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An Investigation Into the Diversification–Performance Relationship in the U.S. Property–Liability Insurance Industry

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Abstract

This article investigates the relationship between product diversification and firm performance in the U.S. property–liability insurance industry using data over the 1994 through 2002 time period. Using various measures of product diversification and firm performance, we find that the extent of product diversification shares a complex and nonlinear relationship with firm performance. Our findings suggest that performance benefits associated with product diversification are contingent upon an insurer's degree of geographic diversification. Robustness tests using subsamples and market returns for public firms show consistent results.

Introduction

The U.S. financial markets experienced significant deregulation throughout the 1990s. In response, many competitors sought to take advantage of new opportunities by implementing diversification strategies. Interesting is the fact that a significant body of financial literature supports the notion of a "diversification discount," implying *dis*economies of scope when firms diversify their operations (e.g., Berger and Ofek, 1995). Conversely, studies at the interindustry level have found support for diversification through economies of scope (e.g., Markides and Williamson, 1994) and the anticipated financial synergies associated with diversification (e.g., Stein, 1997). Thus, the true value of diversification as a business strategy has not yet been fully explored.

Like the broader financial marketplace, the non–life insurance industry has also attempted to avail itself of new opportunities. Expectations for economies of scope in the insurance industry are largely attributable to the ability to cross-sell products,

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generate cost savings, enter new markets, create hybrid products, and enhance brand image, all while developing new sales channels (*Business Insurance*, 1998; Seol, 2000; *Best's Review*, 2000). Additionally, some researchers have suggested that diversification holds special potential value as a natural hedging mechanism, thereby reducing an insurer's reliance on the need for more formal hedging mechanisms such as reinsurance, options, financial futures, etc. (Cummins, Phillips, and Smith, 2001).

This article investigates the relationship between product diversification and financial performance to test the claims of synergistic benefits associated with product diversification within the insurance industry. If such synergies exist, it is reasonable to assume that they will be most evident in a single-industry analysis where product structure, target market characteristics, and other market features share strong similarities. Thus, this article contributes to the existing body of research by focusing on the effect of diversification at the insurance product level on firm performance within the U.S. property–liability market. In testing the diversification–firm performance relationship, we use various assessments of financial performance including both accounting and market measures. We also employ two differing methods of diversification assessment, the Entropy Measure and the modified Herfindahl Index. The Herfindahl Index is commonly employed in insurance-related literature whereas the Entropy Measure is more closely associated with the management literature. Additionally, we perform a split-sample analysis based on the level of an insurer's geographic diversification. The main findings across the various analyses are consistent with one another.

The article makes three primary contributions to the existing body of literature. First, the analysis controls for geographic diversification and interacts that variable with product diversification to reveal a far more complex relationship with firm performance than had been previously identified. Second, the analysis incorporates both accounting and market-based measures of firm performance, thereby adding to the veracity and robust application of the results. Third, much of the earlier empirical literature relied on pre-1998 data. The financial marketplace however, has undergone significant structural and regulatory change, and thus the focus on the more recent time period in this study offers a timely update on the current nature of the relationship.

The remainder of the article is organized as follows. A summary of pertinent literature is presented first, followed by a discussion of the hypotheses development and the methodologies employed in the analysis. The empirical results are then presented followed by a conclusion.

LITERATURE REVIEW

The relationship shared by diversification and firm performance has been the subject of significant investigation in the finance literature over the last 20 years. In their survey of the associated literature, Martin and Sayrak (2003) identified three "waves" of research during the 1990s, differentiated by methodological refinements that provide a fundamental shift in the evidence. The first round of research found general support for the *diversification discount hypothesis* (e.g., Berger and Ofek, 1995). It has been argued that the reason for the destruction of firm value lies in unwieldy operational costs as

the corporation expands. Such costs include coordination costs, incentive degradation (employees begin to undermine broader firm efforts and act in their own self-interest, despite incentive systems), and bureaucratic distortions (Nayyar, 1992). Additionally, senior management of highly diversified firms may find it difficult and expensive to properly manage an increasingly dissimilar set of business operations (Jones and Hill, 1988). However, Martin and Sayrak go on to suggest that a subsequent wave of research, although not calling into question the notion of a diversification discount, do argue that the value destruction is attributable to factors other than diversification. A primary premise for many of these studies is that conglomerate firms are different from focused firms even before diversification programs are implemented and that this factor is not explicitly accounted for in the earlier analyses, thus calling those results into question (e.g., Graham, Lemmon, and Wolf, 2002; Hyland and Diltz, 2002; Campa and Kedia, 2002).

A last round of research identified by Martin and Sayrak (2003) takes issue with model specification and data measurement techniques employed in prior research. For instance, Villalonga (2004) finds that the diversification discount reported in previous studies is an artifact of segment-level data reported by Compustat. Using comparable data from the U.S. Census Bureau, Villalonga reports a diversification premium, in contrast to prior studies. Palich, Cardinal, and Miller (2000) conducted a meta-analysis of 55 studies on the diversification–firm performance relationship and found support for a complex inverted U-shaped relationship between diversification and firm value where increasing returns-to-scale are found up to a point, after which decreasing returns become evident.

Paralleling the broader literature discussed above, the body of relevant insurance-specific literature offers varied support for the two competing hypotheses with respect to the value of diversification and firm performance. King (1975) compared the market performance of 455 Ohio insurers when measuring diversification based on various forms of conglomerate affiliation. He found that diversified insurers placed greater importance on research, development, and advertising, whereas nondiversified firms were marginally more efficient with some exceptions. He added that the significant factor explaining such performance differences was not the extent of diversification of the firm but rather whether the firm was diversified. While King's findings are significant, generalizations associated with the findings are limited in that the study was based on a single-state, single-year analysis.

Fiegenbaum and Thomas (1990) applied the concept of strategic groups to insurance firms for the period 1970 to 1984 where insurer diversification was assessed based on the nature of business pursued: focused-life, focused-personal lines, or a hybrid structure combining life and personal lines. That study reported that a diversified strategy was associated with lower combined ratios and lower risk than the industry average. The focused-personal line firms revealed average performances, whereas the focused-life firms had below-industry-average performances. Using data from 1973 to 1987, Hoyt and Trieschmann (1991) reported that diversified insurers had lower returns and higher risk when compared to firms focusing solely on a single insurance market. Employing a Herfindahl Index–derived measure of product diversification, Tombs and Hoyt (1994) also reported that insurers who were diversified experienced lower risk-adjusted returns.

In the last decade, four other studies have analyzed the phenomenon of insurer diversification using more recent data (i.e., 1988–2004). Employing a sample of 684 insurers for the years from 1988 to 1992, Berger et al. (2000) reported that revenue and cost-scope economies vary across firms following either a focus or conglomerate strategy. However, they found no differences in profit-scope economies between insurers who followed either a focus or conglomerate strategy, leading them to infer that both strategies were viable in the long run. Meador, Ryan, and Schellhorn (2000) employed a single-industry product line measure of diversification when focusing on the efficiency of 321 life insurers over the period 1990 to 1995. They reported that insurers who are diversified across multiple product lines have higher X-efficiencies compared to those who are more focused with respect to product lines. However, using a sample of 817 insurers from the period 1993 to 1997, Cummins, Weiss, and Zi (2003) found only weak support for economies of scope and concluded that a focus strategy was a more efficient option than the conglomerate strategy. Additional support for the strategic focus hypothesis is presented by Liebenberg and Sommer (2007) who, using a 10-year sample (1995 to 2004) of 914 firms, found undiversified firms outperform diversified firms. In conclusion, the extensive body of literature on insurers and other industries indicates that benefits of diversification are complex and vary by other strategies employed by the firm, thus serving as a motivator for additional analysis on the topic of diversification and firm performance.

HYPOTHESES DEVELOPMENT AND METHODOLOGIES

The key issue under investigation is the relationship shared by an insurer's product diversification and its financial performance. Because both regulatory and rating agencies assess insurer operations using accounting data we use both return on assets (*ROA*) and return on equity (*ROE*) as the measures of financial performance. The use of *ROA* and/or *ROE* as a proxy for measurements of an insurer's financial performance is consistent with past research (e.g., Amit and Livant, 1988; Grant, Jammine, and Thomas, 1988; BarNiv and McDonald, 1992; Pottier and Sommer, 1999; Lai and Limpaphayom, 2003; Browne, Carson, and Hoyt, 2001; Greene and Segal, 2004; Wang, Jeng, and Peng, 2007). Whereas an insurer's *ROA*[1] (*ROE*) serves as our "base" financial performance variable, companies with higher returns may be exposed to greater levels of risk. Therefore, we also employ a risk-adjusted form of the variable, *RAROA* (*RAROE*), as an alternative measure of financial performance.[2] This measurement is calculated by dividing a company's *ROA* (*ROE*) by its standard deviation of *ROA* (*ROE*) over the past 3 years. The standard deviation of *ROA* (*ROE*) is computed on a moving average basis.[3]

[1] Following conventional definitions, we calculate *ROA* and *ROE* as after-tax net income divided by admitted assets and owner's equity, respectively.

[2] A similar approach was used by Browne, Carson, and Hoyt (2001).

[3] Risk-adjusted *ROA* is calculated by $ROA_{i,t}/SD_{i,t-2\sim i,t}$. For example, the risk-adjusted *ROA* for 1994 is calculated by dividing 1994 *ROA* by standard deviation of *ROA* over 1992–1994, and the risk-adjusted *ROA* for 1995 is calculated by dividing 1995 *ROA* by standard deviation of *ROA* over 1993–1995, and so on. Similar calculation is done for the *RAROE* variable.

Product Diversification

Product diversification is the key explanatory variable of interest in our analyses and, as noted above, we use two different measures to assess a firm's level of product diversification. The Entropy Measure considers not only the number of products offered by a company but also the weighted distribution of a company's share in each product line (Berry, 1975; Palepu, 1985). When applied to the insurance industry, the Entropy Measure for product diversification can be defined as

$$PDIV = \sum_{s=1}^{2} P_s \left(\sum_{l \in s} \frac{P_l}{P_s} \ln \frac{P_s}{P_l} \right) + \left(\sum_{s=1}^{2} P_s \ln \frac{1}{P_s} \right),$$

where s represents a specific segment of the insurance industry, l represents product line within the corresponding segment, and P_s and P_l represent the share of the insurer's premium associated with segment s and in product line l, respectively. As a result of the calculation, an insurer with an exclusive focus on a single product line takes the value 0 for the *PDIV* measurement whereas a more diversified firm will have a higher value for the *PDIV* variable. The Entropy Measure allows us to quantify the level of product diversification within property–liability lines of business as well as those that diversify across the property–liability and life–health segments. Although the Entropy Measure has been widely used in management strategy literature, insurance-based studies have traditionally used the Herfindahl Index (or some variation thereof) to measure line-of-business concentration or product mix (e.g., Mayers and Smith, 1990; Tombs and Hoyt, 1994; Sommer, 1996; Pottier and Sommer, 1997; Meador, Ryan, and Schellhorn, 2000). We use a variation of the Herfindahl Index to assess product line diversification.[4] Based on Berry (1971) and Fiegenbaum and Thomas (1990), this modified version is calculated as $1 - \sum p_i^2$, where p_i represents the percentage of an insurer's net premiums written on product line i, and thus our measure of product diversification may range only from 0.0 to 1.0.[5] The lines of insurance included in this analysis are derived from the National Association of Insurance Commissioners' (NAIC) annual data presentation, and some lines have been consolidated in an effort to control for a measurement bias due to two primary effects. First, some lines of insurance may represent insignificant portions of the typical insurer's book-of-business and thus would represent trivial inclusions in

[4] We use a modified version of Herfindahl Index to ensure the two measures of product diversification used in this article parallel to each other in terms of interpretation of model results.

[5] The specific number of lines of insurance included in the analyses for any given year varies slightly but usually includes the following 22 lines: homeowners, personal auto, allied, farm, commercial multiple peril, ocean marine, inland marine, commercial auto, financial and mortgage guaranty, surety and fidelity, medical malpractice, worker's compensation, general liability, theft, boiler and machinery, other miscellaneous property/casualty, accident and health, ordinary life, annuity, group life, group annuity, other life insurance and deposit-type funds.

any data analysis if included separately.[6] Second, consolidation among certain lines is feasible and reasonable where the underwriting and/or loss characteristics of those lines are relatively homogeneous.[7] A similar rationale for such line aggregation has been applied by McCullough and Hoyt (2005) as well as by the Insurance Information Institute's data presentation in its annual *Fact Book* publication. Given the existence of dissenting research and our specific focus on product diversification within the property–liability industry, the expected relationship between product diversification and firm performance is not entirely clear.

Geographic Diversification

The issue of geographic diversification, with respect to firm performance, has most often arisen in the insurance literature as a control variable (e.g., Mayers and Smith, 1988, 1994; Pottier and Sommer, 1997). Mayers and Smith (1988) argue that operating across many geographic regions will require firms to allow for greater managerial discretion, thereby incurring higher costs in monitoring, resulting in reduced financial performance. Conversely, the risk-reduction benefits associated with product diversification cited earlier should be equally applicable to geographic diversification, implying higher levels of financial performance. To control for these relationships, we include a geographic diversification variable (*GEODIV*) whose construction parallels that of the product diversification variable using the modified Herfindahl Index. Because of these contradictory expectations, the relationship between geographic diversification and firm performance remains undefined at this time.

Given the role of product and geographic diversification as management strategies, we also include an interaction term linking the product (*PDIV*) and geographic diversification (*GEODIV*) variables to test the shared relationship with firm performance. We expect the interaction term–firm performance relationship to parallel the relationships product and geographic diversification share with firm performance. Although the expected relationship remains unclear, it is anticipated that the inclusion of this interaction term will provide a deeper, multidimensional assessment of the diversification–performance relationship.

Business Sector

The nature of the business for which an insurer competes affects the firm's performance (Fiegenbaum and Thomas, 1990; Hoyt and Trieschmann, 1991). Fiegenbaum and Thomas (1990) suggest that the relative emphasis (and costs) on marketing, underwriting, etc., differ across property–liability insurers, depending on their focus on either personal or commercial lines. To control for this potential differing focus, we include a variable that identifies the percentage of an insurer's premiums derived from commercial lines (*COMMERCIALP*). Additionally, deregulation now allows insurers to compete in both life- and non-life-insurance markets and many insurers have taken advantage of this opportunity. Hoyt and Trieschmann (1991) found that investment in

[6] For example, for the purposes of this analysis international, credit, aircraft, and aggregate write-ins for other lines of business are grouped as "other miscellaneous property/casualty" lines.

[7] For example, for the purposes of this analysis, fire, allied lines, earthquake, and glass are aggregated and identified as "allied" lines.

insurers that focused solely on either the life–health or property–liability industries were superior to investment in insurers who operated in both. To control for this relationship, we include a dummy variable (*LIFE*) that identifies those intrainsurance industry property–liability insurers. Following Hoyt and Trieschmann, we expect this variable to share a negative relationship with firm performance.

Size

The relationship an insurer's size shares with performance is ambiguous *a priori*. A number of earlier investigations found support for a positive relationship between insurer size and performance (e.g., Gardner and Grace, 1993; Sommer, 1996; Cummins and Nini, 2002; Liebenberg and Sommer, 2007). However, Yuengert (1993) found the relationship between firm efficiency and size to be statistically insignificant, and Lai and Limpaphayom (2003) actually found an inverse relationship between insurer size and profitability. Thus, although its relationship with insurer performance is unclear, the need to control for an insurer's size is evident. We use the natural logarithm of an insurer's admitted assets (*SIZE*) as a proxy for size and do not hypothesize the expected relationship with the dependent variable.

Affiliation

Group affiliation is an increasingly common characteristic of today's financial services marketplace. Although such affiliation fulfills certain needs for its members, the relationship shared with firm performance has been found to be negative (Liebenberg and Sommer, 2007). A rationale for this negative relationship that has been presented in various forms by Cummins and Sommer (1996), Sommer (1996), and Liebenberg and Sommer (2007) is that an insurer group may be viewed as a portfolio of options, whereas a single insurer is more correctly thought of as an option on a portfolio. A portfolio of options is worth more to shareholders and less to policyholders than if the same assets and liabilities were part of a single company, and thus policyholders should be willing to pay more for the unaffiliated insurer's product. Thus, we control for the relationship by including a dummy variable that identifies whether an insurer is affiliated with a group (*GROUP*) and expect a negative relationship with firm performance.

Organizational Structure

Agency costs vary across stock and mutual organizational structure (e.g., Fama and Jensen, 1983; Mayers and Smith, 1990; Pottier and Sommer, 1997). Stock companies face agency inefficiency in the form of managerial discretion, where the interests of owners may differ from those of the managers. However, the market for corporate control mitigates managerial discretion distortions, forcing managers to maximize performance. This pressure to maximize firm performance at the expense of the policyholder is far less in a mutual firm, since the role of owner and policyholder functions are merged (Mayers and Smith, 1981, 1988). Additionally, Cummins, Weiss, and Zi (1999) found evidence in support of the *expense preference hypothesis* that suggests mutuals employ a higher cost structure than do stock firms. To control for this relationship, we include a variable identifying the organizational structure of each insurer (*STOCK*) and we anticipate that a stock company will have a relatively better financial performance than a mutual, other things equal.

Distribution System

The insurance industry traditionally employs two parallel systems of product distribution: the independent and exclusive agency systems. The costs and efficiency of each system has been the topic of significant research (e.g., Mayers and Smith, 1981; Kim, Mayers, and Smith, 1996; Berger, Cummins, and Weiss, 1997; Regan, 1997). The *market-imperfections hypothesis* suggests that the independent agency system, although relatively more expensive, continues to be used because of externalities, such as regulation. The *product-quality hypothesis* suggests that relatively higher levels of product quality are associated with comparably higher levels of input costs necessary to produce those results. Berger, Cummins, and Weiss (1997) find that the hypothesis holds as an explanation for the relatively higher quality services provided by independent-agency insurers. Given these differences, a dummy variable (*AGENCY*) is included in our models to control for an insurer's distribution system.

Core Business Activities

The two core business activities of an insurer, underwriting and investment, are both central to an insurer's overall financial performance. Therefore, we include variables to control for these influences. The common measurement of an insurer's underwriting performance is the combined ratio (*UNDERWRITE*). We expect this variable to share a negative relationship with financial performance. With respect to investment activities, an insurer's asset portfolio mix affects not only the magnitude but also the variability of its financial returns. Risky investments may generate greater returns; however, they may also foster greater volatility in such returns. Following Browne, Carson, and Hoyt (2001), who identified stocks, real estate, and mortgages as relatively more risky investments, we include the percentage of the investment portfolio invested in those assets (*INVEST*) as a measure of an insurer's investment activities. We expect this variable to share a positive relationship with firm performance before making adjustments for risk but a negative relationship with a risk-adjusted assessment of performance.

Leverage

Although leverage fulfills a vital function in an insurer's operations in providing relatively cheaper capital, its use also subjects the firm to the probability of increased levels of financial distress (Colquitt and Hoyt, 1997). This assumption of higher levels of financial risk would likely be reflected in lower market values for the firm. Following Colquitt and Hoyt, we control for this relationship by including a proxy for a firm's leverage (*LEVERAGE*), where the leverage ratio is defined as liabilities divided by a firm's surplus, common stock, and preferred capital stock. We expect this variable to share a negative relationship with firm performance.

The empirical analyses are based on pooled cross-section and time-series data of U.S. property–liability insurance companies that report to NAIC for the years 1994 through 2002. Most company-specific information is derived from the NAIC database, with the exception of distribution system data, which is obtained from *Best's Key Rating Guide*. The sample includes only insurers that meet the following criteria: provide complete data for all of the variables under consideration; have positive values for assets, surplus, and net premiums written; the organization form is either stock or mutual;

have obtained licenses from at least one state; and reported to NAIC for at least 3 years. Insurance companies may be structured as a single insurer or as an affiliate of an insurance group. Given that insurance groups may implement corporate strategies and practice risk management at the group level, instead of at the individual company level, insurers that belong to the same group are consolidated as one observation unit in our sample. In the case where multiple insurers are grouped as one unit, the values for dummy variables are based on the lead insurer in the group, and continuous variables are constructed by aggregating values of all insurers in the group. The final sample consists of 7,086 company units, which include 1,074 distinct insurers. The number of companies for each year ranges from 718 in 2002 to 826 in 1998.

Given the data structure, we employ a one-way fixed-effect model to test the relationship between the insurer's level of diversification and financial performance.[8] Fixed-effect models control for time-specific effects that are not otherwise controlled for by other variables included in the models.[9] In addition to the control variables discussed above, our model tests for nonlinear relationships between product diversification and firm performance, as well as the interactive impact of product diversification and geographic diversification on firm performance. To control for these relationships, we include the measure of a firm's product diversification (*PDIV*), the square of *PDIV* ($PDIV^2$), and the interaction terms of product diversification and geographic diversification ($PDIV*GEODIV$). Given that a firm's decision to diversify may be affected by its performance, we estimated our regression using a lag structure by regressing firm performance in year $t+1$ on company attributes in year t to correct for potential endogeneity.[10,11] The use of the lagged-structure models is appropriate also because it is reasonable to expect that effects of environmental factors are reflected in the performance in the subsequent year. The empirical model for testing the hypotheses can be written in the following form:

$$
\begin{aligned}
&\ln\left(ROA_{i,t+1}\right) \text{ or } \ln\left(RAROA_{i,t+1}\right) \\
&\quad = \alpha_t + \beta_1 PDIV_{i,t} + \beta_2 PDIV_{i,t}^2 + \beta_3 GEODIV_{i,t} \\
&\qquad + \beta_4 \left(PDIV^{*}GEODIV\right)_{i,t} + \beta_5 (PDIV^{2*}GEODIV)_{i,t} \\
&\qquad + \beta_6 COMMERCIALP_{i,t} + \beta_7 LIFE_{i,t} + \beta_8 SIZE_{i,t} \\
&\qquad + \beta_9 GROUP_{i,t} + \beta_{10} STOCK_{i,t} + \beta_{11} AGENCY_{i,t} \\
&\qquad + \beta_{12} INVEST_{i,t} + \beta_{13} UNDERWRITE_{i,t} + \beta_{14} LEVERAGE_{i,t} \\
&\qquad + u_{i,t},
\end{aligned}
$$

[8] The Hausman's test suggests that fixed-effect models are superior to random-effect models.

[9] For additional discussion on the fixed-effect model, see, for example, Greene (1997). One-way fixed-effect models in this study include time-specific intercepts. We also estimated the model, using pooled ordinary least squares (OLS) regressions. The results of the OLS models are consistent with those of the fixed-effect models.

[10] Another potential solution for correcting endogeneity is to use a two-stage modeling methodology. However, that approach is not adopted here due to a lack of supporting literature on variables identifying the diversification equation in the structured model setting.

[11] As a result of the lagged structure, data for financial performance span the time period from 1995 to 2003.

TABLE 1
Variable Definitions and Basic Statistics

Variable	Definition	Expected Signs	Mean	SD	Median
ROA	Return on assets		0.021	0.074	0.023
ROE	Return on equity		0.045	0.376	0.121
RAROA	Risk-adjusted return on assets		104.107	212.961	53.159
RAROE	Risk-adjusted return on equity		337.143	821.690	173.663
PDIV (1)	Product diversification, as measured by the Entropy Measure	±	0.360	0.284	0.731
PDIV (2)	Product diversification, as measured by the modified Herfindahl Index	±	0.712	0.579	0.423
GEODIV	Geographic diversification, as measured by the modified Herfindahl Index	±	0.325	0.371	0.092
COMMERCIALP	Percentage of premiums written in commercial lines	±	0.554	0.402	0.588
LIFE	Dummy variable = 1 if a firm sells life insurance products, 0 otherwise	−	0.219	0.414	0.000
SIZE	Natural log of total assets	±	17.842	2.451	17.547
GROUP	Dummy variable = 1 if a firm is a member of a group, 0 otherwise	−	0.409	0.492	0.000
STOCK	Dummy variable = 1 if stock company, 0 otherwise	+	0.464	0.499	0.000
AGENCY	Dummy variable = 1 if independent agency firm, 0 otherwise	±	0.528	0.499	0.000
INVEST	Natural log of percentage of assets in stocks, real estate, mortgage	±	−2.018	1.455	−1.919
UNDERWRITE	Natural log of combined ratio	−	0.033	0.285	0.032
LEVERAGE	Natural log of leverage ratio	−	0.648	0.453	0.591

where the subscript i represents the company, t represents time, α_t represents time-specific intercepts, and $u_{i,t}$ is the company-specific random error term. The definitions, summary statistics of the sample, and expected signs of the variables are included in Table 1.

Because of the focus on diversification in this article, a summary means analysis of the data is presented in Table 2 based on insurer diversification profiles. Of particular interest are the profiles of the insurers that possess diversification profiles with respect to geography and/or product that are either highly diversified or only minimally so. Four such profiles are identified and presented: A, B, C, and D. Each of these four profiles is defined by some combination of upper quartile, that is, 0.75–1.00, and/or lower quartile, that is, 0.00–0.25, diversification coordinates. Additionally, aggregate market values are presented for comparative purposes.

The diversification columns in Table 2 present the diversification measures based on the modified Herfindahl Index associated with each respective profile. Additionally, the share of business (as a percentage of total book-of-business) represented by the

TABLE 2
Diversification Profiles

	Diversification (as Measured by the Modified Herfindahl Index)		Lines of Business (as a Percentage of Total Book-of-Business)				
Group	Product	Geographic	Commercial	Allied	Liability	Homeowner	Auto
Aggregate market	0.36	0.32	55.4	11.7	7.9	12.1	28.8
A	0.77	0.01	66.3	14.4	6.4	26.2	10.0
B	0.03	0.02	68.8	13.7	10.3	2.8	29.0
C	0.07	0.87	62.6	5.7	8.4	0.7	26.7
D	0.79	0.90	77.7	9.5	16.4	5.7	20.4

five dominant insurance lines is presented for consideration.[12] Using *t*-tests for group mean-value analyses, all of the mean values presented for the four profile clusters were found to be statistically significantly different from their respective nongroup counterparts; that is, the mean values of group A insurers were statistically different from nongroup A insurers.[13] Additionally, all four profiles include commercial lines books-of-business that are significantly larger than that of the broader marketplace.

EMPIRICAL RESULTS

Table 3 shows estimations of the parameters from the fixed-effect models on both return on assets (*ROA*) and risk-adjusted return on asset (*RAROA*). Model specifications for both the Entropy Measure and the modified Herfindahl Index are reported. The empirical results show a nonmonotonic relationship between the level of product diversification (*PDIV*) and firm performance and evidence of this relationship was found in both versions of product diversification measurement. Product diversification (*PDIV*), geographic diversification (*GEODIV*), and the interaction terms of these two variables are found to be statistically significant. These results indicate that an interactive relationship exists between product diversification and geographic diversification. The main results for the *ROA* and *RAROA* models are consistent with each other. Similarly, the main results using the alternative performance measures of *ROE* and *RAROE* are generally supportive of the *ROA* and *RAROA* results. This is especially true with respect to the models using the Entropy Measure of diversification. Notable, however, is the finding that the *ROA* and *RAROA* models have higher adjusted R^2 values and that the coefficients generally display a greater statistical significance than do those associated with the *ROE* and *RAROE* variables. Thus, in an effort to provide a concise and manageable statement of our results, we focus our discussion of the results of the *ROA* and *RAROA* models (Table 3) while reporting the *ROE* and *RAROE* results in Table 4 for comparative purposes. The coefficients of *PDIV*, $PDIV^2$, *GEODIV,* and the associated interaction terms are statistically significant in all models in Table 3. The significance of $PDIV^2$ suggests that the relationships between *PDIV* and a firm's financial performance are nonlinear. Holding other control variables constant at 0, Figure 1 presents the marginal effects of product and geographic diversifications on firm performance found in the *RAROA* model when using the modified Herfindahl Index as the measure of product diversification.[14] Given the competing expectations with respect to the benefits and the inefficiencies associated with diversification, we can assume that marginal differences in firm performance are a *net* result of these influences.

The relationship shared by an insurer's diversification profile, that is, the interaction of product and geographic diversification levels, and firm performance is complex and defies simplistic explanation. Arguably, the most notable findings associated with Figure 1 are the differing performance levels associated with insurers that employ

[12] For the sake of clarity and simplicity, we present only five major lines of insurance for examination in Table 2.

[13] The only the exception to this statement relates to the liability and auto lines for group C, where no statistically significant difference was found.

[14] Roughly comparable results are found in the *ROA* model.

either a highly diversified profile (corner D) or those that more closely reflect a focused strategy (corner B). The performance levels associated with corner D are the lowest among the group whereas the performance of insurers with a focused strategy (corner B) is among the highest. The implication is that extreme diversification with respect to both product and geography results in significant inefficiencies, outweighing any potential synergist benefits. However, the performance results associated with insurers who employ a highly diversified product profile while limiting their geographic diversification (corner A) are the highest among the group, suggesting significant synergistic benefits exceeding operational and managerial inefficiencies in such settings.

TABLE 3
Parameter Estimates of Lagged Fixed-Effect Models Using *ROA* and *RAROA* as Dependent Variables

		Dependent Variable = *ROA*		Dependent Variable = *RAROA*	
Variables	Expected Sign	Entropy Measure	Modified Herfindahl Index	Entropy Measure	Modified Herfindahl Index
Intercept		0.7149***	0.7155***	1.4986***	1.5234***
		(0.0051)	(0.0050)	(0.1367)	(0.1355)
PDIV	±	−0.0168***	−0.0336***	−0.3500***	−0.5910***
		(0.0035)	(0.0079)	(0.0949)	(0.2141)
$PDIV^2$	±	(0.0096***	0.0388***	0.1804***	0.5776*
		(0.0024)	(0.0114)	(0.0656)	(0.3080)
GEODIV	±	−0.0085***	−0.0079***	−0.2321***	−0.1929***
		(0.0024)	(0.0024)	(0.0651)	(0.0651)
*PDIV*GEODIV*		0.0207***	0.0348**	0.8010***	1.2298***
		(0.0065)	(0.0154)	(0.1744)	(0.4164)
$PDIV^2$*GEODIV		−0.0137***	−0.0462**	−0.4605***	−1.3975**
		(0.0040)	(0.0206)	(0.1068)	(0.5566)
COMMERCIALP	±	0.0035***	0.0032***	0.1013***	0.0912***
		(0.0013)	(0.0013)	(0.0340)	(0.0340)
LIFE	−	0.0058***	0.0057***	0.1502***	0.1448***
		(0.0013)	(0.0013)	(0.0359)	(0.0360)
SIZE	±	−0.0003	−0.0004	0.1465***	0.1451***
		(0.0003)	(0.0003)	(0.0075)	(0.0074)
GROUP	±	0.0020	0.0020*	−0.0947***	−0.0954***
		(0.0012)	(0.0012)	(0.0323)	(0.0324)
STOCK	+	0.0058***	0.0058***	−0.0684***	−0.0718***
		(0.0009)	(0.0009)	(0.0247)	(0.0246)
AGENCY	±	0.0012	0.0011	0.0871***	0.0839***
		(0.0009)	(0.0009)	(0.0244)	(0.0243)
INVEST	±	0.0008***	0.0009***	−0.0313***	−0.0313***
		(0.0003)	(0.0003)	(0.0079)	(0.0079)
UNDERWRITE	−	−0.0324***	−0.0325***	−0.3452***	−0.3492***
		(0.0015)	(0.0015)	(0.0396)	(0.0396)

(*continued*)

TABLE 3
(Continued)

		Dependent Variable = *ROA*		Dependent Variable = *RAROA*	
Variables	Expected Sign	Entropy Measure	Modified Herfindahl Index	Entropy Measure	Modified Herfindahl Index
LEVERAGE	–	−0.0074***	−0.0073***	−0.2969***	−0.2934***
		(0.0010)	(0.0010)	(0.0259)	(0.0259)
−2 Log likelihood		−27,382.1	−27,387.3	19,172.7	19,175.9
Adj. R^2		0.10	0.10	0.17	0.17

Note: Year dummy variables are included in the models, but are not reported here. Standard errors are given in the parentheses below coefficient estimates.
ROA = return on assets;
RAROA = risk-adjusted return on assets;
PDIV = product diversification, as measured by Entropy Measure or modified Herfindahl Index;
GEODIV = geographic diversification, as measured by modified Herfindahl Index;
COMMERCIALP = percentage of premiums written in commercial lines;
LIFE = dummy variable equals 1 if a firm sells life insurance products, 0 otherwise;
SIZE = natural log of total assets;
GROUP = dummy variable equals 1 if a firm is a member of a group, 0 otherwise;
STOCK = dummy variable equals 1 if stock company, 0 otherwise;
AGENCY = dummy variable equals 1 if independent agency firm, 0 otherwise;
INVEST = natural log of percentage of assets in stocks, real estate, mortgage;
UNDERWRITE = natural log of combined ratio; and
LEVERAGE = natural log of leverage ratio.
*Significant at 0.10 level; **significant at 0.05 level; ***significant at 0.01 level.

Interestingly, intermediate levels of product diversification coupled with high levels of geographic diversification strategies appear to positively relate to firm performance. For example, highly geographically diversified insurers employing a moderate level of product diversification appear to maximize the net benefits of diversification when compared to similar insurers that employ either higher or lower levels of product diversification. These results suggest that there is an optimal diversification profile whose benefits (synergies) exceed operational and managerial inefficiencies that might be associated with such diversification. At higher or lower levels of product diversification those positive net results are diminished.

At the other extreme, insurers with a focused geographic strategy and intermediate levels of product diversification have lower performance levels than other similar insurers that employ either higher or lower levels of product diversification. This suggests that, given a geographically focused strategy, moderate product diversification strategies result in relatively lower financial performance, suggesting that an insurer would be better to either position itself as a mono-line insurer or as a highly diversified carrier. The inefficiencies associated with product diversification outweigh any potential synergies unless a firm adopts a substantially diversified product profile.

Two broad implications can be derived from these results. First, diversification, in and of itself is neither positively nor negatively associated with firm performance. Rather, multiple diversification/focus strategies represent both positive and negative relationships with insurer performance. Second, the complex relationship geographic diversification shares with product diversification and firm performance must be carefully considered within an insurer's over-all diversification strategy; a flawed understanding could result in significantly differing performance outcomes.

Among other control variables, the coefficients of *COMMERCIALP* are positively significant in all models in Table 3, indicating that insurers with a relatively larger book-of-business in commercial lines have better financial performance than other competitors. Similarly, we also found that property–liability insurers that sell life insurance products have better financial performance than insurers that do not

TABLE 4
Parameter Estimates of Lagged Fixed-Effect Models Using *ROE* and *RAROE* as Dependent Variables

		Dependent Variable = *ROE*		Dependent Variable = *RAROE*	
Variables	Expected Sign	Entropy Measure	Modified Herfindahl Index	Entropy Measure	Modified Herfindahl Index
Intercept		2.0713***	2.0720***	5.6225***	5.6392***
		(0.0058)	(0.0057)	(0.1493)	(0.1479)
PDIV	±	−0.0080**	−0.0198**	−0.2664**	−0.3003
		(0.0040)	(0.0090)	(0.1036)	(0.2337)
$PDIV^2$	±	0.0050*	0.0258**	0.1697**	0.3084
		(0.0028)	(0.0130)	(0.0716)	(0.3362)
GEODIV	±	−0.0062**	−0.0064**	−0.0449	−0.0225
		(0.0027)	(0.0027)	(0.0711)	(0.0710)
*PDIV*GEODIV*		0.0133*	0.0335*	0.5989***	0.6580
		(0.0073)	(0.0175)	(0.1904)	(0.4545)
$PDIV^2$*GEODIV*		−0.0091**	−0.0473**	−0.3909***	−0.7370
		(0.0045)	(0.0234)	(0.1166)	(0.6076)
COMMERCIALP	±	0.0036**	0.0035**	0.0425	0.0337
		(0.0014)	(0.0014)	(0.0371)	(0.0371)
LIFE	−	0.0037**	0.0036**	0.0665*	0.0593
		(0.0015)	(0.0015)	(0.0392)	(0.0393)
SIZE	±	0.0008**	0.0007**	0.0003	−0.0007
		(.0003)	(0.0003)	(0.0082)	(0.0081)
GROUP	±	0.0005	0.0006	−0.0207	−0.0251
		(0.0014)	(0.0014)	(0.0352)	(0.0353)
STOCK	+	0.0030***	0.0030***	−0.0649**	−0.0699***
		(0.0010)	(0.0010)	(0.0270)	(0.0269)
AGENCY	±	0.0009	0.0009	0.1259***	0.1256***
		(0.0010)	(0.0010)	(0.0267)	(0.0265)
INVEST	±	−0.0001	−0.0001	0.0012	0.0011
		(0.0003)	(0.0003)	(0.0086)	(0.0086)

(*continued*)

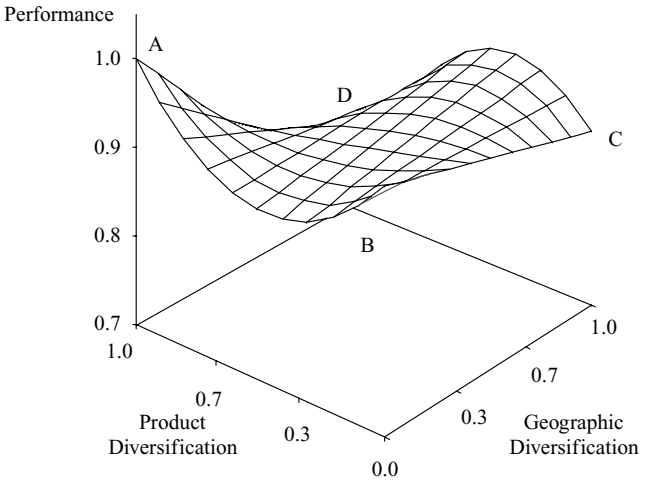
TABLE 4
(Continued)

Variables	Expected Sign	Dependent Variable = *ROE*		Dependent Variable = *RAROE*	
		Entropy Measure	Modified Herfindahl Index	Entropy Measure	Modified Herfindahl Index
UNDERWRITE	–	−0.0158***	−0.0158***	−0.3888***	−0.3953***
		(0.0017)	(0.0017)	(0.0432)	(0.0432)
LEVERAGE	–	−0.0006	−0.0005	−0.9472 ***	−0.9435***
		(0.0011)	(0.0011)	(0.0283)	(0.0283)
−2 Log likelihood		−25,570.1	−25,579.9	20,409.2	20,409.2
Adj. R^2		0.03	0.03	0.17	0.17

Note: Year dummy variables are included in the models, but are not reported here. Standard errors are given in the parentheses below coefficient estimates.
ROE = return on equity;
RAROE = risk-adjusted return on equity;
PDIV = product diversification, as measured by the Entropy Measure or the modified Herfindahl Index;
GEODIV = geographic diversification, as measured by the modified Herfindahl Index;
COMMERCIALP = percentage of premiums written in commercial lines;
LIFE = dummy variable equals 1 if a firm sells life insurance products, 0 otherwise;
SIZE = natural log of total assets;
GROUP = dummy variable equals 1 if a firm is a member of a group, 0 otherwise;
STOCK = dummy variable equals 1 if stock company, 0 otherwise;
AGENCY = dummy variable equals 1 if independent agency firm, 0 otherwise;
INVEST = natural log of percentage of assets in stocks, real estate, mortgage;
UNDERWRITE = natural log of combined ratio;
LEVERAGE = natural log of leverage ratio.
*Significant at 0.10 level; **significant at 0.05 level; ***significant at 0.01 level.

extend their business to the life insurance segment, which disagrees with Hoyt and Trieschmann (1991). A possible explanation for these contrary findings is the disparate methodologies employed by the two studies—Hoyt and Trieschmann used a mean-variance analysis and a capital asset pricing model (CAPM) approach while focusing on a much earlier time period. *SIZE* is positively significant in the *RAROA* models, suggesting that larger insurers may have a relatively stronger financial performance. These results support the findings of Gardner and Grace (1993), Sommer (1996), and Liebenberg and Sommer (2007) with respect to insurer size. *GROUP* is negatively significant in the *RAROA* models, suggesting that group-affiliated insurers have lower risk-adjusted *ROA*-–agreeing with the findings of Cummins and Sommer (1996), Sommer (1996), and Liebenberg and Sommer (2007). Interestingly, *GROUP* is found to be marginally positively significant (at the 10 percent level) in the *ROA* model when the modified Herfindahl Index is used to measure diversification. Choi and Weiss (2005) encounter similarly conflicting results in their assessment of performance in the property–casualty insurance market. One possible explanation for a positive relationship between group affiliation and insurer performance is that

FIGURE 1
RAROA Model—Effect of Product and Geographic Diversification on Financial Performance



affiliated insurers may have less replication and greater efficiency in operations because they can coordinate their resource deployment across the other members of the group. The coefficient for *STOCK* is positively significant in the *ROA* models while negatively significant in the *RAROA* models. The former finding is consistent with Cummins, Weiss, and Zi (1999) and indicates that stock insurers have a higher *ROA* than do mutual insurers. The negative finding in the *RAROA* models suggests that stock insurers have lower returns than mutual insurers when the volatility of returns is controlled. The coefficient for *AGENCY* is found to be positively significant using the risk-adjusted performance measure, suggesting insurers using an independent agency distribution system have higher risk-adjusted returns. Although the coefficients for *INVEST* are found to be positively significant in the *ROA* model, they are negatively significant in the *RAROA* models. These findings suggest that once risk is controlled, firm value suffers when the investment portfolio reflects significant volatility. The coefficients of both *UNDERWRITE* and *LEVERAGE* have the expected negative signs and are statistically significant in all models.

ROBUSTNESS TESTS

Split-Sample Analysis

To validate the results that the relationship between product diversification and firm performance vary by the extent of geographic diversification, we perform separate regressions for geographically diversified firms and geographically focused firms. We divide our sample into two subsamples based on the mean value of *GEODIV*.[15]

[15] We also split the sample based on the median value of the *GEODIV* and estimated the alternative models. The choice of mean or median values as the cutoff point does not change the conclusion of the analysis.

Group 1 (focused firms) includes insurers with a *GEODIV* measure less than or equal to 0.325 (the mean value for this variable) and group 2 (highly diversified firms) includes insurers with a *GEODIV* measure greater than 0.325. There are 4,064 and 2,982 observations in groups 1 and 2, respectively. The coefficients for regression results for *RAROA* along with the mean and median values of the variables are presented in Table 5.[16]

The subsample regressions confirm the nonlinear relationship between product diversification and firm performance found in the full sample. The coefficient of the variable *PDIV* is negatively significant and the coefficient of the squared term of *PDIV* is positively significant for geographically focused firms, supporting the existence of a significant relationship between product and geographic diversification noted earlier. The signs of the coefficients of *PDIV* and $PDIV^2$ are the opposite for geographically diversified firms, which is once again consistent with relationship most clearly observed in Figure 1. The results of other control variables are consistent with the findings based on the full sample.

Market Measure Analysis

We also perform a diversification–performance analysis on a subsample of publicly traded insurers using market value as the dependent variable to see whether results obtained from accounting value analysis is comparable to those of market measures. Following previous studies, we use a proxy measure of Tobin's *Q*-value as a measure of market performance of an insurer (Christophe, 1997; Pantzalis, 2001; Christophe and Pfeiffer, 2002). The *Q*-value is defined as

$$Q\text{-Value} = \frac{MVE + PS + DEBT}{TA},$$

where *MVE* is market value of equity, *PS* is book value of preferred stock, *DEBT* is book value of long-term debt plus short-term liabilities minus short-term assets, and *TA* is book value of total assets.

The data on market value of equity are obtained from Compustat.[17] All property–liability insurers with market value data in Compustat and book-value information in the NAIC data set over the time period from 1994 to 2003 were identified. This provides 280 observations and the number of companies per year ranges from 27 to 38. Basic statistics of the sample can be found in Table 6. The product diversification measure reported here is based on the modified Herfindahl Index. When compared with the full sample, public insurers appear to be more diversified in both product lines and geographic coverage areas; to be larger in size and to be more likely to use independent agencies than are private insurers. It was also found that most public insurers belong to insurance groups and have lower leverage ratios, but higher

[16] In the interest of economization, only parameter estimates from the Entropy Measure models are reported here.

[17] The model structure of the market value analysis is similar to that of *ROA* and *RAROA* models in that we adopt a lagged structure where the *Q*-value in year $t + 1$ is regressed on environmental factors in year t.

TABLE 5
Parameter Estimates of Lagged Fixed-Effect Models on Split-Samples

		Dependent Variable = *RAROA*					
		Geographically Focused Firms ($GEODIV \leq 0.325$)			Geographically Diversified Firms ($GEODIV > 0.325$)		
Variables	Expected Sign	Mean	Median	Coefficient	Mean	Median	Coefficient
Intercept		–	–	1.154***	–	–	1.493***
				(0.164)			(0.252)
PDIV	±	0.600	0.564	−0.338***	0.867	0.917	0.234**
				(0.097)			(0.109)
$PDIV^2$	±	–	–	0.165**	–	–	−0.128**
				(0.066)			(0.061)
COMMERCIALP	±	0.578	0.628	0.128***	0.522	0.525	0.055
				(0.044)			(0.055)
LIFE	−	0.124	0.000	0.246***	0.351	0.000	0.114**
				(0.055)			(0.050)
SIZE	±	16.751	16.636	0.172***	19.362	19.030	0.133***
				(0.009)			(0.013)
GROUP	±	0.238	0.000	−0.117***	0.648	1.000	−0.111**
				(0.044)			(0.048)
STOCK	+	0.382	0.000	−0.044	0.580	1.000	−0.073**
				(0.032)			(0.039)
AGENCY	±	0.508	1.000	0.099***	0.556	1.000	0.065*
				(0.033)			(0.037)
INVEST	±	−1.914	−1.812	−0.026***	−2.164	−2.029	−0.043***
				(0.010)			(0.013)
UNDERWRITE	−	0.029	0.027	−0.165***	0.037	0.038	−0.643***
				(0.048)			(0.068)
LEVERAGE	−	0.705	0.679	−0.398***	0.568	0.453	−0.182***
				(0.032)			(0.049)
−2 Log likelihood		10,860.7				8,293.7	
Adj. R^2		0.14				0.17	

Note: Year dummy variables are included in the models, but are not reported here. Standard errors are given in the parentheses below coefficient estimates.
RAROA = risk-adjusted return on assets;
PDIV = product diversification, as measured by the Entropy Measure or the modified Herfindahl Index;
COMMERCIALP = percentage of premiums written in commercial lines;
LIFE = dummy variable equals 1 if a firm sells life insurance products, 0 otherwise;
SIZE = natural log of total assets;
GROUP = dummy variable equals 1 if a firm is a member of a group, 0 otherwise;
STOCK = dummy variable equals 1 if stock company, 0 otherwise;
AGENCY = dummy variable equals 1 if independent agency firm, 0 otherwise;
INVEST = natural log of percentage of assets in stocks, real estate, mortgage;
UNDERWRITE = natural log of combined ratio;
LEVERAGE = natural log of leverage ratio.
*Significant at 0.10 level; **significant at 0.05 level; ***significant at 0.01 level.

TABLE 6
Parameter Estimates of Lagged Fixed-Effect Models on Market Value and Basic Statistics of Public Insurers

Dependent Variable = ln(*Q*-Value)[a]							
Variables	Expected Sign	Coefficient	Mean	Std. Dev.	Median	Min.	Max.
Intercept		2.408***	–	–	–	–	–
		(0.733)					
PDIV	±	−2.613***	1.092	0.580	1.086	0.011	2.293
		(0.587)					
$PDIV^2$	±	0.936***	–	–	–	–	–
		(0.304)					
GEODIV	±	−0.970***	0.773	0.267	0.904	0.000	0.965
		(0.294)					
*PDIV*GEODIV*		2.077***	–	–	–	–	–
		(0.703)					
$PDIV^2$**GEODIV*		−0.787**	–	–	–	–	–
		(0.355)					
COMMERCIALP	±	0.024	0.365	0.400	0.073	0.000	1.000
		(0.111)					
LIFE	−	0.156**	0.668	0.472	1.000	0.000	1.000
		(0.074)					
SIZE	±	−0.254***	21.864	1.857	21.517	16.941	26.441
		(0.027)					
GROUP	±	1.508***	0.993	0.084	1.000	0.000	1.000
		(0.320)					
AGENCY	±	0.118**	0.686	0.465	1.000	0.000	1.000
		(0.058)					
INVEST	±	0.168***	−2.554	1.225	−2.329	−6.249	0.000
		(0.023)					
UNDERWRITE	−	0.216	0.060	0.142	0.032	−0.341	0.900
		(0.188)					
LEVERAGE	−	1.883***	0.275	0.251	0.209	0.014	1.384
		(0.157)					
−2 Log likelihood		281.7					
Adj. R^2		0.84					

Note: Year dummy variables are included in the models, but are not reported here. Standard errors are given in the parentheses below coefficient estimates.
Q-Value = market performance as measured by $(MVE + PS + DEBT)/TA$ where *MVE* is market value of equity, *PS* is book value of preferred stock, *DEBT* is book value of long-term debt plus short-term liabilities minus short term assets, and *TA* is book value of total assets;
PDIV = product diversification, as measured by the modified Herfindahl Index;
GEODIV = geographic diversification, as measured by the modified Herfindahl Index;
COMMERCIALP = percentage of premiums written in commercial lines;
LIFE = dummy variable equals 1 if a firm sells life insurance products, 0 otherwise;
SIZE = natural log of total assets;
GROUP = dummy variable equals 1 if a firm is a member of a group, 0 otherwise;
AGENCY = dummy variable equals 1 if independent agency firm, 0 otherwise;
INVEST = natural log of percentage of assets in stocks, real estate, mortgage;
UNDERWRITE = natural log of combined ratio;
LEVERAGE = natural log of leverage ratio.
[a]Tobin's *Q*-value summary statistics include: 0.131 (mean), 0.151 (standard deviation), and 0.032 (median).
*Significant at 0.10 level; **significant at 0.05 level; ***significant at 0.01 level.

combined ratios than other insurers. The empirical results from the market value models are presented in Table 6.

The results from the market value models are consistent with the findings of the models that employed accounting measures. Product diversification is found to share a nonlinear relationship with a firm's market value while simultaneously sharing a relationship with the degree to which a firm's operations are geographically diversified. The signs of the coefficients of *PDIV*, $PDIV^2$, *GEODIV*, and the interaction terms of these variables agree with the results from the full sample models when we used *ROA* and *RAROA* as dependent variables. Therefore, our earlier discussion related to the model relying on accounting measures to define firm performance is similarly applicable to the market return analysis. Also consistent with the accounting return analysis are the signs of the coefficients of *LIFE* and *AGENCY*. Public property–liability insurers that also sell life insurance products or use independent agency systems are found to have greater firm values. However, our results show that smaller insurers, insurers belonging to groups, and insurers with higher leverage ratios all have higher firm values—a result that differs from those found in the accounting return analysis. The coefficient for *INVEST* is positively significant, which is consistent with the results found in the *ROA* models. This result suggests that public insurers that take great risks in investment enjoy greater market values.

CONCLUSION

This article investigates the relationship shared by product diversification and firm financial performance using data drawn from U.S. property–liability insurance market over the 1994 through 2002 time period. Our empirical analyses have two major findings. First, a nonlinear relationship exists between product diversification and firm performance. This curvilinear relationship holds true for both accounting and market performance analyses under different diversification measures (the Entropy Measure and the modified Herfindahl Index). Second, when we focus on the interaction of product and geographic diversification, we found a complex relationship between an insurer's diversification profile and firm performance results. Our results indicate that the relationship shared by product diversification and firm performance is significantly affected by levels of geographic diversification. Most notably, firms that have high levels of both product and geographic diversification were found to have the lowest levels of performance results. Conversely, firms with low levels of diversification across both product lines and geography typically had relatively higher levels of firm performance. Our results also show that product diversification could contribute to either better or worse financial performance—depending not only on the level of product diversification, but also with respect to the extent of geographic diversification. The complex relationship found in this study have significant implications for insurer management as they formulate business strategies and refine their diversification plans in hopes of better positioning themselves in this marketplace. This finding that either diversification or focus strategies can be potentially viable, contingent on the approach of the firm, is supportive of, and possibly explains, the various findings in Berger et al. (2000), Meador, Ryan, and Schellhorn (2000), and Cummins, Weiss, and Zi (2003).

Although this article has revealed yet another layer of the "diversification–firm performance" relationship, additional work remains. Research related to the costs associated with both geographic and product diversification would aid management in devising cost-effective strategies for modifying their diversification profile to benefit from higher firm performance. Additionally, given the relationships revealed in this analysis, an investigation of interaction of product and geographic diversification as they relate to firm performance in other fields, such as the banking industry, may be warranted.

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