Intra-Company Auto Insurance Underwriting Profits Under Alternative Forms of Rate Regulation

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Abstract: Intra-company underwriting results for auto insurers are tested to detect systematic profit differences between states attributable to rate regulation. Prior research has shown that regulatory stringency affects the mix of insurers within a state market, which can alter measures of state aggregate profits and distort the effects of regulatory policies on profits. This study looks at intra-company differences in profitability for those insurers that actually participate in each state market. These results do not support the hypothesis that strict rate regulation either systematically increases or decreases the profits for insurers that participate in those markets, although it may affect a company's decision to participate in that market. While no systematic differences are noted based on regulatory structure, the results show that a few states have systematically higher or lower profit margins, and the effect of regulatory policies may be a contributing factor in these specific states.

INTRODUCTION

There is a significant body of literature that has examined the effect of regulatory price controls on the price and availability of insurance products. Most of the prior research has focused on those effects as they apply to aggregate markets, but there has been almost no research on the effect on the profit of individual companies. Insurers may choose to avoid a particular state market because of perceptions of profit restrictions, but those profit restrictions may or may not exist in practice. The purpose of

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Journal of Insurance Issues, 2002, **25**, 2, pp. 166–191.

this research is to identify intra-company differences in the profitability of auto insurance products that are subject to strict rate regulation.

Harrington (1984) cites three general theories on the effect of rate regulation on profits in insurance markets. The *excessive rate hypothesis* is that regulators impose minimum rate floors to reduce cutthroat price competition. If this hypothesis holds true, profit ratios in regulated states will be higher than profit ratios in unregulated states. The *consumer pressure hypothesis* says that consumers pressure regulators to restrict prices to enhance affordability, so the average profit will be lower in regulated states relative to unregulated states. The *regulatory lag hypothesis* is that delays in approving rate filings cause short-term disruptions that exacerbate cyclical behavior, but in the long run there is no difference in the profit ratios between regulated and unregulated states. Although previous studies have found evidence to support all three hypotheses, in recent years the general perception has been that rate regulation has led to lower profits for auto insurers (Tennyson, 1997, p. 503).

MEASUREMENT ISSUES WITH AGGREGATE STATEWIDE DATA

Prior research into the effect of rate regulation on insurance pricing has generally used statewide aggregate measures that may be affected by this aggregation bias. For example, Tennyson (1997) found that states with more stringent regulatory climates had fewer auto insurers generally and that the firms that did operate in those states tended to be smaller, resulting in higher statewide average expense ratios. Gron (1995) showed that rate regulation is negatively correlated with direct writer market shares. Since direct writers are thought to be more efficient providers of insurance, and can thus maintain relatively higher loss ratios, the effect would be to show lower statewide loss ratios if the presence of rate regulation discouraged participation from direct writers. Grabowski et al. (1989), Harrington (1990), and Bouzouita and Bajteelsmit (1997) have shown that states with restrictive rate regulation have inflated residual markets. All of these factors can lead to differences in the inverse loss ratio or the expense ratio generated with statewide aggregate data.

Early studies on the effect of rate regulation in various states used the inverse loss ratio (premiums per dollar of losses) or some derivative of that statistic as the measure of profitability. For example, Grabowski et al. (1989) use this formula for insurance premiums:

$$P_{ij} = L_{ij} + e_{ij}P_{ij} + r_{ij}P_{ij} \quad (1)$$

where P is the premium for rating class j in state i, L is the amount of losses, e is the underwriting expense ratio, and r is the risk-adjusted profit loading. The formula terms can be rearranged so that

$$\frac{P_{ij}}{L_{ij}} = \frac{1}{1 - e_{ij} - r_{ij}} \tag{2}$$

which is the inverse loss ratio function. Differences in price can be attributed to differences in either relative expenses or relative profit. If the expense ratio is constant across rating classes and states, then the expected value of the inverse loss ratio should be the same for each ij pair, unless there are risk-adjusted profit differences. Another statistic frequently used to measure profits is the ratio of underwriting expenses to premiums. Again, if the operating expenses are constant across rating classes and across states, then any other difference should be profits. Traditionally, it has been difficult to measure expenses accurately by line and by state because of the limited reporting in the statutory annual statement. More detail has been added to the statement over the years, but some expenses cannot be easily allocated. It is relatively easy to allocate commissions, taxes, and allocated loss adjustment expenses to individual policies, but expenses such as the unallocated loss adjustment expenses or the general operating expenses are not readily allocable to individual policies or to states.

The underwriting expenses incurred by an insurer may represent quality or service differences. For example, the commission paid to the insurance producer can include incentives and bonuses that reward loss control efforts by the producer (underwriting services) that can lower the losses incurred by the policyholders. Policyholders may pay higher prices for products purchased through independent agents relative to the price for products purchased through a direct writer, but at least part of that increase in cost represents value in the form of search costs. An independent agent may represent dozens of different companies, especially so in the nonstandard market, and this service has a value to the consumer. Therefore, past studies on rate regulation may have measurement problems because differences in the expense portion of the combined ratio may represent quality or service costs rather than excess profits.

Assume that there are only two insurers providing a market for auto insurance. Insurer A does a routine job of handling claims and responding to service requests. The company has a loss ratio of 75 percent and an expense ratio of 25 percent. Insurer B provides more administrative services and better claims handling, which results in a higher expense ratio of

35 percent and a lower loss ratio of 65 percent. Customers are willing to pay more for the added services, so the products are not homogeneous. Taking a market-share weighted average of the loss ratio (LR), expense ratio (ER), and combined ratio (CR) illustrates these differences. The loss ratio for each insurer is constant across jurisdictions, but differences in the market shares of the two insurers lead to differences in statewide aggregate results for both the LR and the ER. Assuming no differences in investment income opportunities, though, each insurer must take in a dollar of income for every dollar of expense.

	Insurer A	Insurer B
Loss Ratio	75%	65%
Expense Ratio	25%	35%
Combined Ratio	100%	100%

	Market Share for A	Market Share for B	Aggregate Loss Ratio	Aggregate Expense Ratio	Aggregate Combined Ratio
Georgia	50%	50%	70%	30%	100%
Alabama	30%	70%	68%	32%	100%
Florida	80%	20%	73%	27%	100%

In this example, there are no profit differences between states for either of the two insurers. Regulatory structure may have affected either insurer's willingness to participate because of preconceptions about the profit potential in any of the three state markets. Once committed into the market, though, both insurers actually experience identical underwriting results in all three states. The difference in market share generates differences in the statewide aggregate expense ratios and loss ratios. Note that the weighted average combined ratio is identical in all states and is in this case a more accurate measure of profitability than either the loss ratio or the expense ratio alone.

RESEARCH DESIGN

The impact of state regulation on the willingness of insurers to participate in that state's market is an important issue. Anecdotal evidence abounds to show that insurers eschew certain markets, but even the most stringently regulated states still have market participants. The focus of this research lies in measuring profit differentials for those companies that actually participate in both rate-regulated state markets and open-competition state markets. If a particular state's regulatory policy has an impact on the profitability of business in that state relative to other states, then each individual company should show systematically higher or lower profits in that state relative to its business in other states.

If rate regulation forces prices to be lower than would otherwise be the case in an unregulated market, then the profitability of an insurer's business will be lower in rate-regulated states than in non-rate-regulated states. Lower profitability would mean a higher combined ratio, all else held constant. Yet the aggregation bias described in the prior section could mask that effect. Consider the following example:

Company	Combined Ratio in Rate-Regulated States	Combined Ratio in Open-Competition States	Intra-Company Difference
X	95%	90%	5%
Y	105%	100%	5%
Z		110%	
Average	100%	100%	5%

Both Insurer X and Insurer Y show a difference of five percent between the profitability in the rate-regulated states and the combined ratio in the open-competition states. Insurer Z operates only in the open-competition states. If X and Y are the only two insurers in the rate-regulated states and each has half of the business, then the aggregate combined ratio in the rate-regulated states is 100 percent. There are three competitors in the open-competition states with equal market shares, and the aggregate combined ratio for the open-competition states is 100 percent also. Examination of intra-company underwriting results, however, shows that the rate-regulated states generate a combined ratio that is five points higher than the open-competition states for those companies that participate in both markets. By measuring differences in profitability within each insurance company, the aggregation bias can be mitigated.

Definition of Rate Regulation

With respect to this study, "regulated" states are those that have a prior approval rate regulation law for auto insurance, according to information reported in the NAIC's *Compendium of State Laws on Insurance Topics* as of 1997. Unregulated or open-competition states are those that use some form of relaxed rate regulation system such as file-and-use, use-and-file, flex rating, or no filing requirement. This dichotomy can be misleading because state regulators do not necessarily apply state laws in accordance with the spirit of the concept. A state with a use-and-file law can turn out to be *de facto* prior approval if the state regulatory authority applies the law in such a manner as to cause insurance companies to submit rates for prior approval. Alternative measures of regulatory policy are sometimes used to better measure the true level of regulatory stringency, and that procedure is also followed in this research.

Some state regulators practice rate regulation even though the state law indicates open competition, and some state regulators apply relatively loose standards even though the state law requires rate approval. Further, most states that have prior approval requirements also have a deemer provision, whereby rates are deemed approved if not disapproved, which can convert the process into *de facto* file-and-use rather than prior approval. Conversely, the deemer provisions and automatic time limits can also be manipulated by regulators to extend the time limit rather than to restrict it (Eastman and Maroney, 2000) and thus impose more stringent standards than indicated by state law. A number of studies (e.g., D'Arcy (1982); Grabowski et al., 1989, Tennyson, 1997, Barth and Feldhaus, 1999) have used an alternative measure of regulation, the Conning & Company regulatory freedom score, to measure the effective degree of regulation in a state.

Several Conning & Company studies have used survey data from insurance companies to quantify a relative measure of state insurance regulation. Conning & Company asks insurance executives to rank states by their level of regulatory freedom, and these surveys are then used to develop scores. The scores encompass more about a state than simply its rating law. Executives are asked to assess each state on a scale of 1 to 5, taking into account "such factors as the regulatory climate, implementation of rating classifications and territories, setting adequate rate levels, cancellation and non-renewal of risks, and involuntary assignments" (Conning, 1994, p. 33). The higher the score, the greater the regulatory freedom; the lower the score, the more stringent the regulation. The regulatory freedom measure tends to be correlated with the type of rate filing system in place in a state, although the correlation is not perfect. That is, rate regulation is incorporated into the Conning & Company score, along with a host of other regulatory factors as well.

Although Conning & Company published survey data on the regulatory climate in 1991, 1994, and 1997, differences in methodological and collection practices mean that the regulatory freedom scores are not always consistent from one study to the next. Additionally, changes in state regulatory practices, judicial climate, market pressures, and state demographics all contribute to changes in the measured regulatory freedom variable. Partially because of data access limitations and partially because of the difficulty of obtaining year-to-year regulatory freedom scores, this research is limited to a specific time frame. Regulatory climate is measured by the 1994 survey scores and company profitability is measured annually over the period 1992–1997, roughly centered on the 1994 Conning & Company regulatory freedom measure.

Testable Hypotheses

Four separate hypotheses were tested:

- For each insurer, the combined ratio for its business in rate-regulated states is the same as the combined ratio for its business that is written in open-competition states. The purpose of this test is to ascertain the effect, if any, of the form of state rate-regulation law.
- For each insurer, the combined ratio for its business in the states that Conning & Company classifies as having a liberal regulatory climate is the same as the combined ratio for its business in the states that Conning & Company classifies as having a restrictive regulatory climate. This test is meant to ascertain whether the regulatory climate, as measured through survey data, alters profitability within an insurance company.
- For each insurer, the marginal difference in the combined ratio for each state market is zero. This test looks at individual states, regardless of their regulatory classification, to ascertain whether certain states are consistently more or less profitable than all others combined.
- For each pair of states, there is no difference in the combined ratios of the insurers that participate in both state markets.

Tests were conducted using the rate regulation statute dichotomy (prior approval/open competition) as well as the Conning & Company regulatory freedom measure, with states classified into three separate groups (stringent, average, and free). The profitability measure used was the by-state combined ratio.

Calculating of Insurer Combined Ratios By-Line By-State

Company-specific data were taken from the Insurance Expense Exhibit (IEE) and the Exhibit of Premiums and Losses (EPL) of the 1992–1997 statutory annual statements filed electronically with the NAIC. The EPL provided by-line, by-state direct earned premiums, losses incurred, allocated loss adjustment expenses, commission and brokerage expenses, dividends and taxes, and licenses and fees. These cost categories make up the bulk of the premium dollar but do not include all expense items that flow into the calculation of underwriting profit. Some underwriting expense items such as unallocated loss adjustment and general expenses that are difficult to allocate by state are reported in the IEE by line of business but not in the EPL. Additionally, the IEE includes an "Other Income less Other Expense" column for other underwriting income or expense items such as finance fees, service charges, and charge-offs that are reported by line only. A policy fee is not technically classified as premium revenue, but is nonetheless an offset to underwriting expenses. Although the IEE expenses are allocated by line but not by state, they are nevertheless a part of the overall profit picture and must be included in the computation of the combined ratio to capture underwriting profitability. The by-line expense allocations from the IEE were used to estimate the unreported portion of the total automobile insurance expenses in the by-state EPL. This practice assumes that the operating expenses reported in the IEE are accurately allocated to the appropriate lines of business and that the by-line expenses are proportional to dollars of earned premium.

Unfortunately, the statistics reported in the EPL are calendar-year measures, and as such can be significantly distorted by estimation errors in prior years as well as large changes in volume from one year to the next. Ideally, accident-year or policy-year statistics would be preferred, but those data are not included in the statutory statement. Additionally, the data are on a direct basis and do not include costs associated with reinsurance arrangements or other peculiarities (e.g., reinsurance facilities for high-risk drivers). There is also no adjustment to recognize differences in investment income potential that might arise from timing differences between the receipt of premiums and the payment of losses and expenses, such as might be expected between no-fault and tort states. The simplifying assumption is that these revenues and expenses are proportional to earned premium.

Insurers generally sell liability and physical-damage as bundled products. That is, most insurers will not sell the physical damage coverage without also providing the liability coverage, although liability-only policies are generally acceptable. The package pricing strategy differs from one insurer to the next. Some insurers intentionally pad the liability portion of the premium to make liability-only policies appear more expensive relative to full-coverage policies. Other insurers take the opposite approach, factoring in higher investment income potential from the liability portion of the premium. Internally, however, profitability is generally judged on the whole rather than on the individual pieces, and managers are judged on the overall results for the automobile line of business rather than separately on the physical damage and the liability components. Therefore, for this study, the by-line data are aggregated into a single category, private passenger auto insurance.

The statutory combined ratio (total losses and total expenses divided by earned premiums) is used as the profitability measure. The combined ratio can also be calculated on a trade basis (underwriting expenses/ written premium plus losses/earned premiums), which recognizes that prepaid underwriting expenses are not recorded as an asset on insurers' balance sheets but are instead deducted from surplus. From a profitability standpoint, though, expenses such as commissions to producers are earned over the life of each policy and general underwriting expenses are incurred throughout the duration of each policy, not just at inception. Therefore, the statutory version was selected as a more appropriate measure of true operating profitability.

A combined ratio in excess of 100 percent indicates an underwriting loss, while a combined ratio that is less than 100 percent indicates an underwriting profit. An underwriting loss is not the same as an economic loss, though, since the insurer has the opportunity to earn investment income during the lag between receipt of premium and actual payment of expenses. It is assumed that each insurer has the same investment income opportunities in each state, so it should be pricing each state so that the same combined ratio is generated for each.

This combined ratio statistic for all auto insurance lines for insurer i in state j during calendar year t is

$$CR_{ijt} = \frac{I_{ijt} + A_{ijt} + D_{ijt} + C_{ijt} + T_{ijt}}{P_{ijt}} + \frac{O_{it} + G_{it} + OU_{it} - OI_{it}}{P_{it}} \tag{3}$$

where I = incurred losses
A = allocated loss adjustment expenses
D = dividends
C = commission and brokerage expense
T = taxes, licenses, and fees
O = other acquisition expenses
G = general expenses
U = unallocated loss adjustment expenses
OI = other income net of other expense

The by-state, by-line variables I, A, D, C, T, and P are taken from the EPL. The other variables are converted to state-specific expenses by multiplying the by-line expense ratio by the by-line state premiums and then aggregating the liability and the physical damage into the single auto insurance category. Written in this fashion, an insurer's CR for state *j* is actually the sum of two ratios: the ratio of state-specific allocated expenses (losses, allocated loss adjustment expenses, dividends, commissions, and taxes) and the ratio of unallocated expenses (other acquisition and general expenses, unallocated loss adjustment expenses, and other income). A company's unallocated expense ratio would be the same for all states unless there was a difference in the relative mixture of liability and physical damage premiums. When examining by-state differences in combined ratios, the unallocated expense ratio for the most part disappears, so that the primary difference in an insurer's combined ratio between states is the difference in the allocated portion.

To be included in the data set for a given calendar year, a company's total direct earned premiums for its private-passenger auto business (both liability and physical damage combined) in a state had to be at least $250,000. This restriction was intended to alleviate outlier problems. Approximately 650 companies were included in the study in one or more years of this six-year period.

RESEARCH RESULTS

Hypothesis #1: Aggregate Combined Ratio$_{\text{Open-Competition States}}$ = Aggregate Combined Ratio$_{\text{Rate-Regulated States}}$

Assuming that there are no systematic differences in the timing of loss and expense payments and that the investment opportunities are the same for the auto insurance business produced in each state, then the expected value of a given insurance company's combined ratio should be the same in each state. If rate suppression is practiced in those states that actively regulate auto insurance rates, then for any given insurer the combined ratio for its rate-regulated book of business should be higher than the combined ratio for its open-competition business. If the excessive rate hypothesis is true, an insurer's combined ratio should be lower for its rate-regulated book of business than for its open-competition book of business.

To test for systematic differences, paired samples of each company's business in rate-regulated states and open-competition states were generated. First, each company's premiums and expenses were allocated into one of two categories: rate-regulated (R) and open-competition (O). The combined ratio for each category was computed for each insurer that generated at least $250,000 of earned premium in at least five R states and at least five O states during a particular calendar year. Separate tests were conducted for calendar years 1992 through 1997, as well as for the aggregate period.

Both parametric and nonparametric tests were performed on the sample to measure differences in the distribution of the combined ratio for the rate-regulated and open-competition business. The parametric test was the paired sample *t* test, which assumes that the mean difference between the paired samples is zero and normally distributed. A Kolmogorov-Smirnov test for normality suggested that the assumption of normality might not be appropriate. Although the distribution of paired differences was symmetrical about its mean, the kurtosis was higher than would be expected for a normal distribution. Additionally, as forecast by the central limit theorem, the variance of each combined ratio is inversely related to the volume of the underlying business. The end result is that, even if the mean differences are normally distributed, the variances of the individual measurements will systematically differ, resulting in a "mixture of normal variables" problem and the potential for an infinite variance. Therefore, the nonparametric Wilcoxon signed ranks test, which uses the rank of the absolute value of the difference between two paired variables, was also conducted. An advantage of this test is that there is no assumption about the distribution of the differences between paired variables, although the power of the test is enhanced when the distribution is symmetrical. The test statistic is based on the ranks of the absolute values of the differences between the two variables.

Results are shown in Table 1. The parametric test failed to reject the null hypothesis of equal means between individual insurer's rate-regulated and the open-competition combined ratios in any year or for the overall period. The nonparametric test indicated a difference at the 5 percent level overall, and this was largely driven by the 1996 and 1997 data years. Calendar years 1992–1995 indicated that there was no statistically significant difference in the combined ratios of participating companies between the open-competition states and the rate-regulated states.

These results do not firmly support either the excessive rate hypothesis or the consumer pressure hypothesis that rate-regulated business generates more or less profit than open-competition business for individual insurers. If the consumer pressure hypothesis were true, then the combined ratio for the rate-regulated business would be systematically higher than the combined ratio for the open-competition business for those insurers participating in the market. These results may lend some credence to the regulatory lag hypothesis that regulatory delays exacerbate cyclical behavior in insurers' underwriting results because of the observed change in the pattern of differences in the combined ratios. The proportion of companies for which $CR_R > CR_O$ dropped systematically from 54 percent to 44 percent

Table 1. Differences in Intra-Company Combined Ratios by Type of Rating Law

		Wilcoxon Signed Rank Test Results				Paired Sample T Test Results			
Period	*N*	# Where $CR_O > CR_R$	# Where $CR_O < CR_R$	Test Statistic	P Value	CR_O	CR_R	Difference	P Value
Overall	833	443	390	–2.060	0.039	101.3%	100.8%	0.48%	0.235
1992	138	64	74	–1.051	0.293	101.4%	102.3%	–0.91%	0.374
1993	137	68	69	–0.317	0.751	100.6%	101.4%	–0.73%	0.432
1994	135	71	64	–0.723	0.470	99.3%	99.2%	0.09%	0.931
1995	139	73	66	–0.727	0.467	101.1%	100.5%	0.65%	0.443
1996	145	89	56	–2.922	0.003	103.3%	101.3%	2.00%	0.087
1997	139	78	61	–2.008	0.045	101.6%	99.9%	1.65%	0.067

CR_O : Insurer's aggregate combined ratio for aggregate business in open-competition states
CR_R : Insurer's aggregate combined ratio for aggregate business in rate-regulated states

over the period. However, additional data years and a more complex modeling process would be required to adequately test for systematic cyclical behavior in the mean differences.

Testable Hypothesis #2:

$$\textbf{Aggregate Combined Ratio}_{\text{Stringent}} = \textbf{Aggregate Combined Ratio}_{\text{Average}} = \textbf{Aggregate Combined Ratio}_{\text{Free}}$$

States were divided into three groups—Stringent, Average, and Free—based on their 1994 Conning & Company regulatory freedom scores. The Stringent group was defined as the ten states with the lowest regulatory freedom scores, the Free group was defined as the ten states with the highest regulatory freedom scores, and all others went into the Average group. As with the open-competition / rate-regulated dichotomy, the business in each of the categories was summarized by company for each calendar year, and paired samples were generated. For a company to be included in any particular year, at least five states in each of two categories were required. That is, to compare differences between a company's Stringent business and its Average business, that company had to have at least $250,000 premium in at least five Stringent state markets and at least $250,000 of premium in at least five Average state markets for that particular year. Separate analyses were conducted to examine differences between Stringent and Average, Stringent and Free, and Average and Free markets. The results for the three sets of tests are shown in Table 2.

Similar to the results generated for open-competition versus rate-regulated business, the evidence was mixed and appeared to change over time, adding more support to the hypothesis that strict regulation affects the timing of profits more than the absolute level. If regulatory policy effectively limits profits, the individual companies should exhibit higher combined ratios in the stringent states relative to other states. While the combined ratios for the stringently regulated states were on average higher in 1992–1994, the opposite was true during 1995–1997.

Testable Hypothesis #3:

$$\textbf{Combined Ratio}_{\text{State } j} = \textbf{Aggregate Combined Ratio}_{\text{All States Except State } j}$$

Aggregation problems may still be present as regulatory effects can differ between the states included in each category. Grabowski et al. (1989) reported that a significant amount of the total differences in auto insurance underwriting results between regulated and unregulated states could be attributed to three particular states (North Carolina, New Jersey, and Massachusetts). Tennyson (1997) showed that market effects attributable

Table 2. Differences in Intra-Company Combined Ratios by Conning & Company Regulatory Freedom Measure

		Wilcoxon Signed Rank Test Results				Paired Sample T Test Results			
Period	*N*	# Where $CR_S > CR_A$	# Where $CR_S < CR_A$	Test Statistic	P Value	CR_S	CR_A	Difference	P Value
Tests for H0: $CR_{Stringent} = CR_{Average}$									
Overall	406	196	210	–0.607	0.544	101.9%	101.1%	0.79%	0.209
1992	71	40	31	–1.834	0.067	103.9%	100.9%	3.02%	0.028
1993	70	46	24	–2.590	0.010	102.4%	98.6%	3.82%	0.012
1994	64	35	29	–1.384	0.166	100.8%	99.0%	1.83%	0.183
1995	70	33	37	–0.167	0.868	102.1%	101.6%	0.52%	0.697
1996	68	18	50	–3.342	0.001	101.0%	104.5%	–3.56%	0.065
1997	63	24	39	–1.506	0.132	100.7%	101.8%	–1.17%	0.456

Tests for H0: $CR_{Average} = CR_{Free}$

		Wilcoxon Signed Rank Test Results				Paired Sample T Test Results			
Period	*N*	# Where $CR_A > CR_F$	# Where $CR_A < CR_F$	Test Statistic	P Value	CR_A	CR_F	Difference	P Value
Overall	493	270	223	–2.230	0.026	100.9%	100.1%	0.79%	0.056
1992	74	54	20	–3.785	0.000	101.0%	96.9%	4.16%	0.000
1993	77	46	31	–1.962	0.050	99.3%	97.4%	1.84%	0.056
1994	81	39	42	–0.242	0.808	98.6%	98.7%	–0.05%	0.963
1995	88	49	39	–0.454	0.650	102.2%	102.3%	–0.06%	0.960
1996	91	43	48	–0.162	0.871	104.2%	104.1%	0.06%	0.949
1997	82	39	43	–0.548	0.584	99.4%	100.1%	–0.70%	0.437

Tests for H0: $CR_{Stringent} = CR_{Free}$

Period	N	Wilcoxon Signed Rank Test Results: # Where $CR_S > CR_F$	# Where $CR_S < CR_F$	Test Statistic	P Value	Paired Sample T Test Results: CR_S	CR_F	Difference	P Value
Overall	256	143	113	–2.358	0.018	101.9%	100.1%	1.83%	0.013
1992	43	35	8	–3.719	0.000	104.6%	96.8%	7.85%	0.000
1993	42	29	13	–2.757	0.006	102.2%	97.3%	4.84%	0.006
1994	40	23	17	–0.780	0.436	101.1%	99.5%	1.65%	0.387
1995	44	20	24	–0.619	0.536	102.3%	103.6%	–1.28%	0.454
1996	46	20	26	–0.989	0.323	101.7%	103.2%	–1.47%	0.394
1997	41	16	25	–0.784	0.433	99.3%	99.6%	–0.34%	0.833

CR_S: Insurer's aggregate combined ratio in the 10 states with the lowest regulatory freedom scores
CR_F: Insurer's aggregate combined ratio in the 10 states with the highest regulatory freedom scores
CR_A: Insurer's aggregate combined ratio in all other states

to stringent regulation were more pronounced in three states (Massachusetts, New Jersey, and California). Aggregation of business within an individual insurance company can produce distorted measures of state regulatory effects because of concentration in one of those states. An insurer might write in ten different rate-regulated states, but its business could be highly concentrated in one state, with just peripheral business in the other nine states. Using the aggregate measures could distort the true relationship by magnifying the effects of that individual state. Therefore, it is also important to assess the impact of each state's regulatory practices relative to other states.

To measure the marginal differences, the combined ratio for the company's business in state *j* was compared to the combined ratio for its business in all other states. That measures the profitability of state *j* relative to the weighted average profitability for its business in all other states. To alleviate outlier problems, only companies that wrote at least $250,000 in each of at least 10 states were included in the analysis.

The results are shown in Table 3. Some states, such as New Jersey, show a consistently higher combined ratio for the state business relative to the remainder-of-country business, so insurance companies earn lower profits on their New Jersey business relative to the business they write in other states. California, on the other hand, shows a consistently lower combined ratio relative to the remainder-of-country combined ratio, meaning that insurers earn higher profits on their California business than on the business they write in other states. Interestingly, New Jersey and California rank number one and number two as having the most stringent regulatory climate. The New Jersey results are the type that would be expected if the consumer-pressure hypothesis held true, while the California results are indicative of what would be expected if the excessive-rate hypothesis were true. However, in examining the results for the various other state markets, there does not appear to be consistent support for either theory.

Testable Hypothesis #4:

Insurer X's Combined Ratio $_{\text{State } i}$ = Insurer X's Combined Ratio $_{\text{State } j}$

The final set of tests are applied on a paired-state basis for each calendar year and then again for the entire six-year period. Each paired state subgroup included each insurer that wrote qualifying business in both states (e.g., Arkansas and Nevada). The paired samples in the subgroup were each company's combined ratio in state *i* and state *j*. Assuming that there is no difference in profitability between state pairs, then the average difference should be zero. If there is a systematic profit differential, then more companies will show a higher (or lower) combined ratio for state *i* than for state *j* for that calendar year.

There were 1,275 potential state pairing subgroups for each calendar year. Although the entire data set included over 300,000 paired samples, some state pairing subgroups had more observations than others. For example, there were less than ten pairs of Hawaii–South Carolina or Alaska–Florida in any of the years, while there were well over one hundred observations for Florida–Georgia and for Illinois–Indiana each year. The power of the test was therefore higher for some state pairing subgroups than for others.

The Wilcoxon signed ranks test was conducted separately for each of the 1,275 subgroups in each of the data years. A second set of tests was run over the entire time period 1992–1997. Table 4 is a summary of the results by state. The first column in the table is the state. The remaining columns of the table show the number of states that had statistically significantly higher combined ratios than that state, the number of states that had statistically significantly lower combined ratios than that state, and the net difference. If the average combined ratio for state *i* was statistically significantly higher than the average for state *j*, then that fact was recorded in the "# Higher" column in the row for state *j*. Only differences where the test statistic was statistically significant at the 5 percent level were included. For example, in 1992 the combined ratio for business written in Alabama was statistically significantly higher than the combined ratio for business written in four other states but statistically significantly lower than the combined ratio for business written in 12 other states. The "net" column is simply the number higher minus the number lower. A positive number means that that state is relatively more profitable than other states, while a negative number means that that state is relatively less profitable than other states. A value of zero means that a state is right in the middle—higher than some, lower than others.

While a few states are consistently negative (e.g., Kentucky and North Dakota) and some are consistently positive (e.g., California, Massachusetts, and New Hampshire), other states show mixed results from year to year or show change. For example, New Jersey shows a shift starting in 1995. That coincides with significant changes in that state's auto insurance market in the wake of legislative reforms intended to alleviate that state's chronic market problems. In 1992, the average combined ratio for insurers in Kansas was higher than that for almost all other states (# Lower = 48), but that was almost certainly a reflection of significant weather-related problems that year rather than regulatory policies. In other states, the changes are more likely to be regulatory in nature. For example, Georgia dropped its no-fault requirement in 1992, and that might explain the abrupt

Table 3. Test Results for Intra-Company Differences Between Each State and All Other States

State	Wilcoxon Signed Rank Test Results				Paired Sample T Test Results						
	N	# Where CRj>CRcw	# Where CRj<CRcw	Test Statistic	1992–97	1992	1993	1994	1995	1996	1997
AK	182	76	106	–1.24	–0.010	–0.066	–0.055	0.016	0.035	–0.020	0.025
AL	569	278	291	–1.07	–0.004	0.001	–0.018	–0.009	0.031	–0.020	–0.008
AR	481	269	212	–3.02**	0.045**	0.026	–0.005	0.064*	0.038	0.081**	0.063*
AZ	550	251	299	–3.15**	–0.025**	–0.030	–0.065**	–0.019	0.027	–0.022	–0.039*
CA	431	112	319	–10.15**	–0.094**	–0.092**	–0.101**	–0.067*	–0.057*	–0.113**	–0.136**
CO	574	227	347	–4.17**	–0.019	–0.011	–0.031	0.009	–0.033	–0.044*	–0.002
CT	536	251	285	–1.21	–0.005	0.039	–0.015	0.018	–0.028	–0.011	–0.037
DC	208	85	123	–3.00**	–0.036*	–0.074*	–0.029	–0.022	0.014	–0.040	–0.070*
DE	332	179	153	–2.12*	0.040**	0.061	–0.016	0.026	0.055	0.012	0.112**
FL	684	372	312	–1.58	0.012	0.013	0.001	0.024	0.024	–0.002	0.015
GA	670	359	311	–2.22*	0.019*	–0.036	0.062**	0.032	0.044*	–0.005	0.016
HI	103	38	65	–1.42	0.006	0.159	0.136	–0.034	–0.096	–0.084	–0.001
IA	498	230	268	–0.99	0.009	–0.018	0.037	0.018	–0.012	0.001	0.027
ID	339	137	202	–2.76**	–0.022	–0.095**	0.030	0.002	–0.040	–0.044	0.015
IL	780	400	380	–0.52	0.012	–0.005	0.019	0.002	0.014	0.041*	–0.001
IN	721	321	400	–2.82**	–0.012	–0.039*	–0.047**	–0.033*	0.007	0.020	0.023
KS	559	304	255	–3.83**	0.064**	0.348**	0.075**	–0.032	0.026	–0.003	–0.015
KY	632	415	217	–8.71**	0.081**	–0.012	0.083**	0.109**	0.079**	0.115**	0.106**
LA	393	189	204	–0.50	0.002	0.071*	–0.031	–0.081**	0.025	0.019	–0.002
MA	109	19	90	–6.36**	–0.131**	–0.177**	–0.158	–0.105	–0.125**	–0.166*	–0.031
MD	477	184	293	–5.29**	–0.047**	–0.089**	–0.060*	–0.053*	–0.038	–0.041	0.005
ME	263	103	160	–3.26**	–0.033*	–0.130**	–0.013	–0.068*	–0.008	0.013	0.006
MI	277	120	157	–1.32	0.004	–0.077	–0.015	–0.053	0.007	0.010	0.135**
MN	601	314	287	–2.14*	0.025**	0.034	–0.000	0.030	–0.008	0.050*	0.044
MO	703	318	385	–2.79**	–0.012	–0.060**	0.030	–0.012	0.007	–0.034*	–0.006

MS	386	171	215	–1.77	–0.010	–0.018	–0.063**	–0.011	0.000	0.009	0.016
MT	319	181	138	–3.01**	0.050**	–0.022	0.030	0.012	0.029	0.103**	0.134**
NC	442	218	224	–0.16	0.009	–0.107**	–0.008	0.006	0.028	0.121**	0.002
ND	252	171	81	–7.02**	0.129**	0.036	0.049	0.108**	0.205**	0.147**	0.210**
NE	414	221	193	–3.26**	0.049**	0.021	0.030	–0.016	0.069*	0.175**	0.012
NH	245	68	177	–6.83**	–0.076**	–0.111*	–0.141**	–0.082**	–0.093**	0.004	–0.029
NJ	227	149	78	–6.06**	0.145**	0.262**	0.188**	0.130*	0.112*	0.044	0.105*
NM	396	205	191	–0.35	0.021	0.104*	0.115**	0.032	–0.040	–0.027	–0.062**
NV	360	203	157	–2.01*	0.023	0.007	0.081*	–0.002	–0.012	–0.007	0.072*
NY	506	238	268	–0.44	0.009	0.049	0.062**	0.007	–0.049*	–0.030	0.015
OH	700	321	379	–1.20	0.002	–0.027	–0.037*	–0.009	0.022	0.018	0.042*
OK	442	198	244	–1.12	–0.000	0.033	0.041	0.006	–0.019	–0.025	–0.041
OR	509	252	257	–0.70	0.003	–0.080**	–0.043	–0.056*	0.071**	0.054*	0.045
PA	578	306	272	–1.68	0.022*	0.059*	–0.027	0.046	–0.007	0.023	0.035
RI	326	108	218	–5.85**	–0.057**	–0.040	–0.094*	–0.048	–0.098**	–0.072**	0.012
SC	179	96	83	–0.51	0.003	–0.037	–0.019	0.002	–0.009	0.034	0.044
SD	279	168	111	–4.60**	0.081**	0.103*	0.182**	0.119**	–0.004	0.090*	–0.006
TN	733	342	391	–1.76	–0.006	–0.043*	–0.060**	–0.010	0.062**	–0.002	0.010
TX	516	256	260	–0.16	0.006	0.063**	0.017	0.047	0.038	–0.095**	–0.056
UT	451	206	245	–1.58	–0.008	0.016	–0.031	0.003	0.018	–0.034	–0.019
VA	626	295	331	–0.81	0.005	0.014	–0.049*	0.007	–0.008	0.012	0.046*
VT	279	123	156	–1.98*	–0.015	–0.062	–0.097**	0.002	–0.018	–0.009	0.097*
WA	565	313	252	–2.86**	0.027**	–0.014	0.020	0.002	0.041	0.069**	0.041
WI	623	280	343	–1.36	0.001	0.000	0.021	–0.009	0.019	–0.012	–0.012
WV	314	147	167	–0.52	0.012	0.011	0.028	0.066	–0.003	–0.016	–0.005
WY	242	110	132	–1.69	–0.009	–0.021	–0.003	–0.049	–0.062	0.079*	–0.003

CR_j: Insurer's Combined Ratio in state j

CR_{cw}: Insurer's Combined Ratio in all other states except state *j*

** significant at .01 level. * significant at .05 level.

Table 4. By-State, By-Year Count of States Where the Average Combined Ratio Is Statistically Significantly Higher or Lower

	1992			1993			1994			1995			1996			1997			92–97
	# Higher	# Lower	Net (H – L)	# Higher	# Lower	Net (H – L)	# Higher	# Lower	Net (H – L)	# Higher	# Lower	Net (H – L)	# Higher	# Lower	Net (H – L)	# Higher	# Lower	Net (H – L)	Net (H – L)
AK	7	0	7	6	3	3	1	2	–1	1	4	–3	8	2	6	1	1	0	5
AL	12	4	8	11	2	9	8	4	4	1	10	–9	11	1	10	8	1	7	8
AR	2	10	–8	5	3	2	0	20	–20	1	4	–3	0	28	–28	0	10	–10	–28
AZ	12	3	9	15	3	12	7	2	5	2	12	–10	9	4	5	16	1	15	21
CA	21	0	21	22	1	21	28	1	27	23	0	23	36	0	36	43	0	43	47
CO	6	3	3	9	2	7	2	6	–4	18	3	15	15	2	13	9	3	6	10
CT	2	24	–22	9	5	4	3	8	–5	9	1	8	11	1	10	16	1	15	7
DC	9	2	7	5	1	4	1	1	0	1	6	–5	6	1	5	16	1	15	17
DE	1	11	–10	3	3	0	0	5	–5	1	14	–13	3	3	0	0	26	–26	–20
FL	2	18	–16	2	17	–15	1	7	–6	2	7	–5	9	6	3	7	2	5	–3
GA	8	4	4	1	17	–16	1	18	–17	1	10	–9	7	6	1	4	6	–2	–9
HI	0	13	–13	0	3	–3	2	1	1	24	0	24	30	0	30	7	0	7	2
IA	10	1	9	2	4	–2	1	5	–4	4	1	3	4	3	1	3	6	–3	3
ID	18	0	18	0	7	–7	6	1	5	11	1	10	13	2	11	6	4	2	13
IL	12	4	8	6	11	–5	4	6	–2	3	11	–8	6	8	–2	7	1	6	–3
IN	15	3	12	18	0	18	9	2	7	7	3	4	4	15	–11	5	7	–2	12
KS	0	48	–48	1	18	–17	12	0	12	1	14	–13	11	4	7	8	1	7	–35
KY	5	6	–1	1	24	–23	0	36	–36	1	23	–22	0	35	–35	0	35	–35	–41
LA	1	23	–22	6	1	5	26	0	26	1	14	–13	3	5	–2	6	1	5	–2
MA	9	0	9	11	0	11	11	0	11	16	0	16	21	0	21	3	0	3	35
MD	20	1	19	15	0	15	14	0	14	17	0	17	14	0	14	4	4	0	30
ME	34	0	34	8	2	6	17	0	17	4	1	3	2	4	–2	4	3	1	21
MI	12	0	12	4	1	3	5	0	5	3	2	1	2	0	2	0	33	–33	0
MN	2	13	–11	2	6	–4	1	7	–6	4	3	1	3	24	–21	4	7	–3	–15
MO	23	0	23	4	8	–4	5	1	4	2	4	–2	15	2	13	11	2	9	21

MS	4	2	2	15	1	14	5	2	3	7	3	4	7	4	3	3	6	–3	11
MT	6	3	3	2	12	–10	3	4	–1	1	5	–4	1	21	–20	2	28	–26	–26
NC	17	1	16	6	4	2	1	9	–8	1	9	–8	0	37	–37	5	3	2	–15
ND	2	1	1	0	3	–3	0	17	–17	0	46	–46	0	33	–33	0	36	–36	–48
NE	4	11	–7	3	7	–4	3	2	1	1	19	–18	0	44	–44	5	0	5	–27
NH	23	0	23	32	0	32	28	0	28	31	0	31	5	2	3	8	1	7	43
NJ	0	40	–40	0	38	–38	0	13	–13	0	4	–4	1	1	0	1	10	–9	–43
NM	2	29	–27	0	20	–20	1	6	–5	16	1	15	11	3	8	22	1	21	–7
NV	1	13	–12	0	19	–19	2	2	0	2	7	–5	5	2	3	2	9	–7	–16
NY	2	24	–22	2	23	–21	1	8	–7	14	4	10	15	2	13	6	2	4	–2
OH	17	3	14	15	2	13	4	2	2	4	6	–2	5	6	–1	3	9	–6	8
OK	4	10	–6	1	20	–19	4	3	1	4	5	–1	9	4	5	14	0	14	3
OR	28	0	28	14	0	14	23	0	23	2	16	–14	3	10	–7	3	6	–3	8
PA	2	25	–23	7	4	3	2	9	–7	5	5	0	4	7	–3	1	10	–9	–12
RI	11	2	9	29	1	28	14	0	14	41	0	41	23	0	23	2	2	0	35
SC	4	0	4	4	1	3	1	2	–1	0	4	–4	3	10	–7	0	5	–5	–1
SD	2	14	–12	0	42	–42	0	28	–28	3	2	1	2	19	–17	2	2	0	–41
TN	17	0	17	25	0	25	6	6	0	1	17	–16	11	2	9	5	3	2	10
TX	2	28	–26	3	14	–11	1	10	–9	1	13	–12	27	0	27	21	1	20	–2
UT	3	6	–3	11	1	10	4	3	1	3	5	–2	13	1	12	4	4	0	14
VA	6	7	–1	10	1	9	4	4	0	10	5	5	6	6	0	4	9	–5	4
VT	9	1	8	20	0	20	3	2	1	12	1	11	4	4	0	0	11	–11	12
WA	7	6	1	2	8	–6	2	9	–7	1	12	–11	1	16	–15	2	2	0	–10
WI	11	4	7	3	5	–2	4	1	3	5	3	2	7	4	3	7	1	6	8
WV	3	14	–11	2	6	–4	0	12	–12	4	3	1	8	1	7	5	1	4	–7
WY	5	0	5	2	0	2	6	0	6	16	0	16	1	20	–19	6	3	3	5

NOTE: "# Higher" ("# Lower") is the number of states that had statistically significantly higher (lower) average combined ratio for companies doing business in both states. In the "Net" column, a positive number indicates that the state was, on average, more profitable because of relatively lower combined ratios.

change in that state's numbers during 1993–1995. In any event, these results show that there can be significant changes over time in state markets and as such cross-sectional time series research into the effects of regulation can be sensitive to the time frame employed.

AREAS FOR FUTURE RESEARCH

Table 5 provides comparative statistics for some of the demographic and market variables that have been proposed to explain aggregate profit differences between states. Statistics on market structure, population, and regulatory approach are presented for the open-competition / rate-regulated categories and for the stringent / average / free categories. The table shows that states rated as having more stringent regulation tend to be, on average, more urbanized and the population tends to be more concentrated. The persons per square mile and the vehicles per road mile are significantly higher in the states rated as most stringently regulated, and those states also tend to have no-fault laws and prior-approval rating laws. As noted earlier, there might be a difference in the potential investment income between tort states and no-fault states, and the profitability statistic used here could misinterpret any such difference.

The table also shows that the more stringently regulated markets have fewer national companies and fewer nonstandard companies, as well as a higher proportion of single-state writers and a lower proportion of low-volume companies. These results are consistent with those reported in Tennyson (1997) and suggest differences in the degree of market competition in those states. The average number of insurers per 100,000 residents is lower in the more stringently regulated states, and the median premium volume is higher, meaning that there are fewer companies in the market and the ones that are participating are relatively larger. It is not uncommon for an insurance group to set up a separate legal entity to insulate its operations in a highly regulated state from the rest of its business, which would increase the proportion of single-state writers. The higher average premium size per company suggests that the smaller insurers, including the nonstandard writers, have a tendency to avoid these markets. That affects the degree of competition because these insurers have more specialized pricing structures than are typically found in standard auto insurers.

The next logical step in this research may be to take a closer look at what drives competition and profits in particular states. California and New Jersey appear to be polar opposites in terms of profitability, even though both states are considered highly restrictive in terms of regulatory climate. Yet California insurers appear to be making money while New

Table 5. Selected Comparative Statistics for State Auto Insurance Markets by Conning & Company Regulatory Freedom Group and Type of Rating Law

		Grouped by Conning & Company Score			Grouped by Type of Rating Law			
	Country-wide	10 Most Stringent States	All Other States	10 Least Stringent States	Prior Approval States	Open Com-petition States	New Jersey	California
Number of observations	33,797	7,680	18,710	7,407	15,612	18,185	500	922
Insurers included in sample	1,196	773	753	530	936	808	118	215
% of insurers active in at least 20 states	46.4%	36.5%	51.7%	43.4%	45.3%	47.4%	30.4%	30.0%
Nonstandard insurers / total insurers	17.8%	14.6%	18.7%	18.9%	16.9%	18.6%	3.6%	19.1%
Single-state insurers / total insurers	7.8%	18.1%	4.2%	6.1%	10.6%	5.4%	27.2%	22.7%
Insurers with < $2m in premium / total insurers	43.7%	27.7%	48.1%	49.1%	41.7%	45.4%	22.2%	24.0%
Median insurer combined ratio	100.7%	100.8%	100.6%	100.8%	100.5%	100.7%	110.3%	94.5%
Median insurer premium volume	2,634,432	6,202,826	2,160,272	2,098,116	2,950,417	2,419,639	14,128,143	9,959,330
Median # of insurers in state per 100k residents*	4.32	1.44	4.89	6.00	4.12	4.75	1.46	0.68
Median state vehicles per capita*	0.77	0.70	0.78	0.83	0.73	0.80	0.70	0.72
Median state vehicles per road mile*	20.8	37.2	18.5	15.7	24.5	16.5	72.6	59.8
Median state population per square mile*	83.6	235.9	74.8	57.2	112.1	63.3	1,088.1	204.0
Median state urban population %*	68.9%	82.3%	68.7%	65.0%	68.5%	69.4%	89.4%	92.6%
Median state population growth, 1990–2000	9.7%	11.3%	10.8%	8.8%	10.3%	9.7%	8.9%	13.8%
Median state average residual market share, 1992–96	0.2%	4.0%	0.2%	0.0%	1.1%	0.1%	4.2%	1.1%
Median state herfindahl index, 1997	0.0922	0.0922	0.1006	0.0831	0.0946	0.0921	0.0711	0.0782
Median state per capita income*	19,854	21,494	19,966	19,485	19,991	19,743	26,595	21,826
% of states with mandatory no-fault law, 1997	27%	60%	19%	20%	27%	28%	YES	NO
% of states with prior-approval rating law, 1997	51%	80%	55%	10%	100%	0%	YES	YES

*1990 demographic data used for state population, road miles, and income. Vehicle registrations are from 1994.

Jersey insurers appear to be losing money, relative to their business in other states. There might be some specific aspects of regulation that make a difference (no-fault laws, uninsured motorists, cross-subsidization between lines of business) that may more accurately explain these observed differences. However, the simple "open competition/rate regulated" dichotomy does not seem to matter when measuring the profits of insurers in the market, nor does the Conning & Company regulatory freedom score.

SUMMARY

The purpose of this study was to examine differences in auto insurance underwriting performance between rate-regulated and open-competition states by looking at intra-company results. Past research has used aggregate state data that can mask true differences because of disparities in insurer demographics between states. Consistent with prior research studies, the simple statistics in Table 5 show that the structure of state insurance markets is connected to the regulatory climate. The different mix of insurers with alternative pricing structures, investment standards, target markets, and expense structures leads to differences in statewide aggregate loss ratios and expense ratios. Those differences may represent quality differences rather than price differences.

Given that state regulatory policy alters the willingness of insurers to enter a market, and hence the mix of insurers in that market, this research extends the literature by examining intra-company profitability differences for those companies actually participating in each state market. If rate regulation does alter profitability, then there should be a systematic difference in the combined ratio for rate-regulated business relative to open-competition business for those insurers that actually compete in both markets. No profitability differences were found between state markets with prior approval rating laws and state markets with open-competition rating laws. The form of a state's rating law does not always adequately define the regulatory climate with respect to price controls, so tests were also conducted using the Conning & Company regulatory freedom score for each state. However, as with the type of rating law, there does not appear to be a statistically significant difference in profitability in intra-company profits for those companies that choose to enter both restrictive and unrestrictive state markets.

The Conning & Company regulatory freedom measure is correlated with both regulatory and non-regulatory variables that could affect an insurer's decision whether to enter a market in the first place. For example, there is a strong correlation between the Conning & Company measure and the presence of a no-fault law. No-fault states tend to have higher urbanized populations, and that would affect the level, timing, and predictability of auto insurance losses and hence affect the desirability of entering that market. No-fault states may have different potential investment income, as the payout pattern for the aggregate liability losses in no-fault states should be different from that in tort states. Observed differences in relative profitability between no-fault and tort states could reflect differences in investment income potential rather than regulatory interference, and since the Conning & Company regulatory freedom scores are generally lower for no-fault states, the measurement of profit differentials attributable to regulatory practices can be distorted. There are fewer nonstandard insurers in the more stringently regulated states, and these insurers typically write minimum limits policies that may generate shorter payout patterns and hence lower investment income as well.

Although regulatory climate almost certainly affects insurers' perceptions of potential profitability and hence their willingness to operate in a given state, these results do not support the hypothesis that there is any realized profitability difference between rate-regulated states and open-competition states in the auto insurance business. There are some states in which relative profits are consistently higher than those in other states, just as there are some states in which relative profits are consistently lower. Regulatory policy does not appear to be the full explanation, although it may interact with other state factors in a manner yet to be measured. Interestingly, the two most heavily regulated states (using the Conning & Company measure as a yardstick) turn out to be polar opposites in terms of measured intra-company profitability. Insurers tend to lose money in New Jersey and to make money in California, although both states are considered to have stringent regulatory climates. Further research is needed to establish the degree to which regulatory policy may alter the realized profits of those insurers that choose to participate in the various state markets.

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