THE DETERMINANTS AND EFFECTS OF CORPORATE DIVERSIFICATION: EVIDENCE FROM THE PROPERTY-LIABILITY INSURANCE INDUSTRY

by

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(Under the Direction of David W. Sommer)

ABSTRACT

This dissertation investigates the determinants and effects of corporate diversification using a sample of property-liability (P/L) insurers over the period 1995 to 2002. First, we canvas the extant literature across several disciplines in order to identify theoretical explanations for why managers diversify their firms. Prior research provides three prominent explanations for corporate diversification: the agency hypothesis, the efficiency hypothesis, and the coinsurance hypothesis. We test the ability of these explanations to explain observed variation in diversification status, extent, and strategy among P/L insurers. Our results suggest that existing theory is at least partially successful in explaining variation in diversification levels and strategies among insurance firms. Although the agency and efficiency views are more successful than the coinsurance view in explaining both total and unrelated diversification, we are unable to find unambiguous support for either of these views. We do, however, find support for our reformulated managerial discretion hypothesis in the sub-sample of unaffiliated insurers.

Next, we review theory and evidence regarding the performance effects of diversification. The strategic focus hypothesis predicts a negative relation between diversification and performance while the conglomeration hypothesis predicts a positive relation. We develop and test a model that explains performance as a function of line-of-business

diversification and other correlates. We consistently find that undiversified insurers outperform diversified insurers in terms of both ROA and ROE. Our results indicate that diversification is associated with a penalty of at least 1% of ROA or 3.5% of ROE. When we confine our analysis to diversified firms we find a negative relation between the extent of diversification and both ROA and ROE. While there is some evidence suggesting a nonlinear, U-shaped, relation between the extent of diversification and performance we find that highly diversified insurers do not outperform their more focused counterparts. Taken together, our findings provide strong support for the strategic focus hypothesis.

INDEX WORDS: Insurance, Diversification, Performance.

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CHAPTER ONE: INTRODUCTION

1.1) Introduction

The US property-liability (P/L) insurance industry consists of over two thousand active firms that differ substantially across several characteristics, including size; group affiliation; ownership structure; distribution system; geographic scope; and product diversification. The extant literature has provided explanations for the coexistence of firms that differ across the majority of these characteristics. A striking exclusion from prior empirical analysis is the observed heterogeneity in line of business (product) diversification. While measures of product diversification have featured in several agency theoretic analyses as proxies for managerial discretion, there is little evidence regarding either the determinants or the effects of line-of-business diversification by P/L insurers. This dissertation develops and tests hypotheses regarding diversification's determinants and effects using a large sample of P/L insurers over an eight-year period.

1.2) Research questions

This dissertation attempts to answer two questions that have not been addressed in the insurance literature. First: why do we observe the coexistence of insurers that specialize in one or a few lines and insurers that diversify their operation across many product lines? We attempt to answer this question by looking to literature from finance, strategic management, and economics that explains why managers diversify their firms. We develop and test a two-step model that explains variation in observed levels of insurer product diversification. We find

support for a number of theoretical arguments. The second question that we address is: what are the performance consequences of different levels of diversification? Several diversification determinants identified in answering our first research question are expected to have opposite effects on insurer performance. For example, scope economies should have a positive effect on performance while agency costs should have a negative effect. We investigate the net effect of diversification on insurer performance in a multiple regression framework that models insurer performance as a function of diversification and other performance determinants. We find that undiversified (single-line) insurers outperform diversified (multi-line) insurers. When we examine performance differences among diversified firms we find a negative relation between the extent of diversification and performance.

1.3) Literature Review

Chapter 2 contains a review of the relevant literature and a summary of empirical evidence regarding our research questions. The chapter is divided into two sections. The first section reviews the theoretical and empirical research regarding diversification's determinants. This research provides three prominent explanations for corporate diversification: the agency hypothesis, the efficiency hypothesis, and the coinsurance hypothesis. In terms of the agency hypothesis diversification is the outcome of unresolved conflicts of interest between managers and owners. The efficiency hypothesis explains diversification as a way for firms to benefit from scope economies and efficient internal capital markets. The coinsurance hypothesis highlights risk-reduction as a motive for diversification.

The second section of Chapter 2 reviews the relevant literature on the effects of corporate diversification. We review two dimensions of this literature; the effect of diversification on firm value, and diversification's effect on performance. Although it is not our intention to empirically

examine the value effects of diversification, a review of this literature raises several methodological issues that motivate our analysis of the relation between diversification and performance in the P/L insurance industry. This section concludes with a summary of research that deals specifically with the effects of product diversification in the insurance industry. The performance literature yields two testable hypotheses: the conglomeration hypothesis and the strategic focus hypothesis. The conglomeration hypothesis emphasizes the benefits of diversification and predicts that diversification is performance enhancing. By contrast, the strategic focus hypothesis emphasizes the costs associated with diversification and the benefits of specialization and predicts that diversification reduces performance.

1.4) Methodology

Chapters Three and Four provide an empirical framework to analyze the determinants and effects of product diversification in the insurance industry. The analysis is divided into two studies, one presented in each chapter. Chapter Three tests hypotheses related to the determinants of diversification while Chapter Four evaluates the effect of diversification on insurer performance.

1.4.1) Chapter Three: Determinants of line of business diversification

Chapter Three develops and tests hypotheses informed by prior literature from finance, economics, and strategic management. Our analysis is motivated by the absence of studies that simultaneously examine diversification's hypothesized determinants. The richness and consistency of data reported by all P/L insurers to regulatory authorities make the P/L industry an ideal candidate for investigation. We model line of business diversification as a function of firm characteristics that reflect various hypothesized determinants. Two primary measures of

diversification are used as dependent variables: the traditional measure (total diversification) and a modified measure (unrelated diversification). We use cluster analysis to aggregate groups of relatively similar insurance lines into six separate clusters. We then define diversification across these clusters as unrelated diversification.

Our empirical analysis follows a two-step procedure. In the first step we evaluate the determinants of the choice to operate in more than one line of business (i.e. to be diversified). In the second step we confine our attention to diversified insurers and explain variation in diversification levels (both total and unrelated) in terms of our hypothesized determinants. Our study contributes to the insurance literature by providing theoretical reasons for observed variation in insurer diversification levels. The study also provides new evidence on the managerial discretion hypothesis.

1.4.2) Chapter Four: Performance effects of line of business diversification

Chapter Four investigates the effects on line-of-business diversification on insurer accounting performance. There is a lack of consensus in the diversification-performance literature regarding the performance and value effects of corporate diversification. Several of the problems encountered by prior researchers can be overcome by studying the insurance industry due to the availability of detailed and consistent statutory data regarding insurer activities.

Following the previous literature we model performance as a function of diversification and other determinants. Given the presence of both diversified and undiversified insurers in our sample we measure the performance effects in two stages. First, we follow the approach taken by diversification discount researchers and test whether diversified firms outperform single-line firms. We are mindful of the potential endogeneity problem that has been highlighted in recent finance studies and apply techniques used in this literature to control for potential bias. We then

confine our analysis to the sub sample of diversified insurers and test the effect of different levels of diversification on insurer performance. Finally, we test the relation between diversification strategy and firm performance.

1.5) Key Findings

This dissertation yields two sets of key findings. The first set of key findings arises from our analysis of the determinants of line of business diversification in Chapter 3. Our results suggest that existing theory is at least partially successful in explaining variation in diversification levels and strategies among insurance firms. Although the agency and efficiency views are more successful than the coinsurance view in explaining both total and unrelated diversification, we are unable to find unambiguous support for either of these views. We do, however, find support for our reformulated managerial discretion hypothesis in the sub-sample of unaffiliated insurers. Limits on managerial discretion afforded to managers of mutual insurance companies results in mutuals engaging in less unrelated diversification than their stock counterparts.

The second set of findings comes from our analysis of the effects of insurer diversification on accounting performance in Chapter 4. The most notable results from this section are those regarding the relation between accounting performance, and diversification status and diversification extent, respectively. Regarding diversification status, we consistently find that undiversified insurers outperform diversified insurers in terms of both ROA and ROE. Our results indicate that diversification is associated with a penalty of at least 1% of ROA or 3.5% of ROE. When we confine our analysis to diversified firms we find a negative relation between the extent of diversification and both ROA and ROE. While there is some evidence suggesting a nonlinear, U-shaped, relation between the extent of diversification and performance we find that

highly diversified insurers do not outperform their more focused counterparts. Taken together, our findings provide strong support for the strategic focus hypothesis.

CHAPTER TWO: PRIOR LITERATURE

2.1) Introduction

This chapter describes research from a wide range of disciplines that forms the theoretical basis for our empirical analyses. Section 2.2 describes various explanations for why managers diversify their firms and discusses empirical evidence regarding tests of these hypotheses. Section 2.3 reviews literature regarding the effects of diversification on firm value and on accounting performance.

2.2) Why do managers diversify their firms?

Prominent hypotheses, or views, that explain corporate diversification include the agency view, the efficiency view (which includes explanations based on economies of scope and internal capital markets), and the coinsurance view.

2.2.1) The Agency view

Proponents of the agency view of corporate diversification argue that the diversification decision results from a conflict of interest between the firm's owners and managers. In most corporate forms, where there is a separation between ownership and control, managers are inclined to engage in activities that maximize their personal utility rather than the utility of the owners (shareholders). In terms of the agency view, managers have an incentive to diversify firms in order to capture private benefits even when their actions reduce shareholder wealth. Accordingly, the majority of agency theoretic explanations of corporate diversification are

attempts at explaining the widely researched 'diversification discount'. Sources of private benefits that potentially drive 'excessive' diversification include empire building, managerial entrenchment, and managerial risk-aversion.

Empire Building: Self-interested managers have an incentive to use free cash flow to expand the firm (irrespective of whether such expansion/diversification maximizes shareholder wealth) rather than paying dividends because of the utility associated with managing a larger, more complex operation. While Jensen (1986) relates his free cash flow theory to diversification via mergers, the theory applies equally to other forms of value-reducing diversification such as entry into new business lines or product markets.

Managerial Entrenchment: Shleifer and Vishny (1989) describe how managers counter disciplinary forces by making themselves costly to replace. They argue that managers may over-invest (beyond the point of value maximization) in order to increase the firm's dependence on their skills. Diversification into areas where the incumbent manager has a comparative management advantage over potential replacements tends to entrench the incumbent by reducing the effectiveness of the market for managers (Shleifer and Vishny (1989)). It has been shown that, controlling for firm size, CEOs of multi-line firms earn substantially more than CEOs of pure-play firms (Rose and Shepard (1997)). Rose and Shepard (1997) test whether this observed premium paid to multi-line CEOs is due to managerial entrenchment or whether it represents compensation for the higher ability that is required to manage a more complex firm. Their empirical evidence supports the latter explanation.

Managerial Risk Aversion: Amihud and Lev (1981) attempt to explain the motives for corporate diversification via conglomerate mergers. They observe that, *a priori*, there does not seem to be any real economic benefit from the merger of functionally unrelated businesses as

synergies are not obtainable. Additionally, while conglomeration does reduce overall firm risk, shareholders are able to costlessly diversify this idiosyncratic risk in perfect capital markets by holding diversified portfolios. This leads Amihud and Lev (1981) to question the validity of the synergy and risk-reduction (coinsurance) explanations of conglomerate mergers and to offer their own explanation, grounded in agency theory, for the conglomerate merger phenomenon. They argue that managers may seek to reduce firm risk because their human capital that is tied to the firm is largely undiversifiable.

This managerial risk aversion hypothesis explains costly conglomerate diversification as the result of risk-averse managers who act in their own interests to protect their jobs at the expense of shareholders who are able to diversify firm risk at little or no cost. Amihud and Lev (1981) test their hypothesis by comparing the number of conglomerate acquisitions made by owner-controlled firms (where owner-manager conflict is low) to those made by manager-controlled firms (where owner-manager conflict is high). They find that the latter type of firm makes significantly more acquisitions than the former. Thus, conglomerate diversification is more prevalent in firms where the agency costs resulting from greater levels of separation of ownership and control are higher.

2.2.2) The Efficiency view

In contrast to value-reducing agency theoretic explanations discussed above, the efficiency view provides two explanations for corporate diversification that are motivated by the desire to maximize shareholder wealth. The efficiency view on corporate diversification uses transactions costs theory to explain why managers diversify their firms. In a transaction costs framework firms and markets are alternative governance mechanisms (Williamson (1975)). Firms diversify into new lines of business when the marginal benefits exceed the marginal costs of intrafirm

governance. Conversely, firms transfer subsidiaries or business lines to the market when the marginal costs exceed the marginal benefits. Benefits associated with housing several business units within one firm include economies of scope and internal capital markets.

Diversification provides firms with the opportunity to benefit from *economies of scope*. Cost scope economies arise from the sharing of fixed production costs across several businesses within the firm (Teece (1980)). Revenue scope economies may be realized due to the transfer of firm-specific intangible assets such as brand reputation and customer loyalty (Markides (1992)). In the context of financial firms, Herring and Santomero (1990) note that diversification provides "one stop shopping" convenience for customers who are willing to pay for the extra convenience of financial supermarkets.

Adding new lines of business also imposes costs on firms, such as the cost of monitoring management and operations. Accordingly, Teece (1980) argues that scope economies do not necessarily provide a rationale for diversification. Rather, a firm's degree of diversification will depend on the relative benefits of trading the common input or its services across markets. Only if this trading is difficult and intrafirm governance is superior will economies of scope be a valid reason for diversification. Thus, diversification for the purpose of benefiting from scope economies makes sense only when there are transaction costs.

The transaction costs literature provides two explanations for why internalization may be preferred to trading the asset to external markets (Hill (1994)). First, information asymmetries between managers and external markets regarding the true value of assets or services may impede external transfer. Second, specific asset investments may be difficult to transfer to other firms. Both of these explanations motivate the decision to incorporate the business unit in the corporate portfolio rather than transacting with the market.

Finance theorists have emphasized the beneficial effect of *internal capital and labor markets* that result from corporate diversification (e.g., Comment and Jarrell (1995); Matsusaka and Nanda (2002)). Because of information asymmetries between managers and external capital and labor markets it has been argued that managers of diversified firms may be more efficient at allocating capital and labor across their business units than would external markets. The diversified firm is likely to have better information regarding the ability and other traits of current employees wishing to transfer to other businesses within the firm than would outside employment agencies. Similarly, managers at head office are likely to have better information regarding the performance and opportunities of business units requiring capital than the external capital markets.

There are costs and benefits associated with internal capital markets. On the one hand, internal capital markets provide the firm with a real option to finance projects without having to access external capital (Matsusaka and Nanda (2002)). Myers and Majluf (1984) explain how internal capital is preferred to external capital because of adverse selection due to information asymmetries between the firm and external capital markets. On the other hand, internal capital markets may be costly in the presence of agency conflicts whereby managers use internal funds for their own benefit rather than to maximize shareholder wealth.

Access to internal capital markets provides managers with greater opportunities to over-invest or to increase their private benefits. External capital markets perform an important monitoring function that can be foregone when managers are able to rely on internal markets for capital (Easterbrook (1984)). In the absence of scrutiny by external markets, managers may be inclined to engage in value reducing activities such as overinvestment (Jensen (1986)). Moreover, it is more difficult to align managerial interest with those of owners in diversified

firms because divisional performance may not be observable. Meyer, Milgrom and Roberts (1992) argue that diversified firms can subsidize failing business segments with profits earned by more profitable segments. In this way diversification impedes market discipline that would have prevented the negative net present value investment.

2.2.3) The Coinsurance view

The coinsurance view of corporate diversification posits that firms diversify to benefit from a reduction in income volatility. Firms can diversify risk by combining businesses with imperfectly correlated earnings streams (Lewellen (1971)). This risk reduction translates into lower expected bankruptcy costs, greater debt capacity, and the ability to earn higher revenues from risk-sensitive customers. By decreasing the probability of bankruptcy diversification makes the conglomerate firm more attractive to lenders, thus increasing its debt capacity and reducing the cost of debt capital.

However, in perfect capital markets the reduction of firm-specific risk cannot be beneficial to shareholders because they are able to costlessly diversify this risk by holding a diversified portfolio (Levy and Sarnat (1970)). Thus, the risk-reduction is valuable because of market imperfections such as taxes and other transaction costs. Smith and Stulz (1985) show that lower income volatility leads to a reduction in expected taxes.

2.2.4) Environmental factors

In addition to the agency, coinsurance, and efficiency views on why firms diversify there is some literature that links diversification to environmental factors. Bergh and Lawless (1998) examine the effect of environmental uncertainty on corporate restructuring activity. They argue that product market uncertainty in a firm's existing portfolio affects its future diversification

behavior. As environmental uncertainty increases, so does the cost of managing multiple business lines. Accordingly, they predict that diversified firms will reduce their level of diversification (i.e. refocus) in times of high environmental uncertainty and increase their diversification level when environmental uncertainty is lower. They find support for this hypothesis for highly diversified firms only.

2.2.5) Empirical evidence on the determinants of diversification

Verweire (1999) points out that the majority of corporate diversification literature has focused on measuring and explaining the effects of different diversification strategies rather than examining the determinants of corporate diversification. A few studies, however, have attempted to explain variation in diversification levels across firms in terms of a number of observable factors. Finance researchers have concentrated on the agency explanation for corporate diversification, paying particular attention to the relation between managerial incentives and firm diversification. Strategy researchers have focused more on the efficiency view, emphasizing the role of firm characteristics as determinants of diversification strategy – whether related or unrelated.

Finance researchers testing the agency explanation for corporate diversification have found conflicting results. May (1995) finds that CEOs with more wealth tied up in the firm's stock engage in acquisitions that increase diversification. His evidence supports the Amihud and Lev (1981) managerial risk aversion view of corporate diversification. In contrast to May (1995), Denis, Denis and Sarin (1997) find a negative relation between managerial equity ownership and the level of diversification.[1]

[1] It is important to note that these two studies used different dependent variables. May (1995) regressed the 'diversification level sought' on CEO wealth invested in the firm. He measured this as the reduction in firm risk that

Aggarwal and Samwick (2003) reconsider the agency explanation for why managers diversify their firms. Consistent with the agency view of diversification they develop a model whereby diversification is related to managerial self-interest. As with previous studies they test whether managers diversify their firms to reduce idiosyncratic risk and/or to capture other private benefits associated with managing a larger, more-diversified organization. In a departure from the methodology followed by previous studies such as May (1995) and Denis, et al. (1997), Aggarwal and Samwick (2003) view diversification as an equilibrium outcome of changes in agency behavior.

Their empirical analysis includes cross sectional regressions as per the previous literature (e.g., Denis, et al. (1997)) and also fixed-effects regressions using several years of panel data. In a cross-sectional framework they find results consistent with Denis, et al. (1997); that diversification is decreasing in managerial incentives. However, when controlling for unobserved firm-specific factors in the fixed-effects regressions they find a positive relation between incentives and diversification – consistent with May (1995) and opposite to Denis, et al. (1997). While May (1995) attributes this relation to the risk-aversion motive, Aggarwal and Samwick (2003) show that their empirical results are due to the private benefits (empire building, prestige, etc.) explanation rather than managerial risk aversion.

In the strategy literature, Chatterjee and Wernerfelt (1991) empirically investigate whether firms diversify in order to utilize surplus financial and non-financial resources. The major difference in their approach to the finance literature is that they consider the linkage between the type of surplus resources and the relatedness of diversification. They compute a diversification index that measures movements in firm business concentration away from its core business

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resulted from an acquisition. By contrast, Denis, et al. (1997) regressed the actual level of diversification, measured as the number of reported segments, on managerial ownership.

across time. This index is then regressed on proxies for physical, tangible, and intangible resources. They find that firms with higher levels of intangible resources tend to diversify in a more related fashion while firms with greater financial resources (liquidity) tend to pursue unrelated diversification.

2.3) What are the effects of diversification?

The net effect of diversification on firm performance is determined by whether firms are able to maximize the benefits associated with diversification while minimizing its costs. Section 2.2 identified potential benefits and costs of operating in more than one line of business. Benefits identified include greater operating efficiency, risk-reduction, and efficient internal capital markets. Costs identified include agency costs, and inefficient internal capital markets.

Empirical evidence on whether firms are successful in offsetting diversification's costs with its benefits, is somewhat mixed. Martin and Sayrak (2003) survey the finance literature and report that while the majority of finance studies find that diversification destroys value, recent researchers have cast doubt on the existence of a diversification discount. Palich, Cardinal and Miller (2000) survey the management literature and find that no consensus exists on whether diversification increases or decreases accounting performance.

2.3.1) Diversification's effect on firm value

The most prominent approaches to measuring the effect of diversification on firm value are the event study methodology and the excess value method. Several authors have looked at the impact of merger and acquisition announcements on stock prices using an event study methodology (e.g., John and Ofek (1995); Berger and Ofek (1999); Graham, Lemmon and Wolf (2002)). Another method of evaluating the effects of diversification on firm value, originated by

Berger and Ofek (1995), is to compare the value of the 'whole' conglomerate to the sum of the value of its parts. This is done by imputing values for each segment of a multisegment firm using valuation multiples from the median stand-alone firm in the same industry as the segment being evaluated. The weighted sum of these imputed values is then compared to the actual market value of the conglomerate firm. The difference between the aggregate imputed value and the actual market value of the firm is referred to as the 'excess value'. Positive excess value implies that diversification is value enhancing while negative values imply that diversification destroys value. In a recent review of the finance literature, Martin and Sayrak (2003) describe three "rounds" of research that have provided evidence regarding diversification's impact on shareholder value.

The first round of research consists of empirical evidence suggesting that corporate diversification destroys shareholder value. Studies that fall into this category have found that diversified firms have lower Tobin's Q ((Lang and Stulz (1994); Servaes (1996); Wernerfelt and Montgomery (1988)); diversified firms tend to have negative excess values, implying that they trade at considerable discounts (Berger and Ofek (1995); Lamont and Polk (2002)); and that the stock market tends to react more favorably to increases in focus than to increases in diversification (Desai and Jain (1999); John and Ofek (1995)). Much of the agency theoretic literature reviewed above was forwarded in an attempt to explain this 'diversification discount'.

The second round of empirical research presents evidence that corporate diversification does not destroy value. Graham, et al. (2002) study the market reaction to acquisition announcements and calculate the excess values for firms after the acquisition. Consistent with research in the first round they find that excess values of acquirers decline after the acquisition. However, they show that this reduction in excess value for acquiring firms is due to the fact that the targets were

already discounted. They argue that a firm's excess value can decline after an acquisition if it acquires a business that is already trading at a discount. Similarly, Villalonga (2004) and Campa and Kedia (2002) argue that much, if not all, of the discount observed by previous researchers may be attributed to the fact that diversified firms would be discounted irrespective of their diversification status. Hence, it is possible that much of the evidence supporting the diversification discount is due to selection bias rather than the act of diversifying.[2]

While the first round of research finds evidence that diversification destroys value and the second explains this value loss as a function of self-selection or endogeneity, the third round argues that diversification actually *creates* shareholder wealth.

Round three of the empirical research finds evidence that diversified firms trade at a significant premium and that the discount observed in previous research is likely due to measurement errors. Villalonga (2004) investigates whether the diversification discount is simply an "artifact of segment data". Prior studies have used Compustat segment level data in order to estimate the degree of diversification (e.g. number of SIC codes, HHI across SIC codes). Firms are recorded as operating in a given Compustat segment (4-digit SIC code) if that segment represents at least 10% of the firm's sales, assets, or profits. This is because firms are required by the FASB to report information for segments that represent 10% of these variables. Researchers then classify firms as diversified or stand-alone based on the number of segments in which they are shown to operate.

Several studies have questioned the reliability of these data and the potential bias due to the use of Compustat segment data in diversification studies (Martin and Sayrak (2003)). Concerns regarding the Compustat segment data include: i) that the level of disaggregation

[2] Lamont and Polk (2002) present evidence that conflicts with Graham, et al. (2002). They study exogenous changes in diversification due to industry shocks and find that diversification and firm value are negatively related – consistent with researchers in Round 1 of the literature.

(diversification) shown in segment financial reporting is much lower than the true extent of industrial diversification (Lichtenberg (1991)), ii) that the FASB definition of "segment" allows for aggregation of multiple activities into one reported "segment" and that these segments are self-reported – thus segments may not be comparable across firms (Davis and Duhaime (1992)), and iii) that changes in segments reported for any given firm are often not associated with any real change in operations across different activities (Denis, et al. (1997)).

2.3.2) Diversification's effect on firm performance

Palich, et al. (2000) survey the diversification-performance (D-P) literature and note that while it is possibly the most researched linkage in the strategic management literature, there is a lack of consensus among the previous researchers. D-P studies tend to explain the relation between these two constructs as being linear or non-linear. Within the class of studies that assume non-linearity, some model the relation as being concave (inverted U-shaped) while others model it as a decreasing function where the slope decreases as the level of diversification increases.

Industrial organization economists are credited with the linear model. Building on theory regarding market power and the efficiency of internal markets, these studies assert that diversification and performance are positively related across all levels of diversification. Empirical evidence on this model of the D-P linkage is mixed.

Montgomery (1994) observes that almost all of the industrial organization studies have found a neutral or negative relation between accounting performance (measured by indices such as return on equity or return on invested capital) and diversification (measured by indices similar to the Herfindahl). A major drawback of these studies is that the use of a continuous measure such as the Herfindahl index of sales across industries does not differentiate between different types of

diversification, such as related as opposed to unrelated diversification. For example, the simple Herfindahl index of sales across business lines is the same for a firm that participates equally in two related lines as it is for a firm that earns half of its revenues from one industry and the other half from a completely unrelated industry.

Largely in response to the mixed results related to the linear model of the D-P relationship, researchers have developed theory that predicts a positive relation at low levels of diversification followed by performance decreases at high diversification levels. This theory assumes that the performance consequences of related diversification dominate those of unrelated (conglomerate) diversification. Proponents of the inverted-U model argue that, compared to unrelated diversifiers, related diversifiers are better able to benefit from scope economies (Markides and Williamson (1994)) because their businesses draw on a common pool of corporate resources. There exists an optimal level of diversification beyond which performance declines as the firm engages in more unrelated diversification. Unlike related diversifiers, conglomerates are unable to benefit from the sharing of common (non-financial) resources across businesses. In addition to a reduction in scope-related benefits of diversification, conglomeration imposes additional costs on the firm. These include costs associated with coordination of disparate activities, higher governance costs, and potential internal capital market inefficiencies (Markides (1992)).

Rumelt (1982) distinguished between several classes of diversifiers, ranging from single business (undiversified) to unrelated diversifiers. He consistently found that firms pursuing related diversification strategies were more profitable than single line businesses or highly diversified firms. While this curvilinear relation between diversification and performance has been confirmed by several subsequent studies in the strategic management literature (e.g., Hoskisson and Turk (1990); Lubatkin and Chatterjee (1994); Markides (1992)), there have been

a number of studies that have found conflicting evidence (e.g., Bettis and Hall (1982)). Finance researchers have used estimates of Tobin's Q (the ratio of market value to replacement value) as a performance measure and SIC codes or Compustat segment data to arrive at a diversification measure. Lang and Stulz (1994) and Servaes (1996) find a negative relation between Tobin's Q and firm diversification; supporting the notion that higher levels of diversification are associated with lower performance.

The intermediate model of the D-P relationship implies that diversification yields positive returns that diminish at the margin as firms diversify further away from their core business (Markides (1992)). Firms first choose to diversify in related areas so that they can leverage existing assets and competencies. Consistent with the resource view of diversification this form of diversification is most profitable to the firm and is generally preferred to unrelated diversification. Once related diversification opportunities are depleted, firms are forced to enter unrelated activities where their competitive advantage is substantially less. Profit-maximizing firms continue to diversify to the point where marginal benefits are equal to marginal costs.

2.3.3) Methodological issues

Datta, Rajagopalan and Rasheed (1991) review the findings of empirical papers on the diversification-performance relationship and explain the inconclusiveness of the extant research as a result of theoretical and methodological differences among the various papers. Past empirical research differs according to diversification measures (independent variables), performance measures (dependant variables), and moderator (control) variables used. Finance researchers have typically measured the degree of diversification in terms of a count of business segments or in terms of diversification index such as the Herfindahl index. As mentioned earlier, strategy researchers have focused more on the type of diversification strategy using various

categorical schemes that capture the degree of relatedness among the various businesses or segments within a firm's portfolio. Among studies that use a given diversification measure there is variation in the performance measure used and the control variables included in the analysis.

Performance has been measured using accounting or market data. Accounting measures of performance include return on investment; return on capital; return on assets; and return on equity. A further source of divergent results among previous studies is the lack of sample homogeneity. Most studies that use multi-industry samples fail to control for industry effects that influence the diversification-performance relationship (Datta, et al. (1991)).

2.3.4) Insurance studies

There is a paucity of studies on the effect of corporate diversification in the insurance industry in general, and in the P/L insurance industry in particular.[3] This is not surprising due to the exclusion of financial services firms in most finance studies on the topic and the focus on conglomerates in much of the diversification literature. While some authors have performed intra-industry diversification studies (e.g., Davis, Robinson, Pearce and Park (1992) on the paper and pulp industry, Capozza and Seguin (1999) on the real estate investment trust industry, and Stiroh (2004) on the community bank industry) the majority of corporate diversification research has been applied to samples of firms that compete across a number of industries.

Researchers that have examined the effect of product-line diversification within the insurance industry include, King (1975); Hoyt and Trieschmann (1991); Tombs and Hoyt (1994); Meador, Ryan and Schellhorn (1997); Berger, Cummins, Weiss and Zi (2000); and Cummins and Nini (2002). King (1975) studies the relative performance of diversified and non-diversified insurers

[3] In the insurance industry distinction is usually made between the life-health insurance industry and the property-liability (also termed property-casualty) insurance industry. While some insurers choose to compete in both the life-health and the property-liability industries, the vast majority of insurers specialize in one or the other.

within the P/L insurance industry. King's classification of the extent of insurer's diversification is based on the degree of relatedness of the product offerings of the organization structure to which an insurer was affiliated. Each structure's level of diversification depends on its degree of conglomeration. Organizations operating solely in the P/L industry are categorized as non-conglomerates; those that offer both P/L and L/H are termed low-level conglomerates; those offering P/L, L/H, and other financial products are termed intermediate conglomerates; and those offering insurance and other (non-financial) products are classified as extensive conglomerates. Using data on 382 P/L insurers licensed in the state of Ohio, King finds that relative performance differs across insurers depending on the degree of conglomeration of the organization to which they are affiliated.

Hoyt and Trieschmann (1991) address the question regarding the relative performance of focused and diversified insurers. They use data for publicly traded insurers to compare risk-return relationships between insurance companies that specialized in either P/L or L/H insurance to insurers that diversified across both major segments of the aggregate insurance industry. Using CAPM and mean-variance approaches to measure risk-adjusted returns to shareholders they find that specialized insurers (focusing on either P/L or L/H) performed better over the sample period (1973-1987). Tombs and Hoyt (1994) examine the relation between stock returns and product-line focus for a panel of 26 insurers for the period 1980-1990. They regress stock returns on a focus measure (Herfindahl index across 10 business line groups) and controls for systematic risk and industry effects. Their results indicate a positive relation between product-line focus and stock returns.

Berger, et al. (2000) compare the relative efficiency of diversified and focused insurers. Their classification of the degree of diversification is similar to Hoyt and Trieschmann (1991) in

that insurers that specialize in either the P/L or L/H industry are deemed to be focusing insurers while those that are joint producers are viewed as diversified (conglomerate) insurers. Berger, et al. (2000) test two competing hypotheses, the strategic focus hypothesis and the conglomeration hypothesis. The former suggests that firms can maximize value by concentrating on their core competencies and avoiding conglomeration-related agency conflicts. Proponents of the latter hypothesis argue that conglomeration maximizes value as a result of scope economies, internal capital markets, and risk reduction. Berger, et al. (2000) results suggest that neither hypothesis dominates for all firms. The strategic focus hypothesis is more applicable to small insurers that specialize in commercial lines while the conglomeration hypothesis holds more for large personal lines insurers.

Meador, et al. (1997) use efficiency analysis to examine the effects of product diversification for US life insurers. They compute measures of X-efficiency[4] that are regressed on a proxy for firm diversification/focus and find that diversified firms are more X-efficient than their more focused counterparts. They conclude that their results are "consistent with the proposition that managers of multiproduct firms are able to achieve greater cost efficiencies by sharing inputs and efficiently allocating resources across product lines in response to changing industry conditions". Thus, their analysis appears to support both divisions of the resource view on corporate diversification discussed earlier. First, scope economies are evident in the sharing of costs across product lines. Second, efficient capital markets enable the firm to efficiently allocate resources across the various product lines.

Some evidence on the relation between diversification and accounting performance for P/L insurers appears in a recent study on insurer capitalization by Cummins and Nini (2002). In their

[4] X-efficiency is comprised of technical and allocative efficiency and is measured as the ratio of minimum to actual production costs (Meador et al, 1997)

regression analysis of performance (measured by ROE) on capitalization and several controls, including product diversification, they find that focused firms have higher ROE than diversified firms. Their result is consistent with the strategic focus hypothesis (comparative advantage) and contrary to the conglomeration hypothesis (risk reduction implies higher prices; consumers pay more for one-stop shopping). Furthermore, this result invites more robust testing of the diversification-performance relationship by (i) better accounting for the effect of risk in the D-P relationship, and (ii) testing this relationship across different market conditions. Their sample period (1993 to 1998) represents only one set of possible industry conditions, namely a "soft market" where prices and profitability are low. It is possible that their result is due to industry conditions and that it may not hold in a hard market where prices and profitability are high.

In summary, the prior insurance literature has shown that, i) performance differs across broadly defined levels of organizational diversification (King (1975)); ii) insurers that specialize in either P/L or L/H tend to outperform joint producers on a risk-return basis (Hoyt and Trieschmann (1991)) but neither specialization nor joint production is universally more efficient (Berger, et al. (2000)); and iii) some evidence exists that focused P/L insurers have higher ROE than more diversified insurers (Cummins and Nini (2002)) and that business-line focus is positively related to stock returns (Tombs and Hoyt (1994)).

2.4) Conclusion

The preceding sections describe the prior literature that provides the theoretical and empirical basis for the dissertation. In section 2.2 we survey literature from a range of disciplines in order to answer the question "why do managers diversify their firms?" Prior literature provides three dominant views on why managers choose to diversify their firms – the agency view, the coinsurance view, and the efficiency view. In terms of the coinsurance and efficiency views

managers diversify firms so that owners can benefit from risk-reduction, scope economies, and efficient internal capital markets. Under the agency view diversification is an action undertaken by managers for their own benefit, without regard for owner interests.

We are unable to find any studies that explicitly modeled and tested diversification status/strategy/level as a function of variables reflecting each of these views. Finance researchers have investigated the relation between agency theoretic determinants and diversification but have not examined the effect of coinsurance and efficiency determinants. Strategy researchers have largely ignored the agency view and have rather concentrated on investigating the determinants of diversification strategy. In the next chapter of this dissertation we use the predictions of the diversification determinants literature to develop and test a model of insurer diversification.

In section 2.3 we described studies that have attempted to answer the question "what is the effect of diversification?" Finance researchers have concentrated on diversification's effect of firm value and have found substantial evidence that diversification destroys firm value. The existence of this "diversification discount" has recently come under scrutiny as some researchers have shown that the discount may be due to measurement error and/or endogeneity bias. Strategy researchers have focused on diversification's effect on accounting performance and have found largely mixed results. Reasons for the lack of consensus on diversification's effect on accounting performance include inadequate controls for industry effects and the failure of most studies to account for the effect of risk on accounting returns.

In Chapter 4 of this dissertation we model insurer accounting performance as a function of diversification status/levels. By focusing on one industry we are able to better control for the effect of industry-specific factors that have been shown to account for substantial variation in

firm performance. By collecting data for a 12-year period we are able to calculate historical risk variables that are used to control for the effect of risk on accounting returns.

CHAPTER THREE: DETERMINANTS OF LINE-OF-BUSINESS DIVERSIFICATION

3.1) Introduction

This chapter develops and tests hypotheses that explain the coexistence of insurers that specialize in one or a few lines of business and insurers that diversify their operations across many business lines. The predictions of three dominant explanations - the agency theory hypothesis, the efficiency hypothesis, and the coinsurance hypothesis – are used to develop a model that explains variation in property-liability (P/L) insurer diversification. We also develop a measure of unrelated diversification to better test the prediction of the managerial discretion hypothesis that mutual insurers should be less diversified than stock insurance companies.

While other predictions of the managerial discretion hypothesis have been supported empirically there has been no support for the diversification hypothesis to date. We contend that the reason for the lack of empirical support is that the diversification measure used in prior studies does not discriminate between the relatedness of diversification. The use of detailed statutory accounting data across 26 distinct lines of insurance enables us to measure the relatedness of a firm's diversification strategy and to estimate our model on measures of both total and unrelated diversification.

A major benefit of testing the relation between diversification and its hypothesized determinants on a sample of P/L insurers is the richness and consistency of statutory data that all insurers are required to report. Regulated financial reporting requirements in the insurance industry provide researchers with consistent financial statements for all firms (public and private,

large and small) that operate in the United States. P/L insurers are required to submit annual financial statements that include highly disaggregated revenue (premiums) data across 26 relatively unique product offerings (business lines).[5] By contrast, firms in unregulated industries are generally not required to report revenue data on such a detailed level.[6] Additionally, unlike managers of unregulated firms that are typically included in diversification studies insurance managers have no discretion in deciding whether to allocate premiums to a particular line of business. The distinction between different insurance policies (e.g., homeowners, auto, surety) is sufficiently clear that it is unlikely that revenues will be misallocated.[7]

A further benefit of studying the P/L industry is the opportunity to test the agency theoretic implications of its unique range of ownership structures. The two most prevalent ownership structures in the US are stocks and mutuals.[8] Shareholders own stock insurers while policyholders own mutual insurers. There are two relationships within the insurance firm that impose agency costs - the relationship between owners and managers, and the relationship between owners and customers (policyholders). The conflict between owners and insurance policyholders is analogous to the shareholder-bondholder conflict that has been examined in the finance literature (Mayers and Smith (1981)). In this context the premium paid represents the price of the corporate bond and the claims payment represents the repayment (Phillips, Cummins and Allen (1998)). Given default risk, policyholders are willing to pay more for insurance from

[5] Life-health insurers are required to submit similar statements. The number of distinct products in the life-health market is substantially smaller than in the property-casualty market. This is one of the reasons why we confine our analysis to the property-casualty industry.
[6] Historically, the Financial Accounting Services Board required that public firms report segment data for segments constituting at least 10% of total sales or assets. The introduction of more stringent segment reporting requirements in 1997 has increased the amount of disaggregation of firm sales and assets into segments.
[7] However, not all insurance policies within a given regulatory category are homogenous. Mayers and Smith (1988) note that substantial heterogeneity may exist within a given line of business.
[8] Other ownership structures include Lloyd's associations, reciprocals, and interinsurance exchanges.

an insurer with a lower bankruptcy probability (Sommer (1996)).[9] Additionally, policyholders are likely to pay less for insurance in the presence of unresolved conflicts of interest between themselves and owners. Owners have the incentive to alter the riskiness of the firm after the policies have been issued – thus increasing the default risk. Policyholders are likely to factor this agency cost in to the amount of premium that they are willing to pay.

Mayers and Smith (1981) explain that mutuals resolve this agency conflict by merging the role of policyholders and owners. The cost of resolving the policyholder-owner conflict is that the owner-manager conflict is worsened in mutuals because policyholder claims are indivisible, thus the market for corporate control is weakened because there is no threat of a proxy contest and no possibility of stock-based compensation plans that better align the interests of managers with those of owners. Given that mutuals face greater owner-manager conflicts, Mayers and Smith (1981, 1994) suggest that they will tend to specialize in activities that require relatively low levels of managerial discretion, compared to stock insurers.

The predictions of the managerial discretion hypothesis include, i) managers of mutual insurers will earn less than managers of similar stock insurers; ii) mutual insurers will specialize in lines of business where management exercises little discretion in setting rates; iii) mutuals will specialize in less volatile lines of business; and iv) mutual insurers will tend to concentrate on fewer lines of business than stock insurers.

While each of the first three predictions are supported empirically (e.g. Mayers and Smith (1992); Mayers and Smith (1988); Lamm-Tennant and Starks (1993); Regan and Tzeng (1999)) there has been a marked absence of support for the fourth prediction listed above. Mayers and Smith (1988) and Lamm-Tennant and Starks (1993) find no significant difference in line of

[9] While state guarantee (insolvency) funds do provide compensation in the event of insurer failure this protection is incomplete (see Harrington (1991) for a discussion). Sommer (1996) shows that the inverse relation between insurance prices and default risk holds despite the existence of guaranty fund protection.

business concentration between stocks and mutuals. More recently, Regan and Tzeng (1999) find that stocks are significantly more concentrated (in the 10 lines of business that they analyze) than mutuals, contrary to the prediction of the managerial discretion hypothesis. Our analysis that follows provides a new approach to capturing differences in managerial discretion and testing the managerial discretion hypothesis.

3.2) Hypotheses Development

Each of the hypotheses described below provide a partial explanation for observed variation in levels of firm diversification.

3.2.1) Agency-theoretic hypotheses

Managerial risk aversion: Amihud and Lev (1981) propose that managers have an incentive to diversify the firm in an attempt at reducing the probability that they will lose their jobs due to the firm failure. The reduction of firm-specific risk is not a value-enhancing motivation for diversification because shareholders can achieve this at no cost by holding diversified portfolios. However, unlike sophisticated shareholders, managers are concerned with reducing firm risk because their human capital is undiversifiable. By diversifying across businesses with imperfectly correlated income streams managers reduce income volatility and the probability of bankruptcy. Amihud and Lev (1981) found a positive relation between conglomerate diversification and the degree of separation between ownership and control.

Empirical finance research has examined this hypothesis by regressing a diversification measure on some proxy for managerial incentives (e.g. May (1995); Denis, et al. (1997); Aggarwal and Samwick (2003)). Because the data for the common proxy for managerial incentives (managerial share ownership) are unavailable for the majority of P/L firms, we use

ownership structure as a proxy for managerial incentives. We distinguish between stock and mutual insurers in terms of a dummy variable that equals one if the firm is a mutual insurer. Because stock-based compensation schemes that align managerial incentives with those of owners are available to stock insurers but not to mutuals the managerial risk aversion hypothesis predicts that mutuals will have a greater level of total diversification than stocks.

It has been shown that the insurance underwriting cycle differs substantially across lines of business (Venezian (1985)). Thus, insurers should be able to reduce the effect of any given line's underwriting cycle on total underwriting income/profit by diversifying across lines that have different cycles. We submit that unrelated lines are likely to differ more by underwriting cycle than related lines due to the differences in demand and supply conditions across unrelated P/L insurance lines. Accordingly, in addition to our general prediction regarding total diversification and volatility, we predict that risk-averse managers of mutual insurers should have a greater incentive than their stock counterparts to engage in unrelated diversification.

Hypothesis 1: *The managerial risk aversion hypothesis predicts that mutuals will exhibit greater diversification (total and unrelated) than stocks.*

Managerial discretion: In terms of the managerial discretion hypothesis mutual insurers are expected to be less diversified than stocks (Mayers and Smith (1981)). As noted earlier, while other predictions of the managerial discretion hypothesis have been supported empirically there has been no support for the diversification hypothesis to date. We propose that a possible reason for the lack of empirical support is that the diversification measure used in prior studies does not accurately reflect managerial discretion. Specifically, the traditional diversification measure does not discriminate between diversification across business lines that are very similar (related diversification) and diversification across business lines that have little in common (unrelated

diversification). We suggest that unrelated diversification requires greater managerial discretion than does related diversification. Accordingly, we propose a reformulated managerial discretion hypothesis that predicts that mutual insurers will exhibit lower levels of *unrelated* diversification than stock insurers.

Hypothesis 2a: *The traditional managerial discretion hypothesis predicts that mutuals will exhibit lower levels of <u>total</u> diversification than stocks*

Hypothesis 2b: *Our reformulated managerial discretion hypothesis predicts that mutuals will exhibit lower levels of <u>unrelated</u> diversification than stocks.*

3.2.2) Efficiency-based hypotheses

Scope Economies: Multi-line insurers are able to share many resources across business lines, thus achieving economies of scope. Meador, et al. (1997) find that diversified life insurers are more cost efficient than their more focused counterparts. Their results imply a negative relation between underwriting expenses and total diversification levels. While we expect this relation to hold in general we do not expect it to hold for unrelated diversification. Markides and Williamson (1994) argue that unrelated diversifiers are less able to share resources across their businesses. We therefore expect underwriting expenses to be negatively related to total diversification and positively related to unrelated diversification. We normalize underwriting expenses by premium volume to enable comparison across insurers.

Hypothesis 3: *The scope economies hypothesis predicts a negative relation between underwriting expenses and total diversification.*

Internal capital markets: The internal capital markets hypothesis predicts that diversification is likely to be greatest among firms that benefit most from the existence of internal markets for

human and financial capital. According to Myers and Majluf (1984) managers prefer internal finance to external sources due to information asymmetry between the firm and external capital markets. We propose that this asymmetry is positively related to the degree of uncertainty regarding the true financial condition of insurers. We capture the degree of information asymmetry between the firm and external capital markets through the percentage of premiums written in long tail lines where it is difficult to predict the timing and amount of final claim payments. We expect a positive relation between the percentage of premiums written in long tail lines and insurer diversification.

Hypothesis 4a: *The internal capital markets hypothesis predicts a positive relation between the percentage of premiums written in long-tail lines and total diversification.*

Internal capital markets are also beneficial to insurers with limited ability to raise external capital. While stock insurers are able to raise both equity and debt capital, mutuals are *generally* confined to the latter and are therefore expected to benefit more from internal capital markets that result from diversification.[10] Thus, the internal capital markets hypothesis predicts that mutuals will be more diversified than stock insurers due to their limited ability to access external capital.

Hypothesis 4b: *The internal capital markets hypothesis predicts that mutuals will exhibit greater total diversification than stocks.*

[10] We emphasize that mutuals are generally confined to debt capital because some mutual-owned insurance groups raise external equity capital via a downstream stock insurer.

3.2.3) Coinsurance hypotheses

In terms of the coinsurance explanation for corporate diversification, adding additional business lines reduces overall income volatility as long as the additional income streams are imperfectly correlated with the existing business. Assuming perfect capital markets, this reduction in firm risk is not beneficial to sophisticated shareholders as they are able to costlessly diversify idiosyncratic risk. Thus, for widely held insurers, the coinsurance benefits of diversification are valuable only in the presence of capital market imperfections – such as taxes and bankruptcy costs. Given that diversification reduces firm risk much like other risk management activities, we look to literature on the determinants of hedging and of the demand for insurance and reinsurance purchases for our hypotheses related to the effect of the aforementioned capital market imperfections on business diversification.

Taxes: Mayers and Smith (1982, 1990) explain that insurance (and reinsurance) purchases result in lower income volatility that translates into lower expected taxes. Smith and Stulz (1985) make the same argument for corporate hedging mechanisms. Several insurance studies have used a dummy variable equal to one if the insurer paid taxes in the past to proxy for the value of tax motive (e.g. Colquitt and Hoyt (1997); McCullough (2000)). We hypothesize a positive relation between this tax dummy and total diversification. Further, because we argue that unrelated diversification should reduce volatility to a greater extent than related diversification we extend this prediction to unrelated diversification.

Hypothesis 5: *The coinsurance hypothesis predicts a positive relation between diversification (total and unrelated) and whether an insurer has paid taxes in the previous year.*

Bankruptcy costs: Risk reduction measures such as insurance lower bankruptcy probability by protecting the firm against large losses (Mayers and Smith (1982)). Because bankruptcy costs are inversely related to firm size (Warner (1977)) it is typically predicted that large firms will purchase less insurance/reinsurance (e.g. Mayers and Smith (1982, 1990); Hoyt and Khang (2000)). Applying this line of reasoning to line of business diversification leads to the prediction that firm size and diversification should be negatively related. We measure firm size as the natural logarithm of total admitted assets.

Hypothesis 6: *The coinsurance hypothesis predicts a negative relation between firm size and diversification (total and unrelated).*

The preceding hypotheses rely on the assumption that firm owners are diversified shareholders who do not value costly reductions in idiosyncratic risk. This assumption is most valid for publicly traded insurers but is questionable for many privately owned insurers and does not apply to mutuals. We therefore expect the coinsurance motive to be stronger for mutual insurers than stock insurers. Among stock insurers we expect the coinsurance motive to be stronger for privately held insurers than publicly traded insurers.

Hypothesis 7a: *The coinsurance hypothesis predicts that mutuals will be more diversified (total and unrelated) than stocks.*

Hypothesis 7b: *The coinsurance hypothesis predicts that privately held insurers will be more diversified (total and unrelated) than publicly traded insurers.*

Table 3-1 provides a summary of the aforementioned hypotheses along with variable definitions and expected signs. It is worth noting that three of the four hypotheses that explain the relation between organizational form and diversification predict a positive relation. Thus, it

is perhaps not surprising that prior researchers have failed to find support for the negative relation predicted by the managerial discretion hypothesis.

Table 3-1. Variable Description and Hypotheses Summary

Variable	Definition	Expected sign	Hypothesis/Explanation
Dependent Variables:			
DT	Total Diversification=1-Herfindahl index of net premiums written (NPW) across 26 lines of business		
DU	Unrelated Diversification=1-Herfindahl index of NPW written across 6 business line clusters		
MULTLINE	=1 if firm operates in more than one line of business, 0 otherwise		
MULTCLUS	=1 if firm operates in more than one business line cluster, 0 otherwise		
Independent Variables:			
SIZE	Natural logarithm of total admitted assets	+	Managerial ability
		-	Coinsurance
AGE	Number of years insurer has been in operation	+	Managerial ability
MUTUAL	=1 if ownership structure is mutual, 0 if stock	+	Coinsurance
		+	Internal Capital Markets
		+	Managerial Risk Aversion
		-	Managerial Discretion
PUBLIC	=1 if firm is publicly traded, 0 otherwise	+	Managerial Ability
		-	Coinsurance
GROUP	=1 if firm is an aggregated insurance group, 0 otherwise	+	Managerial ability
UWEXPRAT	Underwriting Expense Ratio=underwriting expenses/NPW	-	Scope Economies
PLTAIL	Information Asymmetry Proxy=NPW in long tail lines/total NPW	+	Internal Capital Markets
GEODIV	Geographic Diversification=1-Herfindahl index of premiums across 56 regulatory areas	+	Managerial ability
		-	Coinsurance
REINSUSE	Reinsurance Use=reinsurance ceded/(direct premiums written + reinsurance assumed)	+	Real Services Efficiency
		-	Coinsurance
TAXDUM	=1 if taxes paid in previous year, 0 otherwise	+	Coinsurance

Additionally, Table 3-1 includes other variables that are expected to explain variation in diversification levels. *Group:* The majority of P/L insurers are affiliated with a group of insurance firms that is typically controlled by an insurance holding company. Given that the

decisions regarding product diversification strategy are most likely made at the group level we aggregate affiliate data for group members and define the firm as the aggregated entity. This approach is consistent with Lamm-Tennant and Starks (1993). Because insurance groups consist of several firms that may specialize in different lines of business we expect a positive relation between observations defined as groups and diversification. *Firm Age:* We expect that more mature firms will be more diversified as they have had more opportunity to enter additional lines of business.

Geographic Diversification: Insurers are able to reduce risks associated with their exposure at the individual state level by operating across a number of states and territories. State-specific exposures include regulation and catastrophic losses. The US insurance industry is regulated at the state level and because regulatory stringency differs across states there exists an incentive for insurers to reduce their exposure to any particular regulatory regime. Similarly, catastrophic losses such as earthquakes and hurricanes affect a small number of different states and insurers have the incentive to reduce their exposure to large losses in these states by holding a diversified portfolio of premiums across geographic areas.

We measure geographic diversification as the complement of the Herfindahl index of net premiums written across states. In the sense that geographic diversification reduces firm risk and may serve as a substitute for product diversification we would expect a negative relation between geographic and line of business diversification. However, both geographic and product diversification are likely related to managerial ability in which case a positive relation would be expected.

Reinsurance: By ceding all or part of a risk to reinsurance companies, direct insurers are able to insulate themselves against the effect of unexpected large losses (Mayers and Smith (1990)).

Thus, like diversification, reinsurance usage provides insurance companies with a method of reducing underwriting income volatility. In this sense product diversification and reinsurance usage operate as substitutes; implying a negative relation between premiums ceded to reinsurers and line of business diversification. However, Mayers and Smith (1990) hypothesize that reinsurance usage is also motivated by the demand for real services that are provided by reinsurers. These services include the assistance with pricing and product/territorial information for insurers expanding into new areas. The real services advantage of reinsurance is likely greatest for firms entering new lines of business that are unrelated to their core business. The real services argument therefore implies a positive relation between reinsurance usage and both related and unrelated diversification. We measure reinsurance usage as the ratio of reinsurance ceded to the sum of reinsurance assumed and direct premiums written.

Year Dummies: We use a series of year dummy variables to control for the effect of different market conditions on insurer diversification. Bergh and Lawless (1998) find evidence of a negative relation between diversification and environmental uncertainty. We expect that industry uncertainty is higher in "hard market" conditions, when prices are higher than average and supply of insurance is constrained, than it is in "soft market" conditions when prices are lower and supply is abundant. We set 1995 as our base year and use seven dummy variables for the subsequent years to capture these effects.

3.3) Sample and data

Our initial sample includes all firms in the NAIC database for the years 1995 to 2002. The primary advantage of this sample period is that it is sufficiently long to include both positive and negative market conditions. For the majority of the 1990s and latter part of the 1980s the P/L insurance market was characterized by "soft" market conditions where prices were low and

supply was abundant. In 1999 there were signs of increased prices in some commercial lines and by 2000 it became apparent that the industry pricing cycle was finally hardening.[11]

Our first screen is to exclude firms that are under regulatory scrutiny. Next we exclude firms that report negative net premiums written or total admitted assets. We then aggregate affiliated insurers, controlling for potential double counting of intra-group shareholding.[12] This aggregation is appropriate as diversification decisions are likely made at the group level (Berger, et al. (2000)). Groups are assigned an organizational structure (stock, mutual, etc.) based on data collected from Best Aggregates and Averages. Next we exclude groups with substantial premium income (25%) from L-H insurance. Finally, we exclude firms (unaffiliated as well as aggregated groups) with organizational structures other than stock or mutual.

Statutory accounting data were obtained from the NAIC data tapes for the relevant years. We used Best's Insurance Reports (1995-2002) for data regarding ultimate ownership structure of insurance groups. Publicly traded insurers were identified using the Compustat database. Our final sample consists of 7210 firm-year observations.

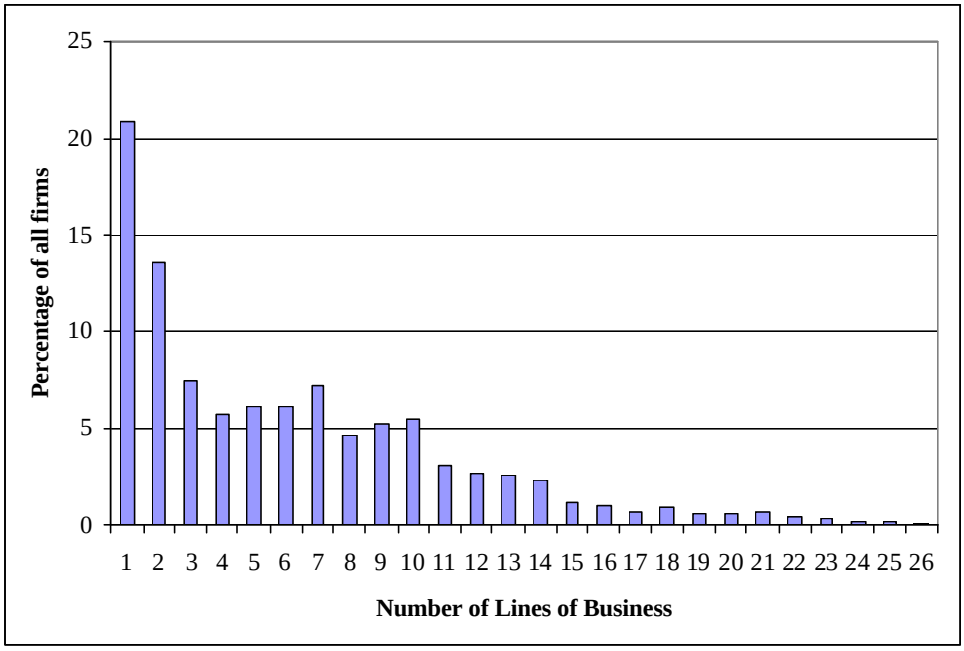
3.3.1) Diversification measures

Two primary diversification measures are used in this study. First, we follow the approach taken in the insurance literature and use a Herfindahl-based index of net premiums written across 26 lines of business that are reported to the NAIC.[13] Because the Herfindahl index reflects concentration rather than diversification we use the complement of the index as a total diversification measure (DT). Firms with total diversification measures closer to zero are

[11] Ceniceros and Hofmann (1999), Ruquet (2000), Goch (2001).
[12] The use of groups and single unaffiliated insurers as units of observation is consistent with Lamm-Tennant and Starks (1993). The alternative to aggregating group member data is to use consolidated data as reported to the NAIC. Disadvantages associated with the use of consolidated data are that groups have discretion regarding whether they include data for all their affiliates and that many groups do not submit consolidated statements.
[13] See Figure 3-1 for the distribution of sample firms by the number of business lines in which they participate.

relatively focused while firms with total diversification measures closer to one are relatively diversified.

Figure 3-1. Distribution of sample firms by number of business lines



We submit that a lower degree of managerial discretion is required of firms that operate across products lines that are fairly homogeneous (with respect to underwriting skills, distribution systems, customer characteristics, etc.) than is required of firms operating across more heterogeneous product lines. Firms that diversify within a group of fairly homogenous product lines are deemed to be following a related diversification strategy while firms that diversify across heterogeneous lines are deemed to be following a more unrelated diversification strategy. Because the standard measure of insurer diversification does not distinguish between the relatedness of an insurer's diversification strategy we require a modified diversification measure that discriminates between related and unrelated diversification.

The first step in measuring unrelated diversification is to classify the 26 lines of business into homogeneous groups.[14] Following Mayers and Smith (1994) we use a variant of principal components analysis to define the groups, or bundles, of similar business lines. Specifically, we use cluster analysis to aggregate the 26 distinct lines of business into a number of clusters using the VARCLUS procedure in SAS. For each firm in the NAIC database we create 26 dummy variables representing whether or not the insurer had positive premiums written in each of the 26 business lines. We then applied the VARCLUS procedure to this matrix to identify groups of business lines that tend to be written together, and are therefore assumed to be relatively homogeneous.

VARCLUS initially assigns all of the lines to one cluster and then iteratively splits the cluster/s until the intra-cluster correlation for all cluster members cannot be improved by further splitting the remaining clusters. The final number of clusters and membership of each cluster is determined by an algorithm that maximizes the sum across clusters of the variation accounted for by the cluster components.[15] Cluster analysis of the full data set yields six clusters of insurance lines.[16]

We then aggregate premiums for each insurer into these six clusters. The complement of the Herfindahl index of premiums written across these clusters is used to measure unrelated

[14] There is precedent for grouping lines into a smaller number of groups. McCullough (2000) groups similar lines together to form 14 distinct bundles. Mayers and Smith (1988) use factor analysis to arrive at 9 groups of lines.
[15] For more detailed information on the VARCLUS procedure see the SAS/STAT User Guide, Chapter 68.
[16] The clusters are as follows:

i. Aircraft, allied lines, commercial multi-peril, credit, fire, inland marine, ocean marine, medical malpractice, surety, workers' compensation.
ii. Auto liability, auto physical damage, homeowner's, farmowner's, earthquake.
iii. Financial guarantee, international, reinsurance
iv. Group accident and health, other accident and health
v. Boiler and machinery, burglary and theft, fidelity, other liability
vi. Credit accident and health, other

diversification. Larger values of this measure imply a higher degree of unrelated diversification than is implied by smaller values.

Table 3-2 provides descriptive statistics for our sample firms and Table 3-3 reports correlations among variables used in our regression analysis. Of the 7210 firm-year observations[17] in our sample 1503 operate in only one business line and 5707 operate in multiple business lines. It is clear that average firm characteristics differ substantially between diversified and undiversified firms. The relatively large percentage of undiversified firms in our sample and the apparent heterogeneity between these firms and the majority of firms in our sample motivates the two-step regression procedure discussed and estimated in the next section.

Table 3-2. Descriptive Statistics

	Full Sample (7210 firms)			Single-line insurers (1503 firms)			Multi-line insurers (5707 firms)		
Variable	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
DT	0.424	0.497	0.305	0.000	0.000	0.000	0.535	0.592	0.240
DU	0.235	0.179	0.230	0.000	0.000	0.000	0.296	0.320	0.220
SIZE	17.45	17.24	2.19	16.49	16.25	1.93	17.71	17.55	2.19
AGE	42.78	18.00	44.55	22.11	12.00	29.97	48.23	22.00	46.14
MUTUAL	0.427	0.000	0.495	0.311	0.000	0.463	0.458	0.000	0.498
PUBLIC	0.066	0.000	0.249	0.026	0.000	0.159	0.077	0.000	0.267
GROUP	0.341	0.000	0.474	0.149	0.000	0.356	0.391	0.000	0.488
UWEXPRAT	0.390	0.342	0.215	0.436	0.326	0.300	0.378	0.344	0.185
PLTAIL	0.624	0.724	0.349	0.526	1.000	0.499	0.650	0.720	0.292
GEODIV	0.301	0.018	0.364	0.175	0.000	0.306	0.334	0.131	0.371
REINSUSE	0.298	0.245	0.457	0.212	0.092	0.747	0.320	0.273	0.339
TAXDUM	0.650	1.000	0.477	0.621	1.000	0.485	0.658	1.000	0.474

Note: DT (Total Diversification)=1-Herfindahl of premiums across 26 lines of business; DU (Unrelated Diversification)=1-Herfindahl of premiums across 6 clusters; SIZE=natural logarithm of total admitted assets; AGE=number of years of operation; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise; GROUP=1 if firm is an insurance group, 0 otherwise; UWEXPRAT=underwriting expenses/net premiums written; PLTAIL=percentage of premiums written in long-tail lines; GEODIV=1-Herfindahl index of premiums across 56 states; REINSUSE=reinsurance ceded/(direct premiums written + reinsurance assumed); TAXDUM=1 if taxes paid in previous year.

[17] For simplicity we refer to firm-year observations as 'firms' from this point forward.

Table 3-3. Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) DT	1.000										
	0.000										
(2) DU	0.786										
	0.000										
(3) SIZE	0.288	0.253									
	0.000	0.000									
(4) AGE	0.355	0.300	-0.137								
	0.000	0.000	0.000								
(5) MUTUAL	0.246	0.167	-0.098	0.550							
	0.000	0.000	0.000	0.000							
(6) PUBLIC	0.156	0.185	0.402	-0.038	-0.141						
	0.000	0.000	0.000	0.001	0.000						
(7) GROUP	0.280	0.231	0.628	-0.163	-0.049	0.371					
	0.000	0.000	0.000	0.000	0.000	0.000					
(8) UWEXPRAT	-0.110	-0.048	-0.404	0.130	0.016	-0.065	-0.165				
	0.000	0.000	0.000	0.000	0.182	0.000	0.000				
(9) PLTAIL	0.141	0.164	0.223	-0.014	0.082	-0.003	0.059	-0.327			
	0.000	0.000	0.000	0.247	0.000	0.831	0.000	0.000			
(10) GEODIV	0.222	0.252	0.583	-0.068	-0.183	0.324	0.481	-0.078	-0.013		
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.277		
(11) REINSUSE	0.086	0.102	0.006	0.027	-0.015	0.048	0.086	0.068	0.030	0.057	
	0.000	0.000	0.606	0.021	0.206	0.000	0.000	0.000	0.012	0.000	
(12) TAXDUM	0.033	0.059	0.281	-0.105	-0.081	0.102	0.141	-0.192	0.061	0.163	-0.059
	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: For each variable listed in the first column correlation coefficients are shown in the first row and p-values appear in the second row. DT (Total Diversification)=1-Herfindahl of premiums across 26 lines of business; DU (Unrelated Diversification)=1-Herfindahl of premiums across 6 clusters; SIZE=natural logarithm of total admitted assets; AGE=number of years of operation; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise; GROUP=1 if firm is an insurance group, 0 otherwise; UWEXPRAT=underwriting expenses/net premiums written; PLTAIL=percentage of premiums written in long-tail lines; GEODIV=1-Herfindahl index of premiums across 56 states; REINSUSE=reinsurance premiums ceded/(direct premiums written+reinsurance assumed); TAXDUM=1 if taxes paid in previous year.

3.4) Regression Analysis

Regression analysis is used to test our hypotheses regarding the determinants of two diversification measures – total diversification and unrelated diversification. Studies that have investigated the determinants of diversification for a sample of diversified firms have used ordinary least squares (OLS) as an estimation procedure (e.g. Aggarwal and Samwick (2003), Denis, et al. (1997)). Because over 20% of our sample firms are undiversified, and therefore

have zero values for our dependent variables, the use of OLS as an estimation procedure on the full sample of firms is likely to result in biased and inconsistent coefficient estimators. We use a two-part model to estimate two separate equations. In the first part we estimate a probit regression on all sample firms for the determinants of diversification status (i.e. to operate in one or multiple lines). In the second part we limit our sample to diversified firms and estimate an OLS regression of the determinants of diversification extent.[18] Equation 3-1 shows the regression equation for the diversification status probit regression where the dependent variable (MULTLINE) is one for diversified firms and zero for firms operating in only one line of business.

Eq. (3-1)
$$MULTLINE_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 AGE_{it} + \beta_3 MUTUAL_{it} + \beta_4 PUBLIC_{it} + \beta_5 GROUP_{it} + \beta_6 UWEXPRAT_{it} + \beta_7 PLTAIL_{it} + \beta_8 GEODIV_{it} + \beta_9 REINSUSE_{it} + \beta_{10} TAXDUM_{it} + \beta_{11-17} YRDUMMY_{it} + \varepsilon_{it}$$

In the OLS regression equation shown in equation 3-2 the dependent variable (DT) is a continuous measure of diversification calculated as the complement of the Herfindahl index of premiums written across 26 lines of business. While equation 3-1 is estimated using the full sample of firms (diversified and undiversified), equation 3-2 is estimated using only the sub-sample of diversified firms.

[18] Examples of insurance studies that have used a two-part analysis to deal with bias introduced by a significant proportion of zero observations (censoring) in the dependent variable include Colquitt and Hoyt (1997) and Krishnaswami and Pottier (2001). These studies also tested for potential sample-selection bias by estimating the Heckman sample selection model. Both studies find the Heckman sample selection parameter to be insignificant in their OLS regressions and accordingly report only the results of separate probit and OLS regressions. We choose to report results from the two-part model rather than those of Heckman's selection model for two reasons. First, Jones (2000) argues that Heckman's model should only be used when selection is unobserved. In our study, the zero values for diversification status (MULTLINE=0) are observed and we can therefore model the diversification decision separately. Second, when we do estimate the Heckman model we find that the selection parameter is highly correlated with other regressors. This collinearity is due to the lack of theoretically justified exclusion restrictions in the second part of the Heckman model.

Eq. (3-2)
$$DT_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 AGE_{it} + \beta_3 MUTUAL_{it} + \beta_4 PUBLIC_{it} + \beta_5 GROUP_{it} + \beta_6 UWEXPRAT_{it} + \beta_7 PLTAIL_{it} + \beta_8 GEODIV_{it} + \beta_9 REINSUSE_{it} + \beta_{10} TAXDUM_{it} + \beta_{11-17} YRDUMMY_{it} + \varepsilon_{it}$$

Equations 3-1 and 3-2 are estimated for total diversification with the dependent variables shown above, and also for unrelated diversification with MULTLINE replaced by MULTCLUS and DT replaced by DU.

Results: First stage probit (Diversification Status)

Positive values for the coefficient estimates shown in the third column of Table 3-4 indicate a positive association between each variable and the probability of a firm being diversified (MULTLINE). The positive coefficients on the variables SIZE and AGE indicate that larger firms and older firms are more likely to be diversified than they are to operate in a single line. The negative sign on the coefficient estimate for MUTUAL implies that mutuals are less likely to be diversified than are stocks. This result is consistent with the managerial discretion hypothesis and contrary to the predictions of the managerial risk aversion, internal capital markets, and coinsurance hypotheses.

The positive coefficients on PUBLIC and GROUP indicate that publicly traded insurers and groups of affiliated insurers are more likely to operate in multiple lines than they are to be undiversified. The negative coefficient estimate on the variable UWEXPRAT implies that firms with lower underwriting expenses tend to operate in multiple lines of business. This result complements the evidence by Meador, et al. (1997) of scope economies in the life insurance industry. The percentage of business written in long tail lines (PLTAIL) is used as a proxy for information asymmetry. The positive coefficient estimate on PLTAIL is consistent with the internal capital markets hypothesis that predicts a positive relation between line of business diversification and the degree of information asymmetry within the firm.

Table 3-4. Total Diversification Regressions

		Probit (status)		OLS (extent)	
Dependent Variable:		MULTLINE		DT	
Explanatory Variable	Expected Sign	Coefficient	p-value	Coefficient	p-value
Intercept		-1.789	0.000	0.123	0.004
SIZE	+/-	0.105	0.000	0.015	0.000
AGE	+	0.015	0.000	0.001	0.000
MUTUAL	+/-	-0.201	0.000	0.075	0.000
PUBLIC	+/-	0.356	0.000	0.061	0.000
GROUP	+	0.656	0.000	0.068	0.000
UWEXPRAT	-	-0.271	0.005	-0.024	0.236
PLTAIL	+	0.468	0.000	0.027	0.031
GEODIV	+/-	0.351	0.000	0.031	0.005
REINSUSE	+/-	0.178	0.235	0.021	0.197
TAXDUM	+	-0.026	0.526	-0.010	0.150
YR1996		-0.002	0.975	-0.003	0.820
YR1997		-0.067	0.344	-0.007	0.536
YR1998		-0.072	0.315	-0.002	0.887
YR1999		-0.133	0.066	-0.007	0.534
YR2000	-	-0.126	0.085	-0.002	0.864
YR2001	-	-0.159	0.031	-0.009	0.452
YR2002	-	-0.228	0.002	-0.010	0.369
Number of observations		7210		5707	
Pseudo R-squared		0.19			
Adjusted R-squared				0.19	

Note: MULTLINE=1 if firm writes business in more than one line, 0 otherwise; Total Diversification=1-Herfindahl index of premiums across 26 lines of business; SIZE=natural logarithm of total admitted assets; AGE=number of years of operation; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise; GROUP=1 if firm is an insurance group, 0 otherwise; UWEXPRAT=underwriting expenses/net premiums written; PLTAIL=percentage of premiums written in long-tail lines; GEODIV=1-Herfindahl index of premiums across 56 states; REINSUSE=reinsurance premiums ceded/(direct premiums written+reinsurance assumed); TAXDUM=1 if taxes paid in previous year; YR1996-YR2002=year dummy variables with 1995 as base year. P-values are based on heteroscedasticity-consistent standard errors.

Contrary to the coinsurance hypothesis and consistent with the managerial ability hypothesis we find that insurers that are more geographically diversified (GEODIV) are also more likely to

diversify into multiple business lines. The lack of statistical significance of the coefficient estimates for REINSUSE, and TAXDUM suggest that variation in these variables does not affect diversification status.

Finally, the negative coefficients estimates on our year dummy variables for 1999 to 2002 are consistent with the environmental uncertainty hypothesis. Each of these years in which the market was hardening is associated with a lower probability of firms being diversified than in the base year (1995). By contrast, for the soft market years (1996-1998) there is no significant relation between the year dummies and diversification status.

Results: Second stage OLS (Diversification extent)

Results for the second stage of our two-part model appear in columns 5 and 6 of Table 3-4. These results are from an OLS regression estimation of equation 3-2 using only the sub-sample of firms that wrote premiums in multiple business lines. Thus, while the previous probit regression analysis explains determinants of insurer diversification *status*, the OLS regression explains the *extent* of diversification among diversified insurers.

Several of the OLS results reinforce those of the first stage probit regression. Coefficient estimates for SIZE, AGE, GROUP, PUBLIC, PLTAIL and GEODIV are all positive and significant. These firm characteristics are therefore positively related to both diversification status and diversification extent. Our result regarding SIZE is contrary to the prediction of the coinsurance hypothesis but consistent with the view that managers of large firms likely posses greater ability than their counterparts in smaller firms and have greater ability to diversify their firms. Our result is also consistent with Demsetz and Strahan (1997) who find a positive relation between firm size and diversification in their sample of bank holding companies.

The positive relation between PUBLIC and diversification extent may be explained by the greater amount of ability possessed by managers of publicly traded firms and by the strong positive correlation between PUBLIC and SIZE. As expected, insurance groups (GROUP) tend to be significantly more diversified than individual insurers because insurance mergers and acquisitions are often motivated by the desire to enter new product lines. The positive coefficient on PLTAIL provides further support for the internal capital market hypothesis. As was the case in the probit regression, the coefficient estimate for TAXDUM is not significant. Thus, whether or not a firm paid taxes in the previous year affects neither the likelihood of being diversified, nor the extent of diversification for multi-line insurers.

Results for MUTUAL, UWEXPRAT, and REINSUSE are different from our probit regression. The positive relation between MUTUAL and the extent of total diversification is opposite to the relation between MUTUAL and diversification status. While mutuals are less likely than stocks to be diversified, those that choose to diversify tend to diversify to a greater extent than stocks. This result is contrary to the managerial discretion hypothesis and consistent with the coinsurance, managerial risk aversion, and internal capital markets hypotheses.

Insurer underwriting expense ratios (UWEXPRAT) are not significantly related to their extent of diversification but are negatively associated with their diversification status. This implies that firms benefit from scope economies when they become diversified but that the marginal benefits associated with increased diversification are insignificant.

The final difference between the results of the diversification extent and diversification status regressions is the insignificance of the year dummies in the extent regression. The effect of hard market conditions on insurer diversification behavior differs with respect to diversification status and diversification extent. Insurers are less likely to be diversified in hard market conditions but

diversification levels among multi-line firms are not sensitive to increased market uncertainty prevalent in hard market conditions.

Table 3-5. Unrelated Diversification Regressions

		Probit (status)		OLS (extent)	
Dependent Variable:		MULTCLUS		DU	
Explanatory Variable	Expected Sign	Coefficient	p-value	Coefficient	p-value
Intercept		-3.136	0.000	0.157	0.001
SIZE	+/-	0.144	0.000	0.000	0.909
AGE	+	0.013	0.000	0.001	0.000
MUTUAL	+/-	0.046	0.322	0.006	0.387
PUBLIC	+/-	0.077	0.426	0.071	0.000
GROUP	+	0.475	0.000	0.033	0.000
UWEXPRAT	-	-0.028	0.759	0.084	0.000
PLTAIL	+	0.709	0.000	0.037	0.001
GEODIV	+/-	0.548	0.000	0.061	0.000
REINSUSE	+/-	0.136	0.149	0.065	0.006
TAXDUM	+	0.115	0.002	0.002	0.730
YR1996		-0.033	0.629	0.001	0.936
YR1997		-0.102	0.128	-0.004	0.705
YR1998		-0.097	0.153	-0.002	0.849
YR1999		-0.168	0.015	-0.005	0.621
YR2000	-	-0.159	0.022	0.001	0.907
YR2001	-	-0.217	0.002	-0.002	0.840
YR2002	-	-0.272	0.000	0.004	0.703
Number of observations		7210		5050	
Pseudo R-squared		0.22			
Adjusted R-squared				0.10	

Note: MULTCLUS=1 if firm writes business in more than one business line cluster, 0 otherwise; DU (Unrelated Diversification)=1-Herfindahl index of premiums across 6 business line clusters; SIZE=natural logarithm of total admitted assets; AGE=number of years of operation; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise; GROUP=1 if firm is an insurance group, 0 otherwise; UWEXPRAT=underwriting expenses/net premiums written; PLTAIL=percentage of premiums written in long-tail lines; GEODIV=1-Herfindahl index of premiums across 56 states; REINSUSE=reinsurance premiums ceded/(direct premiums written+reinsurance assumed); TAXDUM=1 if taxes paid in previous year; YR1996-YR2002=year dummy variables with 1995 as base year. P-values are based on heteroscedasticity-consistent standard errors.

Results: First-stage probit (unrelated diversification status)

Positive values for the coefficient estimates shown in the columns 3 and 4 of Table 3-5 indicate a positive association between each variable and the probability of a firm engaging in unrelated diversification (MULTCLUS). The results are generally consistent with those of the MULTLINE regression (columns 3 and 4 of Table 3-4), with two noteworthy exceptions.

First, the coefficient on MUTUAL is no longer significant, suggesting that while mutuals are more likely than stocks to operate in only one line of business, they are just as likely as stocks to engage in unrelated diversification. Second, the positive coefficient estimate for TAXDUM provides support for the coinsurance hypothesis. Taxation-based incentives for diversification stem from the notion that diversification reduces income volatility, which translates into lower expected taxes. The tax incentive for diversification should motivate firms that are able to benefit from it (i.e. those with a positive expected tax burden) to engage in diversification. The significance of TAXDUM in the unrelated diversification regression only is consistent with our prior that unrelated diversification provides the greatest opportunity for reducing income volatility.[19]

Results: Second-stage OLS (unrelated diversification extent)

The results regarding the determinants of the extent of unrelated diversification are shown in the fifth and sixth columns of Table 3-5. Consistent with the results of the total diversification extent regression we find that AGE, PUBLIC, GROUP, GEODIV, and PLTAIL are positively related to the extent of unrelated diversification. By contrast, the effect of SIZE, UWEXPRAT, PLTAIL, REINSUSE, and MUTUAL is different for unrelated diversification than it is for total

[19] We investigate this prior in two ways. First, we calculate simple correlations between DU, DT and several risk measures used in Chapter 4. The correlations indicate a stronger relation between DU and risk. Second, we regress risk measures on either DU or DT and a number of explanatory variables. We find a positive relation between DU and risk and an insignificant relation between DT and risk.

diversification. The positive relation between SIZE and total diversification does not extend to unrelated diversification. Given that the benefits from coinsurance are likely greatest for unrelated diversification, and that these benefits are most valuable to smaller firms, it is possible that coinsurance effects are offsetting the effects of managerial ability.

Consistent with our expectations we find that underwriting expenses (UWEXPRAT) are positively related to the degree of unrelated diversification. Sharing underwriting expertise and technology across different business lines is more difficult for insurers operating in a range of dissimilar lines of business (e.g. both personal and commercial) than it is for insurers that focus on similar lines (e.g. either personal or commercial). Our proxy for information asymmetry (PLTAIL) is positive and significant. This is consistent with the results from Table 3-4 and provides further support for the internal capital markets hypothesis. REINSUSE was not significant in the total diversification regressions but is positive and significant in the unrelated diversification extent regression. Thus, the effect of real services provided by reinsurers outweighs potential coinsurance effects when firms participate in a greater range of dissimilar business lines. This result supports evidence by Mayers and Smith (1990) that insurance companies purchase reinsurance to benefit from real services provided by reinsurers.

The lack of significance of MUTUAL in the unrelated diversification regression suggests that the managerial discretion effect offsets, but does not dominate, the joint effect of the managerial risk aversion, coinsurance, and internal capital markets hypotheses. There are at least two possible explanations, both related to our pooling of groups and unaffiliated insurers, for the lack of support for the managerial discretion hypothesis.

First, many of the aggregated groups that are classified as mutual insurers in our sample are not “pure” mutuals. Rather, a significant proportion of these mutual groups consist of mutual

insurers that own stock subsidiaries. The presence of these observations in our sample is likely to bias our results against finding evidence supporting the managerial discretion hypothesis. Second, managers of insurance groups are afforded greater managerial discretion due to the complexity of forming and managing groups. For these reasons it is likely that the predictions of the managerial discretion hypothesis might be more applicable to unaffiliated insurers than aggregated groups of insurance companies.

To further test the managerial discretion hypothesis we therefore exclude insurance groups from our analysis and focus our attention on the sub-sample of unaffiliated insurers. We report the second-stage OLS results in Table 3-6.

Results: Unaffiliated insurer sample

The results shown in Table 3-6 provide evidence supporting our reformulated managerial discretion hypothesis. While mutuals exhibit higher levels of total diversification than stocks they are associated with lower levels of unrelated diversification. Thus, it appears that the traditional measure of insurer diversification does not reflect managerial discretion because it does not take into account the degree of heterogeneity among business lines in the insurer's underwriting portfolio. Other results in Table 3-6 are generally similar to those for the full sample.

In summary, our regression models tested the predictions of three primary explanations for corporate diversification – the agency hypothesis (managerial risk aversion and managerial discretion), the coinsurance hypothesis, and the efficiency hypothesis (internal capital markets and economies of scope). Our two agency theoretic explanations offered opposing predictions for the relation between ownership structure (MUTUAL) and total diversification. The managerial discretion hypothesis predicts that mutuals will be less diversified than stocks. By

contrast, the managerial risk aversion hypothesis predicts that mutuals will be more diversified than stocks.

Table 3-6. OLS Regressions on the sub-sample of Unaffiliated Insurers

Dependent Variable:		**DT**		**DU**	
Explanatory Variable	Expected Sign	Coefficient	p-value	Coefficient	p-value
Intercept		0.233	0.000	0.319	0.000
SIZE	+	0.007	0.053	-0.010	0.002
AGE	+	0.002	0.000	0.001	0.000
MUTUAL	+/-	0.033	0.014	-0.012	0.091
UWEXPRAT	-	-0.047	0.037	0.031	0.131
PLTAIL	+	0.061	0.000	0.083	0.000
GEODIV	+	-0.012	0.463	-0.008	0.574
REINSUSE	+/-	0.044	0.012	0.092	0.000
TAXDUM	+	0.002	0.810	-0.001	0.890
YR1996		-0.004	0.762	0.000	0.974
YR1997		-0.006	0.689	-0.006	0.652
YR1998		-0.001	0.966	-0.004	0.745
YR1999	-	-0.004	0.756	-0.005	0.705
YR2000	-	-0.003	0.821	0.003	0.805
YR2001	-	-0.002	0.883	0.007	0.579
YR2002	-	-0.004	0.790	0.012	0.355
Number of observations		3474		2954	
Adjusted R-squared		0.17		0.13	

Note: DT (Total Diversification)=1-Herfindahl index of premiums across 26 business lines; DU (Unrelated Diversification)=1-Herfindahl index of premiums across 6 business line clusters; SIZE=natural logarithm of total admitted assets; AGE=number of years of operation; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise; GROUP=1 if firm is an insurance group, 0 otherwise; UWEXPRAT=underwriting expenses/net premiums written; PLTAIL=percentage of premiums written in long-tail lines; GEODIV=1-Herfindahl index of premiums across 56 states; REINSUSE=reinsurance premiums ceded/(direct premiums written+reinsurance assumed); TAXDUM=1 if taxes paid in previous year; YR1996-YR2002=year dummy variables with 1995 as base year. P-values are based on heteroscedasticity consistent standard errors.

Our results for total diversification do not consistently support either hypothesis. Mutuals are less likely to be diversified than stocks but diversified mutuals tend to be more diversified

than diversified stocks. To better test the managerial discretion hypothesis we estimate the relation between MUTUAL and unrelated diversification – where arguably greater managerial discretion is required and greater risk reduction is possible. In our full sample of firms we do not find support for either hypothesis, however, in the sub-sample of single-unaffiliated insurers we find support for our reformulated managerial discretion hypothesis.

Several variables were used to test the ability of the coinsurance hypothesis to explain variation in observed levels of insurer diversification. Although the coefficients on PUBLIC and SIZE were opposite to what the coinsurance hypothesis predicted, we are not surprised by the positive relation between these variables and insurer diversification as large companies tend to be more diversified and public insurers tend to be large. The coefficient on TAXDUM was generally insignificant and thus also failed to support the coinsurance hypothesis.

The efficiency hypothesis explains variations in diversification in terms of the differential value of internal capital markets and economies of scope across firms. We find strong support for the internal capital markets hypothesis, as the coefficient estimate for PLTAIL is positive and significant in all regression models. We find limited evidence for the scope economies motive for diversification. Underwriting expenses are negatively related to diversification status but are not significantly related to the extent of diversification exhibited by diversified insurers.

Interesting results regarding our control variables include those related to reinsurance usage (REINSUSE) and environmental uncertainty (YR1999-YR2002). In our diversification extent regressions we find a positive relation between REINSUSE and the extent of unrelated diversification. This result supports the real services efficiency hypothesis of Mayers and Smith (1990). In our diversification status regressions we find that insurers are less likely to be

diversified in hard-market years. This evidence supports the environmental uncertainty hypothesis of Bergh and Lawless (1998).

3.5) Conclusion

This chapter applies theory from finance, economics, and strategic management to explain the observed heterogeneity in P/L insurer line-of-business diversification. We use a two-stage regression model to simultaneously test the agency, coinsurance, and efficiency hypotheses regarding insurer diversification. We also develop a measure of unrelated diversification that is used to better test the managerial discretion hypothesis.

Our results suggest that existing theory is at least partially successful in explaining variation in diversification levels and strategies among insurance firms. Although the agency and efficiency views are more successful than the coinsurance view in explaining both total and unrelated diversification, we are unable to find unambiguous support for either of these views. We do, however, find support for our reformulated managerial discretion hypothesis in the sub-sample of unaffiliated insurers. Limits on managerial discretion afforded to managers of mutual insurance companies results in mutuals engaging in less unrelated diversification than their stock counterparts.

CHAPTER FOUR: PERFORMANCE EFFECTS OF LINE-OF-BUSINESS DIVERSIFICATION

4.1) Introduction

This chapter examines the relation between line of business diversification and accounting performance for a sample of P/L insurers. Our review of the diversification-performance (D-P) literature in Chapter 2 provides us with two testable hypotheses regarding the D-P relation, the conglomeration hypothesis and the strategic focus hypothesis. The conglomeration hypothesis predicts that increased diversification should be associated with better performance because diversified firms are able to benefit from scope economies and efficient internal capital markets. By contrast, the strategic focus hypothesis predicts that increased diversification should be associated with poorer performance because less diversified firms are able to concentrate on their core competencies and avoid various costs associated with diversification.

Despite the vast body of research on the D-P relationship there is no consensus on whether diversification enhances or reduces performance (Datta, et al. (1991)). Reasons for this lack of consensus include measurement error in the level of diversification due to managerial discretion in segment reporting (Villalonga (2004)) and industry effects that have been shown to explain much of the variation in the effects of conglomerate diversification (e.g., Bettis and Hall (1982); Schmalensee (1985); Wernerfelt and Montgomery (1988)).

By studying line of business diversification in the P/L insurance industry we are able to overcome many of the methodological challenges that are at least partially responsible for the lack of consensus on the nature of the D-P relationship.

4.2) Hypotheses development

Prior literature suggests that the relationship between diversification and performance may be described as follows:

Performance = f (diversification | firm and industry characteristics)

There are several benefits to corporate diversification that would suggest a positive D-P relation. First, diversification provides firms with the opportunity to benefit from cost and revenue scope economies. Cost scope economies arise from the sharing of fixed production costs across several businesses within the firm (Teece (1980)). Revenue scope economies may be realized due to the transfer of firm-specific intangible assets such as brand reputation and customer loyalty (Markides (1992)). Second, diversification generates larger internal capital and labor markets. These internal markets may be more efficient than external capital and labor markets due to information asymmetry between the firm and the external markets. Finally, diversification reduces income volatility by combining revenue streams that are imperfectly correlated. Given risk-sensitive customers, this risk-reduction should increase prices that customers are willing to pay (Herring and Santomero (1990)).

There are also several costs of diversification that might suggest a negative relation between diversification and performance. Agency costs are likely positively related to diversification because managerial monitoring and bonding becomes more difficult as firms become more complex. Furthermore, by creating larger internal capital markets, diversification enables managers to avoid the market discipline that comes with external financing (Easterbrook (1984)). Absent capital market discipline managers are more inclined to engage in activities that maximize their private benefits (e.g. increased perquisite consumption) and to subsidize failing business segments (Meyer, et al. (1992)).

The net effect of diversification is therefore a function of firms' ability to maximize the benefits while minimizing the costs. In terms of the conglomeration hypothesis we should expect a positive relation between diversification and performance because diversification's benefits exceed its costs. By contrast, the strategic focus hypothesis predicts that a negative relation should exist because the costs of diversification outweigh the benefits.

Hypothesis 1 (Conglomeration): Diversification is positively related to performance.

Hypothesis 2 (Strategic Focus): Diversification is negatively related to performance.

Control variables

In estimating the relationship between diversification and performance it is important to control for the effect of firm specific and market factors that may explain performance variation across firms (Datta, et al. (1991)). The following firm specific control variables are used: size, capitalization, ownership structure, geographic diversification, group status, publicly traded, and the percent of premiums attributable to L-H insurance policies.

Firm Size: If larger firms have lower insolvency risk then they should be able to charge higher prices than smaller insurers (Sommer (1996)). Additionally, to the extent that size conveys market power we would expect larger firms to enjoy greater revenue efficiencies than their smaller counterparts (Cummins and Nini (2002)). Finally, (Cummins and Zi (1998)) find a positive relation between size and economies of scale and scope. Thus, we expect a positive relation between firm size and risk-adjusted performance. We measure firm size as the natural logarithm of total assets. *Capitalization:* Sommer (1996) finds that safer firms are able to command higher prices. Thus, we expect a positive relation between insurer capitalization and performance. We measure capitalization as the ratio of policyholder surplus to total assets.

Ownership structure: The two forms of ownership structure included in our sample (stocks and mutuals) have different inherent costs and benefits. It follows that the relation between ownership structure and performance should reflect whether, on average, the costs of each ownership structure are offset by the benefits. The advantages and disadvantages associated with each ownership structure stem from each structure's success in controlling incentive conflicts. The two primary sets of incentives conflicts in insurance are owner-policyholder conflicts and owner-manager conflicts (Mayers and Smith (1981)). Owner-policyholder conflicts are more severe, and therefore imply greater costs, for stock companies than for mutuals. The mutual form reduces the costs associated with divergent owner and policyholder interests (e.g. risk-shifting) by merging the role of owner and customer. However, this reduction in owner-customer agency costs may be offset by greater owner-manager agency costs that arise out of a less effective market for corporate control.

Empirical evidence regarding the relative efficiency of stock and mutual insurers is mixed. Mayers and Smith (1986) find that conversion from stock to mutual ownership structure is efficiency enhancing – suggesting that benefits of the mutual form outweigh the costs. However, McNamara and Rhee (1992) find no evidence of improved performance when life insurers convert from mutual to stock organizational structure. Cummins, Weiss and Zi (1999) examine the cost efficiency of stocks and mutuals in the P/L industry and find support for the expense preference hypothesis, which predicts that mutuals will have higher costs than stocks because control of managerial perquisite consumption is more difficult in the mutual ownership form. By contrast, Greene and Segal (2004) find no significant difference in cost efficiency, or accounting profitability, between mutual and stock life insurers. These divergent empirical results suggest

that the relation between ownership structure and performance is ambiguous. We use a dummy variable (MUTUAL) to distinguish between mutuals and stocks.

Geographic diversification: Pro-conglomeration arguments suggest that geographically diversified firms are likely to have less volatile profits due to coinsurance effects. As a result of their lower risk geographically diversified insurers should be able to charge higher prices than geographically focused insurers. These arguments suggest a positive relation between the degree of geographic diversification and risk-adjusted performance. By contrast, pro-focus arguments suggest that geographically focused insurers are able to avoid costly monitoring that is required when operating across different states (Winton (1999)) and achieve efficiencies arising out of market specialization. Geographic diversification is measured as the complement of the Herfindahl index of premiums written across all US states and protectorates (GEODIV).

Industry concentration: Chidambaran, Pugel and Saunders (1997) find a positive relation between prices and market concentration in P/L insurance lines. We follow Montgomery (1985) in controlling for the concentration of industries in which a firm participates. Montgomery argues that, ceteris paribus, firms operating in more concentrated industries are likely to benefit from higher prices and higher profits. To capture the impact of the competitiveness of firms markets on performance we first calculate a Herfindahl concentration index for each line of business (j=1 to 26) in each year (t=1995 to 2002):

$$HHI_{jt} = \sum_{i=1}^{n} \left(NPW_{ijt}^{2} \Big/ NPW_{jt}^{2} \right)$$

The larger the value of HHI_{jt}, the more concentrated is that line of business and the greater is the potential for super-normal profits.

Next, we calculate each firm's (i=1 to n) participation in each line of business (j=1 to 26) in each year (t=1995 to 2002):

$$w_{ijt} = {NPW_{ijt}}\Big/{NPW_{it}}$$

Using w_{ijt} as weights we then calculate the weighted sum of firm exposure to industry concentration across all of the lines in which it operates:

$$WCONC_{it} = \sum_{j=1}^{26} w_{ijt} \times HHI_{jt}$$

Firms with small values for WCONC are exposed to competitive business lines whereas firms with large values for WCONC participate in business lines characterized by less competitive market structures. Based on the predictions of the structure-conduct-performance paradigm we expect WCONC to be positively related to performance.

Group status: Our sample includes single-unaffiliated insurers as well as insurance groups. Cummins and Sommer (1996) and Sommer (1996) suggest that customers should be willing to pay more for insurance from unaffiliated insurers than those belonging to insurance groups because groups have the option to let one of their members fail and policyholders have difficulty in "piercing the corporate veil". Thus, policyholders might view group insurers as being more risky than identical unaffiliated insurers. Group status is measured in term of a dummy variable (GROUP) equal to one if the unit of observation is a group. We expect a negative relation between group status and performance.

Publicly Traded: Monitoring and scrutiny by shareholders and analysts implies a more effective market for corporate control than is present for private insurers. Hence, we expect that publicly traded insurers should, on average, outperform privately held insurers. We use a dummy variable, PUBLIC, to indicate whether an insurer is publicly traded.

Life-Health: Several firms in our sample write business in both the P/L and L-H insurance industries. We control for an insurer's participation in both industries by including a variable equal to the percentage of total premiums (P/L plus L-H) attributable to operations in the L-H industry (PCTLH). To the extent that this variable indicates greater diversification, we expect it to have the same relationship with performance as our intra-industry diversification measure

In addition to the above firm-specific controls we include controls for time-induced variation in performance (year dummies). We also control for performance variation that is induced by companies operating in different states that have different regulatory stringency and demographics by including dummy variables indicating an insurer's participation in any given state or protectorate. Finally, we include dummy variables indicating an insurer's participation in different lines of business. This is an additional way (beyond focusing on one industry) of controlling for industry effects.

4.3) Sample and Data

Our initial sample includes all firms in the NAIC database for the years 1995 to 2002. This period is chosen for two reasons. First, it is sufficiently long to include both positive and negative market conditions. For the majority of the 1990s and latter part of the 1980s the P/L market was characterized by "soft" market conditions where prices were low and supply was abundant. After 1999 the market began to harden as prices increased and availability decreased.[20] Second, our empirical analysis includes historical risk measures that require up to 10 years of prior data. As 1985 is the first year for which we are able to obtain firm data from the NAIC we sample from 1995 onwards.

[20] Ceniceros and Hofmann (1999), Ruquet (2000), Goch (2001).

Our first screen is to exclude firms that are under regulatory scrutiny. Next we exclude firms that report negative net premiums written or total admitted assets. We then aggregate affiliated insurers, controlling for potential double counting of intra-group shareholding. This aggregation is appropriate as diversification decisions are likely made at the group level (Berger, et al. (2000)). Groups are assigned an organizational structure based on data collected from Best Aggregates and Averages.

Next we exclude groups with substantial premium income (25%) from L-H insurance. Because we use historical risk measures requiring between 5 and 10 years of data we exclude firms with less than 5 years of historical data. Finally, we exclude firms (unaffiliated as well as aggregated groups) with organizational structures other than stock or mutual.

4.3.1) Performance measure selection

Several measures of accounting performance have been used in the insurance literature. The two most commonly used measures in the literature are return on assets (ROA) and return on equity (ROE).[21] These accounting performance measures are also widely used in the diversification-performance literature (e.g. Hill, Hitt and Hoskisson (1992), Hamilton and Shergill (1993), Mayer and Whittington (2003)). Consistent with Browne, et al. (2001) and Greene and Segal (2004) we perform our empirical analysis on both performance measures. Because higher performance may simply be the result of higher risk it is important to consider the effect of diversification on risk-adjusted performance.

While the majority of prior D-P studies do not adjust for risk (Datta, et al. (1991)) there are two major approaches that may be followed. The first approach is to divide the relevant performance measure by its variability over a given time period. For annual data the time period

[21] See for example, Browne, Carson and Hoyt (2001); Lai and Limpaphayom (2003); BarNiv and McDonald (1992); Pottier and Sommer (1999); Greene and Segal (2004).

used is typically 5 years (Bettis and Hall (1982), Johnson and Thomas (1987)) or 10 years (Browne, et al. (2001)). The second approach is to include a risk measure as a control variable in a linear regression model where performance is the dependent variable. This approach has been followed by Lai and Limpaphayom (2003) and Hamilton and Shergill (1993).[22] The primary advantage of the latter approach is that it allows for direct interpretation of the effect of diversification on the dependent variable. Because our key results are unaffected by our risk-adjustment method we report results of regression specifications with risk as a control variable.

4.3.2) Diversification measure selection

There are two main categories of diversification measures that are used in the D-P literature: discrete measures and continuous measures. Discrete measures are designed to reflect the number of distinct business activities of the firm. Examples of discrete measures used in the literature are the number of 2, 3, or 4-digit SIC codes in which a firm has positive sales/assets. The richness of our data enables us to use a more detailed measure: the number of different insurance lines in which a firm operates. We follow the approach taken by diversification discount researchers (e.g. Berger and Ofek (1995); Lang and Stulz (1994); Comment and Jarrell (1995); Denis, et al. (1997)) in using a discrete measure to distinguish between undiversified firms operating in only one business line, and diversified firms that operate in multiple business lines (MULTLINE).

Continuous diversification measures are typically used to distinguish between different levels of diversification among firms that operate in multiple business lines/segments. The most commonly used continuous diversification measure is the Herfindahl index of firm sales or assets across all business lines in which the firm operates (e.g. Berger and Ofek (1995), Lang and Stulz

[22] Grace (2004) uses the standard deviation of ROA for the past 5 years as a risk control in her analysis of executive compensation in the P/L insurance industry.

(1994), Montgomery (1985), Tallman and Li (1996)). We use the complement of a sales-based Herfindahl across 26 lines of business as our continuous diversification measure (DT). Greater values of DT imply greater diversification and smaller values imply greater focus/specialization. Variable definitions and descriptive statistics are presented in Table 4-1.

Table 4-1. Variable definitions and descriptive statistics

Variable	Definition	Number of observations	Mean	Median	Standard Deviation
ROA	Net income/total admitted assets	5457	0.02	0.03	0.06
ROE	Net Income/policyholder surplus	5457	0.04	0.06	0.15
SDROA5	Standard deviation of ROA over past 5 years	5457	0.03	0.02	0.03
SDROE5	Standard deviation of ROE over past 5 years	5457	0.09	0.06	0.14
LINES	Number of lines in which firm has positive net premiums written (NPW)	5457	6.49	6.00	4.98
MULTLINE	= 1 if LINES > 1, 0 otherwise	5457	0.83	1.00	0.38
DT	1-Herfindahl index of NPW across 26 insurance lines	5457	0.45	0.53	0.30
SIZE	Natural logarithm of total admitted assets	5457	17.55	17.38	2.17
CAPASS	Policyholder surplus/total admitted assets	5457	0.49	0.44	0.21
GEODIV	1-Herfindahl index of NPW across 57 geographic areas	5457	0.32	0.08	0.37
WCONC	Weighted sum of market share per line multiplied by line-specific herfindahl	5457	0.05	0.05	0.02
PCTLH	Percentage of premiums from life insurance	5457	0.45	0.00	2.20
MUTUAL	= 1 if firm is a mutual, 0 otherwise	5457	0.47	0.00	0.50
GROUP	= 1 if firm is a group, 0 otherwise	5457	0.33	0.00	0.47
PUBLIC	= 1 if firm is publicly traded, 0 otherwise	5457	0.07	0.00	0.25

Table 4-2 compares medians and means of insurers that operate exclusively in one line of business (undiversified) and those that operate in multiple lines (diversified). Notably, single-line insurers earn higher ROA and ROE than multi-line insurers but their performance volatility (SDROA5 and SDROE5) is also higher than it is for diversified insurers. Given that the risk-

adjusted performance (RAROA and RAROE) for multi-line insurers is higher than it is for multi-line insurers, our univariate results provide evidence consistent with the focus hypothesis.

Table 4-2. Univariate comparison between diversified and single-line insurers

	Single-line insurers (939 firms)		Diversified insurers (4518 firms)		Difference: Single-line minus Diversified			
Variable	Mean	Median	Mean	Median	Mean	p-value	Median	p-value
ROA	0.042	0.040	0.020	0.025	0.022	<.0001	0.015	<.0001
ROE	0.074	0.073	0.036	0.053	0.039	<.0001	0.020	<.0001
SDROA5	0.039	0.026	0.032	0.024	0.007	<.0001	0.002	<.0001
SDROE5	0.114	0.060	0.083	0.055	0.030	<.0001	0.005	<.0001
RAROA	2.030	1.366	1.440	0.998	0.589	<.0001	0.368	<.0001
RAROE	1.781	1.246	1.231	0.934	0.549	<.0001	0.313	<.0001
SIZE	16.62	16.41	17.75	17.63	-1.13	<.0001	-1.22	<.0001
CAPASS	0.541	0.489	0.478	0.433	0.063	<.0001	0.057	<.0001
GEODIV	0.207	0.000	0.344	0.169	-0.137	<.0001	-0.169	<.0001
WCONC	0.053	0.046	0.052	0.053	0.001	0.100	-0.007	<.0001
PCTLH	0.003	0.000	0.542	0.000	-0.538	<.0001	0.000	<.0001
MUTUAL	0.336	0.000	0.502	1.000	-0.167	<.0001	-1.000	<.0001
GROUP	0.119	0.000	0.376	0.000	-0.257	<.0001	0.000	<.0001
PUBLIC	0.031	0.000	0.076	0.000	-0.045	<.0001	0.000	<.0001

Note: Single-line insurers are those firms where MULTLINE=0; Diversified insurers are those where MULTLINE=1; ROA (Return on assets)=net income/total admitted assets; ROE (Return on Equity)=net income/policyholder surplus; SDROA5=standard deviation of ROA over past 5 years; SDROE5=standard deviation of ROE over past 5 years; RAROA=ROA/SDROA5; RAROE=ROE/SDROE5; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's Herfindahl across all firms. PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; GROUP=1 if firm is an aggregated group, 0 otherwise; PUBLIC=1 if publicly traded, 0 otherwise. P-values for difference of means are based on a t-test. P-values for for difference of medians are based on a Wilcoxon rank sum test.

4.4) Regression analysis

Our multivariate analysis is performed with a series of pooled cross sectional, time-series OLS regressions. The first part of our regression analysis focuses on whether *any* diversification is performance enhancing (or reducing). Following Berger and Ofek (1995) we use an indicator

variable MULTLINE to denote whether an insurer operates in one line (MULTLINE=0) or multiple lines (MULTLINE=1) in any given year. Our basic regression model that is used to measure the effect of diversification on performance is defined in equation (4-1).

Table 4-3. Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) LOBDIV	1												
	0												
(2) MULTLINE	0.694												
	<.0001												
(3) SIZE	0.269	0.196											
	<.0001	<.0001											
(4) CAPASS	-0.142	-0.111	-0.439										
	<.0001	<.0001	<.0001										
(5) GEODIV	0.180	0.140	0.581	-0.185									
	<.0001	<.0001	<.0001	<.0001									
(6) WCONC	0.048	-0.027	0.145	-0.027	0.035								
	0.000	0.044	<.0001	0.049	0.010								
(7) PCTLH	0.172	0.092	0.307	-0.025	0.171	0.079							
	<.0001	<.0001	<.0001	0.061	<.0001	<.0001							
(8) MUTUAL	0.265	0.126	-0.137	0.204	-0.202	-0.064	0.019						
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.166						
(9) PUBLIC	0.144	0.067	0.404	-0.101	0.314	0.083	0.183	-0.149					
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001					
(10) GROUP	0.306	0.206	0.639	-0.188	0.498	0.137	0.289	-0.036	0.383				
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.008	<.0001				
(11) SDROA5	-0.090	-0.079	-0.276	0.047	-0.146	0.014	-0.054	-0.054	-0.078	-0.117			
	<.0001	<.0001	<.0001	0.001	<.0001	0.291	<.0001	<.0001	<.0001	<.0001			
(12) SDROE5	-0.088	-0.085	-0.076	-0.219	-0.098	0.062	-0.045	-0.090	-0.034	-0.046	0.650		
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.001	<.0001	0.011	0.001	<.0001		
(13) ROA	-0.155	-0.144	0.009	0.232	-0.015	0.026	0.004	-0.086	0.048	-0.040	0.003	-0.054	
	<.0001	<.0001	0.485	<.0001	0.253	0.058	0.778	<.0001	0.000	0.003	0.833	<.0001	
(14) ROE	-0.100	-0.098	0.078	0.103	-0.004	0.005	0.003	-0.060	0.074	-0.012	-0.067	-0.090	0.872
	<.0001	<.0001	<.0001	<.0001	0.766	0.715	0.801	<.0001	<.0001	0.387	<.0001	<.0001	<.0001

Note: For each variable listed in the first column correlation coefficients are shown in the first row and p-values appear in the second row. DT =1-Herfindahl of premiums across 26 lines of business; MULTLINE=1 if firm writes business in more than one line, 0 otherwise; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's Herfindahl across all firms. PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; GROUP=1 if firm is an aggregated group, 0 otherwise; PUBLIC=1 if publicly traded, 0 otherwise; ROA (Return on assets)=net income/total admitted assets; ROE (Return on Equity)=net income/policyholder surplus; SDROA5=standard deviation of ROA over past 5 years; SDROE5=standard deviation of ROE over past 5 years;

Eq. (4-1)

$$ROA_{it} = \beta_0 + \beta_1 MULTLINE_{it} + \beta_2 SIZE_{it} + \beta_3 CAPASS_{it} + \beta_4 SDROA_{it} + \beta_5 GEODIV_{it} + \beta_6 WCONC_{it} + \beta_7 PCTLH_{it} + \beta_8 MUTUAL_{it} + \beta_9 PUBLIC_{it} + \beta_{10} GROUP_i + \beta_{11-17} YEAR_{it} + \beta_{18-42} LINE_{it} + \beta_{43-98} STATE_{it} + \varepsilon_{it}$$

Variable definitions appear in Table 4-1. We estimate equation (4-1) twice – first with year dummies only (OLS1) and then with line and state dummies as well (OLS2). To conserve space we do not report the coefficient estimates of year, line, or state dummies. Regression results for Models 1 and 2 are reported in the second and third columns of Table 4-4.

Recent research on the diversification discount has attributed the observed discount in prior studies to self-selection bias. For example, Villalonga (2004) and Campa and Kedia (2002) argue that firms choose to diversify (or to remain undiversified) based on a set of unobservable characteristics that are likely correlated with performance. Equation (4-2) describes this choice.

Eq. (4-2)
$$MULTLINE^{*}_{it} = \gamma Z_{it} + \mu$$
$$MULTLINE_{it} = 1 \text{ if } MULTLINE^{*}_{it} > 0$$
$$= 0 \text{ otherwise}$$

In equation (4-2) the propensity to diversify (MULTLINE*) is an unobserved latent variable that can be explained by firm and industry characteristics (Z). When a firm decides to diversify we observe only MULTLINE and do not observe the elements of Z that led the firm to diversify. Some of these unobserved elements of Z may be correlated with performance. If that is the case then MULTLINE will be correlated with the error term in equation (4-1) and the coefficient estimates of MULTLINE will be biased. We use three different techniques to control for potential self-selection, or endogeneity, bias.

First, we take advantage of our panel data set and used a fixed-effect estimator.[23] This approach controls for possibility that elements of Z are correlated with performance but are omitted from equation (4-1). The fixed-effects technique is simple to apply but requires the assumption that unobserved characteristics are constant over time. Our fixed effects model

[23] This approach to dealing with endogeneity has been applied by Sanzhar (2003) and Aggarwal and Samwick (2003).

makes the following modifications to equation (4-1): GROUP is excluded from our model because it is constant over time, and firm-specific intercepts are included in the model to capture the effect of unobserved firm characteristics that affect firm performance.

The second method that Campa and Kedia (2002), and Villalonga (2004) use to deal with the potential endogeneity bias is to jointly estimate equations (4-1) and (4-2) in a simultaneous equations framework using either an instrumental variables approach or a treatment effects approach.[24] Both approaches require estimating a decision equation that explains the probability that a firm is a single, or multi-segment firm in any given year. In order to do this we need to find instruments for MULTLINE that satisfy two conditions. First, the instrumental variables must be highly correlated with MULTLINE, and second, they must be uncorrelated with performance.

The most obvious set of instruments comes from our analysis of the determinants of diversification status in the chapter 3 of this dissertation. In Table 3-4 we identified several variables as predictors of diversification status. Table 4-2 shows that, unfortunately, the majority of these variables, with the exception of GEODIV, violate the second condition for a suitable instrumental variable, i.e. they are highly correlated with performance. Another set of potential instrumental variables is suggested by Campa and Kedia (2002). This set includes current, lagged, and historically averaged measures of firm characteristics, industry growth, and general economic growth. We eliminate instrumental variable candidates that are highly correlated with performance and retain only those candidates that are correlated with MULTLINE but not with ROA. Three variables meet this requirement: average firm size for the prior five years (AVSIZE), five-year average percentage of premiums in L-H insurance (AVLH), and five-year average geographic diversification (AVGEO). Unfortunately the predictive ability of the probit

[24] McCullough (2000) uses these techniques in the context of insurance industry mergers and acquisitions.

regression of MULTLINE on these ideal instruments lacks predictive power[25]. Accordingly, we choose additional instruments that have the lowest correlation with ROA and the highest correlation with MULTLINE. Two additional instruments are selected on this basis: the five-year average of reinsurance usage (AVREIN) and firm age.

These instruments are used in a probit model to obtain predicted values of MULTLINE that are inserted into Equation (4-1) to replace observed values for the instrumental variables approach and are used to control for self-selection bias in the treatment effects model. We find that our set of instruments for MULTLINE correctly predicts the actual diversification status for 78% of our sample firms. Further, these instruments are either statistically uncorrelated with ROA (as is the case for AVLH, AVSIZE, and AVGEO) or weakly correlated with ROA but strongly correlated with MULTLINE (as is the case of AGE and AVREIN).

Results: Diversification status

Results for the effect of diversification status on ROA appear in Table 4-4. The coefficient estimates on MULTLINE show that ROA for diversified firms is between 1 and 7.7 percent lower than for single line firms. This negative relation between diversification and performance supports the strategic focus hypothesis. The "diversification penalty" is substantially smaller than the range of diversification discount estimates (using market-based performance measures) that have been reported in the finance literature.[26] Berger and Ofek (1995) present some evidence on the size of the "diversification penalty" using accounting data for a large cross-section of non-financial firms for the period 1986-1991. They compare industry-adjusted ROA between single-segment firms and diversified firms and report a mean penalty of 1.5%. Thus our estimates of

[25] Percent concordant = 62%
[26] For example, Berger and Ofek (1995) document discounts ranging between 13% and 15%.

the diversification penalty, for a sub-sample of financial firms, are similar to their estimates based on a broad cross-section of non-financial firms.

Table 4-4. Regression estimates of the magnitude of diversification's effect on ROA

Dependent Variable = Return on Assets (ROA)												
Model	OLS1		OLS2		Fixed Effects		Instrumental Variables		Treatment Effects		Between Estimator	
Constant	-0.11	<.0001	-0.12	<.0001	-0.425	<.0001	-0.116	<.0001	-0.107	0.000	-0.100	<.0001
MULTLINE	-0.019	<.0001	-0.016	<.0001	-0.012	0.016	-0.077	<.0001	-0.060	0.000	-0.018	<.0001
SIZE	0.01	<.0001	0.01	<.0001	0.02	<.0001	0.010	<.0001	0.009	0.000	0.006	<.0001
CAPASS	0.09	<.0001	0.09	<.0001	0.18	<.0001	0.091	<.0001	0.091	0.000	0.078	<.0001
GEODIV	-0.01	<.0001	-0.01	0.019	-0.03	0.007	-0.007	0.101	-0.008	0.002	-0.010	0.050
WCONC	0.06	0.117	0.05	0.288	0.07	0.491	0.007	0.876	0.028	0.477	0.068	0.370
PCTLH	0.00	0.067	0.00	0.174	0.00	0.845	0.000	0.518	-0.001	0.117	-0.001	0.326
MUTUAL	-0.01	<.0001	-0.01	<.0001	0.01	0.460	-0.004	0.049	-0.007	0.000	-0.014	<.0001
PUBLIC	0.01	0.070	0.01	0.001	-0.03	0.034	0.014	<.0001	0.009	0.011	0.008	0.192
GROUP	-0.01	<.0001	-0.01	<.0001			-0.014	<.0001	-0.013	0.000	-0.011	0.007
SDROA5	0.04	0.057	0.05	0.049	0.20	<.0001	0.047	<.0001	0.046	0.044	-0.026	0.576
LAMBDA									0.026	0.000		
Year Dummies	y		y		y		y		y			
State and Line Dummies			y				y		y			
Number of observations	5457		5457		5457		5457		5457		772	
Adjusted R-squared	0.13		0.15		0.56		0.16		0.15		0.16	

Note: OLS1 is an ordinary least squares regression model with year dummies; OLS2 adds state and line dummies to OLS1; the Fixed Effects model adds firm dummies to OLS1; the Instrumental Variables model replaces observed values for MULTLINE with predicted values from the probit regression reported in Table 4-4, panel B; the Treatment Effects model adds a self-selection parameter to the Instrumental Variables model; the Between Effects model regresses average values of the dependent variable on average values of the independent variables. ROA=Net income/total admitted assets; MULTLINE=1 if firm writes business in more than one line, 0 otherwise; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise. GROUP=1 if firm is an insurance group, 0 otherwise; SDROA5=Standard deviation of ROA over past 5 years; LAMBDA=Self selection parameter (Inverse Mills Ratio).

It is important to note that Berger and Ofek's definition of single-segment firms is far broader than ours. They define single segment firms as those operating in one 4-digit SIC code. Thus, almost all of the firms in our sample (with the exception of insurer groups that participate

in the L-H insurance industry and insurers that are owned by diversified conglomerates) would be classified as single-segment firms by Berger and Ofek and by other diversification discount researchers (e.g. Lang and Stulz (1994)), Servaes (1996)). This implies that diversification discount studies that compare the performance of multi-segment firms to broadly defined single segment firms are actually underestimating the size of the diversification discount.[27]

The pattern of our results on MULTLINE across the various models differs from what has been found by Campa and Kedia (2002) and Villalonga (2004) in their studies of the diversification discount. They find that the discount reduces when accounting for self-selection bias. Hence, their findings are consistent with the hypothesis that firms that choose to diversify would trade at a discount irrespective of their diversification status. This implies negative correlation between MULTLINE* and their measure of value, which biases OLS estimates of the discount. In our data there exists a positive correlation between MULTLINE* and ROA which results in the apparent underestimation of the true effect of diversification on performance.

SIZE is positive and significant across all models - consistent with larger firms having economies of scale and lower insolvency risk. The coefficient on CAPASS is positive and significant, consistent with the hypothesis that higher prices paid by risk-averse policyholders to safer insurers will translate into higher risk-adjusted performance. The negative sign on GEODIV implies that potential benefits from risk-reduction are offset by the costs associated with greater managerial discretion. The coefficients on WCONC are insignificant across all models. We therefore do not find support for the hypothesis that firms operating in more concentrated business lines are able to charge higher prices and earn higher profits than firms

[27] We acknowledge that the diversification discount literature relates diversification status to market-based performance measures (such as excess-value and Tobin's Q) while our study considers accounting performance. Evidence supporting a reasonably strong positive correlation between Q and accounting profit suggests that our results may be generalized to market-based situations. For example, Demsetz and Villalonga (2001) report a correlation of .61 between accounting profit (ROA) and Tobin's Q.

facing more competitive market conditions. Our control for the percentage of premiums from L-H insurance (PCTLH) is generally insignificant.

MUTUAL is negative and significant across all models, except for model 3. Thus, it appears that higher owner-manager agency costs outweigh any benefits associated with the reduction in owner-customer agency costs. Our finding is consistent with Cummins, et al. (1999). PUBLIC is positive and significant in four out of six models in both models – consistent with the hypothesis that greater effectiveness of the market for corporate control will lead to higher profitability of publicly traded insurers. GROUP is negative and significant in all models. This negative relation may be due to lower prices induced by the option to let a member fail, costs of managerial discretion, or other costs associated with conglomeration.

Consistent with the predictions of financial theory we generally observe a positive relation between our risk measure (SDROA5) and performance. F-tests on the joint significance of state and line dummies confirm the importance of line-specific characteristics and geographic factors in insurer performance. The reduction in the coefficient on MULTLINE when state and line effects are included in the model reflects the importance of controlling for 'industry effects'.

Robustness of diversification status results

To investigate whether our results are robust to a different performance measure we repeat our regression analysis using return on equity (ROE) as the dependent variable. Results are reported in Table 4-5.

Consistent with our ROA results in Table 4-4 the coefficient on MULTLINE is negative and significant across all model specifications. The size of the penalty is more than double that observed for ROA in Table 4-4. This difference is not surprising given that the univariate size of the performance difference between single-line and multi-line insurers is at least 2 times larger

when measuring performance in terms of ROE than when performance is measured by ROA.[28] The results for our other regressors follow those reported for Table 4-4.

Table 4-5. Regression estimates of the magnitude of diversification's effect on ROE

Dependent Variable = Return on Equity (ROE)												
Model	OLS1		OLS2		Fixed Effects		Instrumental Variables		Treatment Effects		Between Estimator	
Constant	-0.26	<.0001	-0.29	<.0001	-1.442	<.0001	-0.284	<.0001	-0.286	<.0001	-0.190	<.0001
MULTLINE	-0.041	<.0001	-0.035	<.0001	-0.051	0.000	-0.140	<.0001	-0.133	<.0001	-0.040	<.0001
SIZE	0.02	<.0001	0.02	<.0001	0.08	<.0001	0.025	<.0001	0.025	<.0001	0.016	<.0001
CAPASS	0.12	<.0001	0.13	<.0001	0.46	<.0001	0.132	<.0001	0.132	<.0001	0.072	0.000
GEODIV	-0.04	<.0001	-0.04	0.001	-0.09	0.000	-0.030	0.006	-0.032	0.004	-0.038	0.001
WCONC	0.04	0.728	-0.05	0.656	0.58	0.029	-0.133	0.280	-0.139	0.259	0.014	0.940
PCTLH	0.00	0.009	0.00	0.041	0.00	0.269	-0.002	0.125	-0.002	0.078	-0.002	0.158
MUTUAL	-0.02	<.0001	-0.01	0.011	0.01	0.681	-0.002	0.702	-0.005	0.341	-0.023	0.001
PUBLIC	0.03	0.001	0.04	0.000	-0.10	0.009	0.039	<.0001	0.038	0.000	0.033	0.025
GROUP	-0.03	<.0001	-0.03	<.0001			-0.035	<.0001	-0.035	<.0001	-0.024	0.013
SDROE5	-0.07	<.0001	-0.06	0.000	0.14	<.0001	-0.049	<.0001	-0.049	0.001	-0.147	<.0001
LAMBDA									0.060	<.0001		
Year Dummies	y		y		y		y		y			
State and Line Dummies			y				y		y			
Number of observations	5457		5457		5457		5457		5457		772	
Adjusted R-squared	0.09		0.11		0.50		0.12		0.12		0.12	

Note: OLS1 is an ordinary least squares regression model with year dummies; OLS2 adds state and line dummies to OLS1; the Fixed Effects model adds firm dummies to OLS1; the Instrumental Variables model replaces observed values for MULTLINE with predicted values from the probit regression reported in Table 4-4, panel B; the Treatment Effects model adds a self-selection parameter to the Instrumental Variables model; the Between Effects model regresses average values of the dependent variable on average values of the independent variables.

ROE=Net income/policyholders surplus; MULTLINE=1 if firm writes business in more than one line, 0 otherwise; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise. GROUP=1 if firm is an insurance group, 0 otherwise; SDROE5=Standard deviation of ROE over past 5 years; LAMBDA=Self selection parameter (Inverse Mills Ratio).

To make our results more comparable to studies in the extant finance literature we perform our analysis on the sub-sample of firms whose assets exceed $20 million. This is a standard

[28] See Table 4-2.

sample selection procedure in the diversification literature (e.g. Berger and Ofek (1995), Campa and Kedia (2002)). Our results hold for this sample as well. Another possible explanation for the difference in our results, from those of Campa and Kedia (2002), on the treatment effects and instrumental variables models is that they analyze separately diversifying firms and focusing firms.

We examine the diversification penalty for diversifying insurers by limiting our sample to single-line firms that remained undiversified for their tenure in the sample and multi-line firms that increased (but at no point reduced) the number of lines written during their tenure. Our sample of single line and diversifying firms contains 1521 firm-year observations (roughly one-third of our total sample) of which 1296 are multi-line firm-years and 225 are single-line firm-years. Similarly, we examine the diversification penalty for refocusing insurers by limiting our sample to single-line firms that remained undiversified for their tenure in the sample and multi-line firms that decreased (but at no point increased) the number of lines written during their tenure. Our sample of single line and refocusing firms contains 1166 firm-year observations of which 941 are multi-line firm-years and 225 are single-line firm-years. Our results for both sets of coefficient estimates are almost identical to the full sample results.

As a final robustness check we repeat our analysis using risk measures that are calculated over a longer period of time. We lengthen the time period for calculation of our risk measures by using the 10-year standard deviation rather than the 5-year standard deviation of ROE and ROA risk measures. This approach reduces our sample size by approximately 20%, from 5503 firms to 4413 firms. Our results are very similar to those obtained using the 5-year measures. For example, the coefficient estimates of MULTLINE in the ROA regression were -.02 and -.018 for models OLS1 and OLS2 respectively when using SDROA5 and SDROE5 as risk measures.

When using the 10-year risk measures these estimates are -.02 and -.015. The results for the ROE regression are also largely unchanged.

Having established that single-line insurers outperform diversified insurers we examine whether the negative D-P relation holds across different levels of diversification. Villalonga (2004) notes that finance researchers (such as Lang and Stulz (1994)) find that the diversification discount is not persistent. Consistent with prior studies Villalonga (2004) reports a significant discount between one and two-segment firms but not between two-segment firms and firms with a larger number of segments. For our investigation into the persistence of the diversification penalty we exclude single-line insurers from our sample, thus confining our analysis to diversified insurers. Similar to the previous section, we estimate a regression model using pooled OLS. The model is as follows:

Eq. (4-3)
$$ROA_{it} = \beta_0 + \beta_1 DT_{it} + \beta_2 SIZE_{it} + \beta_3 CAPASS_{it} + \beta_4 SDROA_{it} + \beta_5 GEODIV_{it} + \beta_6 WCONC_{it} + \beta_7 PCTLH_{it} + \beta_8 MUTUAL_{it} + \beta_9 PUBLIC_{it} + \beta_{10} GROUP_i + \beta_{11-17} YEAR_{it} + \beta_{18-42} LINE_{it} + \beta_{43-98} STATE_{it} + \varepsilon_{it}$$

In equation (4-3), DT is measured as the complement of the Herfindahl index based on net premiums written across 26 lines. All other variables have been defined earlier. Three regression methods are used to estimate equation 4-3, using both ROA and ROE as dependent variables. The first model estimates the equation as shown above using OLS. The second model adds firm fixed-effects to equation 4-3. The third model attempts to control for endogeneity bias. In chapter 3 of this dissertation we modeled DT as a function of firm characteristics, of which several are included as regressors in equation 4-3. Accordingly, we need to treat DT as endogenous in the estimation of this equation. We use a two-stage least squares regression model to achieve this objective. In the first stage we regress DT on the same set of instruments as was

used for MULTLINE in the previous section. In the second stage we replace observed values of DT with predicted values from the first-stage regression. Table 4-6 reports results of various specifications of our basic model.

Table 4-6. Estimates of the diversification-performance relation for diversified insurers

Dependent Variable	Return on Assets (ROA)						Return on Equity (ROE)					
Model	OLS		Fixed Effects		Instrumental Variables		OLS		Fixed Effects		Instrumental Variables	
Constant	-0.12	<.0001	-0.48	<.0001	-0.12	<.0001	-0.302	<.0001	-1.678	<.0001	-0.301	<.0001
DT	-0.015	0.006	-0.046	<.0001	-0.074	<.0001	-0.024	0.099	-0.093	0.001	-0.135	<.0001
SIZE	0.01	<.0001	0.02	<.0001	0.01	<.0001	0.021	<.0001	0.083	<.0001	0.024	<.0001
CAPASS	0.08	<.0001	0.18	<.0001	0.08	<.0001	0.125	<.0001	0.496	<.0001	0.129	<.0001
GEODIV	-0.02	<.0001	-0.03	0.003	-0.01	0.001	-0.053	<.0001	-0.114	<.0001	-0.050	<.0001
WCONC	0.02	0.731	0.04	0.703	0.01	0.834	-0.260	0.091	0.445	0.172	-0.273	0.082
PCTLH	0.00	0.109	0.00	0.879	0.00	0.843	-0.002	0.015	-0.002	0.234	-0.001	0.152
MUTUAL	-0.01	<.0001	0.01	0.241	0.00	0.063	-0.017	0.005	0.017	0.581	-0.008	0.192
PUBLIC	0.01	0.001	-0.03	0.024	0.01	0.000	0.032	0.001	-0.109	0.006	0.034	0.001
GROUP	-0.01	<.0001			-0.01	<.0001	-0.030	<.0001			-0.033	<.0001
SDROA5	-0.03	0.204	0.22	<.0001	-0.03	0.308						
SDROE5							-0.098	<.0001	0.225	<.0001	-0.095	<.0001
Year Dummies	y		y		y		y		y		y	
State and Line Dummies	y				y		y				y	
Number of observations	4518		4518		4518		4518		4518		4518	
Adjusted R-squared	0.16		0.51		0.14		0.13		0.49		0.12	

Note: OLS is an ordinary least squares regression model with year, state, and line dummies; the Fixed Effects model adds firm dummies to OLS but excludes state dummies; in the Instrumental Variables model, DT is a vector of predicted values from the regression of DT on a set of instruments - see Table 4-4 for details. ROA=Net income/total admitted assets; ROE=Net income/total policyholder surplus; DT (Total Diversification) =1-Herfindahl index of net premiums written across 26 lines of business; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise. GROUP=1 if firm is an insurance group, 0 otherwise; SDROA5=Standard deviation of ROA over the past 5 years; SDROE5=Standard deviation of ROE over the past 5 years.

The coefficient on our variable of interest (DT) is negative and significant across all specifications. These results provide further support for the strategic focus hypothesis. Our results also provide evidence of persistence in the diversification penalty at the intra-industry

level. This contrasts with the findings of Villalonga (2004) and Lang and Stulz (1994) on inter-industry diversification. Coefficient estimates on the other explanatory variables are similar to those reported for our regressions of performance on MULTLINE.

Our analysis thus far assumes a linear relation between diversification and performance. A popular school of thought in the strategy literature is that the diversification-performance relation is non-linear (see Palich, et al. (2000)). We investigate this possibility by including a quadratic term (DTSQ) for DT in our regression models. To conserve space we report results for regressions on ROA only as the significance of the coefficient estimates on DT is greatest in the ROA regressions in Table 4-6. The OLS results in panel A of Table 4-7 suggest that a non-linear relationship holds while the fixed-effect results do not support the existence of non-linearity. Unreported results for the instrumental variables specifications confirm the OLS results reported in Table 4-7.

According to the coefficients on DT and DTSQ there is a negative relation up to the turning point of .54 where the relation then becomes positive. The goodness of fit statistics for the two regression specifications in panel A of Table 4-7 are almost identical to those reported in Table 4-6 for the linear specification. Thus it is not clear whether the non-linear model better describes the empirical relation between diversification and performance. It is worthwhile to investigate whether firms that diversify beyond the implied turning point of .54 earn higher risk-adjusted ROA than those below this level. To investigate this question we divide the range of DT into deciles and create a dummy variable for each firm that reflects whether a firm lies within a particular diversification decile. The coefficient estimates for diversification decile dummies reported in panel B of Table 4-7 indicate the performance effect of different diversification levels, relative to the least diversified decile (DECILE1) of firms.

Table 4-7. Quadratic regression specification results

Panel A: Quadratic regression specification results

Dependent Variable	Return on Assets (ROA)			
Model	OLS		Fixed Effects	
Intercept	-0.11	<.0001	-0.49	<.0001
DT	-0.061	<.0001	-0.012	0.654
DTSQ	0.057	0.000	-0.041	0.182
SIZE	0.01	<.0001	0.02	<.0001
CAPASS	0.08	<.0001	0.18	<.0001
GEODIV	-0.02	<.0001	-0.03	0.003
WCONC	0.04	0.514	0.04	0.728
PCTLH	0.00	0.095	0.00	0.859
MUTUAL	-0.01	<.0001	0.01	0.228
PUBLIC	0.01	0.000	-0.03	0.024
GROUP	-0.01	<.0001		
SDROA5	-0.03	0.208	0.23	<.0001
Year Dummies	y		y	
State and Line Dummies	y			
Number of observations	4518		4518	
Adjusted R-squared	0.15		0.51	
Turning Point	0.54			

Panel B: OLS regression coefficients for diversification decile dummy variables

Dependent variable = ROA		
Intercept	-0.126	<.0001
DECILE2	0.000	0.884
DECILE3	-0.010	0.002
DECILE4	-0.005	0.181
DECILE5	-0.004	0.234
DECILE6	-0.008	0.022
DECILE7	-0.007	0.080
DECILE8	0.000	0.905
DECILE9	0.001	0.838
DECILE10	-0.005	0.352
Year Dummies	y	
State and Line Dummies	y	
Number of observations	4518	
Adjusted R-squared	0.15	

Note: In Panel A, OLS is an ordinary least squares regression model with year, state, and line dummies; the Fixed Effects model adds firm dummies to OLS but excludes state dummies; ROA=Net income/total admitted assets; DT (Total Diversification) =1-Herfindahl index of net premiums written across 26 lines of business; DTSQ = DT*DT; SIZE=natural logarithm of total admitted assets; CAPASS=ratio of policyholder surplus to total admitted assets; GEODIV=1-Herfindahl index of premiums across 57 geographic areas; WCONC=weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=percentage of premiums attributable to life-health insurance; MUTUAL=1 if mutual, 0 if stock; PUBLIC=1 if publicly traded, 0 otherwise. GROUP=1 if firm is an insurance group, 0 otherwise; SDROA5=Standard deviation of ROA over the past 5 years. In Panel B, the regression specification is OLS with year, state, and line dummies; DECILE2 to DECILE10 =1 if LOBDIV for that firm-year falls within the relevant decile; the model includes all other controls in Panel A but results are not reported to conserve space.

Notably, at no point in the diversification range do more diversified insurers outperform the least diversified decile of insurers. Thus, while regression results from panel A suggest that a minimum point in the diversification-performance relation is reached where DT=.54 and that firms beyond this point experience positive returns to diversification, it does not appear that these firms earn higher returns than the least diversified firms in our sample.

Thus far we have shown that, (i) single-line insurers are more profitable than multi-line insurers in terms of ROA and ROE; (ii) among diversified insurers, higher levels of diversification are associated with lower ROA and ROE; and (iii) the D-P relation may be non-linear but not to the extent where more diversified firms are able to outperform more focused firms. These results support the strategic focus hypothesis and imply that, on average, diversification's costs exceed its benefits for P/L insurers.

Robustness: Diversification extent

To investigate whether our results are specific to our estimation technique we repeat our analysis using the same methodology as that used by Browne, et al. (2001) in their analysis of performance determinants for life insurers. Browne, et al. (2001) use the following technique to adjust return for risk: First, they construct a panel of firms with complete data for a period of 10 years. Next, they average all variables over a 10-year period and calculate the standard deviation of their performance measures over the 10-year period. They then divide each mean performance measure by its standard deviation. This mean, risk-adjusted performance measure is then regressed on hypothesized determinants.

We apply this methodology to our sample by creating a balanced panel over our full 8-year sample period, averaging all variables over this period, and dividing mean ROA and ROE by their 8-year standard deviations. We then regress these risk-adjusted performance measures on mean values of our independent variables. Regression results appear in Table 4-8. Our results for regressions of average risk-adjusted performance on diversification support our earlier evidence that single-line insurers outperform multi-line insurers, and that relatively focused insurers outperform more diversified insurers, irrespective of whether performance is measured as ROA or ROE.

Table 4-8. Regression results for risk-adjusted performance measures

Dependent variable	Risk-adjusted ROA				Risk-adjusted ROE			
Intercept	-5.082	0.000	-4.016	0.001	-4.740	<.0001	-3.974	0.001
MULTLINE	-0.579	0.007			-0.466	0.015		
DT			-0.763	0.049			-0.878	0.027
SIZE	0.251	0.000	0.223	0.000	0.232	<.0001	0.221	0.000
CAPASS	3.190	<.0001	3.191	<.0001	3.347	<.0001	3.343	<.0001
GEODIV	-0.271	0.347	-0.268	0.281	-0.239	0.354	-0.210	0.408
WCONC	15.880	0.001	4.698	0.408	12.622	0.003	4.054	0.484
PCTLH	-2.576	0.570	-2.296	0.527	-2.533	0.532	-2.320	0.531
MUTUAL	-0.483	0.006	-0.484	0.005	-0.467	0.003	-0.455	0.009
PUBLIC	1.331	0.001	0.387	0.265	1.085	0.003	0.442	0.211
GROUP	0.491	0.045	0.344	0.100	0.379	0.083	0.261	0.220
Number of observations	434		355		434		355	
Adjusted R-square	0.18		0.17		0.19		0.18	

Note: Risk-adjusted ROA=8-year average ROA/8-yr standard deviation of ROA; Risk-adjusted ROE=8-year average ROE/8-yr standard deviation of ROE; MULTLINE=1 if firm was a single-line insurer for the full 8-year period, 0 otherwise; DT=8-year average of (1-Herfindahl index of net premiums written across 26 lines of business); SIZE=8-year average of the natural logarithm of total admitted assets; CAPASS=8-year average of the ratio of policyholder surplus to total admitted assets; GEODIV=8-year average of (1-Herfindahl index of net premiums written across 57 geographic areas); WCONC=8-year average of the weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=8-year average of the percentage of premiums attributable to life-health insurance; MUTUAL=1 if firm was a mutual for the full 8-year period, 0 otherwise; PUBLIC=1 if firm was publicly traded for the full 8-year period, otherwise; GROUP=1 if firm is an aggregated insurance group, 0 otherwise.

The final part of our analysis concerns the relation between diversification strategy and risk-adjusted performance. As was the case in Chapter 3 of the dissertation, we use Herfindahl index of premiums written across six clusters of insurance lines to proxy for the degree of unrelatedness of an insurer's underwriting portfolio. Prior research suggests that unrelated diversifiers should perform worse than those firms that diversify within a fairly homogeneous set of businesses (Markides and Williamson (1994)). As firms become involved in more heterogeneous activities it becomes more difficult to benefit from scope economies and it becomes more expensive to coordinate and monitor the firm's activities. We test this hypothesis

in Table 4-9 by including DU, the index of unrelated diversification defined in Chapter 3, in our regression equations. While the sign of the coefficient on DU follows the theoretical predictions, it is significant (at the 10% level) in the ROE regression only.

Table 4-9. The effect of unrelated diversification on risk-adjusted performance measures

Dependent variable	Risk-adjusted ROA		Risk-adjusted ROE	
Intercept	-4.313	0.000	-4.320	0.000
DU	-0.578	0.115	-0.622	0.097
SIZE	0.221	0.000	0.218	0.000
CAPASS	3.360	<.0001	3.540	<.0001
GEODIV	-0.226	0.368	-0.165	0.521
WCONC	4.678	0.412	3.940	0.499
PCTLH	-2.642	0.469	-2.682	0.472
MUTUAL	-0.556	0.001	-0.543	0.001
PUBLIC	0.380	0.274	0.431	0.225
GROUP	0.389	0.063	0.312	0.143
Number of observations	355		355	
Adjusted R-squared	0.17		0.18	

Note: Risk-adjusted ROA=8-year average ROA/8-yr standard deviation of ROA; Risk-adjusted ROE=8-year average ROE/8-yr standard deviation of ROE; DU(Unrelated Diversification)=8-year average of (1-Herfindahl index of net premiums written across 6 business line clusters); SIZE=8-year average of the natural logarithm of total admitted assets; CAPASS=8-year average of the ratio of policyholder surplus to total admitted assets; GEODIV=8-year average of (1-Herfindahl index of net premiums written across 57 geographic areas); WCONC=8-year average of the weighted sum of firm market share per line multiplied by each line's herfindahl across all firms; PCTLH=8-year average of the percentage of premiums attributable to life-health insurance; MUTUAL=1 if firm was a mutual for the full 8-year period, 0 otherwise; PUBLIC=1 if firm was publicly traded for the full 8-year period, otherwise; GROUP=1 if firm is an aggregated insurance group, 0 otherwise.

4.5) Conclusion

This chapter investigates the performance effects of insurer line of business diversification. We examine three facets of insurer diversification: diversification status, diversification extent, and diversification strategy. First, we consider the relation between diversification status and

performance. We consistently find that undiversified insurers outperform diversified insurers in terms of both ROA and ROE. Our results indicate that diversification is associated with a penalty ranging of at least 1% of ROA or 3.5% of ROE. Next, we limit our analysis to the sub-sample of diversified insurers and investigate whether the observed diversification penalty persists across various levels of diversification. We find that the negative diversification-performance relation holds irrespective of whether performance is measured in terms of ROA or ROE. While there is some evidence suggesting a nonlinear, U-shaped, relation between the extent of diversification and performance we find that highly diversified insurers do not outperform their more focused counterparts. Results with respect to both diversification status and diversification extent are robust to various regression specifications that account for potential endogeneity bias and autocorrelation. Our results are also invariant to the time length over which our risk measures are calculated and to our method of risk adjustment. Taken together, these findings provide strong support for the strategic focus hypothesis.

We also find some interesting results with respect to several of our control variables. In every regression specification we find that both size and capitalization are positively related to accounting performance. These results support the hypothesis that customers are willing to pay more for insurance from insurers that have lower insolvency risk. The relation between size and performance may also be explained in terms of scale economies. We present new evidence on the relative profitability of mutual and stock insurers. For the vast majority of our specifications we find that mutual insurers are significantly less profitable than stock insurers. Finally, we find that unaffiliated insurers consistently outperform aggregated insurer groups. This negative relation between insurer groups and profitability may be due to lower prices induced by the

option to let a member fail, costs of managerial discretion, or other costs associated with conglomeration.

CHAPTER FIVE: CONCLUSIONS

5.1) Introduction

This dissertation investigates the determinants and effects of corporate diversification using a sample of property-liability (P/L) insurers over the period 1995 to 2002. First, we canvas the extant literature across several disciplines in order to identify theoretical explanations for why managers diversify their firms. We test the ability of these explanations to explain observed variation in diversification status, extent, and strategy among P/L insurers. Next, we review theory and evidence regarding the performance effects of diversification. We develop and test a model that explains performance as a function of diversification and other correlates. This chapter reviews the key findings and contributions of the dissertation, discusses its potential limitations, and suggests avenues for further research.

5.2) Contributions

The dissertation contributes to the literature on corporate diversification in general, and insurance markets in particular. By confining our investigation to diversification activity within one industry we are able to more accurately measure both the determinants and effects of corporate diversification. Furthermore, the detail and consistency of P/L insurer statutory filing data enable us to overcome several shortcomings of prior studies. Our first set of contributions relates to the determinants of corporate diversification examined in Chapter 3. The second set of contributions comes from our investigation into the performance effects of diversification investigated in Chapter 4.

In Chapter 3 we develop and tests hypotheses that explain variation in line-of-business diversification among P/L insurers. This study makes two primary contributions to the insurance literature. First, it provides the first attempt (of which are aware) at explaining variation in insurer line-of-business diversification. While measures of insurer diversification are often used as control variables for managerial discretion, there is an absence of research that explains observed heterogeneity in insurer diversification levels. Our regression analysis of the effects of various hypothesized determinants of corporate diversification sheds new light on what is being proxied for by measures of line-of-business diversification. Second, our study provides new evidence on the prediction of the managerial discretion hypothesis regarding insurer diversification. While other predictions of the managerial discretion hypothesis have been supported empirically there has been no support for the predictions of the hypothesis regarding insurer diversification. We argue that the traditional measure of line-of-business diversification is a rather weak proxy for managerial discretion and introduce a new method of measuring managerial discretion in insurers.

In Chapter 4 we measure the relation between diversification and performance. Our analysis contributes to the relatively small body of literature on the effects of insurer line-of-business diversification. We provide some of the first evidence on whether the diversification-performance relation for P/L insurers is best explained by the conglomeration hypothesis or the strategic focus hypothesis. By following the methodology of diversification discount researchers we are able to estimate performance differences between diversified and undiversified insurers. We also contribute to the debate surrounding the relative efficiency of stock and mutual insurers. Despite substantial research on the topic there is no consensus on whether one ownership structure outperforms the other. Our regression analysis provides evidence of the relative risk-

adjusted performance of stock and mutual insurers, holding other performance determinants constant. In addition to the abovementioned contributions to the insurance literature, the dissertation contributes to the general diversification-performance literature. Unlike the majority of studies in the finance, economics, and strategic management literature that have concentrated on the effects of inter-industry diversification, we provide evidence on the effect of diversification within one industry. The richness and consistency of insurer statutory data enables us to more accurately measure product diversification and to better control for other performance determinants. By studying line of business diversification in the P/L insurance industry we are able to overcome many of the methodological challenges that are at least partially responsible for the lack of consensus on the nature of the D-P relationship. Our findings represent evidence of the D-P relation in a setting that eliminates, or reduces substantially, bias introduced by unobservable industry effects, discretion in managerial segment reporting, and diversification measurement error.

5.3) Key Findings

This dissertation yields two sets of key findings. The first set of key findings arises from our analysis of the determinants of line of business diversification in Chapter 3. Our results suggest that existing theory is at least partially successful in explaining variation in diversification levels and strategies among insurance firms. Although the agency and efficiency views are more successful than the coinsurance view in explaining both total and unrelated diversification, we are unable to find unambiguous support for either of these views. We do, however, find support for our reformulated managerial discretion hypothesis in the sub-sample of unaffiliated insurers. Limits on managerial discretion afforded to managers of mutual insurance companies results in mutuals engaging in less unrelated diversification than their stock counterparts. Interesting

results regarding our control variables include those related to reinsurance usage and environmental uncertainty. In our diversification extent regressions we find a positive relation between the degree of reinsurance usage and unrelated diversification. This result support the real services efficiency hypothesis of Mayers and Smith (1990). In our diversification status regressions we find that insurers are less likely to be diversified in hard-market years. This evidence supports the environmental uncertainty hypothesis of Bergh and Lawless (1998).

The second set of findings comes from our analysis of the effects of insurer diversification on accounting performance in Chapter 4. The most notable results from this section are those regarding the relation between accounting performance, and diversification status and diversification extent, respectively. Regarding diversification status, we consistently find that undiversified insurers outperform diversified insurers in terms of both ROA and ROE. Our results indicate that diversification is associated with a penalty of at least 1% of ROA or 3.5% of ROE. When we confine our analysis to diversified firms we find a negative relation between the extent of diversification and both ROA and ROE. While there is some evidence suggesting a nonlinear, U-shaped, relation between the extent of diversification and performance we find that highly diversified insurers do not outperform their more focused counterparts. Taken together, our findings provide strong support for the strategic focus hypothesis.

We also find some interesting results with respect to several of our control variables. In every regression specification we find that both size and capitalization are positively related to accounting performance. These results support the hypothesis that customers are willing to pay more for insurance from insurers that have lower insolvency risk (Sommer (1996)). The relation between size and performance may also be explained in terms of scale economies. We present new evidence on the relative profitability of mutual and stock insurers. For the vast majority of

our specifications we find that the profitability of mutual insurers, in terms of both ROA and ROE, is at least one percent lower than that of stock insurers. Our evidence in this regard complements that of Cummins, et al. (1999). Finally, we find that unaffiliated insurers consistently outperform aggregated insurer groups. This negative relation between insurer groups and profitability may be due to lower prices induced by the option to let a member fail, costs of managerial discretion, or other costs associated with conglomeration.

5.4) Limitations of this Dissertation and Areas for Future Research

The dissertation studies the determinants and effects of insurer line-of-business diversification in the P/L insurance industry. By confining our analysis to one industry we are able to avoid much of the bias that affects multi-industry studies. However, the reduction in bias comes at a cost. Because we limit our analysis to one industry our results may not be generalizable to other industries. A second limitation of this dissertation is that we rely solely on statutory accounting data and do not incorporate market data into our analysis. Thus, while we apply the methodology of diversification discount researchers to our study of the diversification-performance relation, we are unable to compare our estimates of the accounting-based 'diversification penalty' with estimates of the market-based diversification discount.

A useful extension of this study would entail an analysis of the determinants and effects of diversification activity among publicly-traded P/L insurers. Ideally, such a study would apply the methodology of finance researchers to ascertain whether intra-industry diversification destroys value. The difficulty in applying the Berger and Ofek (1995) excess value approach to an intra-industry study is the absence of publicly traded single-line insurers that would be used as benchmark firms. An alternative method of measuring the effect of changes in line-of-business diversification within the P/L industry would be to utilize a panel of insurers and observe

changes in market value in response to diversification activity. Such research would add to our understanding of the diversification-performance relation and confirm whether the market discounts intra-industry diversification (which we have shown to be performance-reducing) as well as conglomerate diversification.

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