Market and ownership features of the US insurance industry

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ABSTRACT

A history of disagreement exists between academic research and popular perception of the competitiveness of the US property-liability insurance industry. This reinvestigation of the industry reports high market share concentration levels, persistence in the market share leaders over time, and both concentrated and interlocking ownership relationships; circumstantial features of a non-competitive industry. Consistent with studies of the effect of entrenched boards performance measured by Tobin's q is shown to be sensitive to the levels of ownership concentration.

I. INTRODUCTION

Despite a historic validity to the claim that the insurance industry is collusive, academic researchers differ from popular opinion regarding the industry competitiveness.[1] This paper describes circumstantial evidence supporting popular opinion in personal lines. In the commercial lines, an inability to completely define the relevant market impedes coming to a similar conclusion. However, the popular press contains strong recent evidence of anticompetitive behavior in the commercial lines.[2]

Industry studies are characterized as structural and non-structural (Bikker and Haaf, 2002). This paper follows the traditional structure-conduct-performance (SCP) paradigm which considers the association of concentrated markets with collusive behavior or superior market performance. SCP studies typically follow one of two concentration paths; the most common studies investigate market share concentration, another path investigates ownership concentration. SCP market share studies of the property-liability insurance industry conclude that it is competitively structured in most lines, with numerous firms, relatively easy entry, and satisfactory concentration levels, though popular claims persist that the industry is not competitive (Kopcke and Randall, 1991).

Long-run market power requires barriers to the entry of competitors. There are three types of entry or exit barrier: natural, legal, and strategic (Armentano, 2000). Evidence suggests that

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[1] For the popular opinion, see National Marketing Services. "Insurance Industry Outlook 2004 Study." (July 23, 2004) http://www.nationalmarketing.com/Markets/outlook_2004_overview.asp?node=5&sNode=4&Exp=Y viewed July 23, 2004. Also see Consumer Reports. "Surviving the 'hard market' in homeowners insurance." September 2004. For historic examples supporting the popular view, see Klein (1995); these include the facts leading to the Appleton Rule of 1906, the *Southeastern Underwriters* case of 1945, the Federal Trade Commission criticisms of the 1980s, Insurance Services Organization investigations in early 2002, and noncompetitive industry practices that continue to be reported in the press. A recent lawsuit of the nation's leading insurance brokerage firm and insurers is described by the New York State Insurance Superintendent: "This has gone from an inquiry into failure to disclose compensation to an active investigation of bid rigging and improper steering. This certainly proves the adage that where there is smoke, there is fire" ("New York AG to sue insurance broker for manipulation," October 14, 2004; http://reuters.co.uk/newsArticle.jhtml?type=correctedNews&storyID=6506187&section=news.

[2] See "Spitzer making good on plan for wide insurance probe," (October 19, 2004) http://money.cnn.com/services/tickerheadlines/djh/200410191651DOWJONESDJONLINE000944.htm viewed October 19, 2004.

natural and legal barriers in the insurance industry are not sufficient to grant market power to existing firms. Scale and scope economy studies of the insurance industry are not consistent; most find evidence of cost or technical efficiencies. A survey of fourteen frontier efficiency studies of the insurance industry reports that eleven of the studies find cost efficiency results and five find technical efficiencies (Cummins and Weiss, 1998). Estimates of cost efficiencies are reported for the life insurance (Grace and Timme, 1992; Cummins and Zi, 1998) but limited studies exist for the property-liability industry (an exception is Doherty, 1981). Legal barriers, which include licensing and industry specific laws and regulations that create an entry cost constraint, provide consumers with fewer choices and protect inefficiencies and the profit margins of existing suppliers. Yet, to satisfy other social goals States require that insurers be licensed and conform to the rules promulgated by the State (McKenzie, 2001). State regulation both raises entry barriers and defines the geographic boundary of the market but reviewers conclude that legal barriers are not a prohibitive constraint in the insurance industry (Cummins and Weiss, 1991).[3]

Strategic barriers include both legal firm specific actions, such as product differentiation, and illegal or unethical collusive constraints. Among the latter, firm specific strategies that can raise barriers include the threat of predatory or limit pricing. Strategic barriers created by cooperation among firms in an oligopolistic market include price-fixing, the misuse of trade associations, preventing price discounts, and agreements to divide the market (Bulow, Geanakoplos and Klemperer; 1985b). The insurance industry is often accused of these types of activity. Bulow, Geanakoplos, and Klemperer (1985a) also provide an entry barrier rationale for a frequent feature of the insurance industry, the existence of excess capacity. If imperfect competition is present,

[3] State regulations also impose exit barriers. See, for example, "Coalition for Auto Insurance Competition Implores New Jersey State Government to Urgently Address Auto Insurance Availability." (June 4, 2004) http://www.collision-insight.com/news/20020604-coalition.htm, viewed July 20, 2004.

excess capacity provides the firm with a credible threat to use against cartel-violating competition or new entrants.

Ownership concentration, following the Berle-Means (1932) paradigm relating ownership concentration and profitability, is less frequently seen in insurance studies. Berle and Means (1932) concluded that share ownership was becoming increasingly dispersed and implications of this corporate evolution, separating the management and ownership functions, form the foundation of modern financial theory. Countless articles have replicated or extended these studies and most empirical works continued to find declining ownership by the directors and officers of corporations but an exhaustive survey comparing 1935 and 1995 reaches the opposite conclusion (Holderness, Kroszner, and Sheehan, 1999). Recent work links the concentration of power in the hands of those governing corporations with reductions in firm value. For example, Bebchuk and Cohen (2004) note that participants in the corporate governance debate suggest shareholder value is negatively affected by their inability to effectively threaten management because this inability affects the probability of an acquisition and the expected acquisition premium. Others discussing the entrenchment theory suggest that entrenched management has a higher ability to pursue goals other than value maximization.[4]

In Section II, we investigate the levels of premium and ownership concentration of the property-liability insurance industry. We find concentrated markets, a coincident persistence among market leaders, and both concentrated and intertwined ownership patterns. An investigation of the relationship between these concentration measures and corporate performance (measures by returns on equity and Tobin's Q) yields inconclusive results: we do not find a

[4] See, Fahlenbrach, Rüdiger. "Shareholder rights and CEO compensation." University of Pennsylvania. Working paper. (2003) http://assets.wharton.upenn.edu/~rfahlenb/Papers/Rights_and_comp11022003.pdf (Viewed Sept. 18, 2004).

significant relationship between market share concentration and return on equity (ROE) but do find a significant relationship between market share concentration and Tobin's Q. Section III concludes.

II. THE STRUCTURAL APPROACH

SCP-consistent studies of the insurance industry focus on static concentration measures of market-share in specific lines of business, frequently auto insurance, which is the largest premium source in the property-liability industry.[5]

A. Market share concentration

The US property-liability insurance (P&L) industry has thousands of firms, a large number even after correcting for the fact that many of the thousands of firms are subsidiaries of holding companies that exercise tight coordination. After controlling for grouping there are 1,117 P&L insurers in 2002.[6] However, the top ten firms account for almost 44 percent of 2002 industry premiums and the top 25 firms account for 63 percent of these revenues. The market share of each of the smallest 1,000 insurers is less than or equal to 0.1 percent of the industry total.[7]

The focus on market share concentration in the industrial organization literature is due to a disagreement about the causal direction of the link between industry concentration and competitiveness. Higher concentration levels imply greater opportunities for operating a cartel effectively because members will find it easier to detect price-cutting (Stigler, 1964) and many

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[5] For other studies that focus on particular lines of business, see Carroll (1993) and Bajtelsmit and Bouzouita (1998).
[6] Groups or unaffiliated insurers. *Best's Aggregates and Averages*, 2002 Edition. Oldwick, NJ: A.M. Best Company and *AM Best Pick-a-Page* software, 2003.
[7] The market share concentration is from "Property and Casualty Insurance Industry 2002 Market Share Report by State and Countrywide." http://www.naic.org/research/Research_Division/Stats/2002_PC_MktShare.pdf. Viewed August 6, 2004. There are a variety of concentration measures. Two of the more common are the n-firm market share and the Hirfindahl-Hirschman Index. Bikker and Haaf (2002) summarize the relationship between ten measures of concentration and provide policy makers guidelines for choosing the concentration index based on the situation. But, Donsimoni, et al. (1984) argue "there is no such thing as an optimal index of concentration, both because different industries behave differently as well as because no obvious widely accepted normative judgments exist to guarantee its optimality."

empirical studies, following the tradition of Bain (1951), find a positive though often weak link between concentration and profit rates. Critics (Demsetz, 1973; Baumol, 1982) question the presumption that market share concentration is suggestive of market power, they argue that the causal structure is as likely to be from performance to structure rather than from structure to performance.[8] DeVany and Kim (2002) also criticize reliance on concentration indices, arguing that these static measures, computed using point-in-time market shares, give a false sense of market stability. They argue that market share leaders in a competitive industry change rapidly and often. Persistence in the concentration and composition of market leadership bring into question the notion that a market is competitive.

Despite the question regarding the causal direction of the relationship between concentration indices and performance, a relatively high market share concentration is a necessary, though not a sufficient condition to demonstrate a lack of competition. Absent concentration in an industry with more than a few firms, a collusively equal distribution of the market is unrealistic given the advantages to each member from cheating on the cartel agreement. This view is reflected in the US Department of Justice (US DOJ) use of market share concentration data as a starting point for analyzing competitive impact in horizontal merger cases. The US DOJ presumes adverse competitive effects when a merger will cause the four firm concentration ratio (CR_4) to exceed 35 percent and the Herfindahl-Hirshman index (HHI) to exceed 1,000.[9]

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[8] Mathiesen (2002) summarizes empirical studies of the hypothesis that performance is a function of ownership concentration (the performance hypotheses) or that ownership concentration is a function of firm performance (the ownership hypotheses). Some performance hypotheses suggest that higher levels of managerial ownership have a positive impact on firm performance; some suggest the impact is negative; and some studies allow for both positive and negative impacts in various ownership ranges. Each of the ownership hypotheses, however, associates higher levels of firm performance with higher levels of ownership concentration. The hypothesized link between ownership and performance is discussed in Holderness, et al (1999) and partially by Mayers, Shivdasani, and Smith (1997) for the insurance industry.

[9] US Department of Justice. "Horizontal Merger Guidelines." April 8, 1997. http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html viewed May 2, 2004. See especially §2.0.

Measures of market concentration require two dimensional specifications: definition of the product and the geographic area. Because most products are not perfectly homogeneous the product definition includes the range of products that consumers perceive as close substitutes. For regulatory and practical reasons, personal lines consumers have few choices; insurance for a specific risk is addressed by policies insurers consider in a particular line of business. For example, insurance to cover potential damage to a car is addressed by an automobile insurance policy while a homeowner policy covers the potential damage to a home. Because the policies are not substitutes, this distinction serves to set a product definition limit to these markets. Reliance on the "line of business" to set the product definition limits of the market is less reliable for commercial lines. Business risk managers have a wider variety of loss financing tools available, many of these alternatives are not insurance products or not in the market share measures available (e.g., loss financing derivatives and premiums paid to a captive are not in the market share data).

Identifying the state as the relevant geographic area for insurance is more complicated. The geographic area must include all suppliers of a good who are actual or potential competitors. To write business in a state, the actual competitors must be licensed by and use forms and rates complying with state filing regulations. Potential competition is difficult to identify. Though 1,112 insurance groups or unaffiliated companies operate in the US, of the lines of business identified by each state fewer than 200 firms typically have sales in a state.[10] Because legal entry barriers are low, it has been argued that the large number of insurers not operating in a state provides a competitive constraint. This argument is limited by the fact that industry sales are concentrated in the hands of about one hundred insurers, and most of these insurers operate in all states. Still, this potential competitor dilemma complicates the notion that the market definition

[10] Approximately half of the insurers operate in one or two states; thirteen have a positive DPW in all states.

for insurance is no larger than the boundaries of the state.

A further geographic boundary complication exists because the market for some lines also depends on the size and mobility of consumers. Personal lines insurance, including auto and homeowners insurance, are products whose demand and policy format are set by State regulations and lending requirements while a corporate insurance policy may cover exposures in more than one state.[11] Thus, not only do business insurance lines face competition from alternative risk transfer tools, it is unlikely that the corporate premiums insurers report as being in a particular state is attributable only to exposures situated in that state. While we rely on state boundaries to define the geographic market area in this study, we recognize the limitations created by this definition.

Table 1 reports the 2002 direct premium written by insurers in five selected lines of insurance, the five lines account for 73 percent of the industry total. The table also lists average state concentration and persistence measures.

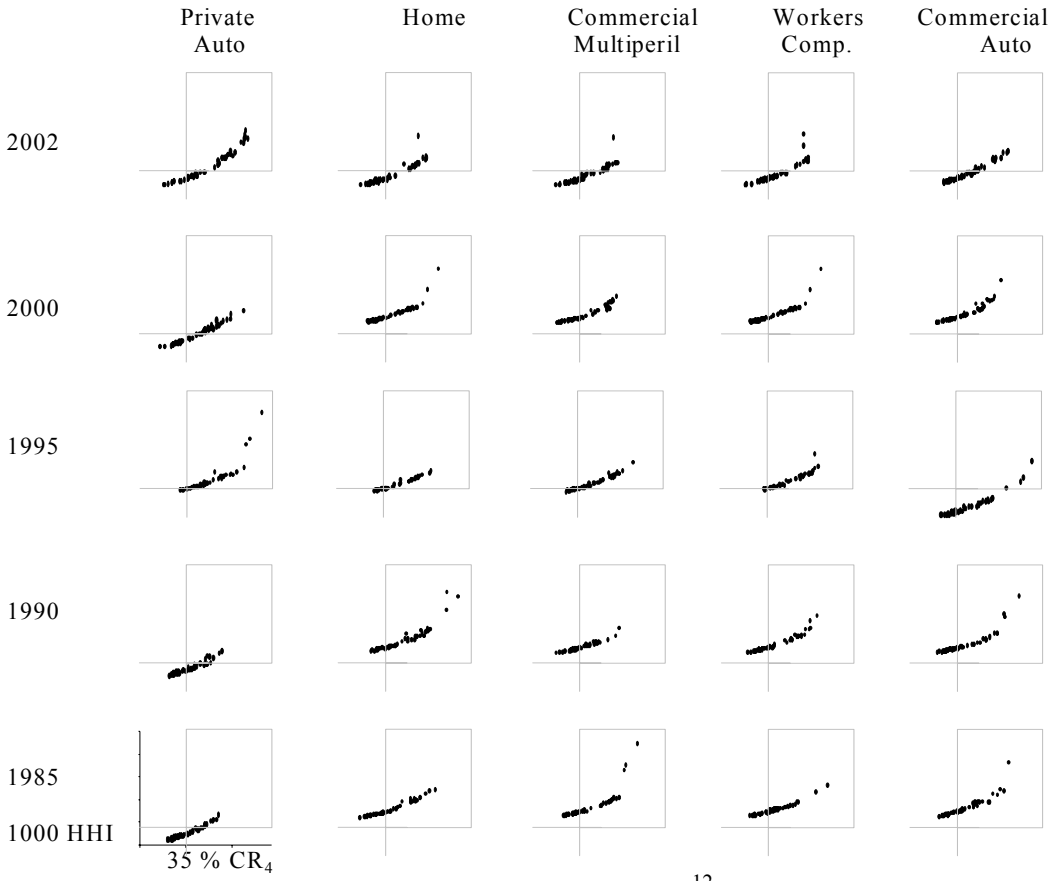
Table 1: DPW, CR_4, HHI & Persistence, selected lines
(Group & Unaffiliated Insurers, 2002 ($B))

Line of Business	DPW		CR_4	HHI	Persistence 85-02	
	$Billions	%			4	4:3
Private Passenger Auto	$1,721.8	36.5	0.541	1,021	18	47
Homeowners	448.8	9.5	0.564	1,118	18	43
Workers Compensation	576.7	12.2	0.478	1,090	0	6
Commercial MultiPeril	365.3	7.7	0.353	586	0	1
Commercial Auto	334.6	7.1	0.301	421	0	3

[11] Master Commercial General Liability (CGL) policies designed to cover multiple locations allocate property-based premium to states in an arbitrary way. Allocation is still more difficult when liability exposures are covered. The impossibility of identifying a "correct allocation" is mentioned in conversation with the NY State tax department, a group with an interest in the correct allocation because it affects premium tax revenues. (For a copy of the CGL policy, see the *CPCU Handbook of Insurance Policies* Insurance Institute of America (2003).)

The CR_4 and HHI columns report the average of the state values. Regardless of the concentration measure, on average the personal lines are more concentrated than the commercial lines. The by-state and by-line analysis, summarized in Figure I, demonstrates that the combination of CR_4 and HHI values in most states and lines exceeds the combination cited by the US DOJ as presumptive of adverse competitive effects.[12]

Figure I: HHI and CR_4 by insurance line for selected years



Each chart in Figure I demonstrates that for years many states exceed the presumptively adverse combination of a high CR_4 and HHI. The figure suggests that the pattern is least frequent

[12] The number of states exceeding both a 35% CR_4 and a 1,000 HHI, by line, are: personal auto, 23 states; homeowners, 15 states; commercial multiple peril, 9 states; workers compensation, 10 states; and commercial auto, 11 states. By state, by line information is provided for a selection of years in Appendices 1 to 3. Appendix 1 reports the four-firm concentration ratio; Appendix 2 presents the HHI values; and, Appendix 3 presents the persistence measure. Full information for all years is available from the authors.

in commercial lines. As discussed below, this perception may have more to do with the difficulty of correctly defining the geographic and cross-price elasticity issues that define these markets.

Table 1 also reports two values characterized as measuring persistence. As suggested by DeVany and Kim (2002), an absence of competition is reflected by an industry with the same market share leaders for an extended period of time. Column six reports the number of top four 2002 firms that were in the top four in a selected number of other time periods covering a 17 year period: 2002, 2000, 1995, 1990, and 1985.[13] The second "Persistence" column reports the number of states in which at least three of the top four 2002 firms also held one of the top four positions in each of the other four periods considered. For example, for private passenger auto, in 18 of 51 states the top four firms in 2002 were also the top four firms in 2000, 1995, 1990, and 1985. In 47 states, the top four 2002 firms occupied at least three of the top positions in the earlier years. The table demonstrates that persistence is more common in personal than in commercial lines.[14] In none of the states were the top four 2002 commercial lines firms market leaders for each of the earlier periods. The dramatic difference between the personal and commercial lines persistence and concentration values reflects market definition issues. Because we cannot solve this problem of correctly identifying the commercial lines market, we report values for an investigation of the commercial lines but do not consider them to be accurate estimates of those segments of the property-liability industry.

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[13] An alternative is to use a rank correlation measure, such as the Spearman *R* statistic. The valid computation of this statistic requires a comparison of the entire distribution of firms rather than isolating the leaders. For example, if the top four firms in 2002 were ranked 1,2, 8, and 3 in the prior time period, the rank correlation would be –1.5, a nonsensical value.

[14] Consumer choice, rather than firm or collusive behavior may be the cause of the persistent leadership for a period of time, but theory suggests that persistent market share leadership is a possible barrier to the entry of competitors. Zeckhauser and Samuelson (1989) suggest that insureds are unlikely to change insurers, even after negative experiences, because they believe the alternatives will be no better and that incurred search costs will not be recouped.

Market share concentration is a concern if it has economic or welfare implications; these include the existence of excess profit. Most industry studies of the relationship between market share concentration and the rate of return earned on equity capital are straightforward, not so in the insurance industry where identifying the market ROE is possible for only part of the industry. In the US P-L insurance industry, 33.7 percent of the firms are non-stock firms that account for 48.5 percent of industry premiums earned. In addition, many stock insurers are closely held, making market data less reliable. In the spirit of the ROE measure, the National Association of Insurance Commissioners (NAIC) reports a by line and state measure characterized as the return on net worth (RNW).[15] RNW is an imperfect ROE proxy because it relies on the statutory accounting principle (SAP) annual statement but the measure has the advantage that it can be computed for any insurer.[16]

Table 2, which compares the RNW for the P-L industry and the ROE for all industries, reveals one of the curiosities of the insurance industry: the reported measure of profit consistently trails industry averages yet the share price of insurance company stocks exceeds the performance of the market over the same time period. The seemingly low returns may reflect a relatively low risk level for the insurance industry but we also question the method of measuring industry profit.[17] If

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[15] See Bailey (1969) for a still relevant critique of the formula and the problem of measuring profitability. The unfortunate consequence is that results are adjusted in different ways, reducing the credibility of results. See Cummins and Tennyson (1992) for a review of other approaches to addressing insurance profit measurement.

[16] Insurance company annual statements do not report data in a format conducive to matching the revenue and costs of its product and it is theoretically difficult to determine an allocation of equity or investment income to specific lines or states. Losses are reported by line for the policy years written but not by line and state. In addition, frequent changes in loss reserves suggest significant variation in expected losses or purposeful reporting issues (Bradford and Logue, 1997). Revenues are reported by line and by state but not by the year of the initial policy. Recognizing the difficulties, insurance industry studies typically rely on the practical solution of measuring performance by comparing the aggregate losses and expenses incurred in a calendar year with the premiums earned in that year. The mismatch between current year revenue values, the loss protection purchased by that revenue, and the resulting profit generated reduces the confidence of conclusions drawn from the use of single year values. The difficulty of correctly identifying revenue, loss, and associated investment streams creates a need for imperfect proxies to measure profit in the insurance industry.

[17] The ROE and RNW comparison is culled from National Association of Insurance Commissioners. "Profitability by Line by State in 2002." Research Quarterly. (Kansas City: 2003) page 14.

the RNW measure accurately reflects the relative level of industry return, the reason for the existence of excess capacity is an unanswered conundrum with a possible answer in the strategic barrier suggestion of Bulow, et al (1985a).

Table 2: Comparison of ROE and RNW

	2002	2000	1995	1993-2002
ROE: Forbes Magazine All Industry	10.2	14.6	14.0	13.1
RNW: NAIC Property/Casualty Insurance	1.7	6.6	8.8	7.0

Consistent with most insurance industry studies, by-line regressions of the measures of market share concentration for each state on the state average return on net worth do not reveal statistically significant relationships.[18] As noted by critics of the SCP market share-concentration approach, this absence of a statistical relationship is consistent with both a competitive and a collusive industry structure.

B. Insurer ownership concentration

Berle and Means' (1932) survey of the ownership and control of US corporations concluded that share ownership was becoming increasingly dispersed. Later investigators felt that the 1932 study was an early snapshot of the evolution of the corporate form and countless articles have replicated or extended these studies. Most empirical works continued to find declining ownership by the directors and officers of corporations but an exhaustive survey comparing 1935 and 1995 reaches the conclusion that the trend has recently been reversed (Holderness, Kroszner, and Sheehan, 1999).

Implications of this corporate evolution identified by Berle and Means (1932), separating the management and ownership functions, form the foundation of modern financial theory. Gordon (1940), Williamson (1964), and others observe that the separation of firm ownership and control

[18] Regressions of the state average RNW on CR_4 and HHI yield significant positive relationships in most lines. However, the addition of a state size adjustment variable – either state personal income as a proxy for effective in-state demand or the state population – renders the CR_4 and HHI coefficients insignificant.

pits the preferences of owners against those of managers. Jensen and Meckling (1976) observe that conflicting incentives among the parties generates agency costs incurred in to reduce incentive conflicts; these agency costs reduce corporate performance. The incentive alignment theory suggests higher levels of equity ownership by managers may increase corporate performance because it aligns the financial incentives of the manager and other equity owners. Bebchuck and Cohen (2004) provide a summary of the entrenchment argument, which describes the entrenchment of managers under different board organization structures, implies that levels of equity ownership by management sufficiently high to render unlikely the replacement of managers by other shareholders may decrease corporate performance (also see, Kamerschen, 1968). The utility preferences of the owner-managers may work against the incentive to maximize profit, substituting goals such as the maximization of compensation, market share, or industry leadership (Morck, Shleifer, and Vishny, 1989). Consistent with the entrenchment hypothesis, Fama and Jensen (1983) suggest increased ownership concentration decreases financial performance because it raises the firm's cost of capital as a result of decreased market liquidity. While disagreement exists about the reasons why managers might be motivated to deviate from a profit maximization goal, theories suggest that managerial utility is correlated with firm size (Marris, 1963). Larger firms are likely and often more able to provide managers with higher levels of salary, power, and status. Combining these conflicting hypotheses, Stultz, Walkling, and Song (1990) and Morck, Shleifer, and Vishny (1989) argue that the effect of the incentive alignment hypothesis is dominant for low levels of managerial ownership but for higher levels, about 5 percent managerial ownership, the entrenchment effect is dominant. They argue that the relationship again reverses for managerial ownership levels higher than 30 percent.

Studies of managerial ownership typically focus on ownership by the firm's directors and executive officers (D&O) and tend to exclude financial service firms. Holderness, et al (1999), do not exclude the financial service sector but they concentrate only on firms organized using the stock form. The relative importance of non-stock firms in the insurance industry means that any study of the control exerted by a small group of insurance company shareholders must understate true industry control levels. Table 3 provides a descriptive view of insurance industry ownership patterns using a sample of firms obtained from the Securities Exchange Commission's (SEC) Edgar database for firms in NAICS code 6331 (Fire, Marine and Casualty Insurance). For comparison, the table also lists information for other industries drawn from Holderness, et al (1999). Insurance company data are drawn from the SEC forms 10-K and 14A for 2002; Appendix 4 lists the sample. The corporate entities in the sample had revenues of $224.6 billion, more than half of the $422.1 billion total 2002 industry premium.

Mean managerial ownership rose for all industries from 12.9 percent in 1935, to 21.1 percent in 1995. Dividing their sample into broad industry categories, Holderness, et al. (1999) report a similar pattern for the Finance, Insurance, and Real Estate (FIRE) sector though the level of managerial ownership for this sector is reported to be lower than the overall average in each time period: 8.4 percent in 1935 and 17.4 percent in 1995.

Table 3: Ownership concentration patterns

			2002 Shareholders	
	1935	1995	D&O	Plus Other Significant
All Industries	12.9%	21.1%		24.8[19]
FIRE	8.4%	17.4%		
Insurance			19.6%	52.7%

[19] The values for 1935 and 1995 are from Holderness, Kroszner, and Sheehan (1999). Insurance values for 2002 are the authors computations. The authors also calculate, for comparison purposes, the "plus other significant shareholder" value for all industries using a sample of 2001 "Blockholder data" provided by Andrew Metrick, http://finance.wharton.upenn.edu/~metrick/data.htm (viewed September 21, 2004). This data suggests a director and officer level closer to 3.8 than to the 21.1 percent reported in Holderness. This anomaly raises a question about what is measured by HKS or about the accuracy of the Metrick data. Still, the total blockholder percentage falls well below that of the insurance industry.

Managerial ownership for the insurance companies in this study, at 19.6 percent, is not dissimilar from Holderness's FIRE finding for 1995. For at least two reasons, however, this estimate of the concentration of corporate control is conservative. First, in the insurance industry we find a very significant level of ownership concentration if other large shareholders, those holding a block of more than 5 percent of the firm's stock, are added to the holdings of management and directors.[20] The last row in Table 3 reports the average ownership of this more inclusive set of close decision makers as 52.7 percent.

In addition to stock measurement issues, two additional insurance industry features imply that the listed estimates of stock concentration understate the true measure of control by a small group. The first feature is the importance of the mutual organizational form; mutual shareholders legally own the firm but the directors and officers control the firm because policyholder block voting is almost impossible for a sizeable firm.[21] Recognizing that one of the largest insurers is a mutual, a firm that is persistently among the top four market share leaders, it is clear that the exclusion of this group of firms leads to an understated measure of the control of industry by a small group of individuals. The other industry feature implying that the coordination of behavior in the insurance industry could be accomplished with ease is the degree of interrelated ownership of insurance company stock.

Table 4 demonstrates the linkages for a subset of the sampled insurers. Column 2 reports

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[20] The 2002 D&O control of AIG voting stock, for example, is reported on their 10-K as 3.3 percent. However, two related entities own an additional 16 percent and members of the AIG management control these other entities. In addition, at least one mutual fund owns 5.2 percent of AIG stock, this external ownership generally adds to the voting block of the directors and officers bringing the total share percentage controlled by a relatively small group to 24.5 percent.

[21] Policyholders are allowed minimal participation in electing a mutual insurance company's board of directors. In New York, mutual life insurance policyholders are allowed one vote regardless of the number or value of their policies. Policyholders have the right to oppose the administrative ticket if they submit a petition signed by at least 500 eligible voters. To obtain a list of eligible voters, the policyholders interested in opposing the administrative ticket must file a petition, signed by twenty-five eligible voters, with New York's Superintendent of Insurance. After overcoming these two blocks, the insurer's board of directors can require voting by ballot only rather than by proxy.

the ownership by directors and officers; column 3 reports large ownership holdings of particular individuals or families who are not listed as directors or officers of the firm. Columns 4 and 5 report the percentage owned by two funds – Dimensional Fund Advisors (DIM) and FMR Corp (FMR) – and column 6 reports the percentage owned by other funds.[22] Column 7 gives the total. Of the firms sampled, DIM owns a large share of at least 13 insurers and FMR owns a large share of at least 11 of the firms; these two mutual funds own two of these 22 firms in common.[23]

Table 4: Significant Ownership patterns, selected insurers, 2002.

	D&O	Ind./Ins.Co.	DIM	FMR	Oth.Funds	Total
RTW Inc.	30.9%		8.0%		10.5%	49.4%
Acceptance Ins. Cos.	33.0%		7.5%		18.3%	58.8%
Pico Holdings	77.4%		6.4%		11.6%	95.4%
Selective Ins Group	5.6%	6.7%	6.3%			18.6%
Bancinsurance	61.1%		5.8%			66.9%
Paula Financials	25.3%	14.0%	5.8%		6.8%	51.9%
Merchants Group Inc	17.5%	35.4%	5.7%		10.6%	69.2%
EMC Insurance Group	3.4%	79.8%	5.3%			88.5%
Vesta Ins. Group	5.5%	7.1%	5.1%		24.1%	41.8%
Argonaut Group Inc.	7.5%	16.5%	5.1%		25.8%	54.9%
Proassurance Corp	10.5%		5.1%		15.4%	31.0%
Ohio Casualty Corp	7.9%		6.6%	6.7%	20.1%	41.3%
Unico American Corp.	51.1%	7.4%	8.8%	5.6%	17.1%	90.0%
HCC Insurance	7.3%			6.9%	11.1%	25.3%
American Intr. Group[24]	3.3%	16.0%		5.2%		24.5%
Montpelier Re Holdings	8.7%	28.8%		5.2%	32.7%	75.4%
Travelers P/C Corp	1.0%	1.4%		0.9%	22.7%	26.0%
Allstate Corp	0.8%			6.0%	12.5%	19.3%
Allmerica Financial Corp	1.4%			9.0%	5.0%	15.4%
Philadelphia Consolidated	22.9%			9.7%	16.8%	49.4%
Ace Ltd	2.0%			10.1%	27.2%	39.3%
Renaissance Re Holdings	10.8%			9.9%	24.6%	45.3%

The connections listed are based on the 10K reporting requirement that firms reveal beneficial owners of 5 percent or more of the firm's stock. If the fund owns less than 5 percent

[22] The list of other funds holding significant blocks of insurance company stock is large. For the sample subset of 22 firms listed, 32 funds, including FMR and DIM, are involved as significant owners. Significant shares of four of these 22 insurers is held by Wellington Capital; Capital Research and Management owns a significant share of 3 of the 22 insurers; 4 funds own significant shares of two of the 22 firms; and another 24 funds have significant shares of only one of the 22 firms.

[23] The list in Table IV includes five firms that are not listed in Appendix 4: RTW Inc, Acceptance Insurance Cos., EMC Insurance Group, Montpelier Re Holdings, and Travelers P/C Corp. Appendix 4 lists firms retained in the sample for the empirical work reported later in this paper but these five firms were excluded from that sample. The reasons for their exclusion are given in Appendix 4.

[24] At this time AIG also owned approximately 63 percent of the stock of 21st Century Holding group.

SEC rules do not require that the ownership be identified but the fund manager may have a role at the shareholder meetings.[25] To understand the possible significance of ownership when less than five percent of the firm is owned, the stock holdings of Dimensional and FMR were obtained from the SEC and the insurers in each firm's portfolio identified. In 2002, DIM and FMR own shares in 63 additional insurance companies and shares in 51 of these other companies are owned by both DIM and FMR. Linkages also exist through ownership of these firms by other funds. For example, DIM and FMR own 6.6 and 6.7 percent of Ohio Casualty; another 20.1 percent is owned by three other funds: T. Rowe Price (8.8%), First Bancorp (6.2%), and American Financial (5.1%). Each of these other funds owns the stock of more than one insurer. Finally, the stock of some insurers is held in the investment portfolio of other insurers, including mutual insurers.

Mathiesen (2002) provides an exhaustive survey of the recent empirical literature building on Berle and Means (1932) study; many investigate a link between firm performance and ownership patterns.[26] These empirical studies use a variety of measures as a proxy for performance, primarily Tobin's q or a measure of the firm's rate of return.[27] The measures are sometime directly adjusted for risk (Bothwell, 1980) but more often Beta is used as an independent variable to adjust for risk differences (Stano, 1976; Cubbin and Leech, 1983; Leech and Leahy, 1991). The typical measure of D&O control is a set of dummy variables for various managerial ownership percentage ranges. As noted above, Stultz, Walkling, and Song (1990) and Morck, Shleifer, and Vishny (1989) suggest the incentive alignment hypothesis is dominant for

[25] It is rare but some firms voluntarily report significant owners with percentages lower than 5; an example listed in Table IV is Travelers.

[26] See http://www.encycogov.com/ for Mathiesen's (2002) dissertation. The document summarizes 94 studies produced between 1966 and 2000 linking performance and ownership percentages. Of the 94 articles reviewed, 31 are event studies. The 63 non-event studies employ samples ranging from 43 to 4,202 firms.

[27] We follow Holderness, Kroszner, and Sheehan (1999) in computing Tobin's q as the ratio of the market value of stock plus the book value of debt to the book value of assets. McConnell and Servaes (1995) use the ratio of the market value of stock, preferred stock, and debt to the replacement value of assets but the difficulty in finding the replacement cost of assets makes this approach problematic. Chung and Pruitt (1994) show that a simple computation method to obtain Tobin's q yields unbiased estimates.

managerial ownership levels below 5 percent and above 30 percent; between 5 and 30 percent the entrenchment effect is dominant. Without significantly different implications, some studies employ a Herfindahl-type index based on D&O ownership or voting percentages (Demsetz and Lehn, 1985; Agrawal and Mandelker, 1990; Leech and Leahy, 1991). Because too few firms in our sample of insurance companies have ownership blocks below 5 percent, we separate firms into groups at 25, 50, and 80 percent.

Researchers include a measure of size for a variety of reasons. Marris (1963) observes that managerial utility is correlated with firm size; larger firms may provide managers with higher levels of salary, power, and status. Measures of size employed by past researchers include assets, both booked (Cubbin and Leech, 1983; Agrawal and Mandelker, 1996) and at replacement cost value (Cho, 1998), and employment (Nickell, Nicolitsas, and Dryden, 1997). Agrawal and Mandelker (1990) also used the market value of the firm's stock as a measure of size. Insurance researchers have used a number of different measures of size; these include the level of premiums, revenue, loss levels, or the value of assets.

Other investigators have also corrected for performance differences due to variation in firm leverage and liquidity. For example, Holderness, Kroszner, and Sheehan (1999) include the ratio of long-term debt to size (measured by total assets) as a measure of leverage and Cho (1998) measures liquidity by the ratio of cash flow to the replacement cost of capital. Because insurance companies are highly levered regulated firms there is insufficient variation to draw inferences about the effect of leverage on insurance company returns. We consider liquidity using the measure identified by Viswanathan and Cummins (2003).[28]

Empirical studies of the relationship between stock control and performance have

[28] They measure liquidity as the ratio of NAIC class 1 and 2 bonds, common and preferred stock, and cash and short-term investments to total assets.

inconsistent results. Recent studies, which exclude the financial services sector, Cubbin and Leech (1983), Leech (1987), Hill and Snell (1988, 1989), and Belkauoi and Palik (1992) offer conflicting evidence but develop increasingly focused measures of corporate control.[29] Table 5 reports revenue weighted regression outcomes for the insurance industry that relate 2002 firm risk levels and ownership concentration to two measures of performance, the return on equity and Tobin's Q.[30]

Table 5: Revenue Weighted Regressions for ROE and Tobin's Q

	Return on Equity		Tobin's Q	
	Coefficient	Significance	Coefficient	Significance
Constant	1.249	0.402	0.242	0.155
Beta	4.009	0.047	0.684	0.004
Leverage				
Liquidity				
Ownership 25-50%	4.560	0.000	0.258	0.067
Ownership 50-80%	0.622	0.793	-0.474	0.102
Ownership >80%	1.538	0.431	-0.722	0.002
Adjusted R^2	0.201		0.377	

The results are consistent with the pattern hypothesized by Stultz, Walking, and Song (1990) and Morck, Shleifer, and Vishny (1989). The incentive alignment hypothesis appears dominant for lower ownership levels while the entrenchment hypothesis dominates for high levels of ownership concentration. That is, the models find higher levels of firm performance at low ownership levels but performance is either neutral or decreasing at higher levels of ownership concentration.

[29] With rare exceptions, the existing empirical studies do not consider the financial service sector and the exceptions typically consider banking but not insurance. Mayers, Shivdasani, and Smith (1997) provide the only specific insurance study we locate that follows a related direction. They include ownership structure in a study of the effect of internal versus external board composition.

[30] We follow the suggestion of DaDalt, Donaldson and Garner (2003) and use the simple computation of q described by Chung and Pruitt (1994) to avoid loosing observations in a data set that is already small (However, though the set of observations is small these groups encompass almost 700 individual firms over 25 percent of industry sales with another 15 percent accounted for by two large mutual companies.). For ease of interpretation, we invert q so that an increase in q implies an increase in market's evaluation of the value of the firm relative to the firm's book value.

III. SUMMARY AND CONCLUSION

This paper develops a set of circumstantial evidence suggesting that the US P-L industry is able to exercise monopoly power. The issue is important because of a discontinuity between an almost unanimous collection of studies of the insurance industry that suggest the industry is competitive and an equally firm conviction to the contrary that is popularly held. We focus on state markets and specific lines of business to develop measures typical of the SCP approach and find concentration levels that would raise concerns for the US Justice Department in merger cases. Consistent with the existing literature, we find insignificant relationships between profit levels and the CR_4 and HHI concentration measures. However, pursuing the approach of Berle and Means we observe concentrated and interlocking ownership relationships that add to both competitive and social concerns. Consistent with the management entrenchment hypothesis, empirical estimates reveal a negative relationship between ownership concentration and Tobin's Q. The data also raise a social concern about the potentially coordinating role for mutual fund managers who are shown to be part of an industry network characterized by concentrated and interlocking ownership relationships. Justice Brandeis warned that the concentration of ownership is important not only for its implications about the competitiveness of the industry but also for its implications about the distribution of societal wealth, power, and welfare.[31]

In sum, we find that average by-state and by-line CR_4 and HHI market share concentration levels exceed those that raise concerns for the US Justice Department in merger cases but we do not find a positive relationship between these measures and industry profit levels. This empirical

[31] Brandeis, speaking primarily of the then relevant problem of interlocking corporate directorates, believed the smaller the group controlling business activity the more likely the actions of the group would be coordinated rather than competitive. "*The practice of interlocking directors is the practice of many evils. ... Applied to rival corporations, it tends to the suppression of competition ... applied to corporations which deal with each other, it tends to disloyalty and violation of the fundamental law that no man can serve two masters. In either event, it tends to inefficiency for it removes incentives and destroys soundness of judgment."* Pujo committee report, 1913; quoted in Miller (1997).

outcome is consistent with both a competitive and a collusive market. We find market share leadership persistence that has lasted for decades in personal lines. This persistence is consistent with the exercise of entry barriers. We believe it is unlikely that the persistence pattern is fully accounted for by an alternative theory: consumer status quo bias. Finally, the results of a NEIO study suggest that the auto insurance market is weakly oligopolistic. Empirical issues prevent developing broader conclusions for commercial lines.

The paper does not supply conclusive evidence of the exercise of monopoly power in the Property-Liability industry but the data provide circumstantial evidence that such a claim is not irresponsible. The study calls into question the confidence with which one can claim that the industry is competitive because the statistics show persistent market leadership, concentrated market shares, and both concentrated and interrelated ownership relationships. Together, these features support the perception that the industry is not competitive. This is not a case where academics are clearly right and popular perception is clearly wrong.

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Appendix 1: Firm/Groups in the sample, 2002[32]

Symbol	Name	D&O	Family	Other Ins. Co.	Fund Ownership	Total	ROE	Revenue	Beta	Q
TW	21st Century Insurance	10.4%	.	69.7%	5.9%	86.0%	0.0%	981	0.75	2.30
ACE	Ace Ltd	2.0%	.	.	37.3%	39.3%	1.2%	7,144	0.39	2.10
AFC	Allmerica Financial Corp	1.4%	.	.	14.0%	15.4%	0.0%	3,317	0.95	0.28
ALL	Allstate Corp	.8%	.	.	18.5%	19.3%	2.4%	29,579	0.29	1.57
AFG	American Financial Group	.5%	41%	.	12.0%	53.4%	5.2%	3,750	0.99	1.08
AIG	American International Grp	3.3%	.	16.0%	5.2%	24.5%	4.5%	67,482	0.90	2.85
ACGL	Arch Capital Group ltd	60.6%	.	.	38.0%	98.6%	3.5%	722	0.02	0.63
AGII	Argonaut Group Inc.	7.5%	6.6%	9.9%	30.9%	54.9%	0.0%	458	0.31	1.90
BWINB	Baldwin & Lyons Inc	61.3%	.	.	.	61.3%	4.3%	108	0.77	1.20
BCIS	Bancinsurance	61.1%	.	.	5.8%	66.9%	3.1%	45	-0.06	0.90
BER	Berkley WR Corp	15.3%	.	.	23.2%	38.5%	15.4%	2,566	0.00	2.57
BRK.A	Berkshire Hathaway	34.4%	.	.	.	34.4%	7.0%	37,166	0.53	2.67
CB	Chubb Corp	2.1%	.	9.4%	.	11.5%	3.3%	9,140	0.50	1.40
CINF	Cincinnati Financial Corp	15.2%	.	.	.	15.2%	3.9%	2,843	0.26	1.09
CAN	CNA Financial	.0%	.	90.0%	.	90.0%	4.9%	12,286	0.56	0.68
SUR	CNA Surety	.8%	.	63.9%	7.1%	71.8%	7.2%	316	0.36	1.22
CGI	Commerce Group	27.4%	9.1%	.	.	36.5%	5.8%	1,258	0.35	1.53
HGIC	Harleysville Group	4.3%	.	55.5%	.	59.8%	7.6%	848	0.42	1.25
HCC	HCC Insurance	7.3%	.	.	18.0%	25.3%	3.7%	669	-0.01	2.80
HMN	Horace Mann Educators	3.5%	.	.	42.3%	45.8%	2.3%	772	0.44	1.36
LUK	Leucadia National Corp	32.3%	.	.	12.4%	44.7%	11.4%	242	0.51	1.42
MKL	Markel Corp	14.4%	7.2%	.	11.8%	33.3%	6.7%	1,770	0.14	2.53
MIG	Meadowbrook Ins Group	17.1%	.	.	16.8%	33.9%	1.1%	198	-0.18	0.62
MGP	Merchants Group Inc	17.5%	23%	12.1%	16.3%	69.2%	6.3%	95	0.10	0.68
MCY	Mercury General Corp	52.2%	.	.	13.6%	65.8%	6.0%	1,786	0.54	1.86
MLAN	Midland Co.	54.1%	.	.	5.5%	59.6%	4.4%	637	0.52	1.08
NAVG	Navigators Group	51.6%	.	.	18.2%	69.8%	10.3%	253	0.50	1.17
ORH	Odyssey Re Holdings	.6%	.	80.6%	.	81.2%	3.9%	1,691	0.61	1.24
OCAS	Ohio Casualty Corp	7.9%	.	.	33.4%	41.3%	0.0%	1,703	0.37	0.88
PFCO	Paula Financials	25.3%	14%	.	12.6%	51.9%	7.6%	14	0.64	0.73
PHLY	Philadelphia Consolidated	22.9%	.	.	26.5%	49.4%	7.9%	456	0.23	1.71
PICO	Pico Holdings	77.4%	.	.	18.0%	95.4%	2.7%	29	0.76	0.74
PMACA	PMA Capital	14.0%	.	.	41.8%	55.8%	-8.3%	1,075	0.15	0.77
PRA	Proassurance Corp	10.5%	.	.	20.5%	31.0%	0.5%	556	0.54	1.20
PGR	Progressive Corp/OH	10.4%	.	.	29.6%	40.0%	19.3%	9,373	0.99	2.87
RNR	RenaissanceRe Holdings	10.8%	.	.	34.5%	45.3%	16.6%	874	-0.31	1.92
RLI	RLI Corp	11.2%	.	.	16.7%	27.9%	9.2%	382	0.37	1.61
SAFC	Safeco Corp.	4.7%	.	.	6.4%	11.1%	7.5%	7,065	0.27	1.13
SIGI	Selective Ins Group	5.6%	.	6.7%	6.3%	18.6%	2.1%	1,179	0.28	1.10
STFC	State Auto Financial Corp	1.0%	5.1%	67.2%	.	73.3%	8.0%	968	0.36	1.30
TRH	Transatlantic Holdings	1.9%	.	59.7%	20.4%	82.0%	8.7%	2,616	0.34	1.72
UNAM	Unico American Corp.	51.1%	.	7.4%	31.5%	90.0%	0.0%	46	0.35	0.45
UTR	Unitrin Corp	11.7%	6.1%	.	21.2%	39.0%	0.0%	2,298	0.53	1.36
VTA	Vesta Ins. Group	5.5%	.	7.1%	29.2%	41.8%	0.0%	634	0.70	0.42
ZNT	Zenith National Ins Co	11.4%	16%	41.6%	19.0%	88.3%	0.3%	602	0.43	1.49
SBBG	Seibels Bruce Group	50.5%	.	.	6.3%	56.8%	19.6%	57	1.10	0.84

Five firms are included in Table 2 but are excluded from the sample listed above which was employed to obtain the empirical results described in Table 5. For three of the firms – RTW Inc, EMC Insurance Group, and Montpelier Re Holdings – we could not obtain complete performance data; Acceptance Insurance Cos. became insolvent during the year; and Travelers P/C Corp. was purchased during 2002 by St. Paul companies.

[32] The initial sample also identified that had to be excluded from the sample used in the empirical estimates for a variety of reasons. Some firms were excluded because they were involved in mergers where the available data for ownership is for the pre-merger period but the by-state and line data is post merger. Other firms were dropped from consideration because of the inconsistent data reporting, especially data for beta. Some firms identified using the Property-liability industry codes (code 6331), are life-health providers or providers of outsourcing services to the insurance industry. Finally, other stock firms are dropped from the sample because they are subsidiaries of a mutual insurance company.