An Economic Analysis of Single versus Multiple Jurisdictional Regulation – The Case of Risk Retention Groups[♣]

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ABSTRACT

Insurers are regulated by states. However, a small subset of firms, risk retention groups (RRGs), are subject to single entity regulation. This paper attempts to determine the effect of duplicative regulation by isolating those firms that have the opportunity to choose between single- or multiple-jurisdictional regulation. The results reveal that there is significant increased regulatory compliance costs associated with multi-state regulation and these costs influence firms' organizational structure decisions. In addition, regression estimates suggest that a move to a single-jurisdictional regulatory framework would result in a 24 percent reduction in total expenses for the average firm. Moreover, results show that the higher compliance costs associated with multi-jurisdictional regulation leads to a higher per unit costs of insurance. Overall, there are significant benefits associated with moving away to a single entity regulatory framework.

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1. Introduction

The objective of this paper is to examine the impact of insurance regulation on insurers and their ability to compete. More than sixty years after the McCarran-Ferguson Act the issue of state versus federal regulation of the insurance industry continues to be debated both within the industry and academia.[1] Under the current state regulatory system, insurers must obtain a license for each additional state entered or form a separate insurance company domiciled (and licensed) in the state of entry. Multi-state insurers face multiple regulatory bodies and multiple sets of regulations with which they must comply. The central complaint against state regulation is the cost and inefficiencies inherent in a multistate system.[2] Because of these inefficiencies many insurers now advocate the creation of an optional federal charter (OFC) and OFC legislation has recently been introduced in Congress.[3] The proposed legislation would allow insurers to seek either a federal or state charter based on the insurer's particular circumstances (American Council of Life Insurers, 2005). Another alternative to state-based regulation is "primary state" chartering (Harrington, 2006), which would allow insurers the option of designating a primary state and operating nationwide subject predominantly to the regulations of that state.

Currently, studies analyzing the merits of federal versus state regulation rely either on comparisons to the banking industry or subjective informed opinions. The novel aspect of this project is an empirical evaluation of single- and multi-jurisdictional regulation within the current insurance industry. Preemption of state regulation for risk retention groups (RRGs) provides an

[1] In the last two years there has been a large amount of academic research on the regulation of insurance (See Harrington, 2006; Grace and Klein, 2007; Brown, 2008; Butler and Ribstein, 2008; Cooke and Skipper, 2008; Detlefsen, 2008; Grace and Scott, 2008; Grace and Klein, 2008a; Grace and Klein, 2008b; Klein, 2008; Litan and O'Connor, 2008; Scott, 2008; and/or Wallison, 2008).

[2] Franks, Schaefer, and Staunton (1997) find that the direct costs of regulation in the U.S. life insurance industry are significantly greater than in the UK and France. They attribute the additional costs to state-based regulation. Grace and Klein (2000) find potential savings achievable from delegating regulatory functions to a single regulatory body.

[3] In May 2007, Senators John Sununu and Tim Johnson introduced the National Insurance Act of 2007 (S.40). In July 2007, Representatives Bean and Royce introduced a companion bill in the House (H.R. 3200).

innovative setting for an analysis on the costs and benefits of single versus multi-jurisdictional regulation. The Federal Liability Risk Retention Act of 1986 mandates that all RRGs be domiciled in a particular state, but once licensed in a state the RRG may conduct business in all 50 states. Most insurance laws and regulations of the other states in which the RRG operates are preempted by the Liability Risk Retention Act of 1986. Thus, the day-to-day regulation of a RRG is controlled by the state in which the RRG decides to charter. In effect, RRGs are subject to regulation by a single-jurisdiction.

The primary objective of the proposed research is to identify the direct costs and benefits of compliance within the current regulatory environments, and, in light of those costs and benefits, quantify the potential economic impact of alternative regulatory systems. This research would be the first to empirically examine the influence of single or multi-jurisdictional regulation of insurers and, as such, it represents a significant innovation over prior studies.

The paper compares the regulation for insurers, which are subject to multi-jurisdictional regulation, to the regulation of RRGs, which are subject to single-jurisdictional regulation. Comparing insurers incorporated in the same time period and engaged in the same lines of business as RRGs provides inferences in the decision to adopt a single or multi-regulator framework. This study investigates whether the organizational form decision, RRG or the standard insurance company structure, is driven by the number of states in which the firm wants to conduct business. It also examines whether operating under single-jurisdictional regulation provides insurers greater operational efficiencies than operating under multiple regulators. In addition, it investigates whether the potentially higher costs associated with multiple regulators are passed along to consumers in the form of higher prices.

By way of preview, the results show that the number of states a firm plans to write business plays a significant role in a firm's organizational structure decision. In fact, it is the only factor increasing the likelihood of electing the RRG structure. Firms desiring to write insurance in more than one state in their first year of operation are 37.8 percent more likely to choose the RRG. The average RRG conducts business in 5.5 states in its first year of operation, while the average insurer specializing in liability insurance writes in only 2.14 states.

Controlling for differences between insurers and RRGs, the results suggest that the regulatory compliance costs of single-jurisdictional regulation are significantly lower than the costs associated with multi-jurisdictional regulation. In particular, RRGs pay less in total insurance department licenses and regulatory fees per net premiums written than similarly focused insurers. The regression estimates indicate that the average insurer pays 60.3 percent more in licensing fees per year than the average RRG. In addition, RRGs have lower expenses and are more technically efficient. The average insurer has 24.4 percent higher expenses per year than the average RRG and is 12.5 percent less technically efficient. The lower regulatory compliance costs with single-jurisdictional regulation are passed on to consumers in the form of lower per unit prices. Overall, this study shows that there are significant benefits associated with moving from a multi-state regulatory framework to a single-entity structure.

The remainder of the paper is organized as follows. Section 2 describes RRGs. Section 3 details the data. Section 4 discusses the estimation of frontier efficiency. Section 5 presents the empirical analysis. Section 6 concludes.

2. Risk Retention Groups

In 1981, the U.S. Congress enacted the Liability Risk Retention Act (LLRA). It was subsequently amended in 1986. The Act provides the legal framework for developing a RRG,

which, by definition, is a cooperative insurance entity made up of owners or members of an association connected by similar business practices and encountering similar liability exposures. RRGs are confined to assuming and spreading the common liability exposures of the RRGs members. The owners of the RRG must be members of the RRG and must be provided with liability insurance by the RRG. The RRG can only offer commercial liability coverage (employers liability is excluded).[4] Consequently, a RRG's ability to diversify across risk exposures is limited.

In order to encourage the formation of RRGs, the LLRA allows RRGs, once licensed in its state of domicile, to insure its members in all states. Thus, the LLRA preempts duplicate and overlapping state insurance laws. The intent of the LLRA was to remove unnecessary regulation by states in which the RRG is not domiciled, while at the same time acknowledging the states' role as insurance regulators. The LLRA created a system under which certain qualified firms can offer their products nationwide, under the authority of a single license issued by their domiciliary state. RRGs are, in effect, exempt from most non-domiciliary state regulation. Accordingly, non-chartering states (i.e. non-domiciliary state) generally cannot regulate the operation of the RRG. There are, however, a few exceptions. For example, non-chartering states can require a RRG to pay premium taxes. Another difference between standard insurers and RRGs is that the policyholders of a RRG are not permitted to gain access to state insurance insolvency guaranty associations in the event of insolvency.

In sum, a RRG is a special type of insurance firm. It must be chartered and licensed as a liability insurance company under the laws of at least one state, but it can then write insurance in

[4] In July 2008, the U.S. House Financial Services Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises marked up a bill to expand RRGs from commercial liability insurance into property coverage ("Increasing Insurance Coverage Options for Consumers Act of 2008" - HR 5792). Interestingly, in the same week the House panel also marked a bill creating a federal office of insurance information (HR 5840, the "Insurance Information Act of 2008).

all other states without needing to obtain a license. Thus, unlike standard insurers, RRGs are largely regulated by a single entity.

3. Data

The variables used in this paper are extracted from multiple sources. The majority of the data comes from the 1990-2006 National Association of Insurance Commissioners (NAIC) Property-Casualty Annual Statement Database. The NAIC database contains the yearly regulatory filings of approximately 2,300 insurance companies domiciled in the United States. The NAIC annual statements are the primary source of data for the construction of the efficiency metrics. In addition to the regulatory annual statements, input price data was obtained from the U.S. Bureau of Labor Statistics and Ibbotson Associates. Information on a firm's ownership structure (RRG or standard insurer) is also extracted from the NAIC database for the years 1990 to 2006. In the early years of the sample, the NAIC did not always code RRGs correctly. To ameliorate this problem, the coding of RRGs was verified using the listing of RRGs in the Risk Retention Reporter (various years).

To make meaningful inferences, only insurance companies that are similar to RRGs are included in the main sample. The major criterion is that insurers must write all of their business in liability lines (i.e., commercial auto liability, products liability, other liability, and medical malpractice). In addition, since one of the objectives of the paper is to investigate the decision to adopt the RRG organizational structure, the sample is also limited to those insurers and RRGs that commenced business after 1989. There are 182 RRGs (635 RRG-years) and 160 insurers (509 insurer-years) that meet these conditions.

Table 1 reports summary statistics stratified by organizational structure, RRG and standard insurer. The average (median) RRG has approximately $8.8 ($8.6) million in total assets. The average (median) insurer is significantly larger with roughly $11.2 ($9.8) million in assets. In

terms of concentration, the average RRG has a line of business Herfindahl Index of about 0.945, which translates to roughly one line of business. The insurers in the sample have a comparable line of business Herfindahl index of 0.958. For the geographic Herfindahl, the index is approximately 0.617 (0.790) for the average (median) RRG. The average (median) insurer has a significantly larger index value of 0.801 (1.00). Similarly, the average (median) RRG operates in approximately 9.5 (2.0) states, while the average insurer operates in 5.6 (1.0) states.[5] The differences are significant at the 1 percent level. Thus, insurers are less diversified geographically than RRGs.

4. Empirical Analysis

The goal of the paper is to compare the costs and benefits of single jurisdictional regulation with that of multi-state regulation. The paper argues that valuable insights into why a P/L insurer would opt for single-entity regulation over multi-entity regulation can be gained by examining the reasons why a firm operating wholly in liability lines of insurance would select the RRG organizational structure over the standard insurance company structure. In essence these firms are choosing between single- and multiple-jurisdictional regulation. To make fair comparisons, RRGs are evaluated against a set of insurance companies incorporated during the same time period and operating only in liability lines. Three broad issues regarding regulation and its impact on insurance firms are examined: (1) the organizational form decision; (2) the benefits (costs) to the firm of single (multiple) jurisdictional regulation; and (3) the benefits (costs) to the consumer of single (multiple) jurisdictional regulation.

4.1 Organizational Form Decision

The first question addressed in this paper is why would policyholders who intend to create their own insurance firm prefer to form a RRG instead of an insurance company? Conversely, why

[5] A firm is recorded as operating in a state if it writes more than $10,000 in premium.

did the owners of an insurance firm which wholly operates in lines of business permissible to RRGs choose to charter as an insurer company?

To evaluate the choice of organizational structure, a logistic regression is estimated in which the dependent variable is equal to one if the liability insurer selects a RRG structure and equal to 0 if it chooses the standard insurance company structure. The main independent variable is an indicator that equals one if the insurer writes greater than $10,000 in premiums in *more* than one state, and zero otherwise. This variable estimates whether the number of states a firm plans on conducting business (and thereby the number of regulators a standard insurance company must comply with) influences the decision to incorporate as a RRG.[6] To evaluate the robustness of the results, a second variable, the natural logarithm of the number of states a firm is doing business is also used. The analysis is conducted using multiple horizons. The first specification examines the first year that the firm is in operation. The second, third, and fourth specifications investigate the first two, three, and four years of a firm's operation, respectively. The standard errors are adjusted for heteroskedasticity and firm level clustering.

Table 2 Panel A reports the results of these regressions. A positive coefficient implies a variable is associated with a higher probability of selecting the RRG structure, while a negative coefficient indicates a lower likelihood. Estimated marginal effects are also reported. The marginal effect for our discrete variable of interest is the change in the predicted probability due to a change from conducting business in one state to more than one state.

The logistic regression results reveal that firms specializing in liability insurance are significantly more likely to incorporate as a RRG if they plan on operating in more than one state. In the first year of operation, the predicted probability of selecting the RRG structure is 37.8

[6] The assumption is that the number of states that the firm operates is a good proxy for the number of states the firm planned on conducting business prior to incorporation.

percent greater for multi-state firms than single state firms. It is 34.4, 30.5, and 29.1 percent in the first two, three, and four years of operation, respectively. Thus, regulatory compliance appears to significantly influence a firm's decision to select single jurisdiction regulation.

In unreported regressions, the natural logarithm of the number of states a firm is doing business is substituted for the greater than one state indicator variable. It is positively and significantly related to the probability of selecting the RRG structure. If the number of states in which the average firm plans to conduct business in its first year were to increase 10 percent, the probability of chartering as a RRG would increase by 3.0 percent. Similarly, the probability is 2.5, 2.1, and 1.9 percent for the first two, three, and four years of business, respectively.

Table 2 Panel B reports logistic regression results for all the years of operation while controlling for other factors. The other independent variables included in the model are size (*Ln(Assets)*), product line diversification (*Product Herfindahl*), leverage (*Kenney Ratio* and *Liquid Assets / Liabilities*), and reinsurance (*Reinsurance*). The results reveal that larger firms are more likely to incorporate as insurance companies. The number of states that a firm writes business is the only significant factor that increases the likelihood of a firm choosing the RRG structure. The estimated probability of selecting the RRG structure is between 26.3 to 31.2 percent higher for multi-state firms relative to single state firms.[7] Again, regulatory compliance seems to be a significant factor influencing a firm's decision to organize as a RRG.

4.2 Benefits to the Firm of Single Jurisdictional Regulation

This section investigates the costs incurred by standard insurers in complying with multiple state regulators relative to the costs incurred by RRGs in complying with a single regulator. The

[7] In unreported regressions that use the natural logarithm of the number of states in which the firm operates, the probability of chartering as a RRG increases by 1.64 to 2.24 percent if the number of states in which the average firm plans to do business were to increase 10 percent.

direct costs of complying with state regulations includes expenses associated with submitting applications for licensing; presenting financial and statistical reports; paying for independent audits and regulatory examinations; preparing and submitting rates and forms filings; ensuring internal compliance with state regulations; responding to regulatory inquiries; and paying taxes, fees and assessments (Grace and Klein, 2000). Many of the activities listed above must be performed for every state in which an insurance company conducts business on a licensed basis. In contrast, RRGs only have to perform a majority of these activities for a single state.

The research design is similar to Grace and Klein (2000). In particular, it examines the relationship between firm efficiency and compliance costs. The study design controls for other factors affecting insurer expenses, such as firm size, geographical diversification, lines of business, leverage, and reinsurance. The hypothesis is that multi-state regulation imposes greater compliance costs and insurers operating in more states are likely to have higher compliance costs than RRGs. If regulation imposes costs on a firm, then it should show up in the expenses of the firm. Higher expenses and lower firm efficiency, all other things held constant, should exist in those environments that are subject to greater regulation.

Grace and Klein (2000) use two indicators of compliance costs: the amount of business written in a restrictive regulatory environment and the number of states/lines in which an insurer conducts business. In contrast, the main indicator of compliance costs in this study is single jurisdictional regulation, i.e. a RRG indicator variable. This is arguably a more direct measure of compliance costs since it explicitly acknowledges the difference between complying with one regulator versus many. Moreover, it provides an empirical estimate of the difference between the status quo regulation of insurance and the current proposals of regulation being debated in Congress.

Similar to Grace and Klein (2000), this study examines the relationship between a compliance cost indicator and the ratio of total expenses to premiums and the ratio of regulatory license fees to total premiums. In addition, it extends their study by investigating the relationship between compliance costs and measures of frontier efficiency. Expense ratios do not account for the multiproduct nature of the firm nor do they accurately reflect the economic production function underlying the production of insurance. Moreover, expense ratios do not account for the fact that some expenses may generate positive benefits. Frontier efficiency measures, on the other hand, have theoretical advantages relative to more traditional ratio measures of performance. Derived from micro-economic theory, the methods develop meaningful and reliable measures of performance in a single statistic that controls for differences in input usage and output production in multi-input, multi-output firms. Section 4.2.1 provides details on the estimation of frontier efficiency. Section 4.2.2 presents the empirical results of the relationship between firm efficiency and compliance costs.

4.2.1 Frontier Efficiency Analysis

The examination of firm efficiency focuses on cost, revenue, technical, and allocative efficiencies. Cost efficiency is the ratio of the minimum required costs to the actual costs utilized to produce a given level of output. A firm is considered fully efficient if its actual input usage equals optimal input usage for given output quantities and input prices. A firm is inefficient if actual input usage exceeds optimal input usage. Cost efficiency is composed of allocative efficiency and technical efficiency. Allocative inefficiency results from a firm's use of a suboptimal combination of inputs in producing a given level of output. Technical inefficiency results from not operating with the best-practice technology, i.e. the use of excessive resources to produce a given output. Revenue efficiency is the ratio of the revenues of a given firm to the

revenues of a fully efficient firm with the same input vector and output prices. Estimating both cost and revenue efficiency is important since the objective of the firm is profit maximization. Thus to be completely efficient the firm must be both cost efficient and revenue efficient.

Efficiency is measured using frontier efficiency methods (Aigner, Lovell, and Schmidt, 1977; and Charnes, Cooper, and Rhodes, 1978). The theory underlying frontier methodologies for estimating efficiency originates with Farrell (1957). It is based on the recognition that some firms will not be as successful as others in meeting firm objectives. A standard linear programming technique, data envelopment analysis (DEA), is used to construct a "best practice" frontier consisting of the dominant firms in the industry for each firm and measure the firm's performance relative to this frontier.[8] A firm is fully efficient (efficiency of 1.0) if it lies on this frontier. A firm is inefficient (efficiency < 1.0) if it is not on the frontier, indicating that its outputs could be produced more efficiently by another firm or set of firms. DEA has been widely used to measure the efficiency of financial institutions (see Berger and Humphrey, 1997).

Although DEA was traditionally viewed as a strictly non-parametric methodology, research has shown that it can be interpreted as a maximum likelihood procedure (e.g., Banker, 1993). As such, DEA estimators exhibit the desirable asymptotic property of consistency (Banker 1993) and the asymptotic distribution of the DEA estimators is identical to the true distribution of the efficiency. Some recent research relies upon translog (e.g., Maksimovic and Phillips, 2001) or log-linear Cobb-Douglas (e.g., Schoar, 2002) production functions. An advantage of DEA is that it avoids choosing a specific functional form for the production, cost, or revenue function and requires no distributional assumptions. Banker and Natarajan (2007) show that DEA-based

[8] For parsimony, DEA is not discussed in detail. A description of DEA is provided in Cooper, et al. (2000). The methodology has also been outlined in insurance studies (e.g. Cummins and Weiss, 2001).

procedures generally outperform parametric methods since it is often the case that no *a priori* knowledge exists about the form of the production function.[9]

We estimate efficient production, cost, and revenue frontiers giving measures of technical, allocative, cost, and revenue efficiency for each firm in each year of our sample.[10] Since the universe of firms determines the production, cost, and revenue frontiers, efficiency is calculated for each of the individual units in the P/L insurance industry, both unaffiliated and affiliated single insurers. Thus, the efficiency sample is comprised of all P/L insurers for which meaningful data were available.[11]

In accordance with a majority of the recent literature on financial institutions, we adopt a modified version of the value-added approach to identify insurer outputs (Berger and Humphrey, 1992; Cummins and Weiss, 2001). Leverty and Grace (2008a) examine other approaches to measuring insurance output and find that the value-added approach is the most consistent with the economic realities of the insurance market. For parsimony, the inputs and outputs are not described here, but for additional information on the inputs and outputs readers are referred to the detailed data appendix in Leverty and Grace (2008b).

4.2.2 Empirical Results

Univariate analysis provides a first look at the costs incurred by standard insurance companies in complying with multiple state regulators relative to the costs incurred by RRGs in complying

[9] Cummins and Zi (1998) find DEA estimates of frontier efficiency for insurers are more highly correlated to traditional performance measures (e.g., premium ratios and return on assets) than econometric estimates.

[10] An advantage of DEA is it provides a convenient way to decompose cost and revenue efficiency into their pure technical, scale, and allocative components.

[11] In a future version, I plan to estimate frontier efficiency for only those firms that comprise the main sample, i.e., the RRG / liability insurer sample. This will allow for the estimation of cross-frontier efficiency (e.g., Cummins, Weiss, and Zi, 1999; and Ehremjamts and Leverty, 2007). Cross-frontier efficiency analysis will measure (1) the efficiency of RRGs relative to an efficient frontier composed of standard insurers specializing in liability lines and (2) the efficiency of standard insurers relative to an efficient frontier consisting only of RRGs. Cross-frontier efficiency analysis can determine whether the RRG and standard insurance company organizational structures represent different technologies for producing insurance and whether the outputs of an organizational structure could be produced more efficiently by the technology of the alternative organizational form.

with a single regulator. Figure 1 displays the relationship between the licensing fee ratio and firm type (RRG or standard insurer) for each of the first four years that the firm is in operation. Figure 2 substitutes the expense ratio for the licensing fee ratio. Means are reported in part A; medians in part B. The figures also report the mean and median number of states that firms conduct business.

The figures reveal that in their first four years of business RRGs operate in significantly more states than standard insurers. Despite the greater number of states, RRGs have significantly lower licensing fee ratios and expense ratios. This is notable considering that Grace and Klein (2000) find that the number of states an insurer is licensed is significantly and positively related to these ratios. Thus, even though RRGs operate in more states than standard insurers, they maintain lower licensing and regulatory fees and lower expense loads. Overall, the figures reveal that complying with multiple regulators constrains firms to operating in fewer states, while at the same time still resulting in greater compliance costs. Nevertheless, a number of other factors, such as firm size and volume of business, may also influence firm expenses. Accordingly, in the next analysis, other firm factors are controlled for using multivariate regression.

The dependent variables in the OLS regressions are measures of compliance costs and firm efficiency. The first is the ratio of regulatory license fees to total premiums. The second is the ratio of total expenses to premiums. The third thru sixth are measures of frontier efficiency—technical, allocative, cost, and revenue efficiency. The standard errors of the regressions are adjusted for firm *and* year clustering (Cameron, Gelbach, and Miller, 2006).

Examining the effect of the regulatory environment, the RRG indicator variable, the proxy for single jurisdictional regulation, is significantly and negatively related to licensing fees and total expenses.[12] A firm subject to a single regulator is associated with lower licensing and regulatory

[12] In unreported regressions, the natural logarithm of the number of states a firm is doing business is substituted for the geographical Herfindahl Index. It is positively and significantly related to licensing fees and total expenses. Thus,

fees and lower expense loads than firms regulated by multiple entities. Holding all other variables at their mean, the regression estimates indicate that the average firm would pay approximately $92,780 in licensing and regulatory fees if it organized as a standard insurer. If the average firm organized as a RRG, on the other hand, it would pay only $57,881. Thus, the average firm pays 60.3 percent more in licensing fees in a year due to multi-jurisdictional regulation. Assuming there are 3,000 insurers in U.S. that write business in multiple states, a transition from multi-jurisdictional regulation to single-jurisdictional regulation would result in a $105 million reduction in licensing and regulatory fees every year.

Turning to total expenses, the regression estimates suggest that the average firm would have $5,301,863 in expenses as an insurance company, but only $4,270,853 as a RRG. A move to single-jurisdictional regulation would thereby result in an approximate $3.1 billion per year reduction in total expenses, which is roughly 0.72 percent of total premiums written in 2007. Grace and Klein (2000) estimate total regulatory compliance costs to be $4.5 billion per year. Thus, moving to a single-entity regulatory structure could result in a significant reduction in total regulatory compliance costs.

The RRG indicator variable is significantly and positively related to technical efficiency. The average firm regulated by multiple entities uses 12.5 percent more resources to produce a given amount of output than the average firm regulated by a single regulator. In contrast, the RRG indicator is significantly and negatively related to allocative efficiency. Thus, RRGs are less inclined to use the correct combination of inputs relative to standard insurance companies. There is no significant difference in the organizational structures in terms of cost and revenue efficiency. The greater compliance costs associated with state-based regulation constrain a firm's ability to be

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similar to Grace and Klein (2000), the data shows that an increase in the number of regulatory jurisdictions is associated with higher regulatory license fees and total expenses.

technically efficient; however, these same forces seem to also drive them to be more precise with their mix of inputs (allocative efficiency). The overall result is no significant difference in total cost and revenue efficiency between the regulatory frameworks.

4.3 Benefits to the Consumer of Single Jurisdictional Regulation

This section investigates whether the higher compliance costs associated with multi-jurisdictional regulation lead to higher per unit costs of insurance. Four measures of the per unit price of insurance are used. The first is the inverse loss ratio, total premiums written over total losses incurred. The second is the premium ratio, total premiums written net of expenses and dividends over losses incurred. It accounts for the differences in expenses between the regulatory structures. The third and fourth are variations of the economic premium ratio (EPR) developed by Winter (1994). The EPR is the ratio of the premium revenues to the estimated present value of losses. The EPR has become the standard price measure in the insurance financial literature (e.g., Cummins and Danzon 1997; and Phillips, Cummins, and Allen 1998). Since premiums reflect the discounting of losses in a competitive market, the EPR improves upon the unit price of insurance by also discounting the losses in the denominator of the ratio. *EPR 1* is measured as premiums written over the present value of losses incurred. *EPR 2* uses premiums written net of expenses and dividends in the numerator. For parsimony, readers are referred to Phillips, Cummins, and Allen (1998) and Cummins, Lin, and Phillips (2008) for details on the construction of the EPR.

A number of factors can impact the price of insurance and it is unlikely that standard firm characteristics will be sufficient. Omitted-variables bias may therefore be an issue. If price is driven in part by unobserved attributes particular to each firm, and if those attributes are correlated with observable variables included in the regression, the error term will no longer be uncorrelated with the included explanatory variables, resulting in biased and inconsistent estimates. It is,

however, possible to correct for it, if necessary, by including firm-specific fixed effects in our estimation. The Breusch-Pagan Lagrangean multiplier test is used to test this possibility. The results shown in Table 4 indicate that the null hypothesis of no firm-specific effects is soundly rejected. Consequently, allowing for firm-specific effects is a more appropriate specification.

Both fixed and random effects models were estimated, with the fixed effects version including both year and firm effects. Hausman chi-square statistics to test the null hypothesis that random effects are appropriate against the alternative hypothesis that the model is characterized by fixed effects are also reported in Table 4. These tests reject the null hypothesis that random effects are appropriate. Thus, the fixed effects models are preferred to the random effects models.

The results of the fixed effects models are shown in Table 5. The log of firm assets is included in the regressions to control for firm size. Insurance prices are inversely related to firm size, reflecting large firm's enhanced ability to diversify risk. Insurers that hedge a greater extent of their insurance underwriting risk through reinsurance are also associated with lower prices. Prior literature documents insurance prices to be negatively related to insolvency risk (e.g., Cummins and Danzon, 1997; Phillips, Cummins and Allen, 1998; Zanjani, 2002; and Cummins, Lin, Phillips, 2008). To control for insolvency risk, a measure of insurer leverage—the Kenney Ratio, the ratio of net premiums written to policyholder surplus—is included in the model. As hypothesized, the results reveal prices are negatively associated with higher leverage. However, the relationship is only significant for the inverse loss ratio measure of insurance price. The Kenney Ratio, however, is not the best measure of insolvency risk.[13] In a future version, I plan to

[13] To test the hypothesis that price is inversely related to firm insolvency risk, I also explored whether higher A.M. Best's ratings result in higher prices. I find a significantly positive relationship between high Best's ratings and insurance prices. Nevertheless, it is difficult assign much confidence in these results as a vast majority of firms in the sample are not rated (over 80 percent).

account for insurer insolvency risk by estimating the probability insolvency using a discrete time hazard model (see e.g., Grace and Leverty, 2008; and Doherty, Kartasheva, and Phillips, 2008).

Turning to the effect of the regulatory environment on the price of insurance, the RRG indicator variable, the proxy for single jurisdictional regulation, is significantly and negatively related to all four price measures. Thus, single body regulation significantly reduces the price of insurance relative to multiple entity regulation. Therefore, some of the benefits of the lower compliance costs in single-entity regulation accrue to consumers. Conversely, the higher compliance costs associated with multi-jurisdictional regulation lead to higher costs of insurance.

5. Conclusion

To date there has not been a great deal of evidence on the social costs and benefits of the duplicative regulation of insurance companies. This paper attempts to determine the effect of regulation on insurers by comparing a set of insurers subject to regulation by a single entity, RRGs, to standard insurance companies subject to regulation by multiple entities. The paper shows that the number of states in which a firm plans to write business plays a significant role in a firm's decision to organize as a RRG. This finding provides casual evidence that costly duplicative regulation influences a firm's decision to incorporate as a RRG. In addition, this paper shows that the regulatory compliance costs of single-jurisdictional regulation are significantly lower than multi-jurisdictional regulation. Moreover, the higher compliance costs associated with multi-jurisdictional regulation lead to higher per unit costs of insurance. Overall, this study shows that there are significant benefits associated with moving from a multi-state regulatory framework to a single-entity structure.

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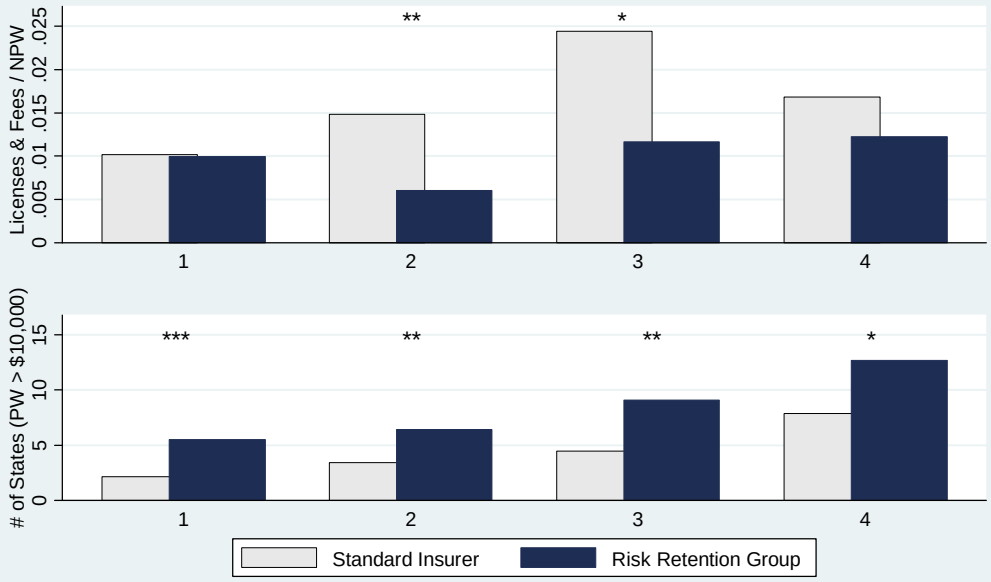
Figure 1A: Licensing Fee Ratio & Number of States (Mean)

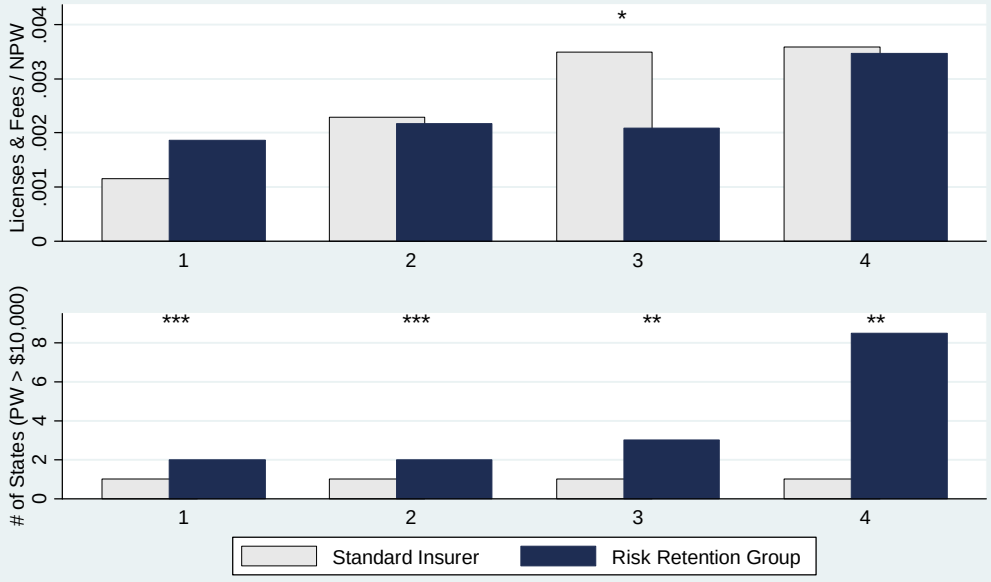
by Firm Type & Year of Operation



Source: NAIC Annual Statement Data, Author's Calculation (***, **, and * = significance at 1%, 5%, & 10%)

Figure 1B: Licensing Fee Ratio & Number of States (Median)

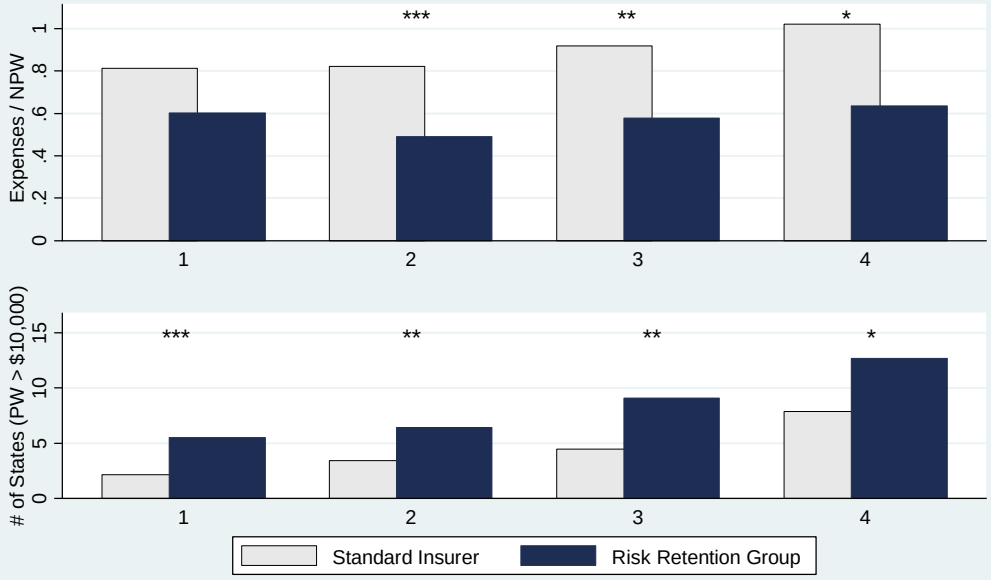
by Firm Type & Year of Operation



Source: NAIC Annual Statement Data, Author's Calculation (***, **, and * = significance at 1%, 5%, & 10%)

Figure 2A: Expense Ratio & Number of States (Mean)

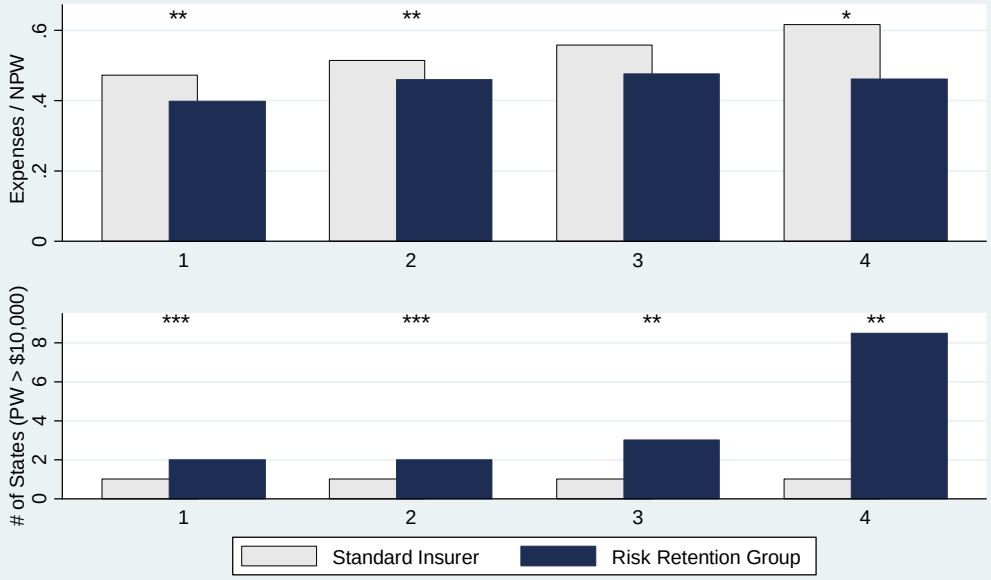
by Firm Type & Year of Operation



Source: NAIC Annual Statement Data, Author's Calculation (***, **, and * = significance at 1%, 5%, & 10%)

Figure 2B: Expense Ratio & Number of States (Median)

by Firm Type & Year of Operation



Source: NAIC Annual Statement Data, Author's Calculation (***, **, and * = significance at 1%, 5%, & 10%)

Table 1: Summary Statistics

	Risk Retention Groups (Single Jurisdictional Regulation)							Standard Insurers (Multiple Jurisdictional Regulation)					
Variable:	N	Mean		Std. Dev.	Median		Min.	Max.	N	Mean	Std. Dev.	Median	Min.	Max.
Ln (Total Assets)	635	15.993	***	1.147	15.971	***	13.198	19.594	509	16.232	1.422	16.101	12.770	20.399
Ln (NPW)	635	14.585		1.369	14.748		9.688	17.654	509	14.508	1.859	14.506	9.688	18.241
Geographic Herfindahl	635	0.617	***	0.393	0.790	***	0.041	1.000	509	0.801	0.321	1.000	0.039	1.000
Number of States	635	9.506	***	12.453	2.000	***	0.000	50.000	509	5.646	10.547	1.000	0.000	50.000
Product Herfindahl	620	0.945	*	0.119	1.000		0.500	1.000	466	0.958	0.115	1.000	0.468	1.000
Kenney Ratio	635	0.947	***	0.707	0.796	***	0.023	2.565	509	0.814	0.726	0.642	0.023	2.565
% PW in Med. Mal.	635	0.557		0.479	0.919	*	0.000	1.000	509	0.582	0.477	0.978	0.000	1.000
% PW in Other Liab.	452	0.070		0.166	0.000	***	0.000	0.916	415	0.075	0.228	0.000	0.000	1.000
% PW in Product Liab.	622	0.002	***	0.039	0.000	***	0.000	0.970	509	0.016	0.088	0.000	0.000	0.855
% PW in Comm. Auto Liab.	623	0.066	*	0.228	0.000		0.000	1.000	473	0.095	0.292	0.000	0.000	1.000
Reinsurance	635	0.317	*	0.317	0.234	***	-0.069	0.933	508	0.280	0.326	0.176	-0.069	0.933
Assets / Liab.	635	2.709	***	4.695	1.653	***	1.054	40.216	508	3.885	6.185	1.766	1.019	40.216
Liquid Assets / Liab.	635	2.114	***	4.584	1.298	***	0.121	39.858	508	3.488	6.051	1.498	0.121	39.858
Licensing Fee Ratio	635	0.011		0.028	0.002		0.000	0.180	509	0.014	0.035	0.002	0.000	0.180
Expense Ratio	635	0.593	***	0.611	0.469	***	0.000	4.480	509	0.784	0.875	0.534	0.000	4.480
TE	288	0.502	***	0.270	0.411	***	0.099	1.000	311	0.421	0.231	0.353	0.121	1.000
AE	215	0.382	***	0.203	0.355	***	0.080	0.938	199	0.543	0.225	0.576	0.068	0.988
CE	215	0.193		0.151	0.144	***	0.034	0.938	199	0.199	0.100	0.185	0.038	0.688
RE	215	0.128		0.179	0.065	*	0.001	1.000	192	0.155	0.184	0.074	0.002	1.000
Inverse Loss Ratio	617	2.219		1.589	1.682	**	0.638	6.993	489	2.115	1.613	1.580	0.638	6.993
Premium Ratio	617	1.485	***	1.167	1.150	***	-0.190	4.768	489	1.284	1.049	1.078	-0.190	4.768
EPR 1	609	2.634		1.885	1.998	*	0.779	8.303	469	2.524	1.886	1.890	0.779	8.303
EPR 2	609	1.761	***	1.374	1.364	***	-0.232	5.633	469	1.523	1.236	1.286	-0.232	5.633

--Note: *Ln(Assets)* is natural logarithm of total assets. *Ln(NPW)* is natural logarithm of net premiums written. *Geographic Herfindahl* is the Herfindahl index using the direct premiums written in each state. *Number of States* is the number of states in which the insurer writes greater than $10,000 in premiums. *Product Herfindahl* is the line-of-business Herfindahl index using net premiums written. *Kenney Ratio* is the ratio of net premiums written to policyholders surplus. *% PW in Med. Mal* . is the percentage of premiums written in medical malpractice insurance. *% PW in Other Liab.* is the percentage of premiums written in other liability. *% PW in Product Liab.* is the percentage of premiums written in products liability. *% PW in Comm. Auto Liab.* is the percentage of premiums written in commercial auto liability. *Growth* is the one-year change in net premiums written. *Reinsurance* is the percent of gross premiums written ceded to reinsurers. *Assets / Liab.* is the ratio of total assets to total liabilities. *Liquid Assets / Liab.* is the ratio of liquid assets to total liabilities. *Licensing Fee R* department licenses and fees over NPW. *Expense Ratio* is total expenses incurred over NPW. *TE* , *AE, CE* , and *RE* are technical, allocative, cost, and revenue efficiency, respectively. *Inverse Loss Ratio* is premiums written over losses incurred. *Premium Ratio* is premiums written net of expenses and dividends over losses incurred). *EPR 1* is the economic premium ratio, which is calculated as premiums written over the present value of losses incurred. *EPR 2* is premiums written net of expenses and dividends over the present value of losses incurred. Significant differences in means (medians) are examined using a t-test (Mann-Whitney). ***,**, and * denote significance at the 1, 5, and 10 percent level.

Table 2: Organizational Form Decision

Panel A: First 4 Years of Operation

	1st Yr of Operation		1st 2 Yrs of Operation		1st 3 Yrs of Operation		1st 4 Yrs of Operation	
	(1)		(2)		(3)		(4)	
Variable:	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	-0.012	0.1901	0.040	0.185	0.086	0.185	0.0423	0.1868
States > 1	1.9579	0.3906 ***	1.728	0.331 ***	1.474	0.299 ***	1.3558	0.2945 ***
Marginal Effect:								
States > 1	0.378	0.060 ***	0.344	0.057 ***	0.305	0.056 ***	0.291	0.058 ***
Obs	279		443		566		649	
Log Likelihood	-157.951		-253.689		-330.661		-387.650	
Pseudo R^2	0.127		0.108		0.085		0.075	

Panel B: All Years of Operation

	(1)		(2)		(3)		(4)	
Variable:	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Intercept	4.345	2.382	5.198	2.739 *	3.021	2.469	3.807	2.772
States > 1	1.138	0.281 ***	1.103	0.299 ***	1.317	0.318 ***	1.281	0.335 ***
Ln (Assets)	-0.266	0.113 **	-0.300	0.122 **	-0.312	0.124 **	-0.346	0.131 ***
Product Herfindahl	-0.344	1.595	-0.712	1.834	0.037	1.620	-0.285	1.837
Kinney Ratio			0.187	0.171			0.158	0.187
Reinsurance			0.060	0.452			0.044	0.489
Liquid Assets / Liabilities			-0.046	0.045			-0.036	0.045
Marginal Effects:								
States > 1	0.272	0.064 ***	0.263	0.069 ***	0.312	0.071 ***	0.304	0.076 ***
Ln (Assets)	-0.065	0.028 **	-0.073	0.030 **	-0.076	0.031 **	-0.084	0.033 ***
Product Herfindahl	-0.084	0.389	-0.174	0.446	0.009	0.396	-0.070	0.448
Kinney Ratio			0.046	0.042			0.039	0.046
Reinsurance			0.015	0.110			0.011	0.119
Liquid Assets / Liabilities			-0.011	0.011			-0.009	0.011
Year Indicators	No		No		Yes		Yes	
Obs	1086		1084		1086		1084	
Log Likelihood	-692.686		-680.501		-638.647		-629.553	
Pseudo R^2	0.066		0.081		0.139		0.149	

--Note: The table displays the results of logistic regressions in which the dependent variable is equal to 1 if a liability insurer incorporating after 1989 chooses a Risk Retention Group organizational structure subject to single jurisdictional regulation, and zero otherwise. Panel A, Model 1 examines the organizational form decision using only the first year that the liability insurer writes business. Models 2 thru 4, examine the decision using the firm's first 2, 3, and 4 years of operation, respectively. Panel B investigates all years of operation. *States > 1* is an indicator variable set equal to one if the liability insurer writes business in more than one state, and equal to zero otherwise. All other variables are defined in Table 1. Year indicators are omitted from the table. Standard errors adjusted for heteroskedasticity and firm clustering. ***, **, and * indicate two-tailed statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Table 3: Benefits to the Firm of Single Jurisdictional Regulation

Dependent Variable:	Licensing Fee Ratio	Expense Ratio	Technical Efficiency	Allocative Efficiency	Cost Efficiency	Revenue Efficiency
Variable:	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.039 ***	0.646 *	-0.897 ***	0.019	-0.728 ***	-1.034 ***
	(0.014)	(0.339)	(0.272)	(0.282)	(0.198)	(0.256)
RRG	-0.004 **	-0.122 ***	0.125 ***	-0.177 ***	0.005	0.021
	(0.002)	(0.044)	(0.038)	(0.032)	(0.016)	(0.039)
Ln (Assets)	-0.002 **	-0.006	0.079 ***	0.029 **	0.055 ***	0.073 ***
	(0.001)	(0.02)	(0.016)	(0.015)	(0.011)	(0.013)
Geographical Herfindahl	-0.006	-0.014	0.098 **	-0.030	0.021	0.038
	(0.004)	(0.079)	(0.047)	(0.044)	(0.021)	(0.048)
% PW in Med. Mal.	0.003	0.047	-0.104 *	0.158 *	0.012	-0.019
	(0.004)	(0.153)	(0.054)	(0.088)	(0.042)	(0.062)
% PW in Other Liab.	0.001	0.145	-0.129	0.037	-0.063 **	-0.057
	(0.006)	(0.178)	(0.097)	(0.093)	(0.032)	(0.067)
% PW in Comm. Auto Liab.	0.003	-0.110	-0.042	0.222 **	0.078	0.029
	(0.005)	(0.172)	(0.079)	(0.097)	(0.06)	(0.066)
Kinney Ratio	-0.006 ***	-0.126 ***	0.052 **	-0.100 ***	-0.020	-0.054 ***
	(0.001)	(0.033)	(0.025)	(0.026)	(0.013)	(0.016)
Reinsurance	0.022 ***	0.425 ***	-0.133 **	0.054	-0.046	-0.071
	(0.005)	(0.096)	(0.064)	(0.05)	(0.033)	(0.054)
Assets / Liabilities	0.001 **	0.043 ***	0.002	-0.002	0.001	0.012
	(0.001)	(0.01)	(0.005)	(0.006)	(0.001)	(0.01)
Obs	819	819	445	309	309	306
R^2	0.241	0.290	0.226	0.270	0.255	0.234

--Note: The table displays the results of OLS regressions. The dependent variable in models 1 thru 5 is the licensing fee ratio, the expense ratio, technical efficiency, cost efficiency, and revenue efficiency, respectively. All variables are defined in Table 1. Standard errors adjusted for firm and year clustering are reported in parentheses below the coefficient. ***, **, and * indicate two-tailed statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Table 4: Summary of Test Statistics

Dependent Variable	Test	Statistic	χ^2 df
Inverse Loss Ratio	Breusch-Pagan Lagrangean Multiplier Test	116.77 ***	1
	Hausman Specification Test	13.91 *	7
Premium Ratio	Breusch-Pagan Lagrangean Multiplier Test	111.22 ***	1
	Hausman Specification Test	14.33 **	7
Economic Premium Ratio 1	Breusch-Pagan Lagrangean Multiplier Test	117.26 ***	1
	Hausman Specification Test	13.14 *	7
Economic Premium Ratio 2	Breusch-Pagan Lagrangean Multiplier Test	102.98 ***	1
	Hausman Specification Test	16.85 **	7

--Note: ***, **, and * indicate statistical significance at 0.01, 0.05, and 0.10 levels, respectively.

Table 5: Benefits to the Consumer of an Operational Federal Charter

Dependent Variable:	Inverse Loss Ratio	Premium Ratio	EPR 1	EPR 2
Variable:	(1)	(2)	(3)	(4)
Intercept	7.701 ***	6.073 ***	8.590 **	7.245 ***
	(2.821)	(2.288)	(3.345)	(2.718)
RRG (Quasi OFC)	-0.795 **	-0.519 *	-0.751 *	-0.616 *
	(0.383)	(0.281)	(0.454)	(0.318)
Ln (Assets)	-0.341 **	-0.200	-0.382 **	-0.253
	(0.151)	(0.133)	(0.182)	(0.16)
Geographical Herfindahl	0.698	-0.107	0.783	-0.182
	(0.589)	(0.485)	(0.703)	(0.579)
Product Herfindahl	0.771	-0.404	0.808	-0.346
	(1.071)	(1.066)	(1.322)	(1.269)
Kinney Ratio	-0.266 *	-0.045	-0.258	-0.014
	(0.143)	(0.114)	(0.176)	(0.138)
Reinsurance	-1.154 ***	-0.948 ***	-1.283 ***	-1.038 ***
	(0.373)	(0.327)	(0.439)	(0.386)
Assets / Liabilities	0.017	-0.048 **	0.029	-0.060 ***
	(0.022)	(0.019)	(0.025)	(0.023)
Obs	1048	1048	1023	1023

--Note: The table displays the results of firm and year fixed effects regressions. The dependent variable in models 1 is the *Inverse Loss Ratio* , premiums written over losses incurred. The dependent variable in model 2 is the *Premium Ratio* , premiums written net of expenses and dividends over losses incurred. The dependent variable in models 3 and 4 is the economic premium ratio (EPR). *EPR 1* is total premiums written over present value of losses incurred. *EPR 2* is premiums written net of expenses and dividends over present value of losses incurred. All other variables are defined in Table 1. Standard errors adjusted for heteroskedasticity are reported in parentheses below the coefficient. ***, **, and * indicate two-tailed statistical significance at 0.01, 0.05, and 0.10 levels, respectively.