data

Our empirical analyses uses data from U.S. property-liability insurance companies obtained from the National Association of Insurance Commissioners (NAIC) database for the years 2000 through 2012. Our state-level macroeconomic data are collected from the Bureau of Economic Analysis.[24] The sample includes firms which report positive values for assets and premiums written, have a complete set of control variables, and are organized as either a stock or mutual insurer.[25] We aggregate all variables for insurers that are affiliated with an insurance group, as insurance groups may implement strategies and risk management practices at the group level rather than at the firm level (Berger et al., 2000). We define diversification as the acquisition of a business line the insurer wrote no business in during the previous year. The final sample yields 1,797 unique insurers, of which 676 diversify at some point during the sample period and 1,121 insurers who do not diversify into a new line of business.

3.4.1 Performance Measures

[24] www.bea.gov.
[25] We follow prior literature and eliminate uncommon insurer types such as Lloyds, reciprocals, HMDI corporations, and risk retention groups (Liebenberg and Sommer, 2008; Elango, Ma, and Pope, 2008).

We use three measures of accounting performance to evaluate the diversification-performance relationship: return on assets (ROA), underwriting return on assets (UROA), and the loss ratio (LR). ROA takes into consideration profit and loss from both business operations and investment activity and is computed simply as the ratio of net income to total assets. UROA measures the profit and loss from insurance activity and is computed as the ratio of net underwriting income to total assets. The LR is our direct measure of annual performance and is computed as:

$$LR = \frac{Direct\ Losses + Loss\ Adjustment\ Expense}{Premiums\ Earned} \tag{1}$$

Where direct losses are total claims against insurance policies (paid and unpaid) over the year. Loss adjustment expense are the costs associated with adjusting insurance claims such as investigation costs and legal defense costs. Premiums earned is the portion of premiums written throughout the year that can be applied to the expired portions of insurance contracts.

All three performance variables can be used to measure overall firm performance on an annual basis and thus are appropriate for testing Hypothesis 1. Testing Hypothesis 2 and 3 requires a performance measure where the inputs are available at the segment-level. The only performance measure that meets this qualification is the loss ratio, where all three inputs are recorded separately for each business line. Panel 1 of Table 2 reports summary statistics for the performance variables and control variables for both diversifying and non-diversifying insurers. Mean and median ROA and UROA are not statistically different between diversifying and non-diversifying insurers.[26] Though, diversifying firms tend to have higher loss ratios (+6% mean, +3% median) than their non-diversifying peers.

[Table 2 about here]

3.4.2 Control Variables

In our multivariate analysis, we include several control variables that reflect firm-specific and market-specific factors which prior research has shown to influence one or more aspects of the loss ratio. One firm-specific control we include is size, Sommer (1996) suggests that larger insurers have lower insolvency risk which allows them to charge higher prices on insurance products. Cummins and Nini (2002) relate insurer size to market power, therefore we would expect larger insurers to more easily generate revenue (premiums) efficiencies following diversification activity than small insurers. Consistent with this notion, Liebenberg and Sommer (2008) find that firm size is positively related to firm performance. We measure size as the natural logarithm of total assets.[27] We find that diversifying insurers are 6.4% larger than non-diversifying insurers. In addition to insurer size, we control for insurer growth as excessive levels of asset growth can indicate

[26] The average overall ROA of 0.015 is slightly lower with other contemporary studies using earlier samples such as Liebenberg and Sommer (2008) of .02 and Elango et al. (2008) of 0.021.

[27] When aggregate insurers at the group level, assets levels are inflated due to intra-group stock holdings. Therefore, we adjust group assets downward by the total intra-group common and preferred stock holdings.

excessive risk-taking on part of the insurer. Firm growth has been linked with a nearsighted strategy to acquire market share (Klein, 1995) and is cited as one of the most common causes of insurer failures (A. M. Best Company, 1991). We suspect that premium growth is related to both underwriting policy (losses) and rates as the firms with high growth may charge lower than actuarially fair prices for their insurance products which in the long-run can lead to increased insolvency risk (Fields et al., 2012). Not surprisingly, we find that premium growth is 7.9% higher in diversifying insurers.

We include, as another risk metric, the ratio of net premiums (net of reinsurance) to gross premiums written (premiums written plus reinsurance assumed). This ratio is related to the net policy risk retained by the firm (Fields et al., 2012). Non-diversifying firms appear to retain 7.6% more policy risk than diversifying firms. We also control for catastrophic loss exposure (CatX) which is calculated as the portion of property premiums written in coastal states with hurricane exposure and California earthquake coverage.[28] Diversifiers in our sample have significantly more catastrophic loss exposure than non-diversifiers at 27% and 18% respectively. Organizational differences across our sample are controlled for by including a company type dummy variable (Mutual) that takes the value of 1 for firms organized as a mutual insurer, and zero for stock insurers. Mutual insurers lack in agency cost controls such as the market for corporate control, shareholder monitoring, and equity-based compensation. Thus the organizational structure of the firm may incentivize managers to behave differently when considering business line

[28] CatX includes property premiums written in Alabama, Connecticut, Delaware, Florida, Georgia, Louisiana, Maine, Maryland, Massachusetts, Mississippi, North Carolina, New Hampshire, New Jersey, New York, Rhode Island, South Carolina, Texas, and Virginia plus earthquake premiums written California.

diversification. Liebenberg and Sommer (2008) show that the mutual organizational form is associated with reduced accounting profitability which we expect to affect the denominator (premiums earned) of our dependent variable. We find that mutual insurers make up a larger portion of the non-diversifying sample than diversifiers.

We include, as proxy for the quantity of insurance demanded, the weighted average state-level GDP for the market area that each firm in our sample participates in. For each firm, market area GDP (MAGDP) is calculated as:

$$MAGDP_{it} = \sum_{j=1}^{51} GDP_{jt} P_{ijt} \tag{2}$$

Where GDP_{jt} represents the per capita GDP in state j, and P_{ijt} represents the portion of premiums written for insurer i in state j in year t. Gron (1994), Esho et al. (2004), Meier (2006), and Lazar and Denuit (2012) all empirically demonstrate that underwriting cycles, premium dynamics, and losses are linked to aggregate economic cycles in the economy. Table 2 provides some evidence that diversifying firms are more often in states with higher levels of GDP as the Wilcoxon sign-rank test is significant at the 5% level. Because our dataset includes firms who enter the sample at different points in time, the stage of the underwriting cycle at which the firm is observed can potentially affect out results, therefore we also include year dummies to capture time-dependent trends in our dependent variables not accounted for by our continuous variables.

Panel 2 of Table 2 compares the loss ratio differences for each of the 22 lines of business between diversifying and non-diversifying firms.[29] Testing the differences in mean loss ratios shows that in ten lines the loss ratios differed significantly between the two groups.[30] Our empirical analysis of Hypothesis 1 centers on testing loss ratio differences between diversifying and non-diversifying firms, however, if diversifying firms participate at a higher rate in lines with high loss ratios, our tests could be biased due to the natural differences that exist between the different insurance lines rather than differences in performance. To address this issue, we first test whether the diversifying sample is significantly participating in a different set of business lines than the non-diversifying sample. To do so, we divide our sample into diversifiers and non-diversifiers and evaluate participation rates in our 22 lines of business in Table 3. A firm's primary business line is defined as the segment that constitutes the largest portion of premiums. The primary business line for diversifying firms are based on the lines those firms participated in the year before they diversified. The number of firms in each primary business line for the non-diversifying group is based on the median number of non-diversifying participants throughout the sample period. The results in Table 3 show that the primary business line participation rates tended to be very similar between diversifiers and non-diversifiers. The average difference in participation rates between the groups is a remarkable -0.01%. The final row of Table 3 reports the weighted average loss ratio for

[29] Lines of business included in this study are the 24 lines reported by Berry-Stölzle et al. (2012) with the following modifications: (1) Other liability combines "Other Liability – Occurrence" and "Other Liability – Claims Made" (lines 17.1 and 17.2); and (2) reinsurance is not considered as a possible new line of business. This leaves 22 lines of business.

[30] Diversifier's had higher loss ratios in: fire, farmowners, earthquake, products liability, fidelity, surety, and burglary & theft. Non-diversifiers' had higher loss ratios in: homeowners, financial guaranty, and auto insurance.

each group using the loss ratios from Table 2 and participation rates in Table 3 as the weights. Again, the difference between the weighted average loss ratios is a marginal 0.02%. Furthermore, a simple correlation test of participation rates and loss ratios indicate that no significant relationship exists between the participation rates of diversifying firms and the loss ratios of the lines they participate in.[31] Overall, these results offer compelling evidence that diversifying firms are not systematically participating in business lines with higher loss ratios than non-diversifying firms.

[Table 3 about here]

[31] The Pearson correlation coefficient between diversifying-firm participation rates and the average loss ratio per line is 0.0664 with p-value of 0.7633.

3.5 Results

3.5.1 Prior Performance (H1)

We begin our empirical analysis by testing Hypothesis 1. The theoretical work of Burch et al. (2000), Matsusaka (2001), and Gomes and Livdan (2004) suggest that firms will seek new business as a result of poor performance. Therefore, we perform a longitudinal analysis of overall firm performance centered at the diversification event (t=0). Since we are interested in relative performance, we report the performance of diversifying firms relative to their non-diversifying peers. That is, we match diversifying firms with the group of non-diversifying firms that operate in the same primary line of business.[32]

Table 4 presents mean and median differences in ROA, UROA, and loss ratio (LR) for diversifying firms and non-diversifying firms arrayed in event-time, from three years before through three years after the diversification event. Two results are notable. First, diversifying firms report lower ROA and UROA in the pre-diversifying period. Median ROA is significantly lower in years -1 and -2, and median UROA is significantly lower in years -1, -2 and in -3. The significantly higher LR in years -2 and -3 also suggests that diversifying

[32] If there are fewer than ten non-diversifying firms to formulate our benchmarks, we use the overall average loss ratio of non-diversifying firms. For example, in Table 3 we report that 5 diversifying firms reported aircraft insurance as their primary line of business, however 0 non-diversifying insurers reported the same primary line. Therefore, we use the year-matched-average, non-diversifying firm ROA, UROA, and LR as benchmarks. Backfilled benchmarks total 54 observations.

firms are paying out more dollars in claims and underwriting expenses per dollar of earned revenue than non-diversifying firms in the recent past, however the difference in loss ratio is not significant in the year $t = -1$. Second, consistent with the diversification discount literature, we observe that the performance disparity between diversifying and non-diversifying firms widens in the post-diversification period.

[Table 4 about here]

Overall, the results presented in Table 4 provide evidence supportive of Hypothesis 1, we find that diversifying firms having low relative performance in the years leading up to diversification activity. While this result is consistent with possible value-maximizing behavior of underperforming firms, the strong negative performance following the diversification event suggests that managers are on average unsuccessful in their efforts to maximize firm performance. The next set of results will help identify the source of the negative post-diversification performance, whether the existing business lines' performance declines, or if management is simply picking bad business lines.

3.5.2 Post-diversification performance (H2/H3)

Our findings in Table 4 confirm that diversification activity is followed by poor performance. However, the source of the performance disparity has yet to be identified. In this section we identify whether the existing business lines or the new business lines are responsible for the poor performance following diversification activity observed in Table 4. For example, in 2004 the Plymouth Rock Insurance Group was writing business in homeowners insurance and auto insurance, though in 2005 they added fire insurance to their portfolio. Our research design would require us to track the loss ratio of the pre-diversified firm (the combined loss ratio of auto and home) and the loss ratio of the new line, fire insurance, separately. We then can use this disaggregated data to determine which lines, new or old, are responsible for any change in the firm's overall performance post diversification.

The results of our initial test of Hypothesis 2 and 3 are reported in Table 5. The "old loss ratio" refers to the loss ratio of the collection of business lines the firm participated in before diversifying. The "new loss ratio" refers to the loss ratio of new business lines added in the diversification year, t=0. Two results are notable from Table 5. First, we find that after firms diversify, the mean old loss ratio significantly increases from 58.8% to 64.2% and remains elevated for three years following the diversification event. Median values also confirm an increase the old loss ratio for years 0, +1, and +2, though in year +3 the median existing business loss ratio improved to 59%. Second, the new business lines outperform the existing lines. The new line loss ratios are lower in the diversification year, and are significantly lower every year following diversification. This evidence suggests that the source of the poor performance in diversifying firms is due to worsening performance in the existing business lines rather than management selecting bad business sectors to diversify into. In untabulated tests, we also find that the average new line loss ratio was not significantly different than the average non-diversifier loss ratio, again verifying that the diversification discount is due to the performance decline in the existing segments rather than the new segments.

[Table 5 about here]

To verify our univariate findings in Table 5, we use regression analysis to link the declining performance in the old loss ratio with diversification activity while controlling for several significant firm specific characteristics that have been shown to influence the loss ratio. These results are reported in Table 6. To mirror our findings in Table 5, we sample diversifying firms in the year before they diversify giving us 1,041 diversification events between years 2000 and 2012. We then use the one-, two-, three-, and four-year change in the old loss ratio as dependent variables in our OLS regressions. The model's intercept is the primary variable of interest as it can verify that the change in the old loss ratio is significantly different from zero, holding all else constant. The control variables include firm size, asset growth, catastrophic exposure, the ratio of net premiums written to gross premiums written, market area GDP, company type, and finally year fixed effects. The basic model is as follows:

$$\begin{aligned} Difference\ in\ Old\ LR_{it} \\ &= Constant + Size_{it} + Growth_{it} + CatX_{it} + NPW/GPW_{it} + MAGDP_{it} \\ &+ Mutual_{it} + Year\ fixed\ effect_t + \varepsilon_{it}. \end{aligned} \tag{3}$$

[Table 6 about here]

The results in Table 6 substantiate the univariate findings of Table 5 that the pre-diversified firm's loss ratio significantly increases following a diversification event. The constant in each model is positive and significant, evidence supporting Hypothesis 2. This finding is consistent with the idea that adding a new division inside the firm gives managers opportunity to poorly allocate human or financial resources across divisions. This also advances the view that resource misallocation is responsible for the poor post-diversification performance common in the extant literature. To the best of our knowledge, this is the first empirical examination of the effect diversification has on the future success of the existing business lines. The coefficient on size was the only explanatory variable that remained significant in every model. Firm size is negatively and significantly related to the change in old loss ratio, suggesting that larger firms are better suited to experience positive performance effects following diversification than smaller firms. This result is consistent with Cummins and Nini (2002), Liebenberg and Sommer (2008), and Elango et al. (2008).

3.5.3 Robustness

Berger and Ofek (1995) and Comment and Jarrell (1995) use an alternative diversification measure, the number of business segments, to validate whether diversification is associated with poor equity performance. As robustness, we perform two similar regression analyses here, first we link the change in the existing business loss ratio with the change in the number of business lines they participate in, and second we regress the loss ratio on the total number of business lines the firm participates in. The new independent variables, the change in the number of business lines and total number of business lines, are not unique to diversifying firms therefore we include both diversifying and non-diversifying observations in our analysis to show the average effect additional business lines have on performance for all firms. Panel A of Table 7 reports that 186 non-diversifier observations drop between 1 and 16 lines during in a sample year. Diversifying firms were much more active during our sample, where 1,415 diversifiers dropped as many as 13 lines or added up to 12 lines in a one year period. In Table 7 we model the change in old loss ratio with Equation (3) and add the change in the number of business lines (Δ Lines) as a new explanatory variable. Table 8 is our second robustness test where the overall loss ratio is also modeled with Equation (3) and we add a variable, Lines Total, which represents the total number of business lines each firm participates in during that year. Because we are now using pooled cross-sectional data, we use general least squares (GLS) random-effects models to test the causal relation between diversification activity and performance.[33] GLS models can correct for the presence of serial autocorrelation and heteroskedasticity which are common issues in pooled time series data (Kmenta, 1986; Mansi and Reeb, 2002).

[Table 7 about here]

[Table 8 about here]

Table 7 shows that adding an additional business line is associated with declining performance for up to the next three years, Δ Lines is positive and significant in every model. The variable NPW/GPW is also positive and significant in every model, indicating that firms that retain more policy risk in the current year experience higher loss ratios in future years. Table 8 reports similar results, Lines Total is positive and significant and of equal magnitude in both the full sample model and the diversifier only model, again

[33] The result of the Hausman test (P>chi2 = 0.2944) indicates that random effects models produce more efficient estimators than fixed effects. Further testing for the presence of random-effects also confirm the use of random effects over OLS estimates (see LM statistic in Table 7).

verifying that additional business lines decrease the overall performance of a firm. Though the findings of Table 7 and Table 8 lack the ability to uncover the source of the performance decline in these firms, they are consistent with the diversification discount literature of Lang and Stultz (1994), Berger and Ofek (1995), Laeven and Levine (2007), Liebenberg and Sommer (2008), Berger et al. (2010), Ammann et al. (2012), and Hoechle et al. (2012).

One potential explanation of the primary finding in our paper is that diversifying firms could have downward trending loss ratios in the years prior to diversifying which persist after the diversification event. Therefore we test for the presence of a downward performance trend using a specification similar to models presented in Powell, Hoyt, and Mustard (2006)[34]:

$$\begin{aligned} Old\ LR_{it} = Constant + Before_{it} + After_{it} + Size_{it} + Growth_{it} + CatX_{it} + NPW/GPW_{it} \\ + MAGDP_{it} + Mutual_{it} + Year\ fixed\ effect_t + \varepsilon_{it}. \end{aligned} \tag{4}$$

Where $Before_{it}$ measures the distance in years each observation is from the diversification event, and $After_{it}$ measures the distance each observation is in years following the diversification event.[35] The estimates on "Before" and "After" are easy to interpret – positive estimates would indicate that the old loss ratio was increasing (worsening) before or after the diversification event, while negative estimates would

[34] Other papers that have used similar techniques to evaluate the before/after impact of specific treatments include Lott (1998), Mustard (2001), Plassman and Whitely (2003), and Grinols and Mustard (2006).
[35] For example, if a firm diversified in 2008, the before variable for 2008 = 0, 2007 = -1, 2006 = -2, 2005 = -3, etc. The after variable for the firm in 2008 = 0, 2009 = 1, 2010 = 2, 2011 = 3, etc.

indicate that the old loss ratio was decreasing (improving) before or after the diversification event. If diversifying firms are experiencing downward trending performance before diversifying, then we would expect to see the Before variable positive and significant. However, the results of Table 9 show just the opposite, after controlling for determinants of the loss ratio, there appears to be no trend in the existing business loss ratio in the years prior to diversification. The coefficient on Before in each model fails to show any significance. Model 2 also shows that after diversifying, the old loss ratio actually improves during that period as the coefficient on After is negative and significant. This result is also supported in the univariate findings, where the median old loss ratio gradually improves following a diversification event.

[Table 9 about here]

3.6 Conclusion

The purpose of this paper is to investigate the source of the diversification discount. We examine three potential sources of the discount namely, firm performance in the pre-diversification period, existing segment performance in the post-diversification period, and the performance of the newly acquired business lines. Prior research have been unable to identify the performance of the separate lines due to the lack of segment-level performance data from COMPUSTAT.

Using a sample of U.S. property casualty insurers with performance data available at the business segment level, we find some evidence that diversifying firms underperform peer firms that do not diversify in the three years before the diversification event. Median ROA and UROA of diversifying firms were ranked significantly lower than non-diversifying firms in univariate tests. This finding is consistent with theories suggesting that diversification activity can be the result of dynamic value-maximizing behavior of underperforming firms. However, in the year firms diversify the performance disparity dramatically widens. Both means and medians of all our performance variables prove to be significantly worse in the three subsequent years for diversifying firms than for non-diversifiers, consistent with the idea that diversification itself destroys value. Next we disaggregate the diversifying firms into two parts, one part comprising of the existing business lines the firm participated in before they diversified, and one part comprising of the new business lines. We track the loss ratios of each part to identify the source of the poor performance in the post diversification period. We find that the existing business loss ratio increases by 5.4% in the year firms diversify, and is consistently higher for the next 3 years. Our multivariate analysis confirms that diversifiers experience significant performance declines in the post-diversification period. This finding is consistent with the research that links the diversification discount with poor resource allocation in conglomerate firms, adding a new business line should have no direct impact on the existing business segments unless the corporate focus and resources are being siphoned from those units. We also find that the new lines are considerably more profitable than the existing business lines (the loss ratio averages 6% lower in the post-diversification period), a finding inconsistent with the idea that managers are diversifying into underperforming sectors (agency theory).

Table 3.1 Prior Literature

Panel A – The Diversification Discount/Premium

Author	Database	Primary findings
		Inter-industry studies
Lang and Stulz (1994)	Segment file	Tobin's Q and diversification is negatively related
Berger and Ofek (1995)	Segment file	Diversified firms trade at a 15% discount to their imputed value.
Servaes (1996)	Segment file	Diversified firms traded at a discount during the 1960's and 70's.
Lamont and Polk (2002)	Segment file	Changes in firm investment diversity is negatively related to changes in excess value.
Villalonga (2004b)	BITS	Diversified firms trade at a significant premium compared to single-segment firms
Santalo and Becerra (2008)	Segment file	Find both premiums and discounts for diversified firms depending on the industry of the firm.
		Intra-industry studies
Hoyt and Trieschmann (1991)	NAIC	Find higher average returns for focused insurers
Tombs and Hoyt (1994)	NAIC	Find a negative relation between diversification and stock returns.
Elango, Ma, Pope (2008)	NAIC	ROA and ROE are lower for diversified firms
Liebenberg and Sommer (2008)	NAIC	ROA and ROE are lower for diversified firms

Panel B – Explaining the Discount

		Resource Misallocation
Lamont (1997)		He observed that oil firms decrease their investment in non-oil segments following decreases in oil revenues.
Shin and Stulz (1998)		Show that investments made by one segment of a diversified firm are dependent on the cash flows of the other segments.
Scharfstein (1998)		Diversified firms invest too much in low-q divisions.
Rajan et al. (2000)		Model the inefficiencies of ICMs and find empirical support consistent with their model.
Mitton (2012)		The misallocation of capital is primarily responsible for the inefficiencies in diversified firms.
		Agency Cost
Roll (1986)		Hubris on the part of the decision maker can lead to overpayment during acquisitions.
Jensen (1986)		Self-interested managers will use free cash flows to acquire poor investments to increase their own power, prestige, or compensation.

Jensen and Murphy (1990)	Managers will diversify to increase their own compensation.
Amihud and Lev (1981)	Managers diversify the firm because they cannot diversify their own portfolios.
Shleifer and Vishny (1989)	Managers entrench themselves by becoming specialists of diversified business divisions.
Hyland and Diltz (2002)	Manager compensation increases following diversification activity.
No Discount/Other Explanations	
Campa and Kedia (1999)	Conglomerates are different from single-segment firms. After controlling for these differences, the discount drops all together.
Graham et al. (2002)	Newly acquired segments were trading at a discount before the acquisition.
Campa and Kedia (2002)	Firms self-select into diversification. After controlling for the endogenous choice, the diversification discount disappears.
Villalonga (2004a)	Also finds that the discount disappears following controls for endogeneity.
Hund, Monk, and Tice (2010)	Find the diversification discount is an artifact of uncertainty in growth rates of diversified firms.
Hund, Monk, and Tice (2011)	Modify the excess value approach to evaluate diversified firms. They find that diversified firms trade at a premium compared to similar focused firms.

Table 3.2 – Summary Statistics

Sample period is 2000 – 2012. ROA is the ratio of net income to assets. UROA represents underwriting return on assets which is the ratio of underwriting profits to assets. Loss ratio is computed as: $(losses\ incurred + loss\ expense)/premiums\ earned$. Size is the natural log of assets. Growth is the one-year percent growth in premiums.

Panel 1 – Summary statistics

	Means			Medians		
Variable	Non-Diversifiers	Diversifiers	T-test	Non-Diversifier	Diversifier	Wilcoxon Approx. Z
ROA	0.0100	0.0105	0.27	0.0150	0.0147	0.06
UROA	-0.0190	-0.0186	0.17	-0.0122	-0.0138	0.72
Loss Ratio (LR)	0.5404	0.6033	4.69***	0.6168	0.6470	3.34***
Size	17.1118	18.2093	10.52***	16.9776	17.9787	9.54***
Growth	0.0246	0.1031	6.70***	0.0476	0.0881	8.05***
NPW/GPW	0.7158	0.6404	6.52***	0.7572	0.6608	7.89***
CatX	0.1794	0.2700	5.78***	0.0000	0.1315	11.28***
Mutual	0.3349	0.2505	3.86***	0.0000	0.0000	3.22***
Market GDP	41,579	41,724	0.41	40,879	41,682	2.11**

Panel 2 – Loss Ratio (LR) by business line

	Non-Diversifiers			Diversifiers					
Line of Business	N	Mean LR	Median LR	N	Mean LR	Median LR	Diff	T-test	Wilcoxon Approx. Z
Fire & Allied Lines	401	57.7%	57.5%	446	60.7%	60.3%	-0.030	1.72*	1.44
Farmowners	150	63.3%	65.4%	161	68.5%	67.2%	-0.051	1.91*	1.71*
Homeowners	312	73.8%	72.8%	378	70.0%	70.9%	0.038	2.38**	2.77***
Mortgage Guaranty	6	42.1%	40.9%	21	41.5%	54.0%	0.006	0.04	0.41
Ocean Marine	52	62.2%	60.6%	131	68.5%	72.3%	-0.063	1.28	1.57
Inland Marine	285	41.6%	39.2%	415	44.4%	43.0%	-0.028	1.36	1.94*
Financial Guaranty	15	62.5%	57.4%	29	37.9%	28.9%	0.246	2.00**	2.09*
Medical Malpractice	118	70.3%	67.7%	114	75.1%	75.2%	-0.048	1.29	1.58
Earthquake	96	11.3%	0.4%	179	18.9%	4.3%	-0.075	2.19**	3.01***
Accident & Health	85	65.5%	69.1%	165	64.8%	69.7%	0.007	0.16	0.23
Workers Compensation	264	77.0%	75.8%	284	78.2%	80.0%	-0.011	0.55	1.66*
Products Liability	92	55.1%	53.5%	188	63.6%	65.1%	-0.085	1.82*	1.84*
Aircraft	16	84.4%	95.0%	79	85.1%	87.8%	-0.007	0.09	0.07
Fidelity	76	33.0%	27.4%	152	46.1%	44.8%	-0.132	2.74***	2.89***
Surety	154	33.6%	21.9%	231	40.2%	35.4%	-0.066	1.82*	2.60***
Burglary & Theft	107	29.9%	25.0%	185	44.8%	43.4%	-0.149	3.80***	3.58***
Boiler & Machinery	40	45.2%	38.9%	136	45.3%	39.5%	-0.001	0.02	0.08
Credit	17	51.0%	56.9%	99	48.2%	48.6%	0.028	0.31	0.47
International	7	59.3%	70.1%	40	80.3%	85.3%	-0.210	1.62	1.56
Auto	382	74.7%	73.0%	436	71.5%	72.5%	0.032	2.37**	1.96**
Commercial Multi-peril	242	63.4%	63.5%	362	66.6%	67.8%	-0.032	1.54	1.98**
Other Liability	420	57.0%	55.4%	510	60.1%	62.1%	-0.031	1.58	2.27**

Table 3.3: Composition of primary business lines for diversifying and non-diversifying firms.

Sample years are 2000-2012. A firm's primary business line is the business line that represents the largest portion of total premiums written in a given year. The sample of diversifier firm years (n = 1,081) are sampled the year prior to diversification activity. The non-diversifying sample's participation rates (n = 970) are the median number of participants each year participating in the various lines. The weighted average loss ratio combines the industry loss ratios reported in Table 2 with the reported participation as the weights.

	Non-Diversifiers		Diversifiers		Difference
Primary Line of Business	n	%	n	%	%
Fire	84	8.7%	77	7.1%	1.5%
Farmowners	8	0.8%	10	0.9%	-0.1%
Homeowners	116	12.0%	136	12.6%	-0.6%
Mortgage Guaranty	4	0.4%	3	0.3%	0.1%
Ocean Marine	5	0.5%	7	0.7%	-0.1%
Inland Marine	16	1.7%	20	1.9%	-0.2%
Financial Guaranty	11	1.1%	0	0.0%	1.1%
Medical Malpractice	109	11.2%	38	3.5%	7.7%
Earthquake	1	0.1%	4	0.4%	-0.3%
Accident & Health	34	3.5%	27	2.5%	1.0%
Workers Compensation	128	13.2%	116	10.7%	2.5%
Products Liability	3	0.3%	3	0.3%	0.0%
Aircraft	0	0.0%	5	0.5%	-0.5%
Fidelity	1	0.1%	1	0.1%	0.0%
Surety	61	6.3%	33	3.1%	3.2%
Burglary & Theft	1	0.1%	5	0.5%	-0.4%
Boiler & Machinery	0	0.0%	0	0.0%	0.0%
Credit	4	0.4%	13	1.2%	-0.8%
International	1	0.1%	3	0.3%	-0.2%
Auto	264	27.2%	315	29.1%	-1.9%
Commercial Multi-peril	48	5.0%	92	8.5%	-3.6%
Other Liability	71	7.3%	173	16.0%	-8.7%
Weighted Average Loss Ratio		66.85%		66.83%	0.02%

Table 3.4: Diversifying firms' peer-adjusted performance before and after diversification events

Notes: Longitudinal study of firms diversifying at time t. Mean and median differences between diversifying and non-diversifying firms are reported for return on assets ($Net\ Income/Assets$), underwriting return on assets ($Underwritng\ Net\ Income/Assets$), and total loss ratio ($(losses\ incurred + Loss\ Adj.expense)/premiums\ earned$. All ratios are winsorized at the 5th and 95% percentile. T-statistics are reported in parentheses for means, Wilcoxon-sum rank score p-values are reported in parentheses for medians. ***, **, * denote significance at the 1%, 5%, and 10% levels respectively.

t	ROA Mean	ROA Median	UROA Mean	UROA Median	LR Mean	LR Median
-3	0.0004	-0.0017	-0.0016	-0.0024*	0.0238***	0.0025*
	(0.25)	(0.1685)	(-0.73)	(0.0582)	(2.63)	(0.0694)
-2	-0.0019	-0.0011**	-0.0031	-0.0027***	0.0180**	0.0001
	(-1.21)	(0.0221)	(-1.61)	(0.0064)	(2.17)	(0.1444)
-1	-0.0021	-0.0018**	-0.0019	-0.0014***	0.0019	0.0001
	(-1.41)	(0.0119)	(-1.12)	(0.0050)	(0.24)	(0.3545)
0	-0.0062***	-0.0053***	-0.0081***	-0.0052***	0.0137*	0.0055*
	(-4.44)	(0.0001)	(-4.71)	(0.0050)	(1.86)	(0.0854)
+1	-0.0044***	-0.0048***	-0.0055***	-0.0046***	0.0276***	0.0117***
	(-3.01)	(0.0001)	(-3.03)	(0.0001)	(3.55)	(0.0017)
+2	-0.0033**	-0.0026***	-0.0033*	-0.0008***	0.0155**	0.0047*
	(-2.18)	(0.0012)	(-1.75)	(0.0052)	(2.06)	(0.0882)
+3	-0.0033**	-0.0026***	-0.0064***	-0.0052***	0.0223***	0.0165***
	(-2.00)	(0.0012)	(-3.12)	(0.0001)	(2.69)	(0.0021)

Table 3.5: Old and new business loss ratios following a diversification event

Sample: diversifying firms for years 2000 – 2012. Firms diversify in year t=0. The business lines firms participated in before they diversified (t=0) are considered "old", and the business lines the firms diversify into are "new". The loss ratio is computed as $(losses\ incurred + Loss\ Adj.\ expense)/premiums\ earned$.

	Mean	Median	(1) T-test Old LR $_t$ - Old LR $_{t=-1}$	(2) T-test Old LR $_t$ - New LR $_t$	(3) Wilcoxon P(Old $_{t=-1}$ < Old $_t$)	(4) Wilcoxon P(Old $_t$ > New $_t$)
Old Loss Ratio $_{t=-1}$	0.588	0.628				
Old Loss Ratio $_{t=0}$	0.642	0.654	(4.81)		(<.0001)	
Old Loss Ratio $_{t=+1}$	0.643	0.662	(4.94)		(<.0001)	
Old Loss Ratio $_{t=+2}$	0.622	0.650	(3.02)		(0.0482)	
Old Loss Ratio $_{t=+3}$	0.623	0.590	(2.62)		(0.0694)	
New Loss Ratio $_{t=0}$	0.572	0.604		(6.60)		(<.0001)
New Loss Ratio $_{t=+1}$	0.557	0.600		(8.06)		(<.0001)
New Loss Ratio $_{t=+2}$	0.563	0.603		(5.38)		(<.0001)
New Loss Ratio $_{t=+3}$	0.568	0.590		(4.76)		(<.0001)

Table 3.6: Multivariate analysis of the change in the existing business lines' loss ratio after a diversification event

Sample period is 2000 to 2012. The dependent variables are the change in loss ratio of the group of business lines the firm held the year before it diversified (Old LR). The loss ratio is computed as: $(losses\ incurred + loss\ expense)/premiums\ earned$. Size is the natural log of assets. Growth is the one-year percent growth in premiums. NPW/GPW is the ratio of net premiums (net of reinsurance) to gross premiums written. CatX represents the firm's catastrophic exposure which is the percent of property premiums written in coastal states vulnerable to hurricanes. Mutual = 1 if the firm is organized as a mutual, = 0 otherwise. Market GDP represents the weighted average per capita GDP based on the states the firm does business in. OLS standard errors are reported in parenthesis. ***, **, * represent p<0.01, p<0.05, and p<0.10 respectively.

VARIABLES	$DV = LR_{t=0} - LR_{t=-1}$	$DV = LR_{t=1} - LR_{t=-1}$	$DV = LR_{t=2} - LR_{t=-1}$	$DV = LR_{t=3} - LR_{t=-1}$
Constant	0.334***	0.292***	0.237*	0.265**
	(0.101)	(0.109)	(0.122)	(0.134)
Size	-0.016***	-0.016***	-0.015***	-0.017***
	(0.004)	(0.004)	(0.004)	(0.005)
Growth	-0.091***	-0.025	-0.009	-0.061
	(0.028)	(0.031)	(0.034)	(0.039)
CatX	-0.046	-0.050	-0.049	-0.040
	(0.028)	(0.031)	(0.034)	(0.039)
NPW/GPW	-0.034	-0.017	0.037	-0.045
	(0.035)	(0.038)	(0.042)	(0.047)
Market GDP	0.013	0.021	0.013	0.031
	(0.017)	(0.018)	(0.020)	(0.021)
Mutual	-0.037*	-0.034	-0.023	-0.014
	(0.020)	(0.022)	(0.024)	(0.026)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,041	898	765	651
R^2	0.057	0.063	0.090	0.114

Table 3.7: Change in the number of business lines

Sample represents the years 2000 to 2012 and include all available firm years. The dependent variables are the change in loss ratio of the group of business lines the firm held the year before it diversified (Old LR). Loss ratio is computed as: $(losses\ incurred + loss\ expense)/premiums\ earned$. Δ Lines represents the number of business lines added that year. Size is the natural log of assets. Growth is the one-year percent growth in premiums. NPW/GPW is the ratio of net premiums (net of reinsurance) to gross premiums written. CatX represents the firm's catastrophic exposure which is the percent of property premiums written in coastal states vulnerable to hurricanes. Mutual = 1 if the firm is organized as a mutual, = 0 otherwise. Market GDP represents the weighted average per capita GDP based on the states the firm does business in. All specifications use random effects estimators, standard errors in parenthesis. L.M. P-value is the result of the Breusch and Pagan Lagrangian multiplier test for random effects for each model. Standard errors are reported in parenthesis. ***, **, * represent p<0.01, p<0.05, and p<0.10 respectively.

Panel A: Number of observations that report a change in the number of business lines

Non-Diversifiers		Diversifiers	
Δ Lines ≤ -1	n = 186	Δ Lines ≤ -1	n = 590
Δ Lines ≥ 1	n = 0	Δ Lines ≥ 1	n = 825
Min = -16		Min = -13	
Max = 0		Max = 12	

Panel B: Multivariate analysis

VARIABLES	$DV = OLR_{t+1} - OLR_t$	$DV = OLR_{t+2} - OLR_t$	$DV = OLR_{t+3} - OLR_t$
Constant	-0.026	-0.054	-0.136***
	(0.023)	(0.035)	(0.049)
Δ Lines	0.011***	0.013***	0.010***
	(0.003)	(0.003)	(0.004)
Size	0.001	0.0004	0.002
	(0.001)	(0.002)	(0.002)
Growth	0.010	0.016	0.037***
	(0.008)	(0.010)	(0.012)
CatX	0.009	0.022**	0.011
	(0.007)	(0.010)	(0.014)
NPW/GPW	0.028***	0.055***	0.082***
	(0.009)	(0.013)	(0.017)
Market GDP	0.00002	-0.003	0.003
	(0.003)	(0.004)	(0.006)
Mutual	0.00001	0.005	0.011
	(0.005)	(0.007)	(0.010)
Year fixed effects	Yes	Yes	Yes
Observations	10,687	9,290	8,027
Pseudo R^2	0.0147	0.0264	0.0424
L.M. P-value	<.0001	<.0001	<.0001

Table 3.8: Total business lines

Sample represents the years 2000 to 2012 and include all available firm years. The dependent variables are the loss ratio and old loss ratio which for diversifiers is the group of business lines the firm held the year before it diversified, for non-diversifiers it is simply their loss ratio. Loss ratio is computed as: $(losses\ incurred + loss\ expense)/premiums\ earned$. Lines represents the number of business lines the firm participated in that year. Size is the natural log of assets. Growth is the one-year percent growth in premiums. NPW/GPW is the ratio of net premiums (net of reinsurance) to gross premiums written. CatX represents the firm's catastrophic exposure which is the percent of property premiums written in coastal states vulnerable to hurricanes. Mutual = 1 if the firm is organized as a mutual, = 0 otherwise. Market GDP represents the weighted average per capita GDP based on the states the firm does business in. All specifications use random effects estimators, standard errors in parenthesis. L.M. P-value is the result of the Breusch and Pagan Lagrangian multiplier test for random effects for each model. Standard errors are reported in parenthesis. ***, **, * represent p<0.01, p<0.05, and p<0.10 respectively.

VARIABLES	Full Sample DV=Loss Ratio	Diversifiers Only DV=Loss Ratio
Constant	0.192***	0.368***
	(0.049)	(0.069)
Lines Total	0.005***	0.005***
	(0.001)	(0.002)
Size	0.028***	0.023***
	(0.003)	(0.004)
Growth	0.005	-0.005
	(0.007)	(0.010)
CatX	0.023*	0.016
	(0.013)	(0.017)
NPW/GPW	-0.081***	-0.067***
	(0.013)	(0.017)
Market GDP	-0.009	-0.031***
	(0.006)	(0.009)
Mutual	0.041***	0.036***
	(0.010)	(0.013)
Constant	0.192***	0.368***
	(0.049)	(0.069)
Year fixed effects	Yes	Yes
Observations	12,711	6,041
Pseudo R^2	0.1083	0.0899
L.M. P-value	<.0001	<.0001

Table 3.9: Trends Analysis

Using the Hoyt, Mustard, and Powell (2006) trend analysis method. Two new variables are created that represent the trend in the dependent variable before and after the event (diversification into a new line). The new variables count the distance from the event in years. For example, if Firm X diversified in 2008, the before variable for 2008 = 0, 2007 = -1, 2006 = -2, 2005 = -3, etc. The after variable for Firm X in 2008 = 0, 2009 = 1, 2010 = 2, 2011 = 3, etc. F-test is used to determine the difference between Before and After (H_0: Before = After). The dependent variable is the old loss ratio for diversifiers or the overall loss ratio for non-diversifiers. Loss ratio is computed as: $(losses\ incurred + loss\ expense)/premiums\ earned$. Size is the natural log of assets. Growth is the one-year percent growth in premiums. NPW/GPW is the ratio of net premiums (net of reinsurance) to gross premiums written. CatX represents the firm's catastrophic exposure which is the percent of property premiums written in coastal states vulnerable to hurricanes. Mutual = 1 if the firm is organized as a mutual, = 0 otherwise. Market GDP represents the weighted average per capita GDP based on the states the firm does business in. Model 1 coefficients are based on OLS estimators, Model 2 coefficients are based on random effects estimators, standard errors in parenthesis. L.M. P-value is the result of the Breusch and Pagan Lagrangian multiplier test for random effects for each model. Standard errors are reported in parenthesis. ***, **, * represent p<0.01, p<0.05, and p<0.10 respectively.

VARIABLES	OLS DV=Old LR	GLS-RE DV=Old LR
Constant	0.2368***	0.1618**
	(0.0349)	(0.0646)
Before	0.0006	-0.0020
	(0.0017)	(0.0018)
After	-0.0012	-0.0034***
	(0.0012)	(0.0013)
Size	0.0304***	0.0392***
	(0.0014)	(0.0029)
Growth	-0.0157	0.0005
	(0.0198)	(0.0173)
CatX	0.0314***	0.1004***
	(0.0095)	(0.0165)
NPW/GPW	-0.1234***	-0.1075***
	(0.0133)	(0.0167)
Market GDP	-0.0172***	-0.0432***
	(0.0053)	(0.0088)
Mutual	0.0648***	0.0451***
	(0.0069)	(0.0131)
Year Fixed Effects	Yes	Yes
F-statistic for difference in Before and After	0.58	0.44
Probability >F	0.4481	0.5065
Observations	6,218	6,218
R-squared	0.1360	0.1268
LM Statistic		<.0001

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"What Determines Bank Performance: Is it the Market or the Manager?", with Ken B. Cyree, *Working Paper*, 2012, University of Mississippi.

“Tobin’s Q and Long-Term Performance”, *Working Paper*, 2009, University of Mississippi.

“Cutting Dividends During a Recession: The Case of the 2008 Credit Crisis”, with Andre P. Liebenberg and Ivonne A. Liebenberg, *Working Paper*, 2011, University of Mississippi.

“Firm Diversification and Abnormal Long-Run Returns”, *Working Paper,* 2010, University of Mississippi.

“Dividends as a Solution to Agency Cost and Opaqueness: Theory and Evidence”, *Working Paper*, 2013, with Brian Roseman and Kathleen P. Fuller.

Conferences:

- 2013 FMA Annual Meeting, Chicago, IL, Presenter, *Effects of Diversification Strategy on Firm Performance*
- 2012 American Risk and Insurance Association (ARIA), Minneapolis, MN, Presenter/Session Chair, *Effects of Diversification Strategy on Firm Performance*
- 2012 Southern Finance Association (SFA), Charleston, SC, Presenter, *Return and Liquidity Response to SEC Investigation Announcements*
- 2012 Southern Risk and Insurance Association (SRIA), Savannah, GA, *Effects of Diversification Strategy on Firm Performance*

Industry Service Publications:

With Larry A. Cox, “Performance of Leading Insurers in Mississippi – 2008”, *Independent Insurance Agents of Mississippi*, 29 (4), Fall 2009

With Larry A. Cox, “Performance of Leading Insurers in Mississippi – 2009”, *Independent Insurance Agents of Mississippi*, 30 (4), Fall 2010

With Andre P. Liebenberg, “Underwriting Performance of Leading Insurers in Mississippi – 2010”, *Independent Insurance Agents of Mississippi*, 31 (4), Fall 2011

Teaching Experience

Teaching interests: Corporate Finance, Financial Markets and Institutions, Risk Management and Insurance

Course	Term
Business Finance I	Fall 2013
Business Finance I	Fall 2013
Risk Management and Insurance	Spring 2013
Risk Management and Insurance	Fall 2012
Doctoral Student Boot Camp	Summer 2012
Business Finance I	Fall 2011

Other Experience

Employment: Microsoft Tech Support, Convergys, Lynden, UT, 2001-2002
Benefits Advisor, Health and Benefits Systems, Overland Park, KS, 2004-2009

Database Proficiency: CRSP, Compustat, Segment file, NAIC, FDIC, Call/TFR data, TAQ, Securities Class Action Clearinghouse (SCAC), Federal Securities Regulation (FSR) database, BEA census data

Statistical Packages: SAS, STATA 12, SPSS

Selected Abstracts

Essay 1: "Effects of Diversification Strategy on Firm Performance" with Stephen G. Fier and Andre P. Liebenberg.

Abstract

This article investigates the relationship between diversification strategy and firm performance in the U.S. property-liability insurance industry. Prior literature has evaluated the effect of total diversification on insurer performance; however, there is an absence of evidence on the effect of diversification strategy for multi-line insurers. Theory suggests that related diversifiers should benefit from economies of scope while unrelated diversifiers should benefit from uncorrelated earnings streams. We test for the net effect of diversification strategy and find that relatedness negatively impacts accounting performance. However, we find that the relatedness penalty is confined to stock insurers while mutual insurers' profitability appears to be unaffected by diversification strategy. Our article is the first to document the strategy-performance effect within U.S. property liability insurers.

Essay 2: "Return and Liquidity Response to SEC Investigation Announcements" with Jared F. Egginton and Kathleen Fuller.

Abstract

This study measures the impact government enforcement actions have on market quality by examining firms who are investigated by the Securities and Exchange Commission. Prior to a formal investigation announcement, markets appear to be uncertain to the future states of suspect firms. Post investigation announcement, asymmetric information appears to decrease with reductions in quoted and effective spreads. Bid close-to-close returns improve and return volatility also decrease post investigation announcement. Our results are consistent across size sorted portfolios. These findings suggest that government enforcement actions restore market participant confidence as liquidity improves and uncertainty decreases following an investigation announcement.

Essay 3: "Explaining the Diversification-Performance Penalty: A Longitudinal Analysis of Business Segment Performance" with Stephen G. Fier, Andre P. Liebenberg, and Ivonne A. Liebenberg.

Abstract

This article investigates the source of the diversification discount commonly found in the literature pertaining to corporate diversification (Berger and Ofek, 1995). Prior studies have had difficulty identifying the source of the discount due to data limitations from traditional sources. We use a sample of U.S. property casualty insurers with performance data (loss ratio) available at the segment-level, we are able to track the performance of existing segments before and after the firm acquires a new business line. This allows us to determine whether the discount is due to the underperformance of the newly acquired segments and/or if the addition of a new line actually affects the performance of the existing lines. We find evidence that diversifying firms underperform in the three years before the diversification event, and that the performance disparity between diversifying and non-diversifying firms dramatically widens in the post-diversification period. We document that the existing business segment's loss ratios increase by 5.4% (worsens) in the year the firm diversifies, and remains consistently higher for the next 3 years. We also

find that the new lines significantly outperform the existing business lines by an average margin of 6% in the post-diversification period. Our multivariate tests confirm these results. Therefore, we trace the source of the diversification discount to the declining performance in the existing business segments following the addition of a new line, supporting the notion that corporate diversification destroys value.