Benefits of Multi-Jurisdictional Regulation of the Life Insurance Industry: Fact or Fiction?

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Abstract

Debates about state versus federal regulation of the insurance industry are as active and cogent today as ever. Few researchers have rigorously investigated whether the current state-based regulatory system provides benefits that offset the high costs of multi-regulator compliance. In this study, we explore factors that affect the expenses and profitability of life-health insurers with a particular focus on regulatory effects. Our evidence suggests that the increased cost of complying with more regulators is offset by the benefits of greater regulatory oversight, which is consistent with the subsidized monitoring hypothesis. We also find that regulatory separation theory and the regulatory forbearance hypothesis can explain the large number of single-state insurers. Additionally, results in contrast with previous findings in property-liability studies suggest that federal regulation could be a better fit for life-health insurers than for property-liability insurers. Our results should have implications not only for the U.S insurance regulatory debate, but also for transnational political entities as they grapple with analogous multi- versus single-jurisdictional regulatory issues for the globalizing financial services industry.

1. Introduction

State versus federal regulation has been a contentious issue throughout the history of the insurance industry in the United States. State regulation of insurance has prevailed through most of this history because state regulators, the National Association of Insurance Commissioners (NAIC), and the insurance industry historically have presented a united front in favor of state regulation (Harrington, 2000). Insurers, especially those in the life-health sector, have increasingly favored federal regulation of insurance in recent years, however (Bair, Donkova, Hatch, Stilkey, and Amoiradaki, 2004). For US insurers, the regulatory jurisdictional unit is the state. An insurer faces a state insurance regulator in each state in which it is licensed to do business, and thus can face up to fifty different regulators.[1] State-based regulation now is perceived by many insurers as causing competitive disadvantages, especially in terms of competing with banks, which have the option of choosing a federal charter (Carow, 2001; Harrington, 2002; and England, 2005).

[1] Insurers may actually face up to 55 regulators if they are also licensed in D.C. and the four U.S territories in addition to the 50 states.

A recent survey estimates that regulation costs life-health insurers more than $1.1 billion per year, with approximately 55% of regulatory costs related to dealing with multiple regulatory jurisdictions (American Council of Life Insurers, 2005). While little argument exists over the substantial compliance costs, research on possible benefits of multi-jurisdictional regulation is scant and considered to be a serious omission in the literature (Franks, Schaefer, and Staunton, 1998). Our primary objective in this study is to employ expense and profitability models to explore the effects, including possible benefits, of a multi-jurisdictional regulatory environment.

One possible benefit is provided by the *subsidized monitoring hypothesis* of Demsetz and Lehn (1985). They argue that regulators are substitute monitors for firm owners and, all else equal, more regulated firms should have lower agency costs. In addition, we draw on implications of the regulatory separation theory of Laffont and Martimort (1999) in an attempt to understand whether the existence of so many small, single-state insurers is a by-product of the current state-based regulatory system. The paucity of test data has heretofore limited empirical studies of such hypotheses. The insurance industry is well-suited for such testing, however, because state-based regulation subjects an insurer to multiple regulatory jurisdictions depending on the number of states in which the insurer is licensed to sell insurance and state-by-state data for insurers is available to a much greater degree than in most other industries.

By testing hypotheses pertaining to possible benefits and effects of multi-jurisdictional regulation specific to the insurance industry, we are able to generate results that should be of interest to political leaders, regulators, investors, and, of course, the insurance industry. While particularly pertinent to ongoing debates about state versus federal insurance regulation in the United States, the potential implications can extend to the analogous debate of country-by-country regulation versus regulation by a single transnational regulator in transnational political entities, such as the European Union. While multinational studies often are confounded by heterogeneous legal systems, economic structures, and information across countries, states are relatively more homogeneous and thereby more tractable for comparative analysis across jurisdictions. In addition to offering standardized accounting data that is readily comparable across regulatory jurisdictions, the US insurance industry is unmatched in the heterogeneity related to the number of regulators faced by firms in the industry.

In this study, we empirically examine the activity of US life-health insurers during the period 1999 through 2003. We find support for the widely shared perception that insurers facing more regulators have higher general expenses. However, in the neglected side of the regulatory story, we find that these higher expenses do not translate to lower profitability. These results imply that some of the costs of complying with multiple regulatory jurisdictions may be beneficial and not just deadweight costs, which is consistent with the regulatory subsidized monitoring hypothesis. In addition, we find that single-state insurers are more profitable than multi-state insurers, which is consistent with the regulatory forbearance hypothesis. This hypothesis predicts that single-state insurers are unique in receiving favorable regulatory treatment under the state-based regulatory system, which could explain why so many single-state insurers are able to co-exist with much larger multi-state and national competitors.

Some of our control variables also generate interesting results. In contrast to findings in property-liability research, we do not find a strong relation between return and geographic or line of business concentration for life-health insurers, which implies that life-health insurers face a different relation between risk and diversification than property-liability insurers. A possible reason for this difference is that property-liability insurers face risks that are more regional in nature, and suggests that federal regulation may be more suitable for life-health insurers than for property-liability insurers.

2. Historical Background and Literature Review

Historical Background

The state versus federal debate over insurance regulation in the U. S. has roots that go back to the founding of the country.[2] In the Constitution, the Commerce Clause authorizes federal regulation over interstate commerce whereas the 10th Amendment delegates all powers to the states that are not specifically authorized to the federal government. In the *Paul v. Virginia* case in 1868, the Supreme Court ruled that insurance

[2] Historical information related to insurance regulation in this section is drawn from Harrington (2000, 2002), Baranoff and Baranoff (2003), and Bair, Donkova, Hatch, Stilkey,and Amoiradaki (2004).

is not interstate commerce, thus clarifying that states should regulate the insurance industry. With the industry experiencing price-fixing complaints in 1942, the Supreme Court reversed the *Paul* decision in 1944, holding that insurance is interstate commerce, which empowered the federal government to regulate the insurance industry. Under pressure from the insurance industry, state regulators, and the National Association of Insurance Commissioners (NAIC), Congress passed the McCarran-Ferguson Act in 1945, returning regulatory authority back to the states.

Interest in federal regulation of the insurance industry has periodically resurfaced, often in response to insurer insolvencies. In more recent years, proponents of federal regulation have focused on cost inefficiencies and delays related to the current, multi-jurisdictional structure of insurance regulation (Harrington, 2000). A big difference now is that instead of resisting federal regulation, many larger insurers are promoting the idea to level the regulatory playing field with other financial institutions. This push seemingly gained momentum after the 1999 passage of the Gramm-Leach-Bliley Act (GLBA), which eliminated barriers within the financial services industry, resulting in more direct competition from the banking and securities industries (Harrington, 2002 and Baranoff and Baranoff, 2003).

Currently, an insurer faces a different state regulator in each state in which the insurer is licensed. From a state regulator's viewpoint, insurers doing business in the state can be categorized as either *domiciled* in the state or *foreign-licensed*. This division has implications for a state's regulatory responsibility. Each insurer is incorporated, that is domiciled, in one state, and additionally must be licensed in each state in which it does business. The insurer's state of domicile has primary regulatory responsibility for the insurer's overall business. Insurers licensed in a state but domiciled in another state are considered "foreign-licensed" insurers. Of course, each state regulates what foreign-licensed insurers do within the state but relies on the insurer's state of domicile for overall supervision of the insurer. An implication of this division of regulatory responsibility is that each state regulator should have a vested interest in other regulators adequately monitoring their domiciled insurers (see, e.g., Klein, 1995 and Csiszar, 2004).

Prior Research

Research on the relation of regulation to costs and profitability in the financial services industry is rare, and we are aware of no previous study that explores possible benefits of multi-jurisdictional regulation. Franks, Schaefer, and Staunton (1998) investigate the costs of regulation for various segments of the financial services industry in the UK, US, and France. For the life insurance industry, they find that regulatory compliance costs are highest in the US and attribute this to state-based regulation. They note that their study focuses on regulatory compliance costs and that a more complete study would also consider the benefits of regulation since it is possible that some of the compliance costs may actually be beneficial and not just deadweight costs.

Grace and Klein (2000) study the relation between regulation and expenses in the US insurance industry and generally find that insurers facing more intense regulation have higher compliance costs. They note that a deficiency of their study is that some of the costs to firms caused by regulation can actually be viewed as investments with a positive net present value. They suggest that future studies should capture this by using a more general measure of financial performance, such as profitability. In other words, insurers facing greater regulation could have higher total expenses, but overall profitability may not suffer if the increased regulation provides valuable benefits. In the only regulatory-profitability study of which we are aware, Born (2001) focuses on factors that more affect property-liability insurers than life-health insurers, such as differences in rate regulation and tort reform measures across states.

With the separation of ownership and control in the modern corporation, managers have incentives to maximize their own welfare rather than the welfare of the owner (Jensen and Meckling, 1976). Therefore, owners must incur monitoring costs to ensure that managers act in the owners' best interests. Demsetz and Lehn (1985) suggest that regulators provide subsidized monitoring and disciplining of management, thereby acting as surrogate monitors, and reducing owners' monitoring expenses. This concept is known as the *subsidized monitoring hypothesis*.

Insurance researchers testing the subsidized monitoring hypothesis generally use a simple proxy for the degree of regulation—a binary variable for whether the insurer is licensed in the state of New York, which is reputed to have the most stringent regulatory environment among the states (see, e.g., Pottier and Sommer, 1998). The empirical evidence regarding the subsidized monitoring hypothesis is quite mixed. In work conducted before introduction of the hypothesis, Harrington (1982) finds that New York licensed insurers have higher expenses. Boose (1990) subsequently finds that insurers licensed in New York have relatively lower general insurance expenses, which she views as support for the subsidized monitoring hypothesis. She specifically argues that the higher costs of complying with more stringent New York regulation are more than offset by the benefits of subsidized monitoring. However, Pottier and Sommer (1998) find the opposite relation between New York licensed insurers and expenses. Wells, Cox, and Gaver (1995) find no significant relation between New York licensing and free cash flow, ultimately surmising that the New York measure may be too simplistic to accurately measure the degree of regulation.[3]

For our study, we require a measure that not only accurately reflects the degree of regulation, but also captures the multi-jurisdictional regulatory aspects that we intend to investigate. We propose the number of states in which the insurer is licensed. This measure, which we call *regulatory pressure*, is exactly equal to the number of regulators faced by the insurer unlike a New York binary variable, which simply contrasts one specific state against the other 49 states lumped together. In addition, our measure should better reflect regulatory rigor. Logically, facing more regulators should translate to more rigorous monitoring, so our measure is a suitable proxy for the degree of regulation. Researchers have found that dealing with more regulators increases regulatory compliance costs (see, e.g., Franks, Schaefer, and Staunton, 1998; Grace and Klein, 2000, and American Council of Life Insurers, 2005). Our primary mission is to examine the neglected side of the regulatory story, that is, do the benefits of facing more regulators substantially offset these higher compliance costs.

[3] In a study of insurer expenses, Grace and Klein (2000) adopt a regulatory proxy based upon the ten most restrictive state regulatory regimes as ranked by industry analyst Conning and Company (1997). New York is not among this top ten, which conflicts with the argument that New York regulation is the most stringent among the states. Empirically, Grace and Klein (2000) find their restrictive regulatory proxy to be positively related to life-health insurer expenses, but not significantly related to expenses of property-liability insurers. Other research indicates that New York licensed insurers may not be significantly different for factors such as insurance prices (Sommer, 1996) and riskiness (Cummins and Sommer, 1996; Brewer, Mondschean, and Strahan, 1997; Pottier and Sommer, 1998).

Another main objective of this paper is to investigate a possible side effect of multi-jurisdictional regulation. A large number of single-state, life-health insurers exist in the US. These relatively small insurers coexist with much larger multi-state, national, and global competitors, which should have various advantages, such as greater economies of scale, more sophisticated actuarial talent, and superior information systems. A possible explanation for this phenomenon is that the current state-by-state regulatory system provides single-state insurers with benefits that compensate for the many advantages of their larger multi-state competitors.

In their theoretical model of regulatory separation, Laffont and Martimort (1999) show that subjecting a regulated firm to more than one regulator raises the transaction costs of collusion, and thus reduces the likelihood that the regulator will be captured by a regulated firm.[4] An implication of this theory for insurance research is that single-state insurers may have unique advantages because they are better able to influence their sole regulator. The rationale is that a state regulator has more discretion in the treatment of an insurer that only does business in its state, which may result in single-state insurers receiving favorable treatment. We refer to this concept as the *regulatory forbearance hypothesis*.

The Life-Health Insurance Industry

We focus our study on life-health insurers instead of property-liability insurers for various reasons. Federal regulation arguably makes more sense for life-health, rather than property-liability insurers because life-health insurance products and regulations should be subject to less regional variation (Harrington, 2002; Bair, Donkova, Hatch, Stilkey, and Amoiradaki, 2004). For example, life insurance contracts mainly deal with mortality and investment risk, which is not especially local in character. In contrast, the exposures underwritten in property-liability contracts vary across geographical regions that are differently affected by such perils as hurricanes, earthquakes, flooding, wildfires, theft, and mold. In addition, the life-health industry has not faced the same level of periodic crisis and uncertainty posed by naturally caused catastrophic losses and shifts in the legal

[4] Laffont and Tirole (1991) state that the most pervasive method for regulated firms to capture regulators is by the incentive of future, higher-paying employment by the regulated firm.

system with regard to tort liability. Empirical evidence indicates that the life-health insurance industry has been subject to much less volatile underwriting cycles compared to the property-liability sector (Lamm-Tennant and Weiss, 1997; Browne, Carson, and Hoyt, 1999).

Also, life-health insurer data is more suitable for this study for various reasons. Life-health insurer data is not subject to the confounding influence of rate regulation to the same extent as property liability data (see, e.g., Grace and Klein, 2000). In addition, compared to property-liability insurers, earnings management is less prevalent among life-health insurers because well-established actuarial tables limit managerial discretion in setting reserves (Petroni, 1992; Gaver and Paterson, 1999; and Green, 2006).

3. Development of Hypotheses

We develop models to test hypotheses pertaining to the impact of multi-jurisdictional regulation and other variables on insurer expenses and profitability. Our discussion of these variables follows.

3.1 Regulatory Variables

Regulatory pressure

This variable expresses the degree of regulation confronting the insurer. Demsetz and Lehn (1985) propose that regulators act as surrogate monitors, which reduces owners' monitoring costs. According to agency theory, agents subject to more monitoring should incur lower expenses and deviate less from value maximizing behavior than their less monitored counterparts. Adams and Mehran (2003) contend that boards of directors are better able to monitor banks than manufacturers because of the existence of regulator reports that can be accessed by bank boards. Warfield, Wild, and Wild (1995) find evidence that managers in regulated firms manipulate accounting rules less than their non-regulated counterparts, which suggests that regulation provides monitoring that reduces opportunistic behavior by managers.

We use the number of states in which an insurer is licensed as our measure of regulatory pressure. In addition to being a measure of the number of regulatory jurisdictions the insurer faces, we contend that it is more general measure of regulatory rigor than the traditional, single-state proxy of New York licensing. The tradeoff we investigate is whether the higher cost of complying with more regulatory jurisdictions is substantially offset by subsidized regulatory monitoring that reduces the owner's monitoring costs.

Considering previous research (see, e.g. Franks, Schaefer, and Staunton, 1998 and Grace and Klein, 2000), we expect that insurers facing more regulation will have higher expenses. A finding of a neutral or positive relation between regulatory pressure and profitability would be consistent with the subsidized monitoring hypothesis and the contention that some regulatory expenses are actually productive investments not reflected in the expense data. On the other hand, if we find a negative relation between regulation and profitability, possible explanations are that the deadweight costs of multi-jurisdictional regulation overwhelm any benefits or that regulators have been co-opted and are acting in the interests of insurer managers rather than the owners.

Regulatory Forbearance

Table 1 shows that a substantial number of the insurers in our sample (about 20 percent) are single-state insurers. We explore whether these relatively small, localized insurers are able to coexist with larger multi-state insurers because of the current multi-jurisdictional regulatory system. Laffont and Martimort (1999) contend in their regulatory separation theory that subjecting firms to multiple regulators raises the transaction costs of collusion between regulators and regulated firms, which reduces the likelihood of regulatory capture. As a result, some insurance researchers apply a single-state binary variable as a measure of regulatory forbearance to control for the possibility that single-state insurers may have unique regulatory advantages.[5] The rationale is that single-state insurers are unique in that they cannot affect any other state as a foreign licensed insurer. Therefore, no other state has a vested interest in how a state deals with its single-state insurers, which gives a state more discretion in the treatment of its single-state insurers. If single-state insurers benefit from favorable regulatory treatment, we would expect them to have lower expenses and/or higher profitability than multi-state

[5] Willenborg (2000) finds that financially distressed single-state insurers are less likely to be subject to regulatory action than multi-state insurers. Grace, Klein, and Phillips (2003) find that the cost of insolvency resolution is higher for single-state insurers, suggesting that single-state insurers benefit from greater regulatory leniency. In a study of liquidating insolvent insurers, Leverty and Grace (2004) do not find single-state regulation to be a significant factor, however.

insurers, which would be consistent with the regulatory forbearance hypothesis, and one possible explanation for the existence of so many single-state insurers.[6] If our evidence shows that single-state insurers have higher returns, another possible explanation is that single-state insurers are more focused. Cummins and Nini (2002) and Liebenberg and Sommer (2006) find a negative relation between insurer diversification and returns. We attempt to control for this possibility by including a line-of-business concentration variable.

New York Licensing

As previously discussed, Boose (1990) finds that New York licensed life insurers have lower general insurance expenses and commissions, which she attributes to the stringency of New York regulation and offers as support for the subsidized monitoring hypothesis. Pottier and Sommer (1998) provide contrasting evidence that insurers licensed in New York generate higher general expenses. We find little prior research upon which to formulate expectations regarding New York licensing and profitability. Born (2001) generally finds no relationship between insurers that write premiums in New York and profitability in a property-liability study. If New York is indeed a suitable proxy for more stringent regulation, then we expect results that parallel those of our more general regulatory pressure variable. Even if we find that New York insurers have higher expenses because of stringent regulation, it is still possible for New York insurers to be as profitable as other insurers if there are benefits to the stricter regulation, which would be consistent with the subsidized monitoring hypothesis.

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[6] Such a finding could be viewed as inconsistent with the subsidized monitoring hypothesis because single-state insurers should face the least regulatory pressure among insurers, and thus benefit the least from subsidized monitoring. However, by including both the regulatory pressure and regulatory forbearance variables in the same model, the two hypotheses are mutually exclusive only in the case of single-state insurers where they have opposite predictions. With its basis in regulatory separation theory that considers single-state insurers to be unique, the regulatory forbearance hypothesis only makes predictions related to single-state versus multi-state insurers. In essence, the single-state variable is included to control for the possibility that single-state insurers are unique. Table 3 shows that single-state insurers are different from multi-state insurers for many characteristics.

The subsidized monitoring hypothesis is more general in additionally considering differences between multi-state insurers according to the degree of regulation they face. A finding in support of the regulatory forbearance hypothesis would be consistent with the argument that single-state insurers are different and that state-by-state regulation may be a possible explanation about why these insurers can coexist alongside larger multi-state insurers. This finding would also indicate that regulatory forbearance better explains single-state insurers than subsidized monitoring, but would not be a competing hypothesis for subsidized monitoring related to differences among multi-state insurers.

3.2 External Monitors

In addition to government regulators, Cummins (1988) states that insurers face other external monitors, such as independent brokers and financial rating agencies.

Independent Brokers

Grace and Timme (1992) describe insurer production/distribution structures and divide insurers into those that mainly produce insurance products and those that both produce and distribute insurance products. We similarly distinguish between insurers that distribute insurance directly or through exclusive agencies, which we denote as direct distribution, and those whose products are distributed by independent agents or brokers, which we reference as broker distribution. Cummins and Weiss (1992) note that most research on this issue indicates that direct distribution costs less and produces a higher return on equity than broker distribution. Gardner and Grace (1993) suggest that direct distribution may have lower agency costs than broker distribution, but they find no statistical differences in efficiency between the two distribution systems. Regan (1999) surmises that direct distribution systems enjoy comparative advantages in more standardized, less complex lines, but broker distribution can have advantages in more complicated lines. While Regan finds that broker distribution leads to higher expense ratios in general, she finds no statistical difference in expenses for the more heavily regulated lines. Considering the previous evidence, we expect broker distribution to be positively related to expenses and negatively related to profitability.

Financial Strength

Commonly used measures of financial strength include regulatory measures, such as the NAIC's risk-based capital (RBC) ratios and private sector measures, such A.M. Best's ratings. Pottier (1997) and Pottier and Sommer (2002) contend that Best's ratings better reflect the ability of an insurer to meet policyholder obligations and are superior overall measures of risk. Their empirical evidence in the latter study supports this contention. We therefore use Best's ratings as our financial strength measure.

Financial rating firms supply insurer monitoring services (Cummins, 1988). If the financial strength ratings published by rating agencies influence the behavior of insurer management, then we expect firms with higher ratings to have lower expense ratios. Previous research based upon property-liability insurance data reveals that firms with greater financial strength command higher premiums (see, e.g., Sommer, 1996; Cummins and Danzon, 1997; and Phillips, Cummins, and Allen, 1998). Cummins and Nini (2002) suggest that insurers with higher ratings are perceived as safer and their empirical tests reveal a positive relation between Best's rating and returns. In other words, consumers should be willing to pay more for insurance from insurers they perceive as less risky, all else equal. In light of the extant research, we expect financial strength to be negatively related to expenses and positively related to returns.

3.3 Other Firm Specific Control Variables

We include variables to control for other firm specific factors.

Separate Account Assets

Insurers are required to keep assets related to some products, such as variable life and variable annuities, separate from their general account assets because investment risk is mostly shifted to policyholders. These products are similar to mutual funds thereby exposing insurers to intense competition from other financial institutions. Browne, Carson, and Hoyt (2001) observe a negative relation between the percentage of assets in separate accounts and investment returns. Forbes (2004) states that separate account products depend on small expense charges and narrow investment spreads resulting in low profit margins. Accordingly, we expect insurers with relatively more separate account assets to be less profitable.

Size

In efficiency studies of the life insurance industry, Gardner and Grace (1993) and Cummins and Zi (1998) find that size is positively and significantly related to efficiency, which implies lower expenses. Regan (1999) and Grace and Klein (2000) observe that expenses generally decrease with size, which can be attributable to larger firms being more capable of capturing economies of scale in underwriting. Born (2001), Cummins and Nini (2002), and Liebenberg and Sommer (2006) find that larger property-liability insurers have a higher return on equity, which they attribute to the greater market power and economies of scale and lower insolvency risk of larger insurers. Similarly, Browne, Carson, and Hoyt (2001) and Greene and Segal (2004) document a positive relation between life-health insurer size and return on equity. Considering the consistency of these results, we expect size to be negatively related to expenses and positively related to profitability.

Geographic Concentration

Writing insurance across fewer geographical regions involves less managerial discretion and, thus, lower costs of monitoring managers (Mayers and Smith, 1994; Sommer, 1996; and Pottier and Sommer, 1999). By this argument, more geographically concentrated insurers are expected to have lower expenses. The analysis is more complex for returns. For an insurer, both customers and policyholders are concerned with the risk of the firm. From a policyholder's viewpoint, insurance is risky debt, and policyholders pay less for insurance if the insurer has higher default risk (Sommer, 1996; Cummins and Danzon, 1997). All else equal, a more concentrated insurer is expected to have higher default risk, which implies that policyholders will pay less for insurance from more concentrated insurers. Alternatively, from a shareholder's viewpoint, higher risk implies a higher expected return (Cummins and Nini, 2002) and empirically provide evidence of a positive relation between return and geographic concentration in property-liability studies. Liebenberg and Sommer (2006) find similar results, which they argue is support for the strategic focus hypothesis, that is, focused firms outperform more diversified firms because the costs of diversification outweigh the benefits. Considering these empirical findings, we expect geographic concentration to be negatively related to expenses and positively related to returns.

Line of Business Concentration

Similar to the argument for geographic concentration, operating in fewer lines of business involves less managerial discretion and, thus, lower control-related resource expenditures. Cummins and Nini (2002) and Liebenberg and Sommer (2006) find a positive relation between return and line of business concentration using property-liability data, which they explain with reasoning similar to that for geographic concentration. Therefore, we expect more concentrated insurers to have both relatively lower expenses and higher returns.

Organizational Form

Stock insurers should have lower owner-manager agency costs while mutual insurers should have lower owner-policyholder agency costs (see, e.g., Mayers and Smith, 1988). Empirical results are mixed for the relation between organizational form and expenses. Fields (1988) finds no significant differences between the cost structures of stock and mutual life insurers, Regan (1999) finds that stock insurers have higher expense ratios, and Grace and Klein's (2000) results indicate just the opposite. Empirical results are more consistent for the relation between organizational form and profitability. Cummins and Nini (2002) and Liebenberg and Sommer (2006) document that stock insurers have higher returns than mutual insurers. Given the conflicting theories and very mixed empirical results in the case of expenses, we have no expectation about the relation between organizational form and expenses. However, the empirical evidence indicates that stock insurers will be more profitable.

Group Affiliation

Petroni and Shackelford (1995) argue that multistate, property-liability insurers can reduce the cost of complying with multiple regulators by organizing as a group and setting up each group member to be licensed in a small number of states. Grace and Klein (2000) argue that group economies of scope may be present that enable insurance groups to provide services at lower costs than unaffiliated insurers. However, their empirical results and a property-liability study by Regan (1999) indicate that group members have higher expense ratios than unaffiliated insurers. A tradeoff most likely exists that diminishes any group economies because a more complex group structure entails higher organizational costs (Colquitt and Sommer, 2003). Because an insurance group can allow an affiliated insurer to fail while, at the same time, protecting its other assets, consumers may view a group-affiliated insurer as riskier and thus pay lower premiums (Cummins and Sommer 1996). Supporting evidence by Liebenberg and Sommer (2006) using property-liability data shows a negative relation between group affiliation and returns. Our expectations reflect the empirical work, which indicates that group-affiliated insurers have higher costs and lower returns.

Non-admitted Assets

Assets are classified as non-admitted if considered as having little value for solvency regulation purposes. Gardner and Grace (1993) contend that these are non-productive assets and are a good proxy for perquisite consumption by management. Their empirical results indicate a positive relation between non-admitted assets and return on equity, which runs counter to expectations. Meador, Ryan, and Schellhorn (2000) document a negative relation between non-admitted assets and X-efficiency, as expected. Adopting the Gardner and Grace view of non-admitted assets as non-productive and a signal of inefficiency, we expect to find a positive relation to expenses and a negative relation to return.

Underwriting Risk

Different lines of business may be subject to varying regulations and expose insurers to different underwriting risks (Pottier and Sommer, 1997 and Cummins, Tennyson, and Weiss, 1999). Therefore, we control for variation in insurer line of business exposure by including a variable for each major line of business.

Investment Risk

While underwriting risk arguably represents the primary source of insurer default risk (Downs and Sommer, 1999), investment risk is another major source of insurer risk (Cummins and Nini, 2002). Therefore, we control for investment mix heterogeneity by including variables that represent the percentage of total assets invested in each of the major asset categories (cash and short-term investments, bonds, stocks, mortgages and real estate).

State Market Share Control Variables

Considerable differences exist between states in terms of size, budget, and sophistication of state insurance departments and state demographics (see, e.g., Klein, 1995; Brewer, Mondschean, and Strahan, 1997; Hall, 2000). In addition, the two main hypotheses in the industrial organization literature, i.e. structure-conduct-performance and efficient structure, both predict a positive relation between market share concentration and performance (see, e.g., Gardner and Grace, 1993; Bajtelsmit and Bouzita, 1998; and Liebenberg and Sommer, 2006). Therefore, we include state control variables that both indicate whether an insurer is licensed in a state and the insurer's market share in each state.

4. Research Design

We next discuss the data, models, and methods we implement to investigate the relation of the previously discussed variables to insurer expenses and profitability.

4.1 Data

Our primary data source is the NAIC InfoPro Database for the period 1999 through 2003. We omit firms that do not have positive assets, premiums, or surplus. We also follow Cummins, Tennyson, and Weiss (1999) in excluding insurers that have an average ROE greater than +100% or less than -100% over the years in our sample. Like Grace and Klein (2000), we omit companies with a ratio of expenses to premiums less than zero or greater than one. We focus on the 50 states, so do not include insurers that only do business in the District of Columbia or the four territories. Firms that are pure reinsurers, that is, only have reinsurance assumed, also are excluded. We use the A. M. Best Key Rating database for two of our variables—financial strength and distribution system. After merging the datasets and retaining only insurers with complete information, our final sample consists of 734 insurers in 1999, 723 in 2000, 721 in 2001, 725 in 2002, and 715 in 2003.

4.2 Empirical Models and Estimation Methods

This section describes the empirical models and estimation methods for our expense and profitability models.

Expense Model

We combine our five years of data into a panel and our expense model is as follows:

$$\begin{aligned} Exp_{it} = \; & \beta_0 + \beta_1 RegPrs + \beta_2 RegFor + \beta_3 NY + \beta_4 Broker + \beta_5 FinStr + \beta_6 SepAct + \beta_7 Size \\ & + \beta_8 GeoCon + \beta_9 LOBCon + \beta_{10} Stock + \beta_{11} Group + \beta_{12} NonAdm + \\ & + \beta_{13\text{-}18} UndRisk + \beta_{19\text{-}23} InvRisk + \beta_{24\text{-}72} StateMS + \beta_{73\text{-}76} Year + \varepsilon_{it} \qquad \textbf{(1)} \end{aligned}$$

where:

Exp	=	relative measure of expenses incurred,
RegPrs	=	regulatory pressure,
RegFor	=	regulatory forbearance,

NY	=	New York licensed,
Broker	=	distribution system,
FinStr	=	financial strength rating,
SepAct	=	separate account assets,
Size	=	firm size,
GeoCon	=	geographic concentration,
LOBCon	=	line of business (LOB) concentration,
Stock	=	organizational form,
Group	=	group affiliation,
NonAdm	=	non-admitted assets,
UndRisk	=	underwriting risk,
InvRisk	=	investment risk,
StateMS	=	state consumer price index, and
Year	=	year indicators.

The expense measure is the total general expenses paid during the year, including both insurance and investment expenses, scaled by direct premiums written.

Regulatory pressure is proxied by the number of states in which the insurer is licensed. Regulatory forbearance is defined as one for single-state insurers and zero otherwise. Our New York variable is one if the insurer is licensed in New York and zero otherwise. Broker is set to one if the insurer uses independent broker distribution and zero otherwise. We follow Baranoff and Sager (2003) by classifying an insurer as using an independent broker system if the A.M. Best Key Rating service assigns it a marketing code that contains a B (e.g., B, BA, AB, BD, and DB). Under the Best Key Rating scheme, B, A, and D indicate broker, agent, and direct marketer, respectively. We use Best's ratings as our financial strength measure. Following Pottier and Sommer (2002) we estimate financial strength based upon A.M. Best's financial strength ratings as follows: A++, A+ = 5; A,A- = 4; B++,B+ = 3; B,B- = 2; C++,C+ = 1; and other = 0.

The separate accounts measure is the ratio of separate account assets to total assets. Size is defined as the natural logarithm of total admitted assets. Geographic concentration is proxied by a geographic Herfindahl index, which is the sum of squared percentages of premiums written in each state. Line of Business *(LOB)* concentration is defined as the LOB Herfindahl index, which is the sum of squared percentages of premiums written in each line of business. We use the same lines as Pottier and Sommer (1997) to calculate this index: industrial life, ordinary life, individual annuities, credit life, group life, group annuities, group accident and health, credit accident and health, and other. Stock is defined as one if the insurer is a stock organization and zero otherwise. Group affiliation is defined as one if the insurer is a member of a group and zero otherwise. Non-admitted assets is measured by the ratio of non-admitted assets to total assets.

We apply premiums written in a particular line of business scaled by the total premiums written by the insurer, as our underwriting risk measure for all lines of business. The six lines of business used are three individual lines (life, annuities, and accident and health) and three group lines (life, annuities, and accident and health). Investment risk variables are defined as the percentage of assets invested in each of the major asset categories (cash and short-term investments, bonds, stocks, mortgages, and real estate). For each state, a state market share variable is defined as the insurer's market share in the state if the insurer is licensed in the state or zero otherwise. The year variables are binary variables set to indicate the year.

Estimation Method for Expense Model

For our expense investigation, we use pooled OLS, random effects and fixed effects estimation directly on equation 1. We perform tests to determine the appropriate estimation method. A LaGrange multiplier (LM) test is used to determine whether pooled OLS is more suitable than the random or fixed effects approaches. We apply a Hausman test to determine whether random effects is more appropriate than fixed effects. For pooled OLS and fixed effects estimation of the expense model, we estimate White's heteroskedasticity consistent covariance matrix as described by Greene (2002, pp. E6-1 and E8-23). For random effects estimation, a two-step feasible GLS procedure is used (Greene, 2002, p. E8-14).

Profitability Model

We combine our five years of data into a panel and our profitability model is as follows:

$$\begin{aligned} Prof_{it} = \; & \beta_0 + \beta_1 RegPrs + \beta_2 RegFor + \beta_3 NY + \beta_4 Broker + \beta_5 FinStr + \beta_6 SepAct + \beta_7 Size \\ & + \beta_8 GeoCon + \beta_9 LOBCon + \beta_{10} Stock + \beta_{11} Group + \beta_{12} NonAdm + \\ & + \beta_{13\text{-}18} UndRisk + \beta_{19\text{-}23} InvRisk + \beta_{24\text{-}72} StateMS + \beta_{73\text{-}76} Year + \varepsilon_{it} \qquad \textbf{(2)} \end{aligned}$$

The dependent variable in equation 2 is profitability, which we measure by the return on equity (ROE). We use ROE, rather than return on assets, as our measure of profitability because it better captures not only underwriting profit from all lines of business, but also investment results (Born, 2001). Petroni, Ryan, and Wahlen (2000) also argue that among profitability measures, ROE is a more precise indicator of the effect of regulatory burdens on profitability. Our specific proxy for ROE is the ratio of net income to capital and surplus. We use net income before federal income taxes and policyholder dividends, which Cummins and Nini (2002) argue is a better measure of operational performance. For measures used for all other variables in equation 2, refer to the descriptions in the Expense Model section.

Estimation Method for the Profitability Model

For our profitability model, we use three estimation techniques. Initially, we use pooled OLS, random effects, and fixed effects estimation on equation 2, similar to what we did for the expense model. However, a logical argument is that more profitable insurers may be more likely to expand the number of states in which they operate. If so, regulatory pressure and regulatory forbearance may be endogenous or jointly determined with profitability. To handle this possibility, we also implement 2SLS estimation by using the reduced form predicted values of regulatory pressure and regulatory forbearance in the profitability equation. However, regulatory pressure and regulatory forbearance are non-linear variables, which could be a problem for 2SLS estimation because it assumes linear reduced forms. Therefore, we also implement non-linear, simultaneous-equation estimation.

Our main equation of interest is equation (3a) below, which has a continuous linear dependent variable, that is, profitability. The simultaneous equations need to account for the discrete nature of other two dependent variables. In particular, the regulatory pressure variable in equation (3b) is a positive integer count variable and the regulatory forbearance variable in equation (3c) is a binary variable. Therefore, we are dealing with the estimation of a system that contains both linear and non-linear equations. The general formulation is as follows:

$$\text{Prof} = \gamma_1 + \gamma_2\text{RegPrs} + \gamma_3\text{RegFor} + W\theta + \varepsilon_1 \quad \textbf{(3a)}$$

$$= X_1\beta_1 + \varepsilon_1,$$

$$\text{RegPrs} = h_2(\beta_2, X_2) + \varepsilon_2 \quad \textbf{(3b)}$$

$$\text{RegFor} = h_3(\beta_3, X_3) + \varepsilon_3 \quad \textbf{(3c)}$$

We estimate this mixed linear/nonlinear system of equations using multiple equation generalized method of moments (GMM) estimation.[7] The general idea of GMM estimation is that parameter estimates are chosen to yield sample moments that are equal to the analogous population moments.

Given a set of instrumental variables $z_{n,}$, such that

$$E[z_n \, \varepsilon_{mn}] = 0 \quad \textbf{(4)}$$

where n = 1 to N observations and m = 1 to M equations,

the sample analog for equation (4) is as follows:

$$\frac{1}{N}\sum_{n=1}^{N} z_n [y_{mn} - h_m(\beta, x_n)] = 0, \text{ m = 1 to M} \quad \textbf{(5)}$$

Assuming,

$$\frac{1}{N} Z'\Omega_{lm} Z = E\left[\frac{Z'\varepsilon_l \varepsilon'_m Z}{N}\right] \quad \textbf{(6)}$$

the general criterion for our GMM estimation is

$$F = \sum_{l=1}^{M}\sum_{m=1}^{M} \frac{\varepsilon_l(\beta)' Z}{N}\left[\frac{Z'\Omega_{lm} Z}{N}\right]^{lm} \frac{Z'\varepsilon_m(\beta)}{N} \quad \textbf{(7)}$$

where the middle term in brackets is the *lm*[th] block of the inverse of the matrix.

In matrix form with three equations, this is:

$$F = \begin{bmatrix} \varepsilon_1(\beta_1)' Z / N \\ \varepsilon_2(\beta_2) Z / N \\ \varepsilon_3(\beta_3) Z / N \end{bmatrix}' \begin{bmatrix} \omega_{11} & \omega_{12} & \omega_{13} \\ \omega_{21} & \omega_{22} & \omega_{23} \\ \omega_{31} & \omega_{32} & \omega_{33} \end{bmatrix}^{-1} \begin{bmatrix} Z'\varepsilon_1(\beta_1) / N \\ Z'\varepsilon_2(\beta_2) / N \\ Z'\varepsilon_3(B_3) / N \end{bmatrix} \quad \textbf{(8)}$$

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[7] GMM is a general class of estimators that includes most other familiar estimators as special cases, such as least squares, nonlinear least squares, and instrumental variables. In addition, GMM extends beyond these estimators by allowing model formulation that does not make strong distributional assumptions and allows researchers to use information to optimally identify models. In the following description, we draw heavily on Newey (1993), Hayashi (2000), Greene (2002), and Greene (2003).

where $\varepsilon_m(\beta_m) = y_m - h_m(\beta_m, X)$ are the residuals[8] and for example, ω_{13} is estimated by

$$\hat{\omega}_{13} = \frac{1}{N}\sum_{n=1}^{N} z_n z'_n (y_{1n} - x'_{1n}\hat{\beta}_1)[y_{3n} - h_3(\hat{\beta}_3, x_{3n})] \quad \textbf{(9)}$$

$\hat{\beta}_m$ is a consistent estimator of β_m, with *m* representing the equation number, and for example, y_{37} would be the 7th observation of the dependent variable for the 3rd equation. For GMM estimation, the *optimal* weighting matrix first needs to be estimated, which is the asymmetric covariance matrix of empirical moments as can be seen in equation (9).

GMM estimation occurs in several passes. First, we employ equation-by-equation nonlinear instrumental variables to get consistent but inefficient initial estimators ($\hat{\beta}_m$) for estimating the optimal weighting matrix. Next, these initial $\hat{\beta}_m$ are used to estimate each block ($\hat{\omega}_{lm}$ in equation 8) of the optimal weighing matrix. Then the first order conditions for GMM estimation are:

$$\frac{\partial \hat{F}}{\partial \beta_m} = \sum_{l=1}^{M}\sum_{m=1}^{M}\left(\frac{X_l^0(\beta)' Z}{N}\right)\hat{\omega}^{lm}\left(\frac{Z'\varepsilon_m(\beta)}{N}\right) = 0 \quad \textbf{(10)}$$

where $X_l^0 = \dfrac{\partial f(x_{l,}\beta)}{\partial \beta}$, which is a matrix of pseudoregressors from the linearization of the the non-linear equations in the system, and $\hat{\omega}^{lm}$ is the *lm*th block in the inverse of the estimate of the center matrix in equation (8).

The GMM estimators are the estimators that minimize equation (10). These estimators are:

[8] In equation (3a), the dependent variable, *Prof,* is a continuous linear variable in which case the residuals are $\varepsilon_1(\hat{\beta}_1) = \Pr of - X_1\hat{\beta}_1$. The other two equations have nonlinear dependent variables. In equation (3b), the dependent variable, *RegPrs*, is a count variable. Following Greene (2003, pE11-23), we model this by $h_2(\beta_2, X_2) = \exp(x_2'\beta_2)$ in which case the residuals are $\varepsilon_2(\hat{\beta}_2) = \mathrm{Re}\, g \Pr s - \exp(x_2'\hat{\beta}_2)$. In equation (3c), the dependent variable, *RegFor*, is a binary variable. Following Bertschek and Lechner (1998), we model this by $h_3(\beta_3, X_3) = \Pr(y = 1 \mid x) = \int_{-\infty}^{x'\beta}\phi(t)dt = \Phi(x_3'\beta)$ in which case $\varepsilon_3(\hat{\beta}_3) = \mathrm{Re}\, gFor - \Phi(x_3'\hat{\beta}_3)$.

$$\begin{bmatrix} \hat{\beta}_{1,GMM} \\ \hat{\beta}_{2,GMM} \\ \hat{\beta}_{3,GMM} \end{bmatrix} = \begin{bmatrix} X_1' Z\hat{\omega}^{11} Z' X_1 & X_1' Z\hat{\omega}^{12} Z' X_2 & X_1' Z\hat{\omega}^{13} Z' X_3 \\ X_2' Z\hat{\omega}^{21} Z' X_1 & X_2' Z\hat{\omega}^{22} Z' X_2 & X_2' Z\hat{\omega}^{23} Z' X_3 \\ X_3' Z\hat{\omega}^{31} Z' X_1 & X_3' Z\hat{\omega}^{32} Z' X_2 & X_3' Z\hat{\omega}^{33} Z' X_3 \end{bmatrix}^{-1} \begin{bmatrix} \sum_{m=1}^{M} X_1' Z\hat{\omega}^{1m} y_m \\ \sum_{m=1}^{M} X_2' Z\hat{\omega}^{2m} y_m \\ \sum_{m=1}^{M} X_3' Z\hat{\omega}^{3m} y_m \end{bmatrix} \quad \textbf{(11)}$$

For the non-linear equations in the system, the X_m in the above matrix will be the pseudoregressors described above. The asymptotic covariance matrix for this GMM estimator is the inverse matrix in equation (11) times N. The standard errors for the GMM estimators are extracted from this matrix. We use the Newey-West technique in the block by block calculation of the $\hat{\omega}_{lm}$ in equation (8) to account for heteroskedastic and autocorrelated error disturbances. As recommend by Greene (2003, p546), we use a lag length of $N^{1/4}$. This is a general full-information GMM estimator for the system of equations shown in 3a to 3c. Other estimators, such as 2SLS and 3SLS, are special cases of this general GMM estimator by assuming certain restrictions on $\hat{\omega}_{lm}$. This general GMM estimator will be more asymptotically efficient than even 3SLS if the disturbances are heteroskedastic and/or autocorrelated.

Our instruments are all the other variables in the model. More efficient estimators are obtained by using nonlinear functions of the instruments (Wooldridge, 2002). We use squares and cross-products of the instruments. We apply various algorithms and try different sets of starting values to be confident that our results are for a global rather that a local minimum. These algorithms are nonlinear optimization programs that utilize gradient methods to minimize the negative of the log likelihood. For our data, the Broyden, Fletcher, Goldfarb, Shanno (BFGS) algorithm more successfully leads to convergence than the other algorithms. For our GMM results shown in Table 7, the first derivatives related to our parameters range from 1.4D-03 to 2.7D-06, which are all close enough to zero to ensure confidence that true convergence occurred. In our case, we define convergence as when the absolute value of g′Hg becomes less than 1.0D-06, where g is the gradient, that is, the vector of first derivatives, and H is the inverse of the Hessian, that is, an estimate of the asymptotic covariance matrix of the coefficient estimates.

5. Results

We first report and discuss summary data and statistics in this section. Regression results are analyzed subsequently.

5.1 Summary Data and Statistics

The results in Table 1 indicate a bimodal distribution with a large percentage of insurers licensed in either one state or in 49 or 50 states. In our final sample, about 21 percent of the insurers are licensed in one state and about 25 percent are licensed in 49 or 50 states. An interesting question is whether this clustering at the two extremes implies any specific advantages to being licensed in one state or almost all states and, if so, whether the characteristics of companies in the two groups are different. Part of this could be driven by stringent New York regulation as argued by Pottier and Sommer (1998), or by potential advantages of single-state insurers described previously. We consequently must control for both single-state and New York insurers in our models.[9]

Table 2 groups insurers into four categories: insurers that are licensed in one to five states, six to 25 states, 26 to 45 states, and 46 to 50 states. About two-thirds of the insurers are licensed in either one to five states or 46 to 50 states. On average, insurers licensed in 46 to 50 states have lower expense ratios and higher ROEs than insurers licensed in one to five states, which is consistent with subsidized monitoring. As expected, an insurer's total assets increase with the number of states in which the insurer is licensed.

Insurers licensed in fewer states, on average, have much lower Best's ratings, even though they hold more capital and are less leveraged than insurers licensed in more states. We also note that insurers licensed in fewer states are, on average, more concentrated by line of business. The percentage of insurers with group affiliation increases with the number of states in which the insurers are licensed. Insurers licensed in one to five states have lower percentages of business in the individual life and annuity lines and the group life and annuity lines, but a higher percentage of business in the group

[9] Another reason to control for New York licensing and single-state measures in the same model are the possibly confounding influences related to the approximately 15% of single-state insurers in our sample that are licensed in New York.

accident and health lines. On the investment side, insurers licensed in one to five states have a much higher percentage of their investment holdings in cash.

Table 3 separates insurers into single-state and multi-state categories. We observe that single-state insurers have significantly higher expense ratios, but their ROEs are not significantly different from multi-state insurers. Single-state insurers generally are much smaller as measured by total assets, are more concentrated by line of business, have a higher percentage of their business in riskier lines of business (group accident and health), and have much lower financial strength ratings. Of course, many of these univariate differences between single and multi-state insurers could be related to other factors such as differences in firm size, so it is important to conduct tests in a multivariate setting.

Table 4 indicates that Texas has the most licensed insurers while New York has the least, but these two states are number one and two in both the number of domiciled and single-state insurers. Looking at the total premiums written in each state, New York is the second largest insurance market after California. The evidence in Table 4 is consistent with the Pottier and Sommer (1998) argument that insurers attempt to avoid the extraterritorial application of stringent New York regulation by setting up a single-state, New York affiliate to isolate the rest of the group from New York regulation. Of the 128 insurers that are licensed in 49 states, only five of these insurers are licensed in New York. In addition, we find that all 22 New York single-state insurers are group affiliated.

From the previous evidence, one might expect that a major proportion of premiums written in New York would be written by single-state insurers. However, we find that less than 10% of premiums written in New York are by single-state insurers, and that eleven other states have a higher proportion of premiums written by single-state insurers. Additionally, New York domiciled insurers write the most foreign premiums, so the extraterritorial application of stringent New York regulation to New York-licensed insurers does not overtly translate into a competitive disadvantage outside of New York.

Table 5 reports additional means of selected data. Compared to the national average, the average New York domiciled insurer has a higher ROE, amount of assets, Best's rating, leverage, percent of assets in separate accounts, and reinsurance ratio, and is about the same as the national average for the expense and RBC ratios.

5.2 Regression Results

Tables 6 and 7 show the expense and profitability model results respectively. Estimation includes all the variables shown in equations (1) and (2) unless noted otherwise, but the tables show results only for the first 12 variables. The remaining variables are control variables for which we make no predictions, and thus omit to reduce clutter in the tables.

Expense model results

The LaGrange multiplier (LM) test results indicate that the fixed and random effects methods are more suitable than pooled OLS estimation, while the Hausman test indicates that fixed effects is more appropriate than random effects estimation. We show results for all three estimation methods in the tables, but the description of the results are for fixed effects only.

The regulatory pressure variable is positive and significantly related to the expense ratio at the one percent significance level. While these results are not surprising or unexpected, the complete story of whether some of these expenses are beneficial will have to wait for the profitability results. The insignificant regulatory forbearance variable indicates that any regulatory advantage of single-state insurers does not translate into lower expenses relative to multi-state insurers.

Using the traditional measure of New York licensing as the measure of regulatory stringency, we observe a positive relation between New York licensed insurers and expense ratio, which is consistent with the results of Pottier and Sommer (1998), and supports the argument that more strict regulation leads to higher compliance costs. The financial strength variable is negative and significantly related to the expense ratio, which supports Cummins' (1988) argument that financial rating firms provide insurer monitoring services, and our expectation that managers are motivated to attain and retain higher ratings by keeping expenses in check.

The percent of assets in separate accounts is positively and significantly related to the expense ratio. Size is significantly and negatively related to the expense ratio, which is consistent with most previous studies. The line of business concentration variable is negative and significant, which supports the argument that more focused firms have lower expenses. The stock variable is not significantly related to the expense ratio, which suggests that mutual and stock insurers are sorted into lines of business that allow them comparative advantages in minimizing agency costs, so that differences in cost efficiency will not be apparent (Cummins and Zi, 1998).

The independent broker variable is significant and unexpectedly negative, which contradicts previous work that finds no expense differences between distribution systems or that insurers using independent brokers have higher expenses. A possible explanation is that, like financial rating agencies, the monitoring provided by independent brokers encourages insurer managers to keep expenses down. The geographic concentration variable is not significant, which contradicts the managerial discretion argument of lower monitoring costs for managers of more geographically concentrated insurers. Life-health insurance products are arguably less subject to regional variation than property-liability products, which can make it less costly to monitor widely dispersed managers.

Group affiliation is significant and inversely related to the expense ratio. These results contradict previous empirical findings but are in line with the theoretical prediction that group economies of scope may offset any higher costs of the more complex group structure. The relation between the percent of non-admitted assets and expense ratio is insignificant, which contradicts the contention that a higher percentage of non-admitted assets is a signal of more inefficient management.

Profitability model results

Table 7 shows the multivariate results for the profitability model of equation 3a. We show the results for GMM, 2SLS, and OLS estimation. The regulatory pressure variable is positively related to profitability in all cases and significant for two of the three estimation methods.[10] Even though facing more regulators leads to higher costs, it does

[10] To investigate a possible non-linear relation between profitability and our regulatory pressure variable, we also run an OLS regression that includes the square of the regulatory pressure variable. The sign of this

not translate to lower profitability. This result implies that the increased cost of complying with more regulators is offset by some type of benefit from being subjected to more regulators, which is consistent with the subsidized monitoring hypothesis. Our regulatory forbearance variable is positively related to profitability in all cases. This indicates support for insurers benefiting when they only have to deal with one regulator, which is consistent with the regulatory forbearance hypothesis. Recall from Table 1 that insurers tend to cluster at the two ends of the spectrum, with the greatest number of insurers either licensed in one state or 49 or 50 states. Perhaps a characteristic of state-by-state regulation is that it allows a great variety of insurers to co-exist, with each following strategies that allow survival in the many, varied regulatory niches spawned by state-based regulation.

Similarly, the results in Tables 6 and 7 indicate that even though we find evidence that New York licensed insurers have significantly higher expense ratios, they do not appear to be any less profitable than insurers not licensed in New York. Once again, this result suggests that some expenses related to more stringent regulation may actually be investments that end up improving the bottom line, which is consistent with the subsidized monitoring hypothesis. The independent broker variable is insignificant in the OLS and 2SLS results but negative and significant in the GMM estimation. The GMM results are in agreement with most previous research, which finds that broker distribution produces lower returns than direct distribution. Financial strength has a significantly positive relation to ROE in all cases, which supports the line of reasoning that consumers pay attention to financial strength ratings and will pay more for insurance from insurers they perceive as being safer.

The percent of assets in separate accounts is significantly and negatively related to ROE indicating that separate account products have relatively lower profit margins as expected. The stock organizational form variable is positively related to return and significant in the OLS and GMM results, providing some support for previous research and the argument that stock insurers seek out higher return opportunities. The percent of assets that are non-admitted is negatively related to profitability in all cases and

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variable is negative, which suggests that profitability increases as the number of regulators an insurer faces increases, but at a decreasing rate. However, the variable is not significant at any reasonable significance level (p-value is 0.21) indicating the relation is roughly linear.

significant in two cases, which is consistent with the argument that these assets are non-productive.

Size is positive and significant in the GMM results as expected, but insignificant in the OLS and 2SLS regressions, which differs from the findings of previous studies.[11] In disagreement with previous property-liability research findings, our results indicate no relation between geographic concentration and profitability for life-health insurers. A possible explanation is that geographical diversification is not as important in reducing risk for life-health insurers as for property-liability insurers. Also, contradicting previous findings in the property-liability area, our line-of-business (LOB) concentration variable is not significant in any case. Perhaps higher LOB business concentration is not as strong a risk factor as in the property-liability area, where certain lines are exposed to catastrophic losses. The group affiliation variable is insignificant. Even though group affiliated insurers have lower expenses in our expense ratio model, higher returns are not produced. A possible explanation is that lower expenses are counteracted by lower premiums, which supports the argument that that consumers pay less for insurance from group affiliated insurers because insurance groups have the option of letting a struggling group member fail.[12]

Diagnostics and Robustness

Correlation analysis reveals Pearson coefficients with an absolute value greater than 0.50 among various combinations of the following variables: regulatory pressure, regulatory forbearance, financial strength, size, and geographic concentration. We therefore

[11] As described below in the Diagnostics and Robustness section, size becomes positive and significant in the OLS results when we use an alternate specification for the 50 state-related control variables suggesting that certain specifications of these control variables co-opt the explanatory power of the size variable.

[12] To handle the possibility that decisions on the number of states in which to operate is made at the group rather than the individual insurer level, a regression with data aggregated by group would be informative. However, our regulatory pressure, regulatory forbearance, NY licensed, and independent broker variables are impossible to aggregate for a group. For example, regulatory forbearance is a binary variable to indicate whether the insurer is licensed in only a single state, resulting in an insurmountable aggregation problem if a group contains both single and multiple state insurers. We do investigate whether the other independent variables in the main regression are sensitive to group affiliation by splitting insurers into group and non-group subsamples and running separate GMM regressions for the subsamples. Overall, most of the independent variables are not sensitive to group affiliation. The only differences between the two subsample results are for the NY licensed, separate account assets, and size variables.

computed variance inflation factors (VIFs), which were all below 4.5, indicating that collinearity is unlikely to be a problem.

We try an alternative for controlling for differences between states. In the original specification, we use 50 state market share variables that are equal to the insurer's market share in the state if the insurer is licensed in the state, and zero if the insurer is not licensed in the state. In the alternative, we use 50 state consumer price index (CPI) variables that indicate the consumer price index in each state in which the insurer is licensed, and zero if the insurer is not licensed in the state. The purpose of the alternative specification is to control for differences in costs between states so all that is left is the regulatory burden. Table 8 shows the results for this alternative CPI specification for the OLS regressions for the expense and profitability models. In the expense models in Tables 6 and 8, the same variables are significant in the two OLS FEM regressions, though the variables tend to be more significant in Table 6, which uses 50 state market share control variables. In the profitability models in Tables 7 and 8, there are three differences in the two OLS FEM regressions. The most substantial change is that in agreement with most previous results, size is significant at the 10% level when using the 50-state CPI data in Table 8 unlike in Table 7 where size is very insignificant when using the 50-state market share variable data. Two less drastic changes are that the geographic concentration variable becomes significant and the stock variable becomes insignificant when the 50-state CPI data is used.

We also test for robustness using different coding for our financial strength variable. Epermanis and Harrington (2006) code their financial strength variable with finer gradation than Pottier and Sommer (2002). Specifically, they estimate financial strength based upon A.M. Best's financial strength ratings as follows: A++ = 10, A+ = 9, A = 8, A- = 7, B++ = 6, B+ = 5, B = 4, B- = 3, C++ = 2 , C+ = 1, and other = 0. We find no significant differences in the results between the two specifications.

Conclusion

This paper investigates possible benefits and effects of the current multi-jurisdictional regulatory system faced by insurers doing business in the United States. With increasingly direct competition from federally-regulated financial services firms, some insurers are calling for a change in the long-existing, state-based regulatory system. A main argument is related to the high costs for multi-state insurers to comply with this multi-jurisdictional system. While there is no major disagreement on the higher costs of facing more regulators, possible benefits of the current system have not been investigated in the academic literature. Before making major changes, both costs and benefits of the current system should be investigated to reduce the likelihood of unintended consequences.

An important issue is whether any of the expenses of complying with multi-jurisdictional regulation translate into benefits that would be reflected in our return model. Drawing on the subsidized monitoring hypothesis of Demsetz and Lehn (1985), we investigate the relation of various factors to the expense and profitability of insurers. We especially focus on the number of regulators faced by the insurer. Our findings indicate that an increase in the number of regulators faced by an insurer is positively related to the expense ratio as expected, but also positively or not related to profitability depending on the estimation method. These results are consistent with the argument that the high costs of facing more regulators are substantially offset by benefits, such as the subsidized monitoring provided by regulators. The results for the NY licensing variable also provide some support for the subsidized monitoring hypothesis.

We also investigate single-state insurers, whose existence in large numbers is surprising considering the many advantages of their larger multi-state insurers. Motivated by the regulatory separation theory of Laffont and Martimont (1999), we propose the regulatory forbearance hypothesis as an explanation for the existence of so many single-state insurers. These insurers are unique in having to deal with only a single regulator. Since no other state regulators have a vested interest in monitoring a single-state insurer, a regulator will have more discretion in how it treats its single-state insurers relative to how it treats multi-state insurers. In our results, single-state insurers are not statistically different from multi-state insurers for expense ratios, but have greater profitability. The profitability results support an implication of the regulatory forbearance hypothesis, that is, regulated firms dealing with only one regulator are more likely to receive favorable regulatory treatment relative to their larger multi-state competitors. These results suggest that a side effect of the current state-based regulatory system is that it allows the existence of a large number of single-state insurers.

Results for some of our control variables are revealing. Our evidence suggests there is not a strong relation between return and geographic or line of business concentration for life-health insurers in contrast to the positive relation found in property-liability research. These results imply that life-health insurers face a different relation between risk and concentration than property-liability insurers. A possible explanation is that unlike life-health insurers, property-liability insurers face risks that are more regional in nature and deal in lines of business that are more subject to catastrophic losses. These results imply that federal regulation may make more sense for life-health than for property-liability insurers.

We envision several interesting avenues for future research. Further theoretical and empirical research on why insurers seem to cluster at the two extremes (with a significant portion licensed in one, 49, or 50 states) impresses as warranted. We are interested in the determinants of this separation and whether and how insurers are exploiting niches in the diverse regulatory environment provided by state-based regulation.

If federal regulation becomes a reality, will it render some insurers' strategies obsolete? Would single-state insurers lose an important regulatory advantage, be overwhelmed by large nationwide insurers, and cease to exist? If so, would unique products for niche markets be lost with the demise of single-state insurers? Or does the current state-based regulatory system simply protect small inefficient insurers that do not add anything positive? Does the current system prevent the even spread of uniform insurance products across states? Does it prevent large insurers from realizing the full benefits of returns to scale?

The US insurance industry data is well-suited for testing multi-jurisdictional regulatory issues. Our results should prove interesting beyond the US insurance industry to financial services regulation worldwide as transnational political unions struggle with analogous issues in a globalizing economy. The state-based regulatory system of the

U.S. should provide a unique laboratory for testing many of these issues in future research.

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Table 1: Selected Data for Insurers by Number of States in which Insurer is Licensed

No. of States in Which Licensed	No. of Ins.	Means for Each Category									
		ROE	Exp. Ratio	Assets	Ins. Lever.	RBC Ratio	ReIns. Ratio	Sep. Acct. %	Ind. Broker %	Group A&H %	Cash %
1	147	0.070	0.26	1.3E+08	3.5	14.0	0.083	1.9%	17.0%	36.9%	26.2%
2	38	0.071	0.23	4.8E+08	2.3	18.2	0.090	4.2%	23.7%	28.1%	14.9%
3	14	0.014	0.22	5.3E+08	5.6	11.3	0.151	6.7%	35.7%	17.2%	6.9%
4	8	0.056	0.30	1.6E+08	5.4	15.9	0.134	0.3%	0.0%	25.3%	11.9%
5	11	0.035	0.30	7.2E+07	1.5	10.4	0.161	0.0%	27.3%	42.8%	15.1%
6	13	0.040	0.30	2.7E+08	4.7	10.9	0.092	6.6%	30.8%	14.8%	11.8%
7	14	0.071	0.30	5.3E+08	4.1	13.5	0.175	0.0%	28.6%	20.1%	9.5%
8	4	0.084	0.17	2.5E+08	5.1	8.8	0.033	0.0%	25.0%	8.3%	3.3%
9	5	0.068	0.18	5.1E+08	2.3	12.4	0.090	17.1%	40.0%	2.5%	11.8%
10	9	0.041	0.21	4.4E+08	5.3	7.9	0.196	2.0%	44.4%	16.7%	6.2%
11	7	0.102	0.27	3.3E+07	0.8	11.8	0.212	0.0%	42.9%	56.6%	33.5%
12	10	0.101	0.27	8.5E+08	5.2	12.9	0.153	0.0%	40.0%	12.0%	4.1%
13	6	0.138	0.21	1.5E+08	1.3	22.2	0.066	0.0%	16.7%	17.9%	17.2%
14	5	0.088	0.30	5.2E+07	5.4	12.8	0.180	0.0%	0.0%	3.9%	18.0%
15	8	0.061	0.37	4.5E+07	2.1	20.3	0.114	0.0%	25.0%	28.0%	18.7%
16	5	0.035	0.26	2.9E+08	4.0	12.2	0.081	0.0%	20.0%	19.7%	6.3%
17	3	0.104	0.27	5.8E+07	2.9	6.8	0.076	0.0%	0.0%	37.4%	31.9%
18	6	0.093	0.30	6.7E+08	5.3	9.5	0.222	1.3%	33.3%	28.6%	19.9%
19	5	0.016	0.27	5.2E+08	2.9	13.6	0.116	0.0%	20.0%	39.3%	19.1%
20	4	0.060	0.19	1.4E+08	4.7	8.8	0.047	0.0%	75.0%	39.0%	29.8%
21	2	0.010	0.54	2.3E+07	5.3	7.7	0.314	0.0%	0.0%	21.3%	2.0%
22	3	-0.057	0.19	1.8E+08	5.7	6.1	0.047	0.0%	0.0%	10.3%	6.8%
23	5	0.039	0.51	8.4E+07	5.5	10.6	0.223	0.0%	40.0%	27.2%	3.8%
24	1	0.023	0.03	9.2E+08	13.2	4.9	0.008	0.0%	100.0%	0.0%	1.1%
25	7	-0.056	0.30	2.9E+07	3.6	7.2	0.189	0.0%	57.1%	43.5%	16.0%
26	4	0.129	0.16	2.0E+08	8.1	6.1	0.176	0.0%	50.0%	26.2%	3.4%
27	4	0.035	0.23	3.2E+08	8.0	5.4	0.199	0.0%	50.0%	11.5%	3.7%
28	6	0.065	0.17	3.0E+08	6.9	6.9	0.103	0.0%	16.7%	16.9%	10.6%
29	6	0.126	0.21	3.6E+08	3.7	10.7	0.109	0.0%	16.7%	48.9%	18.1%
30	2	0.248	0.09	2.1E+08	4.8	10.7	0.024	0.0%	0.0%	0.6%	4.2%
31	10	0.117	0.21	1.6E+08	3.4	11.7	0.161	0.3%	20.0%	42.7%	16.7%
32	1	0.205	0.03	3.1E+07	0.6	5.7	0.000	0.0%	0.0%	100.0%	68.9%
33	8	0.028	0.22	2.4E+08	5.8	6.4	0.216	0.0%	25.0%	18.7%	8.5%
34	3	0.044	0.38	2.8E+07	3.3	5.6	0.213	0.0%	0.0%	57.1%	9.3%
35	5	0.055	0.18	9.0E+08	1.5	11.6	0.067	2.3%	20.0%	17.7%	7.7%
36	5	-0.031	0.29	2.4E+10	4.6	9.5	0.099	0.6%	20.0%	39.6%	20.3%
37	4	0.158	0.20	5.6E+07	4.3	6.6	0.324	0.0%	75.0%	34.0%	7.4%
38	3	0.163	0.24	3.5E+08	6.1	9.4	0.093	1.0%	66.7%	31.2%	16.1%
39	8	0.147	0.20	1.3E+09	6.1	13.5	0.107	0.0%	37.5%	25.0%	9.2%
40	8	0.038	0.27	6.5E+08	4.6	8.3	0.177	3.7%	12.5%	21.1%	7.9%
41	12	0.048	0.19	5.3E+08	7.1	7.9	0.256	1.5%	25.0%	22.8%	10.3%
42	10	0.097	0.17	1.2E+09	3.9	11.9	0.261	11.6%	10.0%	11.4%	7.7%
43	10	0.023	0.25	1.7E+09	9.9	8.0	0.182	13.2%	20.0%	7.5%	7.1%
44	5	0.047	0.16	1.6E+09	6.7	19.9	0.147	1.1%	20.0%	2.7%	4.5%
45	9	0.076	0.19	7.3E+08	4.8	13.1	0.279	12.2%	44.4%	12.6%	7.7%
46	23	0.029	0.19	9.5E+08	6.7	9.1	0.186	2.9%	21.7%	25.0%	7.5%
47	20	0.074	0.19	4.1E+09	7.5	8.3	0.149	10.9%	30.0%	18.6%	4.8%
48	27	0.068	0.14	3.8E+09	8.2	11.5	0.141	9.0%	37.0%	3.0%	4.3%
49	128	0.087	0.20	7.4E+09	7.3	8.4	0.185	19.1%	43.8%	16.8%	5.1%
50	54	0.083	0.25	2.5E+10	7.0	7.4	0.174	23.1%	37.0%	22.2%	3.5%

Table 2: Selected Data for Insurers by Aggregate Number of State Categories

	Number of States in Which Insurer is Licensed			
	(1 to 5)	**(6 to 25)**	**(26 to 45)**	**(46 to 50)**
Number of Insurers	218	122	123	252
Means for Each Category				
ROE	0.065	0.058	0.077	0.078
General Expense Ratio	0.255	0.281	0.210	0.200
Total Assets	2.19E+08	3.24E+08	1.63E+09	1.00E+10
Leverage	3.40	4.06	5.52	7.29
RBC Ratio	14.5	11.9	9.8	8.6
Reinsurance	0.094	0.141	0.181	0.175
LOB Concentration	0.739	0.688	0.693	0.618
Best's Rating	1.81	2.40	3.14	4.07
Separate Acccounts %	2.4%	1.6%	3.5%	16.7%
Non-Admitted Assets %	4.1%	2.2%	3.4%	1.8%
Stock Form %	90.1%	91.0%	90.0%	86.1%
Independent Broker %	19.3%	32.0%	26.0%	38.5%
Group Affiliation %	64.1%	69.1%	79.7%	95.9%
Life (individual)%	26.9%	32.7%	30.6%	38.8%
Annuities (individual) %	8.6%	9.2%	15.6%	17.4%
A & H (indivudual) %	10.0%	13.9%	18.6%	9.4%
Life (group) %	5.5%	10.0%	7.7%	8.5%
Annuities (group) %	1.1%	0.7%	1.2%	5.2%
A & H (group) %	34.0%	22.8%	23.3%	17.4%
Bond %	60.0%	69.7%	75.8%	74.7%
Stock %	10.5%	6.9%	6.0%	5.7%
Real Estate %	2.0%	1.8%	0.8%	0.8%
Cash %	21.9%	13.5%	10.2%	4.9%

Table 3: Single-state versus Multi-state Insurers

	Single-State Insurer (means)	Multi-state Insurer (means)	Two-sample t-test For difference in means: (SingleSt - MultiSt)	
			t-stat	*p-value*
Number of Insurers	147	568		
Means				
ROE	0.072	0.052	1.3	*0.192*
General Expense Ratio	0.260	0.216	6.1	*<0.001*
Total Assets	1.43E+08	5.33E+09	-8.0	*<0.001*
Leverage	3.450	5.651	-3.3	*0.001*
RBC Ratio	24.500	15.120	3.7	*<0.001*
Reinsurance	0.097	0.160	-7.8	*<0.001*
LOB Herfindahl	0.768	0.660	11.5	*<0.001*
Best's Rating	1.440	3.301	-26.4	*<0.001*
Separate Acccounts %	2.3%	9.6%	-8.9	*<0.001*
Non-Admitted Assets %	4.9%	2.6%	4.9	*<0.001*
Stock Form %	91.6%	88.7%	2.3	*0.023*
Independent Broker %	15.8%	32.8%	-9.2	*<0.001*
Group Affiliation %	58.5%	83.4%	-15.1	*<0.001*
Life (individual)%	29.1%	32.3%	-2.0	*0.045*
Annuities (individual) %	9.6%	17.6%	-6.7	*<0.001*
A & H (indivudual) %	9.6%	12.2%	-2.4	*0.018*
Life (group) %	4.8%	7.7%	-4.3	*<0.001*
Annuities (group) %	0.5%	4.4%	-7.5	*<0.001*
A & H (group) %	32.1%	19.9%	8.4	*<0.001*
Bond %	55.9%	73.6%	-17.9	*<0.001*
Stock %	9.9%	6.1%	7.1	*<0.001*
Mortgage Loans %	3.1%	4.8%	-4.8	*<0.001*
Real Estate %	2.0%	1.0%	6.6	*<0.001*
Cash %	22.5%	9.2%	12.9	*<0.001*

Table 4: Number of Licensed, Domiciled, and Single-State Insurers by State

State	No. of Lic. Ins.	No. of Dom. Ins.	No. of Single State Ins.	No. of Sing. St. Non-grp Ins.	Total Prem. written in State	Total Nationwide Prem. of Dom. Ins.	Total Foreign Prem. Of Dom. Ins.	% Prem. Written by Single St. Insurers
AK	305	0	0	0	6.7E+08	-	-	-
AL	404	9	2	1	4.9E+09	7.1E+08	3.4E+08	0.3%
AR	439	21	11	9	2.9E+09	9.6E+08	3.0E+08	19.6%
AZ	423	18	1	1	8.6E+09	5.0E+09	4.8E+09	0.1%
CA	364	14	3	2	4.6E+10	3.4E+09	2.1E+09	1.7%
CO	416	7	1	0	7.7E+09	2.8E+09	2.6E+09	0.0%
CT	309	17	3	0	1.2E+10	2.2E+10	2.0E+10	12.1%
DE	376	19	1	0	3.4E+09	1.2E+10	1.1E+10	0.0%
FL	420	11	4	2	2.6E+10	3.6E+09	1.1E+09	8.3%
GA	401	12	1	0	1.0E+10	7.9E+09	7.6E+09	0.3%
HI	318	2	1	0	1.7E+09	1.0E+08	4.2E+07	0.8%
IA	376	20	1	0	6.4E+09	1.2E+10	1.0E+10	17.7%
ID	389	5	2	1	2.0E+09	6.6E+08	3.6E+07	15.2%
IL	446	55	8	5	2.7E+10	2.6E+10	2.1E+10	1.4%
IN	434	29	2	2	8.8E+09	5.1E+09	4.6E+09	0.2%
KS	416	7	3	1	5.2E+09	1.1E+09	2.5E+08	15.4%
KY	405	4	1	0	3.8E+09	1.4E+08	5.7E+07	1.1%
LA	449	25	16	10	5.6E+09	1.1E+09	2.2E+08	12.5%
MA	309	14	1	1	1.9E+10	1.2E+10	1.1E+10	0.0%
MD	384	7	1	0	9.9E+09	3.2E+09	2.9E+09	0.1%
ME	265	2	1	0	1.5E+09	3.1E+09	3.0E+09	0.0%
MI	365	16	5	2	1.6E+10	7.5E+09	6.6E+09	0.9%
MN	338	12	1	0	8.4E+09	1.0E+10	9.6E+09	0.0%
MO	438	28	2	1	9.0E+09	3.6E+09	2.8E+09	0.5%
MS	427	14	3	2	3.3E+09	1.2E+09	4.1E+08	21.1%
MT	385	0	0	0	8.9E+08	-	-	-
NC	377	4	0	0	1.2E+10	2.2E+09	1.8E+09	-
ND	388	4	1	1	8.9E+08	3.2E+08	3.0E+08	0.0%
NE	410	20	2	1	3.9E+09	8.3E+09	7.5E+09	11.6%
NH	242	3	1	0	2.4E+09	1.4E+07	4.6E+06	0.2%
NJ	300	5	1	0	1.9E+10	9.7E+09	8.4E+09	1.0%
NM	416	1	1	1	1.7E+09	2.9E+05	0.0E+00	0.0%
NV	394	0	0	0	2.2E+09	-	-	-
NY	130	75	22	0	3.6E+10	3.8E+10	2.7E+10	9.3%
OH	411	26	2	1	1.9E+10	6.2E+09	4.7E+09	1.3%
OK	428	18	5	2	3.7E+09	1.4E+09	1.2E+09	0.7%
OR	394	3	0	0	4.3E+09	1.2E+09	8.3E+08	-
PA	385	27	0	0	2.3E+10	6.3E+09	4.0E+09	-
RI	292	1	0	0	1.7E+09	8.3E+08	7.8E+08	-
SC	418	12	3	3	4.6E+09	1.2E+09	1.0E+09	0.3%
SD	392	2	1	0	1.3E+09	3.8E+08	2.0E+08	14.3%
TN	433	8	2	0	7.8E+09	3.9E+09	3.5E+09	1.1%
TX	468	80	26	7	3.1E+10	1.0E+10	5.2E+09	10.7%
UT	417	14	3	1	2.8E+09	7.0E+08	5.1E+08	2.0%
VA	387	10	2	0	1.2E+10	6.2E+09	4.0E+09	14.4%
VT	249	2	0	0	8.2E+08	1.4E+09	1.4E+09	-
WA	375	12	3	0	8.0E+09	2.5E+09	2.0E+09	0.1%
WI	365	20	3	2	9.5E+09	1.3E+10	1.2E+10	4.4%
WV	369	0	0	0	1.8E+09	-	-	-
WY	359	0	0	0	5.7E+08	-	-	-

Table 5: Selected Data for Domiciled Insurers by State

State	No. of Dom. Ins.	Means for Domestic Insurers in State							
		ROE	Gen. Exp. Ratio	Assets	Best Rating	Ins. Lever.	Sep Acct. %	RBC Ratio	Reinsur. %
AK	0	-	-	-	-	-	-	-	-
AL	9	0.093	0.283	5.9E+08	2.89	6.839	0.4%	9.144	6.2%
AR	21	0.071	0.310	8.2E+08	1.00	9.508	7.2%	13.190	5.2%
AZ	18	0.075	0.225	3.1E+09	3.22	3.102	10.2%	13.481	11.0%
CA	14	0.090	0.240	4.1E+09	2.36	4.470	3.4%	13.003	12.7%
CO	7	0.123	0.155	5.8E+09	3.71	6.872	7.9%	11.021	15.2%
CT	17	0.090	0.166	1.8E+10	4.47	3.446	28.0%	8.793	12.4%
DE	19	0.078	0.181	6.6E+09	4.16	6.177	28.5%	12.836	15.5%
FL	11	0.047	0.238	4.0E+08	3.18	2.979	0.0%	9.532	20.8%
GA	12	0.123	0.299	2.8E+09	3.00	5.016	0.0%	8.888	21.5%
HI	2	0.156	0.172	2.0E+08	3.50	2.598	0.0%	9.157	8.1%
IA	20	0.064	0.170	8.1E+09	3.80	8.147	14.8%	9.314	15.7%
ID	5	0.050	0.125	1.6E+08	0.80	3.413	0.0%	4.959	4.3%
IL	55	0.071	0.235	2.8E+09	3.29	4.522	3.6%	9.670	10.7%
IN	29	0.072	0.196	3.7E+09	3.00	6.230	3.7%	11.474	16.7%
KS	7	0.033	0.183	8.2E+08	2.57	2.932	0.0%	15.932	8.8%
KY	4	0.032	0.390	1.0E+08	1.75	9.334	0.0%	9.430	14.5%
LA	25	0.052	0.345	1.6E+08	1.00	4.747	1.2%	12.350	7.4%
MA	14	0.050	0.237	1.2E+10	3.71	8.804	23.9%	7.711	25.2%
MD	7	0.009	0.200	4.0E+09	3.86	6.367	13.0%	6.246	15.9%
ME	2	-0.017	0.215	4.1E+09	2.00	2.901	0.2%	5.986	11.4%
MI	16	0.059	0.175	4.9E+09	2.81	4.237	4.4%	7.467	13.6%
MN	12	0.070	0.226	8.9E+09	4.33	4.912	30.1%	10.656	18.8%
MO	28	0.066	0.229	1.4E+09	3.36	4.044	7.0%	12.626	22.5%
MS	14	0.063	0.308	4.9E+08	2.29	2.503	0.0%	21.042	18.5%
MT	0	-	-	-	-	-	-	-	-
NC	4	0.079	0.119	3.1E+09	2.00	7.176	4.1%	16.725	6.3%
ND	4	-0.030	0.315	6.4E+08	1.00	8.670	0.0%	5.940	33.1%
NE	20	0.045	0.231	1.7E+09	3.40	4.116	7.4%	11.992	18.3%
NH	3	-0.093	0.300	2.0E+07	3.33	1.945	0.0%	7.924	4.1%
NJ	5	0.014	0.271	3.9E+10	3.80	4.358	20.6%	15.893	4.9%
NM	1	0.073	0.604	1.6E+06	0.00	0.222	0.0%	60.493	0.0%
NV	0	-	-	-	-	-	-	-	-
NY	**75**	**0.077**	**0.238**	**7.6E+09**	**4.07**	**6.079**	**12.0%**	**11.167**	**17.7%**
OH	26	0.036	0.212	5.3E+09	3.85	6.239	14.9%	7.243	19.6%
OK	18	0.119	0.248	5.8E+08	2.44	4.095	0.8%	15.728	15.8%
OR	3	0.088	0.173	2.1E+09	3.33	2.698	5.6%	4.454	27.1%
PA	27	0.057	0.204	1.0E+09	2.89	4.823	8.3%	14.820	12.3%
RI	1	0.090	0.288	5.7E+08	5.00	5.413	0.0%	10.484	12.2%
SC	12	0.060	0.340	3.0E+08	2.00	3.463	0.0%	12.794	13.9%
SD	2	0.137	0.063	4.6E+08	4.00	5.713	0.0%	5.872	0.2%
TN	8	0.155	0.180	3.7E+09	4.38	6.644	3.7%	8.570	9.8%
TX	80	0.083	0.241	8.4E+08	1.83	5.364	1.4%	10.847	15.6%
UT	14	0.058	0.188	1.1E+09	1.50	2.997	7.0%	10.366	5.9%
VA	10	0.054	0.163	3.8E+09	2.90	7.020	6.9%	8.585	10.4%
VT	2	0.246	0.365	4.0E+09	4.50	9.195	3.8%	6.879	9.1%
WA	12	0.100	0.252	2.0E+09	1.83	5.280	5.0%	14.095	12.7%
WI	20	0.051	0.203	5.2E+09	2.65	3.829	2.4%	7.651	12.8%
WV	0	-	-	-	-	-	-	-	-
WY	0	-	-	-	-	-	-	-	-
Average		*0.069*	*0.238*	*3.9E+09*	*2.906*	*5.099*	*6.5%*	*11.610*	*13.2%*

Table 6: Expense Ratio Regressions

Independent Variables	Dependent Variable: Expense Ratio					
	Pooled OLS		Random Effects		Fixed Effects	
	Coeff.	*P-val*	**Coeff.**	*P-val*	**Coeff.**	*P-val*
Intercept	**0.710**	*<0.001****	**0.729**	*<0.001****		
Reg. Pressure	**0.001**	*0.006****	**0.001**	*<0.001****	**0.001**	*0.001****
Reg. Forbearance	**-0.013**	*0.162*	**-0.003**	*0.762*	**0.005**	*0.628*
NY Licensed	**0.051**	*<0.001****	**0.053**	*<0.001****	**0.052**	*<0.001****
Ind. Broker	**0.006**	*0.343*	**-0.016**	*0.003****	**-0.027**	*<0.001****
Fin. Strength	**-0.007**	*0.001****	**-0.010**	*<0.001****	**-0.012**	*<0.001****
Sep. Acct. Assets	**0.049**	*0.003****	**0.079**	*<0.001****	**0.091**	*<0.001****
Size	**-0.026**	*<0.001****	**-0.026**	*<0.001****	**-0.023**	*<0.001****
Geo. Concentration	**0.015**	*0.258*	**0.012**	*0.332*	**0.006**	*0.658*
LOB Concentration	**-0.076**	*<0.001****	**-0.071**	*<0.001****	**-0.067**	*<0.001****
Stock	**0.005**	*0.574*	**0.004**	*0.666*	**-0.001**	*0.973*
Group Member	**-0.041**	*<0.001****	**-0.047**	*<0.001****	**-0.050**	*<0.001****
Non-adm. Assets	**0.009**	*0.712*	**-0.013**	*0.512*	**-0.022**	*0.280*
R^2	0.27		0.49		0.64	
Number of Obs.	3618		3618		3618	

*Where ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.*

Dependent variable: Expense ratio = total general expenses paid during the year, including both insurance and investment expenses, scaled by direct premiums written.

Independent variables shown: Regulatory pressure = number of states in which the insurer is licensed. Regulatory forbearance = 1 for single-state insurers, 0 for multi-state insurers. New York licensed = 1 if insurer is licensed in New York, 0 otherwise. Independent broker = 1 if the insurer uses independent broker distribution, 0 otherwise. Financial strength = Best's rating (A++, A+ = 5; A,A- = 4; etc.). Separate accounts assets = ratio separate account assets to total assets. Size = natural logarithm of total admitted assets. Geographic concentration = geographic Herfindahl index, which is the sum of squared percentages of premiums written in each state. Line of Business *(LOB)* concentration = LOB Herfindahl index, which is the sum of squared percentages of premiums written in each line of business. Stock = 1 if the insurer is a stock organization, 0 otherwise. Group member = 1 if the insurer is a member of a group, 0 otherwise. Non-admitted assets = the ratio of non-admitted assets to total assets.

Independent variables not shown: The following independent variables are included as control variables in the regression (also refer to equation 1), but results for these variables are not shown in the above table. Underwriting risk consists of six variables: X_{LOB}/(total premiums written), where X_{LOB} are the premiums written in a specific line of business. The six lines of business used are three individual lines (life, annuities, and accident and health) and three group lines (life, annuities, and accident and health). Investment risk consists of five variables: X_A/(total assets), where X_A is a specific asset category. The five asset categories used are cash and short-term investments, bonds, stocks, mortgages, and real estate. For each state, a state market share variable is defined as the insurer's market share in the state if the insurer is licensed in the state, or 0 otherwise. The year variables are binary variables set to indicate the year. The panel includes years from 1999 to 2003. The year 1999 is omitted in the regression.

Table 7: Profitability Regressions

Independent Variables	NonLinear SimulEq GMM		Traditional 2SLS Fixed Effects		OLS Fixed Effects	
	Dependent Variable: ROE					
	Coeff.	*P-val*	Coeff.	*P-val*	Coeff.	*P-val*
Regulatory Pressure	**0.009**	*<0.001****	**0.061**	*0.387*	**0.001**	*0.086**
Regulatory Forbearance	**0.118**	*0.001****	**0.050**	*0.048***	**0.050**	*0.081**
New York Licensed	**0.022**	*0.134*	**0.451**	*0.795*	**-0.007**	*0.777*
Independent Broker	**-0.089**	*<0.001****	**-0.003**	*0.874*	**0.008**	*0.658*
Financial Strength	**0.027**	*<0.001****	**0.029**	*0.002****	**0.026**	*<0.001****
Separate Acct. Assets	**-0.037**	*<0.001****	**-0.123**	*0.013***	**-0.141**	*0.004****
Size	**0.027**	*<0.001****	**0.006**	*0.371*	**-0.002**	*0.773*
Geo. Concentration	**-0.140**	*0.290*	**0.098**	*0.170*	**0.059**	*0.135*
LOB Concentration	**0.035**	*0.138*	**0.027**	*0.477*	**-0.011**	*0.778*
Stock Org. Form	**0.056**	*0.010***	**0.034**	*0.225*	**0.051**	*0.065**
Group Member	**-0.023**	*0.515*	**-0.018**	*0.453*	**-0.016**	*0.477*
Non-admitted Assets	**0.096**	*0.157*	**-0.151**	*0.011***	**-0.158**	*0.008****
R^2			0.33		0.32	
Number of Obs.	3618		3618		3618	

*Where ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.*

Dependent variable: Return on Equity (ROE) = ratio of net income to capital and surplus. Net income is before federal income taxes and policyholder dividends.

Independent variables shown: Regulatory pressure = number of states in which the insurer is licensed. Regulatory forbearance = 1 for single-state insurers, 0 for multi-state insurers. New York licensed = 1 if insurer is licensed in New York, 0 otherwise. Independent broker = 1 if the insurer uses independent broker distribution, 0 otherwise. Financial strength = Best's rating (A++, A+ = 5; A,A- = 4; etc.). Separate accounts assets = ratio separate account assets to total assets. Size = natural logarithm of total admitted assets. Geographic concentration = geographic Herfindahl index, which is the sum of squared percentages of premiums written in each state. Line of Business *(LOB)* concentration = LOB Herfindahl index, which is the sum of squared percentages of premiums written in each line of business. Stock = 1 if the insurer is a stock organization, 0 otherwise. Group member = 1 if the insurer is a member of a group, 0 otherwise. Non-admitted assets = the ratio of non-admitted assets to total assets.

Independent variables not shown: The following independent variables are included as control variables in the OLS and 2SLS regressions (also see equation 2), but results for these variables are not shown in the above table. Underwriting risk consists of six variables: X_{LOB}/(total premiums written), where X_{LOB} are the premiums written in a specific line of business. The six lines of business used are three individual lines (life, annuities, and accident and health) and three group lines (life, annuities, and accident and health). Investment risk consists of five variables: X_A/(total assets), where X_A is a specific asset category. The five asset categories used are cash and short-term investments, bonds, stocks, mortgages, and real estate. For each state, a state market share variable is defined as the insurer's market share in the state if the insurer is licensed in the state, or 0 otherwise. The panel includes years from 1999 to 2003. The year 1999 is omitted in the regression. For the OLS and 2SLS regressions we use all the variables described above for a total of 76 variables. Complex GMM models are problematic to estimate with a large number of variables (Bond, 2002). For the GMM estimation, we use only the variables shown in the table above and the year variables.

Table 8: Alternative State-Related Control Variables[1]

Independent Variables	Expense Ratio OLS FEM Coeff.	Expense Ratio OLS FEM *P-val*	ROE OLS FEM Coeff.	ROE OLS FEM *P-val*
Regulatory Pressure	**0.004**	*0.072**	**0.014**	*0.054**
Regulatory Forbearance	**-0.008**	*0.457*	**0.052**	*0.088**
New York Licensed	**0.189**	*0.093**	**0.428**	*0.198*
Independent Broker	**-0.014**	*0.018***	**0.004**	*0.814*
Financial Strength	**-0.015**	*<0.001****	**0.027**	*<0.001****
Separate Acct. Assets	**0.044**	*0.007****	**-0.120**	*0.014***
Size	**-0.017**	*<0.001****	**0.012**	*0.064**
Geo. Concentration	**-0.018**	*0.208*	**0.089**	*0.035***
LOB Concentration	**-0.064**	*<0.001****	**0.001**	*0.973*
Stock Org. Form	**0.006**	*0.487*	**0.037**	*0.171*
Group Member	**-0.055**	*<0.001****	**-0.018**	*0.425*
Non-admitted Assets	**-0.011**	*0.580*	**-0.169**	*0.004****
R^2	0.65		0.34	
Number of Obs.	3618		3618	

*Where ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.*

[1] Same as the OLS regressions in Tables 6 and 7 except 50 state consumer price index (CPI) variables are used instead of 50 state market share control variables.

Dependent variables: Expense ratio = total general expenses paid during the year, including both insurance and investment expenses, scaled by direct premiums written. Return on Equity (ROE) = ratio of net income to capital and surplus. Net income is before federal income taxes and policyholder dividends.

Independent variables shown: Regulatory pressure = number of states in which the insurer is licensed. Regulatory forbearance = 1 for single-state insurers, 0 for multi-state insurers. New York licensed = 1 if insurer is licensed in New York, 0 otherwise. Independent broker = 1 if the insurer uses independent broker distribution, 0 otherwise. Financial strength = Best's rating (A++, A+ = 5; A,A- = 4; etc.). Separate accounts assets = ratio separate account assets to total assets. Size = natural logarithm of total admitted assets. Geographic concentration = geographic Herfindahl index, which is the sum of squared percentages of premiums written in each state. Line of Business *(LOB)* concentration = LOB Herfindahl index, which is the sum of squared percentages of premiums written in each line of business. Stock = 1 if the insurer is a stock organization, 0 otherwise. Group member = 1 if the insurer is a member of a group, 0 otherwise. Non-admitted assets = the ratio of non-admitted assets to total assets.

Independent variables not shown: The following independent variables are included as control variables in the OLS and 2SLS regressions (also see equation 2), but results for these variables are not shown in the above table. Underwriting risk consists of six variables: X_{LOB}/(total premiums written), where X_{LOB} are the premiums written in a specific line of business. The six lines of business used are three individual lines (life, annuities, and accident and health) and three group lines (life, annuities, and accident and health). Investment risk consists of five variables: X_A/(total assets), where X_A is a specific asset category. The five asset categories used are cash and short-term investments, bonds, stocks, mortgages, and real estate. *For each of the 50 states, a variable is defined as the consumer price index of the state if the insurer is licensed in the state or zero if the insurer is not licensed in the state.* The year variables are binary variables set to indicate the year. The panel includes years from 1999 to 2003. The year 1999 is omitted in the regression.