A Comparison of Large Firm Dominance in Property and Liability Insurance with Major Industries

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Abstract: This paper compares the concentration of property and liability insurance by line with a host of other industries. Measurements used are the Herfindahl and the concentration ratio. It was found that four of the lines distinguish themselves as the most concentrated among the top property and liability insurance, far exceeding in concentration all others.

INTRODUCTION

The passage of antitrust laws initially came in response to political concern about big business. The Sherman Act of 1880, followed in 1914 by the Clayton Act and the Federal Trade Commission Act, formed the foundation of antitrust legislation. According to Pepall, Richards, and Norman (1999), a body of economic research has emerged as a consequence of antitrust cases. The focus of the research is to identify an industry market structure ranging from monopoly on one extreme and perfect competition on the other. The framework of analysis is known as the Structure-Conduct-Performance (SCP) model (Bain, 1959; Leach, 1997; Ng, 1995). The most emphasized characteristics in the SCP model are those that deal with the strategic aspects of competition and pricing. They include the degree of concentration, the degree of product differentiation, and the condition of entry.

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Sellers' concentration refers to the number in a market—one, few (oligopoly), or many—as well as the relative sizes of sellers. The expectation is that effectiveness of competition is highly reduced when concentration is high. Furthermore, collusion through controlling price movements is easier to sustain when the number of firms controlling large chunks of business is small. Product differentiation refers to the extent to which products are similar. When products are not identical, buyers have alternatives. Condition of entry refers to the extent to which potential entrants can penetrate a market where established sellers have many advantages, such as capital cost of entry.

Monopolization, characterized by high concentration, is usually accompanied by high profits, so an increase in profits often is associated with an increase in concentration. Leach (1997) explains that in a concentrated industry, collusion results in monopoly pricing, leading to high profits. Others argue a reverse direction—that most efficient, low-cost, highly profitable firms gain big shares of the market because of their superior performance (Brozen, 1982). This alternative, as proposed by Demsetz (1973, 1974), is called the competitive view of structure, in which performance (low costs) results in concentration. However, government agencies concerned with promoting competition among businesses in an industry treat increases in concentration with disfavor. Their fear is that concentration will result in lessening of competition and enhancement of political corporate power, both of which can be detrimental to the interests of consumers.

REGULATORY POLICIES

For the insurance industry, the year 1944 marked a change in regulation of insurance by the addition of federal to state regulation of transactions that cross state borders (Lereah, 1985), making insurers subject to antitrust laws. Through the McCarran-Ferguson Act of 1945, however, priority for regulation returned to the states, unless effective regulation is absent at that level. Nevertheless, a great deal of variation in regulation exists among states across lines of insurance (Pauly, Kunreuther, and Kleindorfer, 1986).

Joskow and McLaughlin (1991) provide a comprehensive look at the effects of the passage of the McCarran-Ferguson Act. They report that rather than protecting consumers from anticompetitive behavior, the state laws more often protected insurers from competition. In essence, state regulations discouraged price competition, made entry and expansion of insurance suppliers difficult, and discouraged the introduction of new or

better products. Joskow and McLaughlin indicate further that interest in repealing or narrowing this antitrust exemption has intensified in the last few years in response to the so-called liability insurance crisis of the mid-1980s and rising auto insurance rates of the late 1980s. The argument is that the insurance industry antitrust exemption is a major cause of both events. The implication is that by applying the anti-trust laws, pricing and availability problems will be ameliorated.

On the same theme as Joskow and McLaughlin, Weiss (1991), Cummins and Weiss (1991), and Bajtelsmit and Bouzouita (1998a, 1998b) observed that a prevailing belief among the public is that some lines of property and liability insurance earn excessive profits. Dissatisfaction with the performance of the property and liability insurance industry, for instance, prompted the success in California of Proposition 103, which mandated a rollback for most property and liability coverage, especially auto liability. This type of consumer attitude may explain legislative proposals at the federal level to repeal the McCarran-Ferguson Act.

PAST RESEARCH

An important question arising from the controversy surrounding the proposed repeal of the McCarran-Ferguson Act concerns anticompetitive allegations in property and liability insurance. Questions regarding the connection between profit and concentration have been addressed in recent years by Carroll (1993), for the workers compensation market by Chidambaran, Pugel, and Saunders (1997), for the roles of variables affecting competition; and by Bajtelsmit and Bouzouita (1998a, 1998b), for private automobile and commercial automobile lines, respectively. Carroll's examination of the workers compensation line found no relationship between profitability and concentration, while Bajtelsmit and Bouzouita, on the contrary, found such that a relationship exists at the state level for both commercial and private passenger automobile insurance.

Because any legislative proposals to scrap or amend the McCarran-Ferguson Act require legal justification, a study of concentration for property and liability by line of insurance is of interest. The federal legal apparatus which decides competitive and market power issues in an industry is the Department of Justice for merger cases and the federal courts for monopolization cases. According to Cameron and Glick (1996) and Rhoades (1995), the federal courts, the ultimate ruler in both situations, draw inferences nearly exclusively on market concentration as measured by the Herfindahl index (to be discussed later).

Furthermore, high profits may be the result of greater efficiency or monopoly power. As Blair (1972) and Bajtelsmit and Bouzouita (1998a, 1998b) explained, the existence of a relationship between concentration and profitability may imply that large firms have cost advantages over smaller firms, or it may imply the existence of a noncompetitive environment. A similar argument was advanced in Britain by Cook (1997) for the brewing and oil industries. An alternative to profitability as a measure of degree of concentration of an industry is an index used as a yardstick for comparison with other industries. This scheme is especially useful with regard to property and liability insurance because of the uncertainty faced by insurers in predicting claims and, consequently, profit. Winter (1994) describes fluctuations between "soft markets" of stable premiums and low returns to insurers followed by "tight markets" of rapidly rising premiums.

PURPOSE OF RESEARCH

Unlike the studies cited earlier, which relate concentration to profitability, the purpose of this research is to ascertain whether the degree of concentration for many lines of property and liability insurance is larger than that for many other industries. This scheme provides an unmistakable measure of the degree of market power among the industries, lending to useful comparisons (Adams and Brock, 1995).

This article will provide further insight into the ongoing debate about the advisability of repealing of the McCarran-Ferguson Act. If judgment for the repeal is based solely on findings revealing that the lines of the property and liability insurance either exceed or are comparable in concentration to other industries, which are subject to antitrust regulation, then the repeal may be advisable. There are other considerations, however. The structure, behavior, and performance of the insurance industry differ from other industries because of state price regulations intended to protect consumers and to prevent insolvencies of insurers. As stated by Joskow and McLaughlin (1991), a comprehensive policy regarding the repeal of the McCarran-Ferguson Act requires the removal of both unnecessary antitrust exemptions and unnecessary price regulations.

Thus, because of the complexities of the issues surrounding the insurance industry, the aim of this research is not to advocate retaining or repealing the McCarran-Ferguson Act, but merely to provide an assessment of the degree of concentration other than profitability. The research is conducted in two ways. First, the largest 50 firms are used for comparisons. Second, only the largest ten firms are utilized. The next section, which

describes the data and measurement issues, is followed by an empirical results section and concluding section.

DATA AND MEASUREMENT

Data

Insurance premium data for 1995 utilized in this research were obtained from the National Association of Insurance Commissioners (NAIC, 1998), and the services industries data were obtained from *Fortune* (1994). For systematic comparisons among the various industries, only those industries with at least 50 firms were chosen from both sets. The eight service industries qualified for inclusion were utilities, transportation, retailers, life insurance, savings, diversified financial, commercial banking, and diversified services.

Only premium written of the 12 lines that on aggregate constitute the largest portion of business were included in this study. Four of the lines are concerned with auto insurance and two are concerned with multiple peril. The other six are workers' compensation, homeowners, general liability, fire, medical malpractice, and allied.

The choice of the largest 50 firms as a basis of analysis provides an equalized sample consisting of an equal number of the largest enterprises as was done by Dunning and Pearce (1985). The rationale is to eliminate distortions that are due to differences in sample size. Each of the 50 largest firms in the chosen industries controls a large segment of the business. O'Neill (1996) indicates that the largest 50 firms in banking hold 48.3 percent of total banking assets. In life insurance, the top 50 firms control 70 percent of assets and 48 percent of insurance in force (amount covered). For electric and gas utilities, the largest 40 firms control 64.5 percent of assets and 60 percent of net income after taxes. Finally, for retail trade and transportation, the top 50 firms control 23.0 percent and 74.0 percent, respectively. In contrast, the top 50 firms among the chosen 12 in property and liability insurance control shares in premium written ranging from 81.3 percent for general liability to 59.0 percent for medical malpractice in 1995.

To expand the number of other industries included for comparisons, an alternative analysis will utilize data on the largest ten firms. That way, the number of non–property and liability industries is increased from eight to 28. The source of data is *Fortune* (1996).

Measurement

There are many indexes by which to measure concentration. The two most popular indexes will be used in this study—the concentration ratio and the Herfindahl index. The simplest of the two measures of concentration is the concentration ratio of market share of the largest *N* firms of the total n firms under consideration. The choice of *N* is arbitrary.

The most popular summary measure of concentration, according to Scherer and Ross (1990), is the Herfindahl Index:

$$H = \Sigma_i z_i^2, \quad 1/n \leq H \leq 1.00, \quad i = 1, \ldots, n, \tag{1}$$

where n is the number of firms and Z_i is the market share of the *i*th firm. When one firm holds all shares (a pure monopolist), H equals one. When shares are held equally, H equals 1/n. Note that by squaring market shares, the Herfindahl index gives more weight to larger firms than to smaller firms.

A concept known as "numbers equivalent" for equally sized firms corresponding to a given concentration index provides an intuitive understanding of the extent of concentration. For the Herfindahl (Clarke, 1985), the reciprocal of H is the numbers equivalent

$$m = 1/H. \tag{2}$$

The interpretation of m is that for the Herfindahl index for the n firms, each with market share 1/n, the index value will correspond to m equally sized firms, which implies that the larger is H, the smaller is m. As explained by Hanna and Kay (1977), because some of the firms under consideration are very large but most are small, it would be better to say that there are m firms of roughly equal size. This way, it is possible to make a meaningful assessment whether the degree of concentration is high or low.

A transformation between H and the square of the coefficient of variation $(CV)^2$ is obtained (Clarke, 1985) as $(CV)^2 = nH - 1$. Note here that $(CV)^2$ is calculated from standardized data in the sense that Z_i is the share (proportion) of firm i, making $(CV)^2$ equivalent to the variance "S^2," as explained by Harris (1998). Therefore, without loss of accuracy, the relationship between $(CV)^2$ and H can be written as

$$S^2 = nH - 1. \tag{3}$$

Table 1. Dollar Magnitudes of Premiums Written or Revenues by Top 50 Firms and Proportions by Sets for Selected Property and Liability Insurance Lines and Other Service Industries

	Industry Code	Total ($million)	Industry Set 1	Industry Set 2	Industry Set 3
Panel A: Property and Liability					
Private passenger auto liability	1	49,126	0.5623	0.2732	0.1645
Private passenger auto physical damage	2	30,424	0.5866	0.2474	0.1660
Worker's compensation	3	23,694	0.3787	0.3698	0.2515
Homeowners	4	21,428	0.5744	0.2611	0.1645
General liability	5	18,881	0.5053	0.3342	0.1605
Commercial auto liability	6	10,221	0.2963	0.3785	0.3252
Commercial multiple peril	7	9,220	0.3247	0.4362	0.2391
Commercial multiple peril (liability)	8	8,205	0.3673	0.4015	0.2312
Fire	9	3,900	0.3993	0.3491	0.2516
Commercial auto physical damage	10	3,649	0.2754	0.3843	0.3403
Medical malpractice	11	3,552	0.4264	0.4242	0.1494
Allied	12	2,916	0.3244	0.4369	0.2389
Panel B: Services					
Commercial Banking	13	1,579,450	0.3467	0.3477	0.3056
Retailer	14	491,000	0.4039	0.3370	0.2591
Diversified services	15	334,950	0.3475	0.3584	0.7941
Diversified financial	16	88,550	0.3467	0.3830	0.2704
Utilities	17	260,300	0.2839	0.4021	0.3140
Savings	18	250,200	0.4442	0.2980	0.2578
Life insurance	19	187,650	0.3756	0.3807	0.2437

Note: Set 1 = top 5 firms, Set 2 = next 15 firms, and Set 3 = bottom 30 firms.
Source: NAIC (1998) and *Fortune* (1994).

Equation (3) is useful to test the equality of variances and, by implication, the equality of the Herfindahl measures for the various industries by the F-distribution with a test statistic

$$F^* = S_j^2 / S_k^2, \tag{4}$$

where S_j^2 and S_k^2 are the variances, computed from equation (3), for a pair of industries, j and k. The test statistic F* is compared for significance with a tabular F-distribution for a two-sided test for a significance level α.

EMPIRICAL RESULTS

Comparison Among the Top 50 Firms

In Table 1, the top 50 firms are grouped into three sets: the top 5 firms (Set 1), the next 15 firms (Set 2), and the remaining 30 firms (Set 3). For a preliminary look, Table 1 provides (Panel A) a dollar amount summary of premiums written of the largest 50 firms of the 12 insurance lines, arranged from the largest aggregate dollar magnitude to the smallest. Similar arrangement is made for the eight service industries in Panel B, where the dollar magnitudes are in terms of revenues, sales, or deposits, as appropriate. Coding is provided to facilitate comparisons.

Table 1 reveals that the top five firms of each line of insurance control a substantial proportion of premiums written, ranging from 59 percent for private passenger auto physical damage to 28 percent for commercial auto physical damage. Furthermore, for private passenger auto liability, for instance, the distribution of the 50 firms (the top five, the next 15, and bottom 30) was 56 percent, 27 percent, and 17 percent, respectively. Another line of insurance with a comparable distribution is homeowners, where the approximate respective percentages are 57, 26, and 17. Among the industries with the aggregate shares of concentration ratio of the largest five firms in Panels A and B, which control close to 40 percent of the business, six were in the insurance lines and three were in the services.

Table 2 provides the results of the Herfindahl Index, giving H by equation (1) for concentration, S^2, the variance, by equation (3), and the numbers equivalent m by equation (2). In almost all lines of property and liability insurance, the concentration index is noticeably larger than in services. For the three personal lines—private passenger auto liability, private passenger auto physical damage, and homeowners multiple peril—the corresponding H values are 0.10191, 0.11519, and 0.11444 and corresponding m values 9.81, 8.68, and 8.74. For commercial auto physical damage, H = 0.03007 and m = 33.26. In contrast to the insurance industry, savings in the services industries, with H = .05748, S^2 = 1.874, and m = 17.40, is the most concentrated. The least concentrated (utilities) had H = 0.03233, corresponding to S^2 = 0.617 and m = 30.93.

To compare the Herfindahl Index for all pairs of industries in Table 2 for statistical significance, Table 3 arranges the industries in Panels A and B of Table 2 in descending order according to their S^2 magnitude. Thus, the passenger auto physical damage (code 2) at S^2 = 4.760 is the most concentrated. The least concentrated, at S^2 = 0.504, is recorded by utilities (code 18). The remaining 18 industries fall between these two limits.

Table 2. Herfindahl Index of Concentration for Selected Property and Liability Insurance Lines and Other Service Industries

	Industry code	Herfindahl H	S^2	m
Panel A: Property and Liability				
Private passenger auto liability	1	0.10191	4.096	9.81
Private passenger auto physical damage	2	0.11519	4.760	8.68
Worker's compensation	3	0.04305	1.153	23.23
Homeowners multiple peril	4	0.11444	4.722	8.74
General liability	5	0.08570	3.285	11.67
Commercial auto liability	6	0.03230	0.615	30.96
Commercial multiple peril	7	0.03805	0.903	26.28
Commercial multiple peril (liability)	8	0.45200	1.260	22.12
Fire	9	0.05254	1.627	19.03
Commercial auto physical damage	10	0.03007	0.504	33.26
Medical malpractice	11	0.05772	1.887	17.32
Allied	12	0.03852	0.926	25.96
Panel B: Services				
Commercial banking	13	0.03780	0.890	26.46
Retailers	14	0.05076	1.538	19.70
Diversified services	15	0.05705	1.852	17.53
Diversified financial	16	0.04131	1.066	24.21
Savings	17	0.05748	1.874	17.40
Utilities	18	0.03233	0.617	30.93
Life insurance	19	0.04649	1.325	21.51
Transportation	20	0.04840	1.420	20.66

Note: H, S^2, and m are calculated from equations (1), (3), and (2).
Source: NAIC (1998) and *Fortune* (1994).

By using the relationship between the S^2 and the Herfindahl Index established in equation (3), the test statistic of equation (4) is of help for testing statistical significance of differences in concentration for a pair of industries. The results are compared for a two-sided test with the critical value F = 1.95 and F = 1.65 at the 1 and 5 percent significance levels, respectively, indicated accordingly in the matrix of Table 3 by * and **.

Table 3 largely identifies the exclusive position in concentration of four lines of insurance (Codes 2, 4, 1, 5), forming a select group. For instance, in the column headed by Code 2 (private passenger auto physical damage),

Table 3. Matrix of F-Ratios for Testing Hypothesis of Equality of Herfindahl Index for Selected Property and Liability Insurance Lines and Other Service Industries

Code		2	4	1	5	11	17	15	9	14	20	19	8	3	16	12	7	13	18	6	10
	S^2	4.776	4.72	4.10	3.29	1.89	1.87	1.85	1.63	1.54	1.42	1.33	1.26	1.15	1.07	0.93	0.90	0.89	0.62	0.62	0.50
2	4.76	1.00																			
4	4.72	1.01	1.00																		
1	4.10	1.16	1.15	1.00																	
5	3.29	1.45	1.44	1.25	1.00																
11	1.89	2.52*	2.50*	2.17*	1.74**	1.00															
17	1.87	2.54*	2.52*	2.19*	1.75**	1.01	1.00														
15	1.85	2.57*	2.55*	2.21*	1.77**	1.02	1.01	1.00													
9	1.63	2.93*	2.90*	2.52*	2.02*	1.16	1.15	1.14	1.00												
14	1.54	3.09*	3.07*	2.66*	2.14*	1.23	1.22	1.20	1.06	1.00											
20	1.42	3.35*	3.33*	2.88*	2.31*	1.33	1.32	1.30	1.15	1.08	1.00										
19	1.32	3.59*	3.57*	3.09*	2.48*	1.42	1.41	1.40	1.23	1.16	1.07	1.00									
8	1.26	3.78*	3.75*	3.25*	2.61*	1.50	1.49	1.47	1.29	1.22	1.13	1.05	1.00								
3	1.15	4.13*	4.10*	3.55*	2.85*	1.64	1.63	1.61	1.41	1.33	1.23	1.15	1.09	1.00							
16	1.07	4.47*	4.43*	3.84*	3.08*	1.77**	1.76**	1.74**	1.53	1.44	1.33	1.24	1.18	1.08	1.00						
12	0.93	5.14*	5.10*	4.42*	3.55*	2.04*	2.02*	2.00*	1.76**	1.66**	1.53	1.43	1.36	1.24	1.15	1.00					
7	0.90	5.27*	5.23*	4.54*	3.64*	2.09*	2.08*	2.05*	1.80**	1.70**	1.57	1.47	1.40	1.28	1.18	1.03	1.00				
13	0.89	5.35*	5.31*	4.60*	3.69*	2.12*	2.11*	2.08*	1.83**	1.73**	1.60	1.49	1.42	1.29	1.20	1.04	1.01	1.00			
18	0.62	7.72*	7.66*	6.64*	5.33*	3.06*	3.04*	3.00*	2.64*	2.49*	2.30*	2.15*	2.04*	1.87**	1.73**	1.50	1.46	1.44	1.00		
6	0.62	7.74*	7.68*	6.66*	534*	3.07*	3.05*	3.01*	2.65*	2.50*	2.31*	2.15*	2.05*	1.87**	1.73**	1.51	1.47	1.45	1.00	1.00	
10	0.50	9.45*	9.38*	8.13*	6.52*	3.75*	3.72*	3.68*	3.23*	3.05*	2.82*	2.63*	2.50*	2.29*	2.12*	1.84*	1.79**	1.77**	1.22	1.22	1.00

Note: * and ** indicate statistical significance in concentration between the corresponding pairs of industries at 1% and 5% levels, respectively. For industries corresponding to codes, see Table 2.
Source: NAIC (1998), *Fortune* (1994), and calculations by Equation (4).

the F* corresponding to Code 4 (homeowners), Code 1 (private passenger auto liability), and Code 5 (general liability) are 1.01, 1.16, and 1.45. All are less than F = 1.65, indicating no statistically significant difference in concentration among these lines. The test statistic F* concluded that though no statistically significant differences in concentration exist among them, they were highly significantly different from the remaining 16 industries, as can be observed in Table 3 by looking downward in the columns corresponding to the four lines (Codes 2, 4, 1, 5).

Furthermore, medical malpractice (Code 11), ranked fifth in concentration, differs statistically significantly from seven industries, four of which are other insurance lines. Therefore, aside from private passenger auto physical damage (Code 2), homeowners (Code 4), private passenger and liability (Code 1), general liability (Code 5), and perhaps medical malpractice (Code 11), the lines of insurance do not particularly distinguish themselves as being highly concentrated as compared to other service industries. Therefore, the overall conclusion from Table 3 is that either some of the insurance lines are relatively highly concentrated or they display similar concentration to other industries.[3]

Comparison Among the Top Ten Firms

In order to increase the number of non–property and liability industries for comparison with the property and liability lines, this section provides the concentration ratio of the leading three firms among the largest ten firms as well as the Herfindahl H, the variance S^2, and numbers equivalent m. The data for non–property and liability were obtained from *Fortune* (1996)[4]. Such use is adopted in studies related to foreign direct investment (FDI), where an investor would like to predict the intensity of competition before embarking on a particular investment. When only one or a few firms dominate the market (high concentration), competition most likely will be orderly, as pointed out by Pan, Li, and Tse (1999). Trevino and Daniels (1994), in their study of Japanese FDI in the United States, employed such a scheme to determine industry concentration.

The results for comparing the concentration of the 12 lines of insurance with 28 other industries, 40 industries in all, by the method outlined above are shown in Table 4 (Panels A and B), where total revenues (sales, premiums) in column (1) are ordered according to dollar magnitudes of the largest ten firms. The next two columns provide the dollar magnitudes of revenue of the leading three firms and related proportions, followed by three columns portraying the Herfindahl H by equation (1), the variance S^2 by equation (3), and the numbers equivalent m by equation (2).

Table 4. Revenues for the Largest Ten and Leading Three Firms for Selected Property and Liability Insurance Lines and Other Industries

	Largest 10 ($ million)	Leading 3 ($ million)	Proportion	Herfindahl H	Herfindahl S^2	Herfindahl m
Panel A: Property and Liability						
Private passenger auto liability	33,806	23,258	0.688	0.22837	1.284	4.38
Private passenger auto physical damage	21,355	15,256	0.714	0.22829	1.283	4.38
Homeowners multiple peril	14,978	10,614	0.709	0.22816	1.282	4.38
Workers' compensation	13,646	5,956	0.436	0.11365	0.136	8.80
General liability	12,749	7,304	0.573	0.17936	0.794	5.58
Commercial multiple peril	4,793	2,051	0.428	0.11029	0.103	9.07
Commercial auto liability	4,759	2,068	0.434	0.11043	0.104	9.06
Commercial multiple peril (liability)	4,532	2,199	0.485	0.12536	0.254	7.98
Medical malpractice	2,233	1,111	0.498	0.12983	0.298	7.70
Fire	2,127	1,212	0.570	0.15448	0.545	6.47
Commercial auto physical damage	1,586	683	0.431	0.11028	0.103	9.07
Allied lines	1,522	645	0.424	0.11192	0.119	8.94
Panel B: Non–Property and Liability						
Motor vehicles & parts	416,405	359,161	0.863	0.29193	1.919	3.42
Petroleum refining	343,227	213,520	0.623	0.17595	0.760	5.68
General merchandiser	249,273	163,462	0.656	0.20370	1.037	4.92
Telecommunications	21,098	117,452	0.557	0.18672	0.867	5.36
Electronics, electrical equipment	184,569	113,267	0.614	0.19575	0.958	5.11
Computers, office equipment	166,364	118,214	0.711	0.27364	1.736	3.65
Commercial banks	147,267	68,374	0.464	0.12023	0.202	8.32
Food	122,623	57,836	0.472	0.11872	0.187	8.42
Aerospace	118,065	65,170	0.552	0.14337	0.434	7.93
Food & drug stores	117,611	58,645	0.499	0.12613	0.261	6.98
Chemicals	111,222	68,987	0.620	0.18035	0.804	5.55
Pharmaceuticals	109,520	49,290	0.450	0.11552	0.155	8.66
Wholesalers	102,639	47,392	0.462	0.11691	0.169	8.55
Diversified financials	95,880	47,878	0.511	0.13218	0.322	7.57
Forest & paper products	95,238	45,233	0.503	0.12616	0.262	7.93
Scientific, photographic & control equip	77,967	50,337	0.478	0.16736	0.674	5.98
Airlines	75,590	44,047	0.583	0.14945	0.495	6.69
Electric & gas utilities	69,585	27,207	0.389	0.10426	0.043	9.59
Industrial farm equipment	65,818	32,092	0.488	0.13040	0.304	7.67
Food services	55,815	45,817	0.821	0.34344	0.434	2.91
Health care	51,611	28,067	0.544	0.16800	0.680	5.95
Metals	49,234	24,775	0.503	0.13506	0.351	7.40
Computer and data services	38,031	17,812	0.468	0.11586	0.159	8.63
Metal products	37,615	16,628	0.442	0.11554	0.155	8.66
Engineering, construction	35,695	18,533	0.472	0.13929	0.393	7.18
Publishing, printing	32,201	14,010	0.435	0.11477	0.148	8.71
Pipelines	31,035	17,823	0.574	0.15671	0.567	6.38
Rubber & plastic poducts	28,972	19,084	0.654	0.24574	1.457	4.07

Source: NAIC (1998) and *Fortune* (1996).

Aside from the ratio 0.863 for motor vehicles and parts, and food services with a ratio of 0.821, three insurance lines (private passenger auto liability, private passenger auto physical damage, and homeowners multiple peril) stand out as among the highly concentrated industries[5], as also evidenced by H, S^2, and m. The implication here is that these three lines distinguish themselves as the most concentrated among the 12 lines under consideration. In most cases, the concentration ratios (as well as H, S^2, and m in Panel A) of the leading three do not differ much from the other industries in Panel B.

SUMMARY AND CONCLUSION

The focus of this paper is to provide statistical tools and testing as well as descriptive procedures to compare the level of concentration by line of property and liability insurance to a comparable collection of other industries to see how insurance fares. The underlying concern is whether the calls for the repeal of the McCarran-Ferguson Act are justified.

The picture that emerges is that some lines of the property and liability insurance industry are highly concentrated. Other lines either exceed or are comparable in concentration to other industries that are subject to antitrust regulations. Is, then, a repeal of the McCarran-Ferguson Act warranted? If the concentration criterion alone is taken as the basis of decision, the answer is perhaps yes. Concentration alone does not preclude competitiveness, however, because a combination of factors (large number of firms, ease of entry and exit) exert pressure on the industry to stay competitive.

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NOTES

[1] The 1995 premium data for property and liability insurance used in this research were obtained from "electronic company listing" provided by NAIC late in 1998 as being the latest reliable source. The NAIC (1998) furnished information gathered from 5,500 insurance companies in 1995 for some 40 lines. There is a great deal of affiliation among these companies. Most of the affiliates (firms) operate in more than one state, and a substantial number operate nationwide. The electronic company listing includes information on each company, such as line of insurance, assets, premiums written, and state of domicile. Therefore, it was necessary to aggregate the data of the companies in each state by line of insurance into their affiliates (firms).

[2] The last year *Fortune* magazine published the Service 500 for the largest 100 or 50 firms was 1994. Because this research intends to compare business concentration of the property and liability insurance with other comparable service industries, the 1994 *Fortune* data were

employed. Because the data for most industries were given only for the top 50 firms, this research uses the top 50 firms for the property and liability insurance as well.

[3] To classify the 12 lines of property and liability insurance into those lines that display high levels of concentration and those that do not, a procedure that is used often for measuring concentration in cities is used, as outlined by Berry (1961), Malecki (1970, 1980), and Danta (1984). A usage applied to income inequality and suggestion for its use to measure business concentration is provided by Braun (1998), Fan (1992), and Fan and Casetti (1994). The scheme describes a linear relationship between the size and rank of an observation. The results of this scheme indicate that the five most concentrated lines are private passenger auto liability, private passenger auto physical damage, homeowners, general liability, and medical malpractice, substantiating the findings in Table 3. The other seven lines were not highly concentrated.

[4] *Fortune* magazine, after 1994, started publishing the "*Fortune* 1000 Ranked Within Industries," a mixture of manufacturing and services. However, because of the large set of industries included, only small samples of companies in each industry are reported. This research used only the top ten in each industry to increase the number of industries for comparison purposes. For the insurance lines, premiums written of the largest ten affiliates range from 33 percent for the commercial auto physical damage line to 58 percent for the homeowners multiple peril line. On average, the top ten control around 45 percent of market share. It is conceivable that such patterns of control also prevail for the industries listed in Panel B of Table 4. The source of data, *Fortune* (1996), does not provide dollar values of total revenues.

[5] For economy of space, the testing procedure for deciding the joint concentration of a pair of industries as was done in Table 4 is withheld. The test can be done by simply computing the ratios of their variances by Equation (4). Tabular F values for rejecting a two-sided hypothesis of equality of the variances are 6.42 and 3.96 at the 1 and 5 percent significance levels, respectively, when the ratios of the variances are greater than 1.00. When ratios of the variances are less than one, the corresponding F-values at 1 and 5 percent significance levels are 0.156 and 0.253.

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