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1. To provide a forum for opinion and discussion on major insurance regulatory issues;
2. To provide wide distribution of rigorous, high-quality research regarding insurance regulatory issues;
3. To make state insurance departments more aware of insurance regulatory research efforts;
4. To increase the rigor, quality and quantity of the research efforts on insurance regulatory issues; and
5. To be an important force for the overall improvement of insurance regulation.

To meet these objectives, the NAIC will provide an open forum for the discussion of a broad spectrum of ideas. However, the ideas expressed in the *Journal* are not endorsed by the NAIC, the *Journal’s* editorial staff, or the *Journal’s* board.
Insurance regulation is typically aimed at policyholder protection. On the one hand, regulators attempt to ensure the financial “safety” of insurance firms, for example, by means of capital regulation; on the other hand, they are concerned about the “affordability” of insurance and thus impose restrictions on insurance pricing. Using a model that incorporates a bias of insurance buyers' perception of the insurer's solvency level, this paper weights up the welfare benefits and costs of the two regulatory tools. We demonstrate that capital requirements will only be effective when consumers have a significantly optimistic perception of the solvency level; significant frictional costs of equity capital and insurance risks are additional drivers for the effectiveness of capital regulation. Interestingly, the drivers for effective price regulation point in the opposite direction: A realistic or pessimistic consumer perception of solvency, low frictional costs of equity capital and a low riskiness of the portfolio make price regulation more effective.
A Public Policy Evaluation of Florida’s Citizens Property Insurance Corporation

Jessica Weinkle

This article presents a public policy evaluation of Florida’s residual insurance market for catastrophic hurricane risk, Citizens Property Insurance Corporation (Citizens), in respect to its legislative mandate to provide “affordable property insurance.” Following in the academic tradition of the policy sciences, this work draws from multiple disciplines such as sociology, political science, climate science and actuarial science, and the technological and social contexts for decision-making about insurance rates to better understand outcomes of the Citizens public policy. Citizens has difficulty meeting its mandate due to four main factors: 1) the use of Citizens as a means to deflect market judgments of risk when they threaten the state’s economy; 2) the practical difficulty of an actuarially sound residual market; 3) the politicization of the hurricane risk; and 4) the conflict between Florida’s economic and property insurance public policies. The struggle between political interests for control over the characterization of hurricane risk that Florida insures against reflects a lack of consensus on desired outcomes of a residual market. In order to reconcile the conflict between insurer economic sustainability and insurance affordability a public dialogue needs to develop for guiding policymaking for Florida’s future economy.

Material Misrepresentations in Insurance Litigation: An Analysis of Insureds’ Arguments and Court Decisions

Kevin Gatzlaff, Ph.D.
Stephen Avila, Ph.D.
John Fitzgerald, Ph.D.

In an insurance contract, a material misrepresentation occurs when the insured makes an untrue statement that: 1) is material to the acceptance of the risk; and 2) would have changed the rate at which insurance would have been provided or would have changed the insurer’s decision to issue the contract. The insurer’s remedy upon discovery of a material misrepresentation is rescission of the policy. The circumstances under which the insurer may exercise this rescission remedy are governed by differing state standards, which have been tested in litigation in various state and federal courts. In this paper, we explore some of the court decisions involving an insured’s material
misrepresentations that featured summary judgment motions by the insurer. We analyze the arguments against the rescission remedy made by insureds and find that they tend to prevail only in very specific circumstances. We also find that, overall, insurers appear to be proficient at determining in which cases they are likely to prevail on summary judgment, due to their high degree of success in our sample. We theorize that this result is explained partly by selection bias in the sample and partly due to variance in state laws governing the insurer’s remedy of policy rescission. Insureds, insurers, agents and brokers, regulators, and litigators could all potentially benefit from this broad review of litigation involving material misrepresentations and the remedy of insurer rescission.

Market Structure and the Profitability of the U.S. Health Insurance Marketplace: A State-Level Analysis

Cassandra R. Cole, Ph.D.
Enya He, Ph.D., FCII
J. Bradley Karl, Ph.D.

Health insurance premiums have more than doubled over the past 10 years, which has been suggested to be the result of high market concentration in the health insurance industry. In this paper, we conduct a state-level analysis in which we examine the health insurance marketplace across the states and, more important, investigate the relation between market concentration and profitability. We find that there has been an increase in the number of insurers operating in most states over the sample period; accordingly, the extent of market concentration has declined in recent years. We also find evidence of a positive relation between market concentration and insurer profits but are unable to definitively determine if this result is due to anticompetitive behavior or greater efficiency of larger health insurers. To the extent that the provisions of the federal Patient Protection and Affordable Care Act (PPACA) will impact the number of insurers in the marketplace and/or the operational efficiency of health insurers, PPACA will likely affect the profitability of the health insurance industry.
Public Policy and Regulation to Reduce Underlying Risks: Two Insurance-Mitigation Strategies Following the Recent Gulf Coastal Property Insurance Crisis

Lorilee A Medders
Charles M. Nyce
Patrick F. Maroney

Hazard mitigation is a valuable tool for reducing the damages to residential properties that may result from catastrophic events, such as hurricanes. Because of the upfront costs associated with retrofitting buildings to protect against loss, incentives are often used by insurers and policymakers/regulators to promote mitigation on existing structures. These incentives may include, *inter alia*, tax credits and mitigation grants or financing assistance. Property insurance premium credit programs, which are intended to reflect reductions in expected losses achieved through property improvements, do not exist solely as mitigation incentives. Nevertheless, insurance premium credit programs may be the most influential of all the mitigation policies on individual property owners’ choice to fortify existing structures, primarily due to the immediate savings that can be obtained via the reduced insurance premium.

Integrated Determination of Insurer Capital, Investment and Reinsurance Strategy

Hong Mao
James M. Carson
Krzysztof M. Ostaszewski
Wei Hao

Based on the criteria of the Swiss Solvency Test, Solvency II, RBC and minimizing total frictional cost, we establish integrated models to determine the adjustment capital required, investment strategy and reinsurance strategy by numerically analyzing the effect of several important parameters. Results illustrate that when the cost of reinsurance is low or the frictional cost of capital is high, reinsurance is especially attractive as an effective instrument for capital management. However, when the cost of reinsurance is high or the frictional cost of capital is low, capital can partly or fully substitute for reinsurance. Furthermore, in most cases, setting the regulatory capital level either by
Solvency II or the Swiss Solvency Test leads to greater prudence than determining insurer capital level by minimizing total frictional cost, except when the cost of capital is very low.

How to Set Rates if You Must: An Efficiency-Based Methodology for Setting Promulgated Insurance Rates with an Application to Title Insurance

Jing Ai
Patrick L. Brockett
Linda L. Golden
Utai Pitaktong

In a competitive insurance market, competition enforces cost and pricing efficiency. In some markets, however, either competitive economic environments do not exist or considerations exist such that the regulators set rates. This can occur with the introduction of new types of insurance (e.g., agricultural insurance in emerging markets) or in markets with insufficient information for consumers to make informed choices. Regardless of the desirability of rate regulation, it does happen. The objective of this paper is to explore how to develop better methods for setting regulated rates. This paper presents a data envelopment analysis (DEA) approach to determine efficient levels of expenses to use as an input into rate making by regulators when market competition determined levels of expenses are unavailable. Thus, we develop an efficiency-based rate promulgation methodology and use title insurance in Texas to illustrate this process. Using data from the Texas Department of Insurance (TDI), we show how our methodology, in conjunction with current TDI procedures, can improve the rate promulgation process for title insurance. The insights from our empirical analysis are generally applicable to other cost plus pricing models.
A Preliminary Examination of Health Insurers Participating on Federally Facilitated Marketplaces

Cassandra R. Cole, Ph.D.
J. Bradley Karl, Ph.D.

The federal Patient Protection and Affordable Care Act (ACA) mandated the creation of health insurance exchanges and 2014 marked the first year that coverage obtained through the exchanges takes effect. However, there currently exists little empirical evidence regarding the operational characteristics and financial performance of the insurers that have elected to participate on health insurance exchanges. As such, this paper examines the quarterly financial statement data reported to the NAIC of health insurers that elected to operate on health insurance exchanges in 2014. In the aggregate, the evidence presented in this paper suggests that insurers currently participating on exchanges are larger, well-established companies whose profits (expenses) are lower (higher) relative to previous time periods and other insurers not participating on exchanges. While data constraints preclude definitive conclusions regarding the effects of participation in insurance exchanges on insurer performance, the paper provides an important preliminary analysis that helps to inform regulators, policymakers and other health insurance market participants. Our analysis also highlights several areas of research that can be pursued by future researchers when data constraints become less binding.

Own Risk and Solvency Assessment: Origins and Implications for Enterprise Risk Management

David M. Pooser
Paul L. Walker

Although the debate about the causes of the 2008 financial crisis is unsettled, the crisis caused many regulators to rethink regulation of the global financial system and industries such as banking and insurance. Furthermore, the liquidity crisis and federal takeover at AIG led to an additional critical review of how insurance is regulated and how a group or holding company view of an insurance enterprise might be valuable. Some regulators were concerned that the failure of an insurance company might lead to a “contagion effect” of weakening financial status or even company failures within the insurer’s group or
of other firms associated with that insurer. These critical reviews of the financial sector and insurance industry eventually gave birth to the NAIC’s 2008 Solvency Modernization Initiative (SMI).

The Economics and Regulation of Captive Reinsurance in Life Insurance

Scott E. Harrington

The use of captive reinsurance arrangements in life insurance has generated significant debate and led to recent adoption of new regulatory requirements by the NAIC. This paper provides an overview of the regulatory reserve requirements that spurred growth in captive reinsurance and how captive arrangements are used. It elaborates potential efficiencies and risks from the arrangements, as well as how insurers’ financial incentives, previous regulation, rating agency monitoring and monitoring by non-insurance creditors mitigate those risks. It provides evidence on the scope and structure of captive reinsurance using data from NAIC reporting requirements that became effective in 2013, and it compares A.M. Best ratings for life insurers with and without captive arrangements, documenting that most entities using captive reinsurance have relatively high ratings. Finally, it discusses the new NAIC regulatory framework for captive reinsurance arrangements and specific requirements for the amounts and types of assets permitted to back the arrangements.

Abstracts of Significant Cases Bearing on the Regulation of Insurance (2015)

Jennifer F. McAdam, J.D.

Guidelines for Authors
Editors’ Perspective

The insurance regulatory landscape continues to evolve quickly. The 2015 articles highlight many of the major issues facing regulators, the insurance industry and consumers. The issues are diverse, but all have important implications for our economy. The careful analysis of the authors helps to support those tasked with making regulatory decisions across the country.

This year, the impact of changes in the health care market continues to raise important questions. One of the articles provides a state-level analysis of the market structure and profitability of the U.S. health insurance market. As the issues associated with the implementation of the federal Affordable Care Act (ACA) continue to unfold, it will be important for researchers to continue to analyze the changing landscape of this market and its impact on a variety of stakeholders.

Issues related to property insurance also remain important in many areas, especially Florida and the Gulf Coast. Two of the articles investigate these issues by looking at public policy decisions and alternatives. Additionally, some of the more timeless regulatory issues related to rate regulation, captives and material misrepresentation are addressed, as the states still make key decisions in these areas.

Finally, there is an invited article on the subject of Own Risk and Solvency Assessment (ORSA). The article serves as a primer on the subject. As the states continue to adopt the NAIC Risk Management and Own Risk and Solvency Assessment Model Act (#505) and the first wave of ORSA reporting requirements go into effect, this will be in important issue for insurers.

In the coming election year, insurance regulatory issues will remain at the forefront. In addition to health care topics, funding of flood and other catastrophes will be debated. Further, the implementation of ORSA and international accounting standards will spur additional debate related to financial standards in the states. Finally, as emerging risks such as drones become more common, insurers and regulators will be tasked with creating insurance-related and regulatory solutions.

The Journal of Insurance Regulation will continue to generate articles aimed at analyzing these types of issues and providing unbiased resources for the regulatory and insurance communities.
Safety Versus Affordability as Targets of Insurance Regulation: A Welfare Approach

Rayna Stoyanova*
Sebastian Schlütter**

Abstract

Insurance regulation is typically aimed at policyholder protection. On the one hand, regulators attempt to ensure the financial “safety” of insurance firms, for example, by means of capital regulation; on the other hand, they are concerned about the “affordability” of insurance and thus impose restrictions on insurance pricing. Using a model that incorporates a bias of insurance buyers' perception of the insurer's solvency level, this paper weights up the welfare benefits and costs of the two regulatory tools. We demonstrate that capital requirements will only be effective when consumers have a significantly optimistic perception of the solvency level; significant frictional costs of equity capital and insurance risks are additional drivers for the effectiveness of capital regulation. Interestingly, the drivers for effective price regulation point in the opposite direction: A realistic or pessimistic consumer perception of solvency, low frictional costs of equity capital and a low riskiness of the portfolio make price regulation more effective.

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1. Introduction

In attempting to meet their overall objective of protecting policyholder interests, insurance regulators employ different techniques aimed at two subordinate objectives. First, insurance regulators want to ensure that insurance companies are sufficiently capitalized to meet policyholder claims. In this context, they develop sophisticated regulatory regimes imposing risk-based capital (RBC) requirements. For example, under the future regulatory regime Solvency II in the European Union, capital requirements are designed to restrict the insurer's annual default probability at 0.5%. In addition, Solvency II contains qualitative requirements regarding insurers’ risk management practices, as well as transparency and disclosure standards for insurer risk profiles. Implementing such a regulatory regime comes at a high cost: Ernst & Young (2011) estimate that the implementation of Solvency II in the United Kingdom (UK) costs the insurance companies £1.8bn; government expenditure to set up the regulatory regime and establish appropriate regulatory authorities comes on top. Second, regulators frequently employ measures aimed at making insurance more affordable. For example, in some U.S. states, rate regulation is in force for workers’ compensation, automobile and medical malpractice insurance. Even though the insurance markets in the European Union (EU) were deregulated in 1994, there is also some degree of price regulation in the EU: In Germany, for example, private health insurers are required to offer a basic tariff (Basistarif) whose premium is limited in accordance with the maximum rate in the statutory health insurance. Typically, those insurance pricing restrictions are independent of the insurer’s capitalization.

Although these two regulatory objectives—safety and affordability—appear to be in conflict, there is little theoretical work on how insurance regulators should act in order to effectively protect policyholders’ interests. Klein et al. (2002) demonstrate empirically that stringent price ceilings induce insurers to attain higher leverage ratios and thus reduce their safety level. This finding is in line with the (not insurance-specific) theoretical argument that firms use debt as a strategy to influence the regulator to increase the regulated price (Taggart, 1981; Spiegel and Spulber, 1994; Dasgupta and Nanda, 1993). In the context of insurance, there is another, simpler explanation for this observation: Because the regulated premium influences the insurers’ expected profits per insurance contract, it affects their incentive for attracting customers with a strong financial position (Schlüter, 2014). A significant price ceiling, therefore, is accompanied by relatively high

1. A general overview of regulatory theories and tools and the related literature is provided by Lorson et al. (2012).
2. A global overview of the introduction of risk-based capital standards is provided by Eling and Holzmüller (2008).
3. Lorson et al. (2012) give an overview of several studies estimating the Solvency II-related implementation costs and the additional costs for raising capital.
insolvency risk. Vice versa, there are theoretical arguments that stringent solvency regulation might increase insurance premiums. First, solvency regulation affects the insurer’s default put option, which is reflected by insurance premiums (Doherty and Garven, 1986; Gründl and Schmeiser, 2002; Gatzert and Schmeiser, 2008). Second, to attain a higher safety level, insurers face additional risk management costs, such as costs of reinsurance or frictional costs of equity capital (Froot, 2007), that may be passed on to the consumer in higher insurance premiums.

This article investigates how regulatory requirements designed to meet the objectives of “safety” and “affordability” influence an insurer’s optimal capital and pricing strategy, and how these decisions affect policyholder welfare. Based on these results, we investigate in which situations regulators should focus either more on “safety” or, alternatively, on “affordability.” Throughout our analysis, we employ a model with a heterogeneous group of policyholders whose preferences are represented by an insurance demand function, depending on the insurance premium and the insurer’s safety level. The insurer decides on its shareholder-value-maximizing equity-premium combination by anticipating the consequences for insurance demand. The model incorporates frictional costs of the insurer’s equity capital endowment, such as corporate taxes. Insurance buyers may have an overly optimistic or pessimistic perception of the insurer's safety level, and the insurer could make wrong assumptions about this perception bias.

In a benchmark case, we first derive the insurer’s optimal strategy in the absence of regulation. We determine the insurer’s optimal safety level by balancing its incentives resulting from demand reaction against the default put option and the frictional costs of equity. Next, we analyze the influence of RBC requirements. Here, the regulator can specify the insurer’s safety level, to which the insurer reacts by adjusting the insurance premium. We find that the regulator cannot enhance welfare by means of solvency regulation as long as policyholders perceive default risk realistically. However, when policyholders cannot perfectly monitor the solvency level, capital regulation can enhance consumer welfare, even though it causes an increase of insurance premiums. Strictly speaking, given that the insurer could make wrong assumptions about consumers’ solvency perception, the most relevant factor is what the insurer believes about consumers’ perception and reaction to the solvency level: Capital requirements will be effective if the insurer believes that consumers have an optimistic solvency level perception. Moreover, our numerical examples demonstrate that the effectiveness of capital regulation is positively related to the level of capital-related frictional costs and the severity of underwriting risks.

Finally, we study the consequences of regulatory price ceilings. We demonstrate that the net effect of enhancing the affordability of insurance, on the one hand, and reducing the insurer’s optimal safety level, on the other hand, can be

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5. This result is in line with the model of Rees et al. (1999).
positive or negative for policyholder welfare. Our numerical examples indicate that price ceilings will be effective when demand is unbiased and when frictional costs are low. Thus, markets in which price ceilings are effective have characteristics contrary to markets in which capital regulation is appropriate.

The remainder of the article is organized as follows. Section 2 presents the model framework and introduces the objective functions. Section 3 presents the insurer’s optimal strategy in the benchmark case without regulation. Section 4 studies the effectiveness of solvency regulation, while section 5 examines that of price ceilings. Section 6 investigates the impact of frictional costs, the volatility of insurance risks and incomplete information on the effectiveness of the two regulatory mechanisms. Section 7 concludes.

2. Model Design

2.1 Actors and Training

Our one-period model is based on the model proposed by Zanjani (2002). We consider an insurance market with a homogeneous product and three stakeholder groups: insurance buyers, an insurer and a regulator.

Insurance buyers

The insurance buyers are offered an insurance product at a certain price and default risk level. Their buying decisions take these characteristics into account. Cumulative consumer reaction is modeled by an aggregate demand function, which depicts the representative preferences of a heterogeneous group of insurance buyers and sums to the number of customers for whom purchase of the offered insurance product is advantageous.

We use a two-parametric demand function \( y(p, dr) \), where \( p \) denotes the unit price of the insurance product, and \( dr \) is the default ratio that the insurer communicates to consumers. We define the default ratio as the ratio of the arbitrage-free value of unpaid claims to the value of nominal liabilities—that is, liabilities without default risk. The default ratio is used in the model as a measure of risk. To keep the model tractable, we apply a specific form of the demand function:

\[
y(p, dr) = n \cdot e^{-f_p p - f_{dr} dr}
\]

where \( n \) is a scale parameter, and \( f_p \) and \( f_{dr} \) are the sensitivity factors with respect to price and default ratio. The demand function has the following properties:

\[
\frac{\partial y(p, dr_{perc})}{\partial p} = -f_p \cdot y \leq 0, \quad \frac{\partial y(p, dr_{perc})}{\partial dr} = -f_{dr} \cdot y \leq 0
\]

that is, policyholders react negatively to increases in price and default risk. This exponential form of an insurance demand function has been derived by Zimmer et al. (2014) from an
experiment in which the participants were confronted with insurance contracts subject to default risk. The experimental results show participants’ willingness to pay for a household insurance contract with a certain default risk level. The demand function is imperfectly elastic with regard to price and default risk—that is, because of switching and information costs, small changes in price and default ratio do not reduce the demand to zero (D’Arcy and Doherty, 1990; Cummins and Danzon, 1997; Zanjani, 2002; Yow and Sherris, 2008).

**Insurer**

The second party in the model, the limited liability insurer, maximizes its shareholder value (SHV) and makes decisions as to its risk management strategy and underwriting activity in the presence of regulatory constraints—that is, it decides on its default ratio \( dr \) and insurance price \( p \).

The insurer’s objective function is the present arbitrage-free market value of the end-of-period equity capital \( E_0 = PV(E_1) \) minus the initial equity endowment \( K \),

\[
SHV = E_0 - K. \tag{3}
\]

\( PV(\cdot) \) is the arbitrage-free valuation function providing the time-0 value of time-1 cash flows. Equity funds are used as a risk management tool to ensure the realized solvency level. Owing to corporate taxation, agency costs and acquisition expenses, equity endowment is assumed to imply up-front frictional costs, which are modeled by a proportional charge \( \tau \geq 0 \).\(^6\) Considering the insurer’s limited liability, the final payoffs to shareholders at time 1 are given by the future value of the available assets \( A_1 \) minus the nominal claims \( L_1 \) plus any unpaid losses above the available assets—that is, the shareholders’ default put option \( DPO_1 = \max(L_1 - A_1; 0) \). To develop asset and liability values over time, we assume a geometric Brownian motion process. At time 0, the arbitrage-free value of the final shareholder payoffs is then

\[
E_0 = A_0 - L_0 + PV(DPO_1). \tag{5}
\]

The insurer’s initial assets are denoted by

\[
A_0 = y \cdot p \cdot (1 - \tau) \cdot K. \tag{4}
\]

Furthermore,

\[
\mu = L_0/y \tag{6}
\]

---

\(^6\) This is a common approach in the literature. See Zanjani (2002), Froot (2007), Yow and Sherris (2008), and Ibragimov et al. (2010).
denotes the arbitrage-free initial value of the nominal liabilities per contract,
\[ dr = PV(DP_0) / L_0 = DP_0 / L_0 \]  
(6)
denotes the default ratio, and \( s = A_0 / L_0 \) denotes the initial asset-liability ratio. Using option pricing methods, the default ratio can be determined by Margrabe’s (1978) formula:
\[ dr(s, \sigma) = \Phi(z) - s \cdot \Phi(z - \sigma) \]  
(7)
\[ \sigma = \sqrt{\sigma_A^2 + \sigma_L^2 - 2\rho \sigma_A \sigma_L} \]
\[ z = \frac{-\ln(s)}{\sigma} + \frac{1}{2} \tau \]
where \( \Phi \) is the distribution function of the standard normal distribution, \( \sigma_A \) and \( \sigma_L \) are the volatilities of the assets and liabilities, respectively, and \( \rho \) is the correlation between them. Since \( dr(s, \sigma) \) is a continuous and strictly decreasing function in \( s \) and \( \sigma \), there is a unique inverse function \( s(dr, \sigma) \).

Applying the above relationships, we represent the shareholder value function as follows:
\[ SHV(dr, p) = \]
\[ = y(dr, p) \cdot [p - \mu \cdot (1 - dr)] - \tau K \]
\[ = y(dr, \gamma) \cdot \left[ p - \mu \cdot (1 - dr) - \frac{\tau}{1+\tau} (\mu \cdot \gamma(dr, \sigma) - p) \right] \]  
(8)
Therefore, the insurer’s decision problem is to find the optimal and legally allowable combination of default risk level \( dr \) and insurance price \( p \) that maximizes its shareholder value.

**Regulator**
The regulator uses two instruments to achieve the safety and affordability targets. First, there is the option of introducing solvency regulation, in the sense of capital requirements, as a method of improving the safety of insurance companies.

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7. For explanation, see, e.g. Myers and Read (2001), p. 553. The determination of an insurer’s default ratio or Default Put Option via arbitrage-free pricing technique is quite common in the related literature—for example, Cummins and Danzon (1997), Gründl and Schmeiser (2002), Gätzert and Schmeiser (2008), Yow and Sherris (2008), Ibragimov et al. (2010), and Schlüter (2014). Formally, the technique can be applied if the insurer’s assets and liabilities can be replicated with instruments that are traded on an arbitrage-free and complete financial market. Policyholders may be assumed to be unable to hedge their risks with financial market instruments, because they cannot enter the financial market (Ibragimov et al., 2010).

8. For the derivation of equation (8), please see the Appendix.
The second tool is price restriction, which is used to make insurance products more affordable by setting a maximum allowed price. The regulator’s objective function is consumer surplus (CS) maximization,\(^9\) which is calculated as the sum of the differences between the reservation price—that is, the maximum price a consumer would pay for the insurance product—and the offered price \(p'\) over all policyholders:

\[
CS(p', dr) = \int_{p}^{\infty} y(p, dr) \, dp
\]  

To study the effectiveness of the two regulatory tools and be able to compare them, we bring in an effectiveness variable that measures the percentage change of consumer surplus, defined as the absolute change in CS divided by the CS in an unregulated market, \(\frac{CS^{reg} - CS^{non-reg}}{CS^{non-reg}}\). Additionally, we look at the percentage change of shareholder value, \(\frac{SHV^{reg} - SHV^{non-reg}}{SHV^{non-reg}}\), to study the regulatory impact on the insurer’s shareholder value.

### 2.2 Solvency Perception Bias

For consumers, it might be costly to assess and monitor an insurance company's solvency situation due to principal-agent problems.\(^10\) These problems might be intensified by opaqueness problems that appear to be severe for insurance markets.\(^11\) In our model, we include a bias of consumers' perception of the insurer's solvency level by the parameter \(\lambda\), \(\lambda \in [-1; +\infty)\), which measures the divergence between perceived default ratio \(dr_{perc}\) and realized default ratio \(dr_{real}\):

\[
dr_{perc} = dr_{real}(1 + \lambda)
\]

For \(\lambda < 0\), the insurance buyers have an optimistic view on the insurer's solvency situation and perceive a lower level of default risk than actually realized by the insurer. An optimistic bias might be likely in times of economic security when insolvencies or financial distress in the financial sector do not play a major role in the media. For \(\lambda > 0\), the insurance buyers are pessimistic with regard to the insurer’s solvency and perceive a higher default risk level than is actually the case. A pessimistic bias could result from major catastrophic events or financial crises, which raise consumers' awareness for default risk.

---

9. Using the consumer surplus as the regulator’s objective function is consistent with models by Schmalensee (1989), Spiegel and Spulber (1994).
11. Morgan (2002) and Pottier and Sommer (2006) empirically estimate opaqueness for different industries. Using the rating disagreement as a proxy for opaqueness, the studies find that insurance and banking are most severely affected by the opaqueness problem.

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Consumer surplus when solvency perception is biased

As before, CS measures the cumulative utility for policyholders of buying the insurance product. However, in the case of biased solvency perception, different aspects of the calculation must be considered.

Calculation of CS in markets, both with or without perception bias, is illustrated in Figure 1. Assume that the insurer realizes the default ratio $d_{real}$. The thick solid line in Figure 1 shows for how many consumers it is advantageous to buy insurance. Given that the insurer decides on the premium $p' (d_{real})$, the hatched area below the solid curve gives the CS for unbiased demand. For biased demand, the perceived default ratio $d_{perc}$ deviates from the realized one. We distinguish between a pessimistic and an optimistic view.

The dashed curve in Figure 1 represents the optimistic view ($\lambda < 0$) and shows the number of consumers who actually purchase insurance perceiving the default ratio $d_{perc, \lambda < 0}$. Because the perceived default ratio $d_{perc, \lambda < 0}$ is lower than the actual default ratio, consumers overestimate their utility from buying the insurance product. There are some consumers whose utility is reduced by purchasing insurance, since they would not have bought it in the absence of the perception bias. The black area in Figure 1 measures the loss of CS resulting from this effect.

The thin black curve in Figure 1 represents the pessimistic view ($\lambda > 0$) and shows the number of consumers who purchase insurance perceiving the default ratio $d_{perc, \lambda > 0}$. Because the perceived default ratio is higher than the actual default ratio realized by the insurer, fewer consumers buy insurance, although it would have been advantageous for them. In this case, the forgone CS is measured by the gray area in Figure 1.
Under the premium $p^*(dr_{real})$, the CS with biased solvency perception is the hatched area minus the black area or the gray area. Formally, CS is calculated as:

$$\text{CS}(dr_{real}, p) = \int_{\text{hatched area}} y(dr_{real}, \bar{p}) dp - \left[ (p^* - \bar{p}) \cdot y(dr_{perc}, p^*) - \int_{\text{black/gray area}} y(dr_{real}, p) dp \right]$$

where $\bar{p}$ is defined by $y(dr_{real}, \bar{p}) = y(dr_{perc}, p^*)$.

3. Optimal Solutions in an Unregulated Market

As a benchmark case and comparison basis for the different regulatory approaches, we consider an unregulated insurance market in which the insurer can decide on its SHV-maximizing equity-premium combination observing the solvency perception bias of consumers. Here, the insurer’s maximization problem is defined as:

$$\max_{(dr, p)} \text{SHV}(dr_{real}, p)$$

$$= \max_{(dr, p)} y(dr_{perc}, p) \cdot \left[ p - \mu \cdot (1 - dr_{real}) - \frac{\tau}{1-\tau} (\mu \cdot s(dr_{real}, \sigma) - p) \right]$$

Based on the first-order condition of equation (12), we can determine the insurer’s optimal premium for a given default ratio $dr_{real}$:

$$p^*(dr_{real}) = \arg\max_p \text{SHV}(p, dr_{real})$$

$$= \mu \cdot (1 - dr_{real}) + \tau \cdot (\mu \cdot s(dr_{real}, \sigma) - 1 \cdot (1 - dr_{real})) + \frac{1}{\text{Profit mark-up}}$$

The optimal price is calculated as the sum of the arbitrage-free value of claim payments, plus frictional costs transferred to policyholders, plus a profit loading. Note that a solvency perception bias influences the insurer’s optimal default risk level, but it has no direct effect on the premium. The optimal premium $p^*(dr_{real})$ depends only on the insurer’s actual default risk level, not on the perceived level.

Let $dr_{real} = \arg\max_{dr} \text{SHV}(p^*(dr), dr)$ denote the insurer’s SHV-maximizing (actual) default ratio. Solving the insurer’s maximization problem
(Equation 12), the first-order condition for the optimal choice of $\delta r_{real}^*(p^*)$, given that the price is optimally adjusted, implies that\(^{12}\)

$$
\frac{f_{\rho}(1+\lambda)}{f_{\rho}} \cdot \frac{1}{\tau} = \mu - \frac{\tau}{1-\tau} \cdot \frac{\partial (\delta r_{real}(\sigma))}{\partial \delta r},
$$

(14)

The left-hand side of equation (14) represents the marginal change of the insurer’s benefits due to demand reaction when the default ratio is marginally changed. The right hand side measures the marginal change of default put option and frictional costs of equity. Rewriting equation (14) enables us to present the insurer’s SHV-maximizing asset-liability ratio $s^*$ using a closed-form solution:

$$
s^* = g \left[ \frac{f_{\rho}}{f_{\rho}} (1 + \lambda) - \frac{1-\tau}{\tau} \right]
$$

(15)

with $G(x) = \exp \left( -\sigma \cdot \Phi^{-1} \left( \frac{1}{2} \right) \right)$ and $\Phi^{-1}$ denoting the quantile function of the standard normal distribution. One can easily verify that $G(x)$ is a strictly increasing function in $x$. Therefore, the insurer will optimally avoid default risk by holding a high capital level if, c.p., demand reacts strongly to default risk, weakly to price, consumers’ solvency perception is unbiased and frictional costs are low.

We then have the following equations for the maximum shareholder value and resulting CS in the unregulated market:

$$
SHV(\delta r_{real}^*, p^*) = \frac{\gamma(\delta r_{perc}^* p^*)}{f_{\rho}(1-\tau)}
$$

(16)

$$
CS(\delta r_{real}^*, p^*) = \frac{\gamma(\delta r_{perc}^* + \int f_{\rho} d\delta r_{real}^d)}{f_{\rho}}
$$

(17)

The first equation illustrates that shareholders benefit from an optimistic solvency perception bias (i.e. $\delta r_{perc} < \delta r_{real}$). However, the impact of the perception bias on CS depends on the multiple effect of demand change and change in the SHV-maximizing price and realized default risk. In the numerical examples, we provide better understanding of the consequences of a perception bias for the resulting safety level, insurance premium, shareholder value and consumer surplus.

**Numerical example**

Throughout our analysis, we illustrate our results with a realistically calibrated numerical example. We set the following risk parameters: $\mu = 200$, $\sigma_A = 5\%$, \^[12\] The derivation of equations (14) and (15) is analogous to Schlütter (2014), Proposition 2.
\[ \sigma_e = 20\% \text{, and } \rho = 0.13 \text{ which implies } \sigma = \sqrt{5\%^2 + 20\%^2} \approx 0.2062. \] We further assume a frictional cost rate of \( \tau = 5\% \). For simplicity, we set \( r = 0\% \). The demand-function-related parameters are as follows in Table 1:\(^{15}\)

<table>
<thead>
<tr>
<th>Demand-function-related parameters</th>
<th>( f_p )</th>
<th>0.015</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f_{dr} )</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>( n )</td>
<td>10000</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 presents the optimal combinations of price and default risk, as well as the resulting shareholder value and consumer surplus, for five different bias levels \{1.0; 0.6; 0; -0.3; -0.6\}. Apparently, the optimal default risk level is higher for an optimistic solvency perception bias than for a pessimistic one, and according to equation (13), the premium is inversely affected.

<table>
<thead>
<tr>
<th>Perception bias</th>
<th>( p^<em>(dr^</em>) )</th>
<th>( dr_{rest} )</th>
<th>( dr_{perc} )</th>
<th>( K^<em>(dr^</em>_{real}) )</th>
<th>( y )</th>
<th>( SHV )</th>
<th>( CS )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda = 1 )</td>
<td>272.57</td>
<td>0.0697%</td>
<td>0.138%</td>
<td>9600.38</td>
<td>163.2</td>
<td>1146832</td>
<td>1100048</td>
</tr>
<tr>
<td>( \lambda = 0.4 )</td>
<td>272.63</td>
<td>0.0897%</td>
<td>0.1436%</td>
<td>8655.88</td>
<td>164.1</td>
<td>11518.9</td>
<td>11025.45</td>
</tr>
<tr>
<td>( \lambda = 0 )</td>
<td>271.81</td>
<td>0.1606%</td>
<td>0.1606%</td>
<td>6485.90</td>
<td>165.7</td>
<td>11.634.11</td>
<td>11.052.41</td>
</tr>
<tr>
<td>( \lambda = -0.3 )</td>
<td>271.02</td>
<td>0.2632%</td>
<td>0.1842%</td>
<td>4583.44</td>
<td>167.2</td>
<td>11734.05</td>
<td>11024.11</td>
</tr>
<tr>
<td>( \lambda = -0.6 )</td>
<td>268.95</td>
<td>0.7036%</td>
<td>0.2814%</td>
<td>623.557</td>
<td>170.1</td>
<td>11.940.16</td>
<td>10672.67</td>
</tr>
</tbody>
</table>

\(^{13}\) These numerical assumptions are consistent with the market-based calibrated model of Yow and Sherris (2008).

\(^{14}\) Zanjani (2002) reports that the frictional costs for the reinsurance industry can be approximated with 5%.

\(^{15}\) These parameters are consistent with the regression results estimated by Zimmer et. al (2014).
Regarding insurance demand reaction, the premium reduction overcompensates the higher default risk in case of a higher bias, and thus more insurance contracts are sold. While this increases shareholder value, the higher actual default risk level reduces consumer surplus. The resulting combinations of CS and shareholder value are illustrated in Figure 2.

### 4. Effectiveness of Capital Regulation

We next analyze the situation in which the regulator restricts the insurer’s solvency level by means of RBC requirements, but prices remain unregulated. This situation will more or less be the regulatory environment in the EU once Solvency II has been implemented, since most price restrictions were removed by the deregulation of insurance markets in 1994.

In our model, the regulator implements RBC requirements by restricting the insurer’s (actual) default ratio at a level $d_{\text{r}^{\text{reg}}}$, forcing the insurer to hold a sufficient level of capital. The restriction is binding when the regulatory default ratio $d_{\text{r}^{\text{reg}}}$ falls below the shareholder-value-maximizing default ratio.

---

16. It is a simplifying assumption that the regulator can exactly restrict the insurer’s default ratio. Solvency II defines the capital requirements according to the value-at-risk at a 99.5% confidence level. For a discussion on potential discrepancies between the regulatory desired solvency level and the safety level ensured by capital requirements, see section 6: Regulator's ability to monitor the insurer's actual default ratio.
Facing capital requirements, the insurer adjusts the premium to maximize SHV (see equation 13):

\[
p^* (dr^{reg}) = \arg\max_p SHV(p, dr^{reg}) =
\]

\[
= \mu \cdot (1 - dr^{reg}) + \tau \cdot \left( \mu \cdot s(dr^{reg}, \sigma) - \tau \cdot (1 - dr^{reg}) \right) + \frac{1}{f_p}
\]

Equation (18) demonstrates that the optimal insurance premium is negatively related to the regulatory default ratio \(dr^{reg}\). First, a lower value of \(dr^{reg}\) means that the insurer’s default put option decreases, and thus the first premium component increases. Second, the insurer needs to hold additional equity capital to achieve a lower default ratio, and the related frictional costs are transferred to policyholders with the second premium component. Thus, stricter capital requirements will lead to a higher premium. When deciding on the welfare-optimal policy of capital requirements, the regulator needs to balance their positive influence on the safety level against their negative influence on affordability. Formally, the CS in dependence of \(dr^{reg}\) and \(\lambda\) is given by:

\[
CS(dr^{reg}, \lambda) = \frac{y(dr^{reg},(1+\lambda)\cdot p^*(dr^{reg}))(1+f_{dr}\cdot dr^{reg}\lambda)}{f_p}
\]

Taking the first-order derivative of \(CS(dr^{reg}, \lambda)\) with respect to \(dr^{reg}\) enables us to determine how strict the capital requirements should be:

\[
\frac{d}{dr} CS(d^*, \lambda)
\]

\[
= y(dr \cdot (1 + \lambda), p^*) \left[ (1 + f_{dr} \cdot dr^{reg}) (1 - \tau) \left( -\frac{f_{dr}}{f_p} \cdot \frac{\lambda}{1-\tau} + \frac{\tau\mu}{1-\tau} \cdot \frac{\partial s()}{\partial dr} \right) \right]
\]

\[
= -y(dr \cdot (1 + \lambda), p^*) \cdot (1 + f_{dr} \cdot dr^{reg} \cdot \lambda) \cdot (1 - \tau)
\]

\[
\cdot \frac{f_{dr}}{f_p} \cdot \frac{\lambda}{1-\tau} \cdot \frac{\partial s()}{\partial dr} \cdot \frac{1}{1 - \tau}
\]

According to equation (11) and the explanations beneath, expression A in equation (20) reflects the insurer’s marginal benefits minus the marginal costs resulting from a marginal default ratio reduction. If the insurer attains the SHV-maximizing default ratio, expression A is zero. Expression B in equation (20) is driven by the solvency perception bias \(\lambda\). If consumers are unbiased \((\lambda = 0)\), expression B is zero as well, and the whole derivative in equation (20) is thus zero.
Therefore, the default ratio that the insurer will attain based on its own incentives maximizes CS as well, and the regulator does not need to impose capital requirements. If consumers exhibit a pessimistic solvency bias (λ > 0), expression B is positive. If the insurer attains the SHV-maximizing solvency level (i.e. expression A is zero), then the whole derivative is positive, meaning that the CS-maximizing default ratio is even higher than the SHV-maximizing one. As in the previous case, reducing the default ratio by means of capital requirements does not raise consumer welfare. Only if consumers are too optimistic about the insurer’s default ratio (λ < 0) is expression B negative.\(^1\) Equation (20) is then negative for the SHV-maximizing solvency level, and the regulator can effectively enhance policyholders’ welfare by imposing binding capital requirements to reduce the default ratio.

**Numerical example and graphical representation**

We now apply the numerical example from Section 3 to the situation with capital requirements. Table 3 contains the consumer-surplus-maximizing regulatory default ratios, the insurer’s optimal response and the corresponding welfare levels.

| Table 3: Numerical Results Under Capital Regulation for Different Bias Levels |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Perception bias                  | Pessimistic     | Optimistic      |                  |                  |                  |
| \(d_{\text{reg}}^{\text{opt}}\)  |                 |                 |                  |                  |                  |
| \(d_{\text{pre}}\)              | 0.0692%         | 0.0897%         | 3.1606%         | 0.1602%         | 0.1539%         |
| \(d_{\text{opt}}\)              | 0.1384%         | 0.1436%         | 3.1606%         | 0.1121%         | 0.0635%         |
| \(p^*(d_{\text{reg}}^{\text{opt}})\) | 272.97          | 272.63          | 271.81          | 271.814         | 271.826         |
| \(y\)                           | 163.42          | 164.14          | 165.79          | 166.91          | 168.01          |
| \(SHV^{\text{reg}}\)            | 11468.32        | 11518.91        | 11634.11        | 11712.65        | 11790.47        |
| \(\Delta SHV^{\text{reg}}\)     | 0.00%           | 0.00%           | 0.00%           | -0.19%          | -1.25%          |
| \(CS^{\text{reg}}\)             | 11000.48        | 11025.46        | 11052.41        | 11052.15        | 11051.40        |
| \(\Delta CS^{\text{reg}}\)      | 0.00%           | 0.00%           | 0.00%           | +0.25%          | +3.55%          |

The first three columns of Table 3 (\(\lambda = 1; 0.6; 0\)) illustrate, as discussed above, that the regulator cannot improve policyholder welfare by capital regulation when consumers’ solvency perception is pessimistic or unbiased: The consumer-surplus-maximizing default ratio is equal or lower to the insurer’s optimal strategy

\(^1\) We may assume that \(1 + f_{\text{st}} d\lambda > 0\), which is equivalent to the consumer surplus being positive, cf. equation (17).
in the absence of regulation. (See Table 2.) In the fourth ($\lambda = -0.3$) and fifth columns ($\lambda = -0.6$), the regulator restricts the default ratio below the shareholder-value-maximizing default ratio of 0.1606%. Because the premium is only affected by the realized default ratio (see equation 18), the insurance premium is optimally adjusted for all different bias levels; insurance demand is higher in case of a negative bias since consumers overestimate the value of insurance. Compared to our benchmark case with no regulation, the optimal capital requirements are stricter when there is a negative bias and, hence, such capital requirements can increase CS by 0.25% for $\lambda = -0.3$ and by 3.55% for $\lambda = -0.6$.

**Figure 3:**
Combination of Shareholder Value and Consumer Surplus Under Capital Regulation for Different Bias Levels

Figure 3 is a graphic illustration of how capital regulation affects SHV and consumer surplus. Starting at Points A, B and C, the straight solid lines illustrate that a binding regulatory ceiling on the default ratio decreases shareholder value as well as CS when consumers have a pessimistic or unbiased solvency perception. For an optimistic perception bias with $\lambda = -0.3$; $-0.6$, the dashed curves starting at Points D and E demonstrate that capital regulation can enhance CS up to Points D'$ and E'$, which refer to optimal capital regulation. (See Table 3.)

### 5. Effectiveness of Price Regulation

Next, we investigate the consequences of regulatory price ceilings imposed with the intent of meeting the regulator’s affordability target. The price ceiling will be binding when it lies below the insurer’s unregulated premium. (See equation 13.) When only prices are subject to regulation, and there are no capital requirements, the insurer can react to the mandatory prices by adjusting its safety level.
Therefore, any regulatory price induces a specific insurer’s optimal default ratio \( dr^*_\text{real}(p^{\text{reg}}) \). The insurer’s maximization problem can be formalized as:

\[
dr^*_\text{real}(p^{\text{reg}}) = \arg\max_{dr} SHV(dr, \lambda, p^{\text{reg}})
\]

where \( p^{\text{reg}} \) denotes the regulated premium. The optimality condition for the choice of a default ratio level—that is, the first-order derivative of the SHV with respect to default ratio when the price is externally determined—implies:

\[
\frac{dSHV}{dr} = \frac{\partial y(dr(1+\lambda)p^{\text{reg}})}{\partial dr} \left[ p^{\text{reg}} - \mu(1 - dr) - \frac{\tau}{1-\tau} \mu s(\cdot) - p^{\text{reg}} \right] + \gamma \mu - \nu \frac{\lambda}{1-\tau} \frac{\partial s(\cdot)}{\partial dr} = 0
\]

The first term is negative and measures demand effects for marginal changes in the default ratio. The second term is positive and represents the value of the limited liability change. The third term reflects marginal changes in the frictional costs of equity when the default ratio varies. The level of solvency perception bias \( \lambda \) has an influence on all three terms because it manipulates the demand \( y \).

By using price regulation to improve insurance affordability, the regulator aims at creating maximum consumer surplus. Equation (23) gives the regulator’s maximization problem:

\[
p^{\text{reg}} = \arg\max_{p^{\text{reg}}} CS(p^{\text{reg}}, dr^*_\text{real}(p^{\text{reg}}))
\]

To study the effect of price restrictions on CS and to determine the optimal price ceiling, we look at the first-order derivative of the CS with respect to price, \( \frac{dCS}{dp^{\text{reg}}} \). In the optimum, we obtain:

\[
\frac{f_d \partial d^* (1 + f_d \lambda dr_1 + \lambda)}{(1 + f_d \lambda dr_1)} = -f_p
\]

The left-hand side of the equation (24) measures the negative effect to which policyholders are exposed because of the lower safety level resulting from the lower prices. The right-hand side represents policyholders’ additional gain through price decrease. Therefore, as soon as the welfare gain of lower prices outweighs the loss due to the decreased safety level, the change in CS is positive, and the regulatory intervention leads to an improvement in policyholder welfare. Maximum CS is attained when the equation holds. Further price reduction results in higher losses due to worse default risk.
Numerical example and graphical representation

Once again, we illustrate our analytical findings using the numerical example introduced in Section 3. The regulator decides on the consumer-surplus-maximizing price ceiling, \( p^{reg^*} \). The insurer adjusts its realized default risk, \( \text{dr}^{real}(p^{reg^*}) \), under the objective shareholder-value-maximization. The resulting SHV and CS are set out in Table 4. The effectiveness of price regulation is measured by the percentage change in CS.

When the regulator introduces a price ceiling, we observe an improvement in consumer surplus in all five cases. We observe a constant decreasing trend of the price ceiling and the resulting default risk with respect to the perception bias. For negatively biased demand (\( \lambda = -0.6 \), optimistic case), the insurer adjusts its default ratio to the comparatively high price ceiling (247.6) more strongly, whereas for positively biased demand (\( \lambda = 1 \), pessimistic case), the insurer adjusts its default ratio only moderately although the price ceiling is much lower. The reason for this is that unbiased or pessimistically biased policyholders have a stronger disciplinary influence on the insurer’s safety level. As a consequence, the effectiveness of price regulation, defined as the relative consumer surplus improvement, increases with the level of the solvency perception bias and reaches levels over 100%. (See the first column of Table 4.)

<table>
<thead>
<tr>
<th>Perception bias</th>
<th>Pessimistic</th>
<th>Optimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{SHV}^{reg} )</td>
<td>4250.71</td>
<td>11282.83</td>
</tr>
<tr>
<td>( \text{CS}^{reg} )</td>
<td>2723.14</td>
<td>12641.00</td>
</tr>
<tr>
<td>( \Delta \text{SHV}_{SPV^{non-reg}} )</td>
<td>-62.94%</td>
<td>-5.50%</td>
</tr>
<tr>
<td>( \Delta \text{CS}_{CS^{non-reg}} )</td>
<td>+115.66%</td>
<td>+18.44%</td>
</tr>
</tbody>
</table>

The resulting combinations of regulatory price and corresponding SHV-optimal default ratio lead to specific combinations of shareholder value and consumer surplus, represented by the bent curves in Figure 4. Every curve represents a different bias level. The dashed curves stand for the optimistic cases, \( \lambda = -0.6; -0.3 \), the thick curve for the unbiased case, \( \lambda = 0 \), and the fine curves

| Table 4: Numerical Results Under Price Regulation for Different Bias Levels |
|-----------------|-------------|------------|
| | Pessimistic | Optimistic |
| \( \text{Perception bias} \) | \( \lambda \) | \( \lambda \) | \( \lambda \) | \( \lambda \) | \( \lambda \) | \( \lambda \) |
| \( p^{reg^*} \) | 214.56 | 214.39 | 222.25 | 229.63 | 247.60 |
| \( \text{dr}^{real}(p^{reg^*}) \) | 0.7974% | 0.902% | 1.184% | 1.3733% | 1.7241% |
| \( \text{dr}_{perc} \) | 1.5949% | 1.4724% | 1.184% | 0.9611% | 0.6896% |
| \( y \) | 20.10 | 31.83 | 301.61 | 279.12 | 221.73 |
| \( \text{SHV}^{reg} \) | 4250.71 | 4957.58 | 6906.34 | 8655.42 | 11282.83 |
| \( \Delta \text{SHV}_{SPV^{non-reg}} \) | -62.94% | -56.96% | -40.6% | -26.24% | -5.50% |
| \( \Delta \text{CS}_{CS^{non-reg}} \) | +115.66% | +106.39% | +81.95% | +59.01% | +18.44% |
represent the pessimistic cases, $\lambda = 0.6$; 1. Points A'', B'', C'', D'' and E'' correspond to the consumer surplus optimal positions. (See Table 4.)

Figure 4:
Combination of Shareholder Value and Consumer Surplus Under Price Regulation for Different Bias Levels

6. Comparison of Capital and Price Regulation

The previous analysis has shown that capital and price regulation could be beneficial for policyholders. In this section, we compare the effectiveness of the two regulatory tools and explore what kind of regulation is most appropriate to improve consumer surplus under different circumstances.

Impact of frictional costs

In the following subsection, we analyze the effectiveness of capital and price regulation depending on the level of frictional costs. We consider the three bias levels $\lambda = \{0.6; 0; -0.6\}$ and plot the maximum achievable percentage change of consumer surplus when the regulator chooses the consumer-surplus-maximizing $d_{r_{\text{real}}}^{\text{reg},*}$ and $p_{\text{reg},*}$ respectively.

Figure 5 illustrates the case of pessimistically biased insurance demand (i.e., $\lambda > 0$). The solid line depicts the potential consumer surplus increase with price regulation, and the dashed line depicts the effectiveness of capital regulation. Policyholder reaction forces the insurer to choose a default risk level that also maximizes consumer surplus. Therefore, irrespective of the level of frictional costs, capital regulation cannot raise consumer surplus, and the dashed curve
remains at 0%. Price regulation, in turn, can significantly enhance consumer surplus, but its effectiveness decreases with the level of frictional costs. The reason for the decreasing effectiveness of price regulation is that the insurer will respond with a more drastic reduction of its safety level when equity capital is subject to high frictional costs.

**Figure 5:**
Effectiveness of Price and Capital Regulation with Pessimistic Perception Bias of 0.6 When the Carrying Charge of Holding Capital Changes

In the unbiased case, our analysis provides similar results. (See Figure 6.) Again, capital requirements have no influence on the consumer surplus, and price regulation may increase consumer surplus, and the effectiveness of price regulation decreases with the level of frictional costs.

**Figure 6:**
Effectiveness of Price and Capital Regulation in the Absence of Perception Bias When the Carrying Charge of Holding Capital Changes

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The case of an optimistic solvency perception bias is illustrated in Figure 7. Here, capital requirements can clearly raise CS, particularly when frictional costs are high. Furthermore, the effectiveness of price regulation is lower and more affected by frictional costs than in the previous scenarios. If the carrying charge is above 11%, capital regulation is more effective than price regulation. Therefore, regulators should optimally focus on the safety goal if insurance demand exhibits an optimistic solvency perception bias and frictional costs are significant.

**Impact of Volatility of Liabilities**

Next, we examine the effectiveness of capital and price regulation for insurance portfolios of varying volatility. Again, we look at the three bias levels, \( \lambda \in \{0.6; 0; -0.6\} \). The results are plotted in Figures 8 – 10. As before, capital regulation cannot improve policyholder welfare if demand is pessimistic or unbiased, which is the case for all considered values of the riskiness of insurance claims. (See Figures 8 and 9.)

Price ceilings strongly increase consumer surplus when the insurance risks are low, and they have a smaller effect when the insurance portfolio is highly volatile. The reason behind this finding is that the insurer needs to hold much more equity capital for the high-risk portfolio, and the price ceiling clearly reduces the incentive to hold a large amount of equity. Therefore, the insurer with high insurance risks responds to a price ceiling with a severe reduction of its safety level, leading to a smaller increase of the consumer surplus as compared to the low-risk insurer.
Figure 8:
Effectiveness of Price and Capital Regulation with Bias Level 0.6
When the Volatility of Liabilities Changes

Figure 9:
Effectiveness of Price and Capital Regulation in the Absence of Perception Bias
When the Volatility of Liabilities Changes

Figure 10 depicts the considered effects for the negative bias, $\lambda = -0.6$. Now, the dashed line has a clearly positive slope, meaning that capital regulation is effective, especially when insurers have a high-risk portfolio. The solid line has a clearly negative slope, and the effectiveness of price ceilings thus decreases with the volatility of insurance risks. When the volatility of the liabilities exceeds 35%, capital regulation becomes more effective than price regulation.
Impact of Incomplete Information

So far in our analysis, we have made two important assumptions about the level of information of the insurance company and the regulator: 1) the regulator can perfectly monitor the insurer's actual default ratio; and 2) the insurer is fully informed about the consumers’ solvency perception bias and can distinguish between pessimistic, optimistic and unbiased consumers. In reality, however, each of these assumptions could be violated due to information asymmetries. Therefore, we will now take a closer look at the potential impacts of these information asymmetries on our results.

1. Regulator's ability to monitor the insurer's actual default ratio

In our article, we assume that the regulator restricts the insurer's default risk by means of RBC requirements, which, in practice, are typically implemented by a regulatory-defined formula or by an internal model that is developed by the insurance company based on regulatory requirements. In addition, regulators usually use monitoring tools, such as filing financial statements, requiring regulatory reports or conducting examinations. In the following section, we discuss the consequences of two kinds of deficiencies of the regulator's solvency assessment.

First, it is possible that the regulator holds biased beliefs about the insurer's solvency level. Under Solvency II, for example, regulators can increase the capital requirement by a so-called capital add-on if they assess the insurer's risk profile as too specific or the system of governance as inappropriate. According to our

18. An overview on the implementation of capital requirements in the United States and in the European Union under Solvency II can be found in Klein (2012), p. 185-188.
model, a capital add-on reduces the default ratio and increases the premium, since
the insurer transfers higher risk management costs to policyholders (cf. equation
13). An inappropriate capital add-on would, on the one hand, lead away from the
consumer-surplus-maximizing capital requirement (as described in equation 20).
Furthermore, it would destroy SHV if policyholders have a pessimistic or unbiased
solvency perception; if they have an optimistic solvency perception, only an
overly strict capital add-on would destroy shareholder value, while an overly lax
one would increase shareholder value (cf. section 4).

Second, there might be a discrepancy between regulatory capital requirements
based on the default ratio or on the default probability (Gatzert and Schmeiser,
2008). Moreover, it might be difficult for regulators to ensure that the calculation
of the capital requirement, either by a regulatory-defined formula or by an internal
model, leads accurately to the desired safety level. When an internal model is
used, the calculated capital requirement is subject to the methodologies and
assumptions chosen by the insurance company. When the insurer is able to
reduce its capital requirement solely by changing the methodology of calculation
(without the notion of the regulator and of policyholders), policyholders' percep-
tion of the solvency level becomes more optimistic, increasing the SHV.
Under Solvency II, a considerable set of governance requirements around the
development and regulatory approval of internal models shall prevent leeway in
the choice of methodologies and assumptions. For regulatory-defined formulas,
the accuracy of the corresponding safety level may be affected by statistical
deficiencies of the formula's parameterization. Also, the insurer's reaction when
being confronted with the standard formula could cause unexpected side effects.
In light of our model, both issues of regulatory-defined formulas would result in
an (additional) solvency perception bias of consumers and might thereby destroy
consumer surplus.

2. Insurer's ability to distinguish between pessimistic, optimistic
and unbiased consumers

In order to study the impact of incomplete information at the insurer's level,
we will investigate different situations and assess the effectiveness of price and
capital regulation. In particular, we define nine combinations of the assumed

21. Cf., e.g., Wang et al. (2009), p. 61, who highlight that leeway of methodologies and
assumptions in the determination of the value-at-risk may lead to a false sense of comfort for
managers.


24. Fischer and Schlütter (2014) demonstrate how an insurer, based on the Solvency II
standard formula's calibration, will adjust its investment policy in order to achieve a high level of
default risk. The insurer's reaction is relevant, since the calibration of the standard formula is not
fully risk-based. For example, sovereign bonds of European Union member states are considered
free of default risk. Stoyanova and Gründl (2014) investigate the impact of the Solvency II
standard formula on an insurer's merger and acquisition activities and show that the new
regulatory regime may lead to an enhanced geographic restructuring wave.

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perception bias by the insurer and real perception bias of the consumer. (Possible combinations are, for example, pessimistic-pessimistic, pessimistic-unbiased, optimistic-pessimistic, etc). Table summarizes the combinations analyzed and the results.

The main results from Section 4 and Section 5 can be applied to the new situation: In all combinations analyzed, the effectiveness of capital regulation is moderate compared to the effectiveness of price regulation. Furthermore, as soon as the insurer assumes that the demand is unbiased or pessimistic, the effectiveness of capital regulation is extremely low or even zero. The reason for this is that the assumed consumer reaction has a disciplinary effect on the SHV-maximizing strategy, and no further regulatory interventions are necessary in order to improve consumers’ position. Capital regulation can increase the consumer surplus only when the assumed perception bias is negative—i.e., consumers are assumed to be optimistic.

Table 5:
Effectiveness of Price and Capital Regulation Under Incomplete Information

<table>
<thead>
<tr>
<th>Assumed perception bias</th>
<th>Real perception bias</th>
<th>Pessimistic, λ = 0.6</th>
<th>Unbiased, λ = 0</th>
<th>Optimistic, λ = −0.6</th>
</tr>
</thead>
</table>

0 - no effectiveness
○/+ - effectiveness below 1%
+ - effectiveness over 1% below 25%
++ - effectiveness over 25% below 100%
+++ - effectiveness over 100%
4 - highest effectiveness within the assumed perception bias (row)

Price regulation improves consumer surplus in all nine combinations. Furthermore, the effectiveness of regulatory price ceilings increases when the insurer assumes more pessimistic consumers and can attain values over 100%. (Compare the first row in Table 5.) In addition, within the assumed perception bias, the highest effect of price regulation is achieved when the real solvency
7. Conclusion

This article investigates how regulatory capital requirements and price ceilings influence an insurer’s capital level and pricing decisions and what consequences arise for policyholders’ welfare. To this end, we employ a model in which insurance demand is sensitive to default risk and price, policyholders’ perception of the insurer’s solvency level may be biased, and the insurer faces frictional costs of holding equity capital. The insurer’s objective is the SHV, which we measure using the present value of shareholders’ future cash flows minus their initial equity endowment. Policyholders’ welfare is measured using the consumer surplus—i.e., the integral over the differences between their willingness-to-pay and the actual insurance premium.

To evaluate the consequences of regulatory intervention, we consider the insurer’s strategy in a world with no regulation as a benchmark case. Here, the insurer balances its incentives for safety (resulting from insurance demand reaction) against the frictional costs of holding equity capital, and determines the corresponding SHV-maximizing insurance premium.

By means of RBC requirements, the regulator can force the insurer to attain a higher safety level. The insurer will react to this type of regulation by adjusting its premium. We show that capital requirements cannot enhance policyholders’ welfare when insurance demand is unbiased, since the insurer finds it optimal to attain the exact safety level that maximizes consumer surplus. If the regulator requires a higher safety level, premiums become too high so that policyholders are worse off. In contrast, capital requirements can improve policyholders’ welfare in the potentially more realistic case of a differing perception of the safety level by policyholders (which could be fostered by market opaqueness; Morgan, 2002; Pottier and Sommer, 2006). Our numerical examples indicate that capital requirements are especially effective when insurance buyers perceive the solvency level too optimistically (more precisely, when the insurer believes that they have an optimistic perception), when equity capital comes at significant frictional costs, and when insurers face significant underwriting risks. In these cases, the regulator should concentrate on the safety goal. If the regulator imposes a binding price ceiling, the insurer has weaker incentives to attract consumers with its high safety level, and it will reduce its equity position. Nevertheless, we point out that price ceilings can be beneficial for policyholders, especially when insurance buyers’ reaction drives default risk down and frictional costs of equity capital are rather low.

In this article, price regulation is understood as a fixed premium ceiling (i.e., unaffected by the safety level) as it is typically used by insurance regulators. For this form of price regulation, we find that the regulatory targets safety and affordability are in contrast. This interaction could be different if regulators limit
insurance premiums to a "fair" premium (Doherty and Garven, 1986), which goes along with a SHV of zero and leads to pricing restrictions that depend on the insurer's safety level. As demonstrated by Spence (1975), this form of profit regulation may (under certain conditions on the demand function) have a positive impact on product quality (in our case, on the solvency level), especially if quality goes along with capital needs.

Altogether, our findings suggest that regulators should take both targets—safety and affordability—into account under the overall objective of policyholder protection. While our findings on price ceilings do not overrule typical concerns about anti-trust measures, they do shed light on the insurance-specific interaction between price regulation and safety. Our sensitivity analyses indicate in which situations insurance regulators should focus their efforts on solvency regulation in particular, or monitor profit loadings on premiums and create the basis for antitrust regulation.
Appendix A

Derivation of Equation (8)

The derivation is analogous to Schlüter (2014), Appendix A.

\[ S_{HV} = E_0 - K \]  
\[ = A_0 - L_0 + DPO_0 - K \]  
\[ = A_0 - L_0 \cdot (1 - dr) - K \]  
\[ = y \cdot p + (1 - \tau) \cdot K - y \cdot \mu \cdot (1 - dr) - K \]  
\[ = y \cdot \left[ p - \mu \cdot (1 - dr) + \tau \cdot k/y \right] \]  
\[ = y \cdot \left[ p - \mu \cdot (1 - dr) - \frac{\tau}{1 - \tau} (\mu \cdot s - p) \right] \]

where the last equation follows from

\[ s = \frac{A_0}{L_0} = \frac{y \cdot p + (1 - \tau) \cdot K}{y \cdot \mu} \]  
\[ \Rightarrow K/y = \frac{\mu \cdot s - p}{1 - \tau} \]
References


A Public Policy Evaluation of Florida’s Citizens Property Insurance Corporation

Jessica Weinkle*

Abstract

This article presents a public policy evaluation of Florida’s residual insurance market for catastrophic hurricane risk, Citizens Property Insurance Corporation (Citizens), in respect to its legislative mandate to provide “affordable property insurance.” Following in the academic tradition of the policy sciences, this work draws from multiple disciplines such as sociology, political science, climate science and actuarial science, and the technological and social contexts for decision-making about insurance rates to better understand outcomes of the Citizens public policy. Citizens has difficulty meeting its mandate due to four main factors: 1) the use of Citizens as a means to deflect market judgments of risk when they threaten the state’s economy; 2) the practical difficulty of an actuarially sound residual market; 3) the politicization of the hurricane risk; and 4) the conflict between Florida’s economic and property insurance public policies. The struggle between political interests for control over the characterization of hurricane risk that Florida insures against reflects a lack of consensus on desired outcomes of a residual market. In order to reconcile the conflict between insurer economic sustainability and insurance affordability a public dialogue needs to develop for guiding policymaking for Florida’s future economy.

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Introduction

In 2002, under the administration of Gov. Jeb Bush, the Florida Legislature passed Senate Bill 1418, known as the “Windstorm Bill.” The bill responded to a perceived lack of private market catastrophic windstorm coverage and merged two existing residual market facilities, the Florida Windstorm Underwriting Association (FWUA) with the Florida Residential Property and Casualty Joint Underwriting Association (JUA), to create Citizens Property Insurance Corporation (Citizens). Citizens inherited much of its ancestral legislation, including the FWUA mandate that rates be “actuarially sound and not competitive with approved rates charged by authorized insurers” (Deffenbaugh, 2002). Several years later, the legislature changed Citizen’s guiding mandate from “provide property insurance” to “increase the availability of affordable property insurance” (Garcia and Posey, 2007).

1. Typically, insurance for the single peril, hurricane, is not offered. The hurricane peril is one of several wind-related perils included in windstorm coverage. However, this article focuses on windstorm issues in Florida where the primary catastrophic wind peril of concern is hurricane. As such, for the purposes of this article, the terms “windstorm insurance” and “hurricane insurance” are used interchangeably.

2. FL STAT 627.351(2)5b; I was not able to determine if this wording appeared in the original 1970 FWUA legislation. However, based on the analysis in Gorrie (1998), I believe the requirement appeared in 1997. Also, Florida legislators had at one time mandated the JUA have actuarially sound rates (Mittler, 1997).

3. The full text of FL STAT 627.351(6)(a)1 (2007) read as follows:
   It is the public purpose of this subsection to ensure the existence of an orderly market for property insurance for Floridians and Florida businesses. The Legislature finds that private insurers are unwilling or unable to provide affordable property insurance coverage in this state to the extent sought and needed. The absence of affordable property insurance threatens the public health, safety, and welfare, and likewise threatens the economic health of the state. The state therefore has a compelling public interest and a public purpose to assist in assuring that property in the state is insured and that it is insured at affordable rates so as to facilitate the remediation, reconstruction, and replacement of damaged or destroyed property in order to reduce or avoid the negative effects otherwise resulting to the public health, safety, and welfare, to the economy of the state, and to the revenues of the state and local governments which are needed to provide for the public welfare. It is necessary, therefore, to provide affordable property insurance to applicants who are in good faith entitled to procure insurance through the voluntary market but are unable to do so. The Legislature intends by this subsection that affordable property insurance be provided and that it continue to be provided, as long as necessary, through Citizens Property Insurance Corporation, a government entity that is an integral part of the state, and that is not a private insurance company. To that end, Citizens Property Insurance Corporation shall strive to increase the availability of affordable property insurance in this state, while achieving efficiencies and economies, and while providing service to policyholders, applicants, and agents which is no less than the quality generally provided in the voluntary market, for the achievement of the foregoing public purposes. Because it is essential for this government entity to have the maximum financial resources to pay claims following a catastrophic hurricane, it is the intent of
Private insurers, political interest groups and the public have criticized Citizens since its creation. North Florida residents and politicians express concern that their cost of insurance subsidizes South Florida’s comparatively greater hurricane risk (Newman, 2009). Some policymakers argue that, in the wake of a catastrophic loss, North Florida businesses and residents may move across the state line to Georgia or elsewhere to avoid burdensome assessments (Musulin, 2013). Private market insurers consider the program as unfairly competitive (Olorunnipa, 2012a). Florida Sen. Alan Hayes (R-Umatilla) went so far to claim that Citizens is “nothing more than socialism, and we need to stamp out socialism in this country as soon as we can” (Channel 7 – WJHG 2011). Moreover, some see decisions about Citizens policies as determinants of Florida’s future economy. For example, David Hart, vice president of the Florida Chamber of Commerce, has argued that higher insurance rates are needed “[t]o secure Florida’s future” (Hart, 2012). In contrast, Florida Sen. Mike Fasano (R-New Port Richey) has argued that Florida’s “economy just can’t withstand” increasing rates (Olorunnipa, 2012b). For Hart and Sen. Fasano, Florida’s future rests on decisions about Citizens’ rates.

The political controversy surrounding Citizens gives reason for its evaluation in relation to the goals policymakers intend for it to achieve. Additionally, improved understanding of Citizens provides insight into Florida’s implementation of the democratic process and the role of residual markets in society. This article applies a classic form of policy evaluation in the tradition of the policy sciences in respect to Citizens’ legislative mandate to provide “affordable property insurance” (Lasswell, 1971). A public policy evaluation seeks to answer the question, “Is it working?” (Schneider, 1986) and follows a standard format of identifying stated policy goals, evaluation of goal metrics and attribution of responsibility for success and failure. By first beginning with authoritative goals, public policy evaluation distinctly differs from advocacy by differentiating what is “functionally” important to the public and civic order from that which is of only “conventional” importance (Lasswell, 1971, p. 2).

Many have contributed to the thoughtful consideration of the complex discussion surrounding Citizens and its ratemaking practices. However, to the author’s knowledge, scholars have yet to produce a public policy analysis of Citizens specifically in respect to its legislative mandate of affordable property insurance. While prominent works have conducted analysis similar to public policy evaluation, they have not related analysis and conclusions to the stated policy objective of affordable property insurance. For example, Klein (2009) provides a review of U.S. wind related residual markets, including Citizens. Although the review discusses public concerns of insurance costs as the incentive
for legislative changes in 2007, Klein does not discuss the mandate of affordable property insurance explicitly. Second, Klein writes from a conventional perspective that residual markets “were not intended to serve as long-term sources of coverage for a substantial portion of a state’s property exposures” (2009, p. 1). History and stated public policy in Florida do not support this assertion. Florida has maintained some form of a residual market for wind exposure since the creation of the FWUA in 1970. Moreover, the original and current Citizens legislation includes an explicit directive to maintain access of residual market to a broad population for “as long as necessary.”

Other prominent examples include Lehrer (2011) and Medders et al. (2012). Neither work provides a public policy evaluation in regard to the legislative mandate of affordable property insurance. Lehrer identifies four public policy goals and means for achieving them. However, these goals are unrelated to stated objectives found in the Citizens legislation. The work by Medders et al. provides an economic analysis of Florida insurance market conditions. The authors analyze market trends in respect to economic theory of market failures with an explicit focus on academic literature that supports concluding that government regulation has negative impacts on market conditions (e.g., Medders et al., 2012, pp. 6–8).

This article continues in six sections. The first section gives a review of the literature that provides the theoretical underpinnings to this work. The second section identifies two idealized, contrasting perspectives on the proper role of a residual market in society, technocratic and democratic, as a framework for understanding conflicting ideas on how Citizens should function. The third section provides information on the data and methodology used to identify trends in meeting the goal of affordable property insurance. The fourth section provides a potential interpretation of the data and attribution of responsibility for policy success or failure from the two idealized perspectives. The fifth section considers the data from the perspective of public policy analysis and attributes responsibility for performance to four main factors. In the sixth section, I draw lessons about Florida’s struggle to maintain democratic accountability in its management of Citizens. The article closes with a brief conclusion.

**Literature Review**

A problem is a “perceived discrepancy between goals and an actual or anticipated state of affairs” (Lasswell, 1971, p. 56). Defining a public policy problem is not straightforward; it is a social processes whereby interested groups

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4. Ibid. (2002). As of 2014, the language reads as follows: “It is necessary, therefore, to provide affordable property insurance to applicants who are in good faith entitled to procure insurance through the voluntary market but are unable to do so. The Legislature intends, therefore, that affordable property insurance be provided and that it continue to be provided, as long as necessary, through Citizens Property Insurance Corporation, a government entity that is an integral part of the state, and that is not a private insurance company.”

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form “strategic representation of situations” (Stone, 1988, p. 106). The process requires reflection on cultural values, interest group advocacy, scientific information and professional advice (Rocherfort and Cobb, 1994). How an issue comes to be defined as a problem has importance for the issue’s political standing and potential solutions available to decision-makers (Rocherfort and Cobb, 1994; Kingdon, 1984; Baumgartner and Jones, 1993; Dery, 2000).

Decision-making about risk is a process whereby the decision-maker chooses risk(s) to respond to and how best to respond in order to maximize the likelihood of a favorable future. Knowledge about risk has cultural dependence whereby “choice of risks and the choice of how to live are taken together” and, therefore, “common values lead to common fears” (Douglas and Wildavsky, 1982, p. 8). Naturally, then, risk assessment by experts and laymen alike requires a blending of science and judgment, facts and values (Jasanoff, 1986; Wynne, 1992; Slovic, 1999; Loewenstein et al., 2001; Freudenburg, 1988; de Groot et al., 2013). In this way, defining risk is a political act of problem definition revealing (explicitly or implicitly) the definer’s values and power relationships in society (Fischhoff et al., 1984b; Slovic, 1999).

Insurance ratemaking is a specific decision process whereby insurers compile social and scientific information to characterize risk and determine an insurance rate, the primary basis for the cost of an insurance policy (McClenahan, 1987). However, in complex, open systems, “knowledge of the future is fluctuating, vague and uncertain” (Keynes, 1937, p. 213). Indeed, knowledge is dependent upon social context (Kuhn, 1996; Rayner, 2012; Jasanoff, 2004). In turn, insurance ratemaking also requires decision-making about the state of knowledge about risk. Because knowledge is malleable, so, too, is the characterization of risk for insurance ratemaking.

Ratemaking for catastrophic risk relies heavily on scientific information through the use of catastrophe modeling (Grossi and Kunreuther, 2005; Musulin, 1997). Catastrophe models, a specific type of computer simulation model, are useful in the process of negotiating a shared understanding of risk amongst different perspectives because one need not understand the underlying science in order to make use of the model output (for discussion, see Carlile, 2004; Star and Griesemer, 1989; Star, 2010). Still, to the extent that models differ in their construction, they represent select perspectives on knowledge about risk and can mask scientific conflict (Latour, 1987). The process of choice in building the model is often justified on the grounds that the model produces estimates of risk that are reasonable and consistent with the builder’s or user’s view of the risk (Boumans, 1999). If groups have different perspectives of the risk or conflicting objectives, they may disagree on the model appropriate for use in decision-making (Sarewitz et al., 2000).

Information and decisions about its use can alter power dynamics in society (National Science Board, 1988; Sarewitz, 2004; Slovic, 1999; Jasanoff, 2004) and pose difficulty in an insurance regime and, more generally, economic markets (Arrow, 1963; Rothschild and Stiglitz, 1976; Akerlof, 1970). As characterizations of a risk change, perceived insurability may fluctuate and, at times, conflict...
Disagreement or controversy regarding how to best characterize risk can limit the availability of insurance (Musulin, 1997; Charpentier, 2008). Ambiguity in risk characterization limits the willingness of insurers to make insurance available or increase the cost at which insurers are willing to provide coverage (Kunreuther et al., 1995; Hogarth and Kunreuther, 1989). Changes in information may also prompt changes in insurance risk classification, resulting in normative impacts on society and concerns about social equity that call for government regulation of the information used by insurers to characterize societal risk (Hoy, 1984; Baker, 2003; Worham, 1985).

Technocratic and Democratic Residual Market Perspectives

A useful framework for understanding conflicting opinions in regulatory decision-making comes from the work by science and technology studies scholar, Sheila Jasanoff (1990), on contrasting technocratic and democratic perspectives of decision-making. These perspectives are theoretical and idealized, but helpful for understanding regulatory controversy. A technocratic perspective approaches decision-making as a technical exercise, uses scientific expertise to validate policy decisions and generally seeks more or better science as solutions to policy problems. A democratic perspective approaches decision-making as an exercise in public policymaking, uses broad participation by multiple interests beyond those of technological expertise and may seek political solutions to policy problems. In practice, decision-making is always a mixture of facts and values, but the technocratic/democratic dichotomy emphasizes that different perspectives (e.g., actuaries and politicians) weight different sources or types of information more heavily at the time a decision must be made. Legal scholars have also applied the technocratic and democratic dichotomy to decision process analysis in the risk regulatory law literature (e.g., Fine and Owen, 2005; Fraiberg and Trebilcock, 1997).

Here, I use this contrasting, idealized perspective as a means to develop a discussion and more in-depth understanding of the social aspects underlying disagreement about how Citizens ought to function. That is, from the idealized technocratic and democratic perspectives two distinctly different ideas arise about the role of a residual market, when one ought to be created and the information most pertinent to decisions about rates. As a form of shorthand, these two different perspectives are dubbed technocratic residual market (TRM) and democratic residual market (DRM). Although both technocratic and democratic perspectives agree that a residual market should exist where consumers cannot obtain insurance on the private market, the perspectives differ on acceptable limiting factors for determining availability.

The TRM holds that residual markets provide coverage when conventional insurance practices view a risk as extremely challenging to insure because of
knowledge limits leading to risk aversion, perhaps due to ambiguity (Hogarth and Kunreuther, 1989) or inadequate characterization of a risk-limiting satisfaction of insurability criteria (Berliner, 1982). In this way, power to define the risk society insures against resides with the private market. For example, the Insurance Information Institute (III), an organization providing data and information about the insurance industry (III, 2013a), explains that residual markets provide coverage for applicants who the private market views as too “high risk” (III, 2013b). The International Risk Management Institute (IRMI), an organization providing risk management education, explains that a residual market serves to provide “coverage of last resort for firms and individuals who have been rejected by voluntary market insurers” (IRMI, 2014). From the TRM perspective, a residual market provides coverage where private market coverage does not exist.

The DRM holds that residual markets provide coverage when consumers have a real or perceived inability to access the coverage available on the private market. Technological and scientific knowledge may not act as a restraint for decisions on providing coverage, nor may it serve as the sole basis for characterizing risk. In this way, the power to define the risk that society insures against is negotiable among a range of interests. The DRM perspective enables a wider range of issues to act as limiting factors for determining availability. For example, Frank Nutter, president of the Reinsurance Association of America, explains that “[s]tates view their role as one of assuring access to insurance protection on an affordable basis” and, therefore, residual markets provide a place for business to “flow” when the public views the cost of insurance as unaffordable (Nutter, 2002). While Nutter does not discuss the idealized DRM perspective described in this work, his description of the state’s view of a residual market is distinct from a perspective holding that residual markets function only in the periphery of the private market.

From a practical standpoint, issues of availability and affordability interrelate. The amount an insurer can charge for coverage is a limiting factor for its willingness to accept risk. Likewise, to the extent that consumers cannot afford to purchase coverage, it is unavailable to them (cf. Newman, 2010). In turn, unaffordable coverage renders a risk uninsurable by limiting or eliminating the potential customer base (Berliner, 1982). From a DRM perspective, a residual market provides coverage where private market conditions are politically unacceptable.

Is Citizens Property Insurance Corporation Insurance?

Scholarly opinions abound regarding the insurability of risks (Faure, 1995; Kunreuther and Michel-Kerjan, 2004; Babel, 2006; Cummins, 2006; Schmit, 1986; Charpentier, 2008). Although I do not go into a detailed discussion of the criteria of insurability, this article uses the nine criteria of insurability defined by Baruch Berliner (1982) as a reference point for the work presented in this article.\(^5\) Berliner’s work focuses on how the characterization of risk affects determination

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5. For a broader discussion of insurability criteria, see Weinkle (2013).
of insurability (see also Berliner, 1985). Likewise, the interest here lies with how contextual information and changes in characterization impact the understanding of risk and the successful implementation of insurance.

However, residual markets differ from private insurance markets in two key ways that make it inappropriate to judge their success solely along conventional criteria. First, legislators create residual markets when society has a need to insure against a risk that conventional insurance practices views as uninsurable, perhaps due to regulatory constraints on price. Second, residual markets, as government entities, have the ability to spread risk over time so that a large loss becomes managed through available resources into the future and several layers of public institutions (King, 2009). A residual market does not “go out of business” in the traditional sense of the phrase. For example, when Citizens has a loss exceeding its ability to pay, it can incur debt through the sale of government bonds and pay back that debt into the future by collecting assessments from policyholders. At least one rating agency views Citizens’ ability to levy assessments as a virtue improving its credit rating (S&P, 2012). However, incurring debt is inconsistent with the insurability criterion of charging a premium that covers all costs associated with loss (Berliner 1982). The difference in the ability to respond to deficit between private market insurers and a residual market causes different social experiences for the two groups in regard to catastrophic risk and may trigger different demands for action by each (Slovic, 1999; Renn et al., 1992; Loewenstein et al., 2001).

Methods

Social Context

Discourse, such as interviews and congressional records, is an important source of data in the social sciences (Baumgartner and Jones, 1993; Dryzek and Niemeyer, 2008; Krippendorff, 2012; Lasswell and McDougall, 1992; Phillips and Hardy, 2002). This type of data provides relevant context for the decisions made regarding Citizens’ rates. I gained a better appreciation for the complexity of the issues underlying Citizens and Florida hurricane risk through extensive review of
U.S. and Florida legislative hearings, media reporting, so-called “gray literature”\(^7\) and interviews with key decision-makers during a visit to Florida in 2012. Due to the sensitive political nature of the topic, the names of those interviewed remain confidential.\(^8\)

**Affordability Data**

No official metric of affordability exists for Citizens’ policies because the Citizens mandate does not define “affordable.” Common measures of insurance affordability include comparison to household income, household purchase choice and housing burden guidelines established by the U.S. Department of Housing and Urban Development (HUD; Grossi et al., 2005). Other econometric approaches to affordability compare prices per unit of total insured valued (TIV) to some other unit of analysis, such as the TIV in other states for the same line of business. These situations (explicitly or implicitly) require the researcher to make choices about what is of value to compare. Choice inherently involves criteria based on preferences (Wildavsky, 1985; Simons, 1990). Thus, just as defining a policy problem is a political act, “choice of a method is a political decision with a distinct message about who should rule and what should matter” (Douglas and Wildavsky, 1982, p. 4). Without official criteria of affordability, the metric of evaluation chosen by the researcher imposes the researcher’s preferred measurement of affordability onto the public and may introduce bias.\(^9\) This can have real-world knock-on effects because the use of different metrics can create different “winners” and “losers” in society, thereby attracting different sets of supporters and detractors (Hancock, 1993; Hammond, 1996).

Contrary to the more typical metrics discussed above, this work approaches affordability as a multidimensional social value enabling public involvement in the political process of defining the hurricane risk that the state chooses to insure against. From this viewpoint, risk affordability becomes a risk acceptability issue, whereby public debate—informed by technological and scientific expertise— defines the risk society manages (Fischhoff et al., 1984a, 1984b).

\(^7\) “Gray literature” is a general term referring to texts that are not peer-reviewed and published by a scholarly press. Examples include government reports and industry white papers. For more information, see National Research Council (1997).

\(^8\) Politically sensitive topics can present real and perceived risks to individuals close to the subject matter that agree to participate in research studies. Federal regulation requires university affiliates conducting studies involving human subjects to minimize the subjects’ risks by, for example, gaining explicit consent for participation and maintaining the anonymity of interviewees. For more information, see 45 CFR 46.111 or the University of Colorado Institutional Review Board at [www.colorado.edu/vcr/irb](http://www.colorado.edu/vcr/irb).

\(^9\) This is a good example of a technocratic approach to decision-making, whereby expert choice of metric to define the political value of affordability attempts to impose scientific and technological solutions to policy problems rooted in social value conflict (see also Brown, 2009).
Table 1: Total Number of Articles by Newspaper, Jan. 1, 2002 – Dec. 31, 2012

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<td>46</td>
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<tr>
<td>Miami Herald</td>
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<td>4</td>
<td>27</td>
<td>91</td>
<td>237</td>
<td>173</td>
<td>140</td>
<td>78</td>
<td>48</td>
<td>18</td>
<td>57</td>
<td></td>
<td>908</td>
</tr>
<tr>
<td>Palm Beach Post</td>
<td>17</td>
<td>9</td>
<td>33</td>
<td>80</td>
<td>124</td>
<td>50</td>
<td>27</td>
<td>13</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td></td>
<td>386</td>
</tr>
<tr>
<td>Tampa Bay Times</td>
<td>10</td>
<td>5</td>
<td>25</td>
<td>44</td>
<td>97</td>
<td>65</td>
<td>20</td>
<td>30</td>
<td>13</td>
<td>6</td>
<td>9</td>
<td></td>
<td>324</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
<td><strong>19</strong></td>
<td><strong>142</strong></td>
<td><strong>261</strong></td>
<td><strong>524</strong></td>
<td><strong>320</strong></td>
<td><strong>199</strong></td>
<td><strong>135</strong></td>
<td><strong>71</strong></td>
<td><strong>45</strong></td>
<td><strong>87</strong></td>
<td></td>
<td><strong>1,872</strong></td>
</tr>
</tbody>
</table>

Newspapers are a common means of measuring the mood of the public because the journalistic relay of information both shapes and mirrors public concern (Edelman, 1988; Boykoff, 2011). Following from this premise, frequency of reporting on windstorm insurance in Florida’s widely circulated newspapers is used as a metric of affordability. Low frequency of reporting suggests relatively little to no public discontent, public acceptability and an affordable hurricane risk. Likewise, high frequency of reporting indicates heightened public discontent, public unacceptability and an unaffordable hurricane risk.

Reporting frequency was found by using a Boolean search of newspapers with large circulation numbers serving different areas in Florida over the period Jan. 1, 2002, through Dec. 31, 2012, for the phrases, “windstorm insurance” or “hurricane insurance” in either the headline or the story (Table 1). The Miami Herald’s reporting frequency is more than two times greater than the next highest resulting newspaper. This likely reflects the Miami area’s high concentration of Citizens policies. Also, several political representatives from the Miami area spearheaded the creation of Citizens (Citizens Property Insurance Corporation, 2002).

Context for Affordability

The rates of change of Citizens’ average policy cost and of average cost as a percentage of median household income provide context of real and relative policy cost to observed changes in perceptions of affordability (Table 2). A combination of Citizens’ publicly available monthly and annual reports for the period 2002–2012 (www.citizensfla.com) provides relevant data. The U.S. Census provides historical yearly median household income data for 2002–2012 (www.census.gov). All values are adjusted to constant 2013 dollars using the U.S. Bureau of Labor Statistics’ Consumer Price Index for all urban consumers in the South (www.bls.gov).

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Table 2:
Citizens’ Average Policy Cost and Median Household Income ($), 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Written Premium</th>
<th>Policies-In-Force</th>
<th>Cost per Policy</th>
<th>Median Household Income</th>
<th>Policy Cost as % of Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>$981,050,202</td>
<td>564,107</td>
<td>$1,739</td>
<td>$49,738</td>
<td>3.50%</td>
</tr>
<tr>
<td>2003</td>
<td>$1,411,042,333</td>
<td>820,223</td>
<td>$1,720</td>
<td>$49,828</td>
<td>3.45%</td>
</tr>
<tr>
<td>2004</td>
<td>$1,539,851,134</td>
<td>873,937</td>
<td>$1,762</td>
<td>$50,543</td>
<td>3.49%</td>
</tr>
<tr>
<td>2005</td>
<td>$1,654,168,064</td>
<td>810,017</td>
<td>$2,042</td>
<td>$51,754</td>
<td>3.95%</td>
</tr>
<tr>
<td>2006</td>
<td>$3,667,525,424</td>
<td>1,298,922</td>
<td>$2,824</td>
<td>$53,180</td>
<td>5.31%</td>
</tr>
<tr>
<td>2007</td>
<td>$3,394,193,481</td>
<td>1,304,949</td>
<td>$2,601</td>
<td>$51,811</td>
<td>5.02%</td>
</tr>
<tr>
<td>2008</td>
<td>$2,589,425,784</td>
<td>1,084,237</td>
<td>$2,588</td>
<td>$48,728</td>
<td>4.90%</td>
</tr>
<tr>
<td>2009</td>
<td>$2,321,672,727</td>
<td>1,029,214</td>
<td>$2,256</td>
<td>$49,768</td>
<td>4.53%</td>
</tr>
<tr>
<td>2010</td>
<td>$2,828,354,135</td>
<td>1,283,538</td>
<td>$2,204</td>
<td>$47,267</td>
<td>4.66%</td>
</tr>
<tr>
<td>2011</td>
<td>$3,185,251,388</td>
<td>1,472,391</td>
<td>$2,163</td>
<td>$46,770</td>
<td>4.63%</td>
</tr>
<tr>
<td>2012</td>
<td>$2,864,421,927</td>
<td>1,314,811</td>
<td>$2,179</td>
<td>$46,782</td>
<td>4.66%</td>
</tr>
</tbody>
</table>

Insurability Data

In collecting interview data for this research, it became clear that insurance experts often consider the issues of risk insurability as one of insurance availability. For example, when I asked Insurance Executive A (2012) about change in risk insurability, Insurance Executive A suggested that I analyze trends in Citizens’ market share data, because growth in its market share indicate a lack of availability of private market coverage due to perceived uninsurability of the risk, for whatever reason. As a result, this research uses Citizens’ market share of written premium from 2002 to 2012 to identify periods of time when the private market perceived the Florida hurricane risk as relatively insurable or uninsurable. Increases (decreases) of Citizens market share indicate decreases (increases) in perceived insurability of the hurricane risk. A combination of reports on the Citizens’ website, public records requests and the Florida Office of Insurance Regulation (FLOIR) online reporting database, QUASR, provide market share data. Table 3 provides Citizens’ annual market share as a percentage of total direct written premiums.
Table 3: Citizens’ Market Share by Direct Written Premiums

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>16.6</td>
</tr>
<tr>
<td>2003</td>
<td>19.97</td>
</tr>
<tr>
<td>2004</td>
<td>19.53</td>
</tr>
<tr>
<td>2005</td>
<td>18.31</td>
</tr>
<tr>
<td>2006</td>
<td>30.58</td>
</tr>
<tr>
<td>2007</td>
<td>29.25</td>
</tr>
<tr>
<td>2008</td>
<td>24.10</td>
</tr>
<tr>
<td>2009</td>
<td>21.37</td>
</tr>
<tr>
<td>2010</td>
<td>25.36</td>
</tr>
<tr>
<td>2011</td>
<td>28.31</td>
</tr>
<tr>
<td>2012</td>
<td>25.50</td>
</tr>
</tbody>
</table>

Assessing Citizens as Insurance

According to Berliner’s (1982) criteria of insurability, an insurer must charge enough in premiums to cover all costs of loss. To assess Citizens’ performance as successful insurance, this research uses Citizens’ loss ratios (incurred loss/earned premium) from 2002 to 2012 as a metric to judge success as an insurance facility (Table 4). Loss ratios greater (less) than one indicate a company that has experienced a greater (lesser) loss in a year than it has earned in premiums that year. Citizens’ statutory financial statements found on the company’s website provide relevant data.

Figure 1 compiles the data discussed in this section. All data is depicted as mean adjusted indices. Using an index enables evaluation from a constant reference point. The top graph shows trends in affordability and insurability represented by frequency of newspaper reporting and Citizens’ market share. The bottom left graph shows real and relative changes in Citizens’ average policy cost. The bottom right graph shows Citizens’ loss ratio over time. These graphs are used for the rest of the discussion in this article.

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10. Due to limited data, the author is not able to account for other related issues, such as overhead, or calculate a combined ratio for the given period.

11. A mean adjusted index is calculated as the year’s value divided by the annual average. The average is used as a reference. For example, the average annual newspaper reporting frequency is 179 and 320 articles were counted for the year 2007. The calculated index value for 2007 is 1.79. This means that, in 2007, reporting frequency was 79% above average.
Evaluating Trends and Judging Responsibility from Contrasting Perspectives

Citizens’ performance contrasts with the TRM perspective of an ideal residual market in three ways. First, Citizens’ dramatic increase of market share in 2006 suggests that it acts as a competitive force. Second, the stability in the rate of change in policy cost since 2006 suggests that Citizens’ pricing of risk does not consistently consider fluctuating private market views (discussed further below). Third, during 2004 and 2005, Citizens’ losses exceed premiums by roughly 240%, suggesting that it does not perform successfully as conventional insurance. Based on these data, the idealized TRM perspective would perhaps judge Citizens a policy failure because the company does not work only in the periphery of the private market and does not meet conventional insurance standards.

In three ways, Citizens’ performance reflects the DRM perspective of an ideal residual market that responds to political acceptability. First, Citizens’ increasing market share suggests that it is meeting the needs of a larger share of the public. Second, the steady decrease in newspaper reporting beginning in 2007 suggests that public views of risk unacceptability have abated. Third, Citizens’ ability to spread risk over time has enabled the company to handle back-to-back catastrophic losses while continuing to ensure the availability of property insurance. Based on these data, the idealized DRM perspective would perhaps judge Citizens a policy success because the company has responded to various issues and concerns in society.
The idealized TRM or DRM perspectives likely attribute responsibility for performance to different causes. Below, I describe potential views of responsibility from the two idealized perspectives based on experience studying Citizens and research on the use of science in politics and policymaking (e.g., Fischhoff et al., 1984b; Weingart et al., 2000; Sarewitz, 2004; Pielke, 2007).

The TRM perspective attributes Citizens’ performance to a disregard for market judgments of risk. After the multiple landfalls during the 2004 and 2005 hurricane seasons, the private insurance industry developed a heightened perception of hurricane risk and reinsurers demanded catastrophe model adjustments to account for their new concerns (Munich Re Group, 2006). Risk Management Solutions (RMS), an industry-leading catastrophe modeling firm, responded by developing a “near-term” model that increased annual loss estimates on the order of 30% to 50% (Muir-Wood, 2006). Insurers and reinsurers adopted the near-term model for ratemaking and competition drove other modeling firms to develop similar model types (FLOIR, 2008; St. John, 2010). Florida’s model regulating body, the Florida Commission on Hurricane Loss Projection Methodology (FCHLPM), rejected the near-term model for use in the state on the

12. The TRM and DRM perspectives also likely conflict on implementing mitigation to manage the hurricane risk (Musulin, 2013). A full discussion of how these views conflict regarding mitigation and the potential for mitigation to play a more prominent role in the risk-management process is beyond the scope of this article.
basis of unacceptable methodology (Kern, 2007). The FCHLPM rejection resulted in severely inconsistent understandings between Florida and the insurance industry of the hurricane risk because, as one Florida actuary explained, “Only Florida uses Florida’s models” (Florida Actuary, 2012).

Figure 2 demonstrates inconsistencies between Florida’s view of risk and the insurance industry’s. The graph compares loss exceedance probabilities for the same portfolio of Florida residential properties. The gray curve reflects a commercial vendor’s FCHLPM-approved model. The black curve shows the same vendor’s model using a near-term catalog of events. The near-term model estimates much higher probabilities for a given loss amount compared to the FCHLPM model.

![Figure 2: Comparison of Loss Exceedance Curves Using a Commercial Vendor’s FCHLPM-Approved Model (Gray) and the Same Vendor’s Near-Term Model (Black)](image)

Because Citizens can spread risk over time, it can retain whatever risk it cannot transfer to reinsurance due to limitations presented by the cost of capital. Citizens’ improved ability to manage the conflicting views of risk between FCHLPM-approved models and private industry enables it to offer rates that do not reflect market judgments of risk.

The DRM perspective attributes trends in Citizens’ performance to changes in Florida’s economy. Historically, Florida’s economy has been concentrated in real estate and land development (Cumming, 2006). In 2012, at least 20% of Florida’s economy directly depended upon real estate and land development (Figure 3; [www.bea.gov](http://www.bea.gov)). As indicated by the economic model frequently produced by the Florida Legislature’s Office of Economic and Demographic Research (OEDR), public policymakers will continue to rely on these sectors of the economy at least for the foreseeable future (Figure 4; OEDR, 2010; OEDR, 2011; OEDR, 2012b; OEDR, 2013). Moreover, policymakers understand the availability of affordable property insurance as vital to the real estate sector of both the state and national economies because banks require homeowners to obtain and maintain windstorm
coverage as a mortgage lending requirement (Subcommittee on Consumer Credit and Insurance, 1993; Committee on Banking and Insurance, 1999; Subcommittee on Oversight and Investigations, 2008).

Mortgage lending practices in the 1990s and early 2000s fostered a substantial building boom in Florida and the nation (Committee on Oversight and Government Reform 2009; FIU Metropolitan Center, 2012). However, incomes stagnated or declined and disparity between high- and middle-income families grew in Florida (Bernstein et al., 2008). By 2006, Florida developed one of the highest percentages of mortgaged homeowners with housing burden in the nation\(^\text{13}\) (Schwartz and Wilson, 2007). In Miami, more than 20% of burdened households were paying 50% or more of household income to housing costs (Schwartz and Wilson, 2007). Concurrently, the U.S. economy declined and Florida’s real estate market exhibited a fall in home values, sales and, eventually, an increase in foreclosures (Committee on Oversight and Government Reform, 2009; OEDR, 2008). As a result, the market view of hurricane risk and demand for higher insurance rates after the 2004/2005 hurricane seasons threatened to worsen the health of the state’s economy.

\(^{13}\) Housing burden, or housing-cost burden, is defined as a household with housing expenditures (including insurance) that exceed 30% of household income (Schwartz and Wilson, 2007).
Figure 4: Florida’s Economic Model as Depicted by the OEDR, 2013

Source: OEDR (2013, p. 2), original in color.

Florida House Bill 1A (HB1A), passed in January 2007, structured Citizens rates so that they were lower than those on the private market. Legislative deliberation of HB1A demonstrated the incompatibility of the rapidly inflating conception of hurricane risk coming from the private market with state’s economy. Rep. David Rivera (R-Miami), a co-sponsor of the bill, assured legislators that the proposed changes to Citizens would assist the company in responding to the highly unstable mortgage market:

**Rep. Rivera** (R-Miami): That is certainly the intent, to make sure that the entire mortgage is covered, when the premiums, when the policy begins whatever point of the year that is.

**Rep. Jack Seiler** (D-Fort Lauderdale): And whether the mortgage goes up or down that’s meaningless of the essences at the date you purchase, pay that premium and purchase that policy, that’s going to be the amount that is paid to the homeowner?

Rivera further emphasized that the legislation’s goal to assist financially struggling middle and low-income homeowners:

Reps. Rivera: What we need to deal with is allowing the consumer to have options. Making sure that not just affluent consumers that are homeowners have options, but every homeowner irrespective of the value of their home or the amount of their mortgage can have that option voluntarily… to perhaps lower their property insurance (Rivera, 2007).

From a DRM perspective, Citizens’ rates may have more to do with the state of the Florida’s economy than with actuarial or scientific measures of hurricane risk.

Evaluating Trends and Assigning Responsibility for Performance from the Perspective of Public Policy Evaluation

From the perspective of public policy evaluation trends in goal metrics indicate that implementation of the Citizens public policy had a mixture of success and failure over the period of analysis. General time frames showing success (2002–2004; i.e., affordability and insurability metrics below average) or failure (2006–2008; i.e., unaffordability and uninsurability metrics above average) indicate the goals of affordability and insurance are not inherently at odds—if they were, then the two metrics would reflect oppositely of one another. The following discussion describes four reasons that Citizens struggles to meet its legislative mandate of affordable property insurance.

1. Citizens as Defense Against Market Judgments of Risk

Florida Sen. Rudy Garcia (R-Hialeah), who is from the Miami area, co-sponsored the Windstorm Bill that created Citizens. He promoted it as a means to streamline the residual market and save on operating expenses by acquiring federal tax-exempt status.14 However, the original guiding mandate did not state a need for a reduction in operating costs but identified a problem with the perception of hurricane risk and argued that “actual and threatened catastrophic losses”15 limited

14 Sen. Garcia stated: “The principal goals of restructuring the Florida property coverage market are to provide homeowners with a residual market that provides one policy, one agent, one adjuster for all the perils of their home. The structure of the residual market entity to be eligible for the tax exemption and IRS authorization to issue tax-exempt debt, assure that the residual market entity provides coverage comparable to private market and streamlines residual market operations to achieve administrative savings” (Garcia, 2002).

15 SB 1418, 2002 Legislature.
the availability of private market property insurance in the state (emphasis added). Comments made to the press indicated that policymakers intended Citizens not simply as a means to reduce overhead expenses, but as a tool for bounding the market conception of risk imposed upon the public. In signing the law, Gov. Bush announced that the “legislation will help contain insurance-related costs” and the company promoted itself as a means of “capping windstorm rate increases” (emphases added; Citizens Property Insurance Corporation, 2002). Legislative creation of Citizens responded to the political risk posed by the insurance industry’s measures of hurricane risk.

The sudden surge in the insurance industry’s perceived risk caused by the hurricane events of 2004/2005 led to conflict between reinsurers, primary insurers and the public. Disagreement about the risk after 2004/2005 caused instability in Florida’s insurance market akin to that after Hurricane Andrew in 1992 (see Musulin, 1997). Then attorney general, soon-to-be-elected-governor, Charlie Crist, argued to lower Citizens’ rates because of an obligation to keep the conception of hurricane risk from growing beyond public acceptability:

Citizens Property Insurance Corporation seems to have forgotten that it was created to serve people during their time of great need. It seems to have forgotten that the people of Florida are the boss, and the corporation is there to serve them—not the other way around. It’s time we remind Citizens Property Insurance of its statutory and moral duty to the people of Florida (Crist, 2006).

Faced with the insurance industry’s rapidly evolving conception of the Florida hurricane risk, a slumping real estate market and a disgruntled, financially strained populace, the newly elected Florida Gov. Charlie Crist signed HB1A into law in January 2007. During deliberation of the bill, Rep. Denise Grimsley (R-Sebring), a co-sponsor, argued that HB1A responded to a “competitive disadvantage” policyholders had when dealing with their insurance providers due to information asymmetry and industry folly:

Policyholders have too few options, too few protections, and too little information. Today, policyholders no longer stand on a level playing field with their insurers. The purpose of this legislation is to restore balance and common sense to the market (Grimsley, 2007).

By enabling regulators to set Citizens’ rates well below that of the private market, legislators intended to “place Citizens in more direct competition with the voluntary market” (Deffenbaugh, 2007) and, thereby, in direct conflict with the TRM perspective of a properly functioning residual market.

As the months passed, the economy worsened and the private market’s conception of hurricane risk continued to grow, exacerbated by the new Citizens legislation, its existing debt and the upcoming 2007 hurricane season. In June 2007, the ratification of Senate Bill 2498 expanded eligibility for Citizens even
further (Deffenbaugh, 2007). Deliberation of the bill again focused on the need to increase market competition, yet a brief statement made by Gov. Crist exemplified the underlying power struggle between the insurance industry and the public over definition of the risk:

It does turn things on its head; and that’s the whole idea. It gives more power back to the people for them to have the opportunity through Citizens and other competition as a result of this good legislation to be able to get lower rates (Crist, 2007).

Like previous legislation, SB 2498 emphasized the need to control the conception of hurricane risk, stating the legislature found that “private insurers are unwilling or unable to provide affordable property insurance coverage in this state to the extent sought and needed” (emphasis added). As such, Citizens’ new goal became to “increase the availability of affordable property insurance.” The legislation directed Citizens to achieve its goal through “affordable rates.” Emphasis on the insurance rate indirectly placed responsibility for policy success on the actuarial and scientific process of characterizing Florida’s hurricane risk.

2. The Practical Difficulty of an Actuarially Sound Residual Market

The American Academy of Actuaries, an actuarial professional group, defines actuarially sound “as a general term, assumed to be understood to mean reasonable and consistent with generally accepted actuarial principles and practices” (American Academy of Actuaries, 2012, p. 24). Based on the principles of ratemaking established by the Casualty Actuarial Society (1988), a professional group for the actuarial sciences, a facility with actuarially sound rates is capable of covering all costs associated with loss, signifying that the facility functions soundly as insurance (Table 5).

If the private market is taken as emblematic of generally accepted principles and practices, then under these criteria established by the American Academy of Actuaries and the Casualty Actuarial Society, neither the TRM nor DRM perspectives can achieve an actuarially sound residual market. A TRM cannot have actuarially sound rates for two reasons. First, offering insurance coverage for a risk that the private market views as too high-risk, unable to be characterized or otherwise uninsurable goes against generally accepted practices because the accepted practice is to not offer insurance coverage. Second, if insurers consider the risk as unknown or unmeasurable, then a TRM has no way to judge its ability to cover future losses or to judge the adequacy of its rates. Simply charging higher rates than those on the private market misconstrues the principles underlying the technical practice of ratemaking. While higher rates ensure the residual market does not directly compete with the private market, it does not mean the full cost of  

16. Florida Senate Bill 2498ER, 627.351(6)(a)1.
17. Ibid.
loss has been quantified. Actuarial soundness and noncompetitive are not equivalent concepts.

**Table 5: Principles of Ratemaking (adapted from Casualty Actuarial Society, 1988)**

<table>
<thead>
<tr>
<th>A Rate...</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle 1</td>
<td>is an estimate of the expected value of future costs.</td>
</tr>
<tr>
<td>Principle 2</td>
<td>provides for all costs associated with the transfer of risk.</td>
</tr>
<tr>
<td>Principle 3</td>
<td>provides for the costs associated with an individual risk transfer.</td>
</tr>
<tr>
<td>Principle 4</td>
<td>is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an actuarially sound estimate of the expected value of all future costs associated with an individual risk transfer.</td>
</tr>
</tbody>
</table>

DRM rates necessarily conflict with generally accepted principles and practices because the residual market offers insurance where generally accepted practices result in risk estimates that fall outside of politically acceptable limits. Logically, if decision-makers could set the residual market rates consistent with political acceptability and generally accepted principles and practices, then the legislature would have no reason to create a residual market. Thus, there is a serious practical difficulty in applying the actuarial soundness criteria to ratemaking for residual markets because the residual market view of risk intentionally contradicts with generally accepted principles and practices found on the private market.

3. *Politcization of the Hurricane Risk*

Some political interests use Florida’s hurricane risk as the latest rationale for resolving existing political conflicts in other realms of policymaking. The politicization of the hurricane risk—the weighting of one measure of risk against another based on the political advantage offered—overshadows the opportunity for public debate about moral concerns and values to be maximized with debate over science, technology and correct measures of risk (Weingart, 1999; Pielke, 2007, 2010; see also Robinson, 1992; Fine and Owen, 2005). For example, the James Madison Institute (JMI), a Florida think tank, promoted “comprehensive reform of the state’s dysfunctional property insurance system” to force resolve in other areas of ongoing political debate and “improve the state’s economy and better protect taxpayers, while also helping to preserve Florida’s environment” (Lehrer, 2011). For the JMI, political debate in resolving environmental and fiscal and budget disputes is unnecessary if decision-makers price windstorm insurance in accordance with market judgments of risk. Environmental policy and fiscal and budget policy are two of the more prominent areas of public policy commonly conflated with the politics of Florida windstorm ratemaking.
Environmental groups promote rate policy as a means to address concerns of the environmental impact from “irresponsible” or “reckless” development. The argument holds that affordable insurance has encouraged extensive land development:

Risky coastal development, which we are all underwriting through subsidized insurance and related programs, not only is a burden to taxpayers, but it promotes development in the very areas that are the most prone to storm damage...No reasonable person can conclude that anything but a fundamental change is overdue... (cited in Lehmann, 2012).

Following this argument, pricing the risk appropriately would mean that Citizens should adopt an unaffordable view of risk so that people would be forced to move out of Florida or disinclined to move into it. Yet, recent trends do not suggest that a high cost of risk necessarily discourages development. Consider that, in the early 2000s, building in Florida took place “without regard for actual demand” (FIU Metropolitan Center, 2012). More recently, despite ongoing difficulties with the cost of windstorm insurance in Florida, Florida’s luxury real estate market is experiencing a “boomlet” (Barriomuevo, 2012) along the coast. Current buyers of real estate often pay in cash (OEDR, 2012a) and, therefore, do not have a mortgage and need not purchase windstorm coverage. The high cost of insurance does not appear to limit development but influences the type of development pursued.

Some climate change policy activists use the rise of windstorm insurance costs as an indication that climate change has worsened the impact of hurricanes. In a Washington Post opinion piece, Mike Tidwell, a climate change activist in the Washington, D.C., area, reflected on the increase in the cost of windstorm insurance and insurers’ attempts to withdraw from coastal markets and asked, “Why would private insurance companies lie about climate change?” (Tidwell, 2011). From this perspective, the acceptability of hurricane risk estimates depends upon one’s expectations of climate change impacts on hurricane behavior. Others conflate the issue of climate change with ongoing difficulties in managing the Florida windstorm insurance regime. Ceres, a prominent environmental investment company, has used Florida’s difficulties with windstorm insurance as an example of insurance conditions under climate change if rate policy is not changed to incorporate a market view of risk (Mills et al., 2005; Khalamayzer, 2012; Ceres, 2012).

Some public policymakers have sought to reduce debate about an acceptable measure of hurricane risk to one of fiscal and budget policy. For example, Gov. Rick Scott has argued that public discourse about Florida’s hurricane risk and Citizens’ rates should be placed in the context of “making sure people understand the risk of hurricane taxes” (i.e., assessments) (Anderson, 2012). John Rollins, a member of Citizens’ board of governors, placed decisions about Citizens’ rates...
into the context of ongoing political debate over federal budget policy. If Citizens incurs a deficit, Rollins argues, then:

Florida will be further in debt, future generations can anticipate decades of assessments, and all those property insurance policies must still be renewed using someone’s money to back the promises. Sounds like the “plan” right now in Washington, doesn’t it? (Rollins, 2012).

For Gov. Scott, Rollins and those who may agree with them, Citizens represents just one example of a national fiscal and budget crisis stemming from the cost of social programs.

4. Florida’s Economic Model Demonstrates Conflict in Economic Policy Goals

Florida’s economic model depicts population growth as the main driver of the state’s economy by way of stimulating employment and new construction\(^\text{18}\) (Figure 5). It also shows credit market conditions as limiting factors to growth in new construction and employment. However, the model does not consider the reciprocal effects of hurricane losses on model drivers. Socioeconomic factors, such as increasing concentrations of wealth and population, account for much of the increases in hurricane economic losses observed over the past several decades\(^\text{19}\) (Bouwer, 2011; Pielke et al., 2008; Schmidt et al., 2008; Nutter, 2013). Consequently, the economic model presents an implicit forecast of increasing hurricane losses through growth in population, construction and employment\(^\text{20}\).

The potential for catastrophic loss can have negative consequences for consumer access to credit markets. For example, EQECAT, a leading catastrophe modeling firm, provides a modeling product that specifically predicts the probability of mortgage default as a result of natural catastrophe events. EQECAT

\(^{18}\) The use of GDP as a metric of the economic wealth of a state or nation is common practice. However, in recent years, economists have criticized its use for not sufficiently capturing the economic well-being and quality of life of society, families and individuals (Stiglitz et al., 2009). The issue of GDP as a poor indicator of economic well-being and quality of life is important in respect to the debate about affordable insurance, because building activity that contributes to GDP also increases the value at risk and requires the cost of insurance to increase to remain in accordance with the criteria of insurability (Berliner, 1982). However, while GDP may increase, household incomes may not, thereby causing strain on the ability to provide affordable coverage that is also in line with conventional insurance practices.

\(^{19}\) This topic encompasses a rich scientific debate and a great wealth of literature regarding climate, hurricane and other natural-hazard-related losses. Bouwer (2011) provides an extensive review of the literature that analyzes losses in relation to societal changes. However, given the breadth of this literature, an in-depth discussion of the matter is well beyond the scope of this paper.

\(^{20}\) Employment serves as a proxy for tangible assets and personal wealth, because one who is employed earns an income affording one the ability to purchase goods and accumulate economic wealth.
(2013) explains, “Managing the risk of massive mortgage default resulting from natural catastrophes begins with quantifying the likelihood and the amount of exposure and loss.” That EQECAT produces this product gives reason to believe at least some mortgage lending institutions consider catastrophe risk directly in decisions about mortgage lending in hurricane-prone regions (see also Garmaise and Moskowitz, 2009). An inability to access the credit market does little to spur new construction, so long as potential homeowners rely on mortgages to purchase homes.

Legislators working with an understanding of the Florida economy based upon the economic model undermine their own efforts to provide the public with affordable property insurance. Growth in population, wealth and construction will undoubtedly increase losses when hurricane landfalls occur. In accordance with the criteria of insurability, insurance rates increase with increasing loss potential (Berliner, 1982). Increasing rates exacerbate insurance affordability issues. Rate suppression exacerbates insurability issues. The conflict inherent in Florida’s economic models is a root cause to Florida’s difficulty in reconciling insurer economic sustainability and insurance affordability.

Responsibility for Citizens’ Performance Demonstrates a Lack of Democratic Accountability

A healthy democratic process enables broad public engagement in the process of public policy decision-making (Dahl, 1998). Conditions that serve as explanations for difficulties in meeting Citizens’ legislative mandate also represent trends in Florida’s democratic process. Legislative non-consensus for preferable outcomes of the Citizens policy leads to a lack of democratic accountability. Accountability matters because it legitimizes the actions of government officials (Gutmann and Thompson, 1996; Young, 2002). The practical difficulty of applying actuarially sound criteria to a residual market prevents accountability because the public cannot hold legislators accountable to conflicting goals. Moreover, the legislation establishes a conflict over control of how Citizens functions, whereby satisfying the goal of affordable property insurance means establishing rates in accordance with public acceptability of risk and satisfying the goal of actuarial soundness means establishing rates in accordance with generally accepted practices on the private market. Consequently, regardless of how regulators establish Citizens’ rates, they can always support the morality of the decision based on some part of the legislation. Without accountability, implementation of Citizens is vulnerable to the whim of political power (Lasswell, 1971), as demonstrated by gubernatorial candidates’ use of Citizens rate policy advocacy as an integral part of their political platforms (e.g., Anderson, 2012; South Florida Sun-Sentinel, 2010).
Without policymaker accountability, the measure of hurricane risk chosen—not public policy objectives—determines societal outcomes. Severe politicization of risk threatens the democratic process by reducing the ability of political power to make decisions that effectively address public policy problems and reducing the opportunity for public participation in policymaking (Pielke, 2007). While policymakers occupy public attention with debate about Citizens’ rates, they neglect the conflict between economic wealth creation policies and policies to ensure affordable property insurance. In order to reconcile the conflict between efforts to provide affordable property insurance and policies of economic wealth creation, a public discourse needs to develop about the future of Florida’s economy. The politicization of the hurricane risk hides the need for this discussion and perpetuates advancement of a subset of economic interests, while removing the opportunity for public participation in deciding the desirability of future economic policy.

Conclusion

The analysis presented here demonstrates that social and scientific understandings of the hurricane risk are variable according to context. For this reason, Citizens rates are subject to negotiation among a broad set of interests and valued outcomes well beyond market judgments of risk. State economic policy goals of increasing population, wealth and construction may conflict with the goals of affordable property insurance. A public discourse that highlights trade-offs in different economic policies may help move the context of the debate about Citizens away from one centered on choosing a technologically correct measure of risk for ratemaking (of which there are many) toward a more constructive dialogue about the values the public wishes to maximize in planning for Florida’s future economy. Such a dialogue may also help with the perceived tension between insurance affordability and the economic sustainability of insurers.

Throughout the negotiation process about hurricane risk and insurance rates, political power shifts between the insurance industry and the public. With shifts in power, Citizens may move from falling in line with technocratic ideals of a residual market with rates reflecting market judgments of risk to democratic ideals of a residual market that acts less like conventional insurance. For policyholders, a Citizens policy has no practical difference from an insurance policy purchased from a private company. From a technical standpoint, however, given that Citizens is not bound to conventional insurability criteria and insurance practices, one may question if policymakers ought to expect that it perform in the same way as a traditional insurer. Acknowledging residual markets as something different from conventional insurance may relieve pressure on Citizens to meet conventional insurance standards, such as actuarial soundness, and enable improved accountability for public policy outcomes.
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Material Misrepresentations in Insurance Litigation: An Analysis of Insureds’ Arguments and Court Decisions*

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Abstract

In an insurance contract, a material misrepresentation occurs when the insured makes an untrue statement that: 1) is material to the acceptance of the risk; and 2) would have changed the rate at which insurance would have been provided or would have changed the insurer’s decision to issue the contract. The insurer’s remedy upon discovery of a material misrepresentation is rescission of the policy. The circumstances under which the insurer may exercise this rescission remedy are governed by differing state standards, which have been tested in litigation in various state and federal courts. In this paper, we explore some of the court decisions involving an insured’s material misrepresentations that featured summary judgment motions by the insurer. We analyze the arguments against the
rescission remedy made by insureds and find that they tend to prevail only in very specific circumstances. We also find that, overall, insurers appear to be proficient at determining in which cases they are likely to prevail on summary judgment, due to their high degree of success in our sample. We theorize that this result is explained partly by selection bias in the sample and partly due to variance in state laws governing the insurer’s remedy of policy rescission. Insureds, insurers, agents and brokers, regulators, and litigators could all potentially benefit from this broad review of litigation involving material misrepresentations and the remedy of insurer rescission.

Introduction

Insurance contracts require that both parties operate under the duty of utmost good faith. For example, from the insurer, the insured expects a fair investigation and expeditious settlement of legitimate claims. A violation of this condition on the part of the insurer can subject it to expensive bad faith litigation and punitive damages awarded by a judge or a jury.

This paper focuses on a breach of the duty of utmost good faith on the part of the insured. Specifically, we focus on material misrepresentations on the application for insurance or in the claims process. Material misrepresentations on an application consist of untrue statements or omissions that are material to acceptance of the risk that would either change the rate at which coverage is offered or would cause the insurer to avoid a coverage offer entirely (Childers and Kraham, 2012). Material misrepresentations in the claims process may involve the amount of loss or whether a loss actually occurred. The insurer’s remedies upon discovery of a material misrepresentation include the possibility of policy rescission. This amounts to a declaration that the policy was void ab initio, and thus no claim payment responsibility obtains. Concurrently, any premiums paid to the insurer must be returned to the insured should the insurer invoke policy rescission.

The paper proceeds in the following manner: First, we briefly discuss rescission as a remedy to reduce the impact of insurance fraud. Next, we discuss summary judgment and when it is appropriate, because these cases comprise the bulk of our sample. We briefly discuss the doctrines of waiver and estoppel as they relate to cases involving material misrepresentations, noting a difference between the remedies of declaring a policy voidable instead of void ab initio.

Then, we describe our sample data and analyze cases involving summary judgment where policy rescission is sought by the insurer as a remedy. We examine the insured’s arguments in these cases, classifying the insured’s arguments into seven categories as follows: 1) no intent to deceive; 2) misrepresentation not relevant to actual claim; 3) agent/broker completed application; 4) insurer has duty to investigate; 5) state law supersedes policy language; 6) ambiguity in the application question leading to potential...
misrepresentation; and 7) rescission affects an innocent third party. Finally, we explore some cases where the misrepresentation occurred in the claims process. We find that insurers are generally favored in cases in the first four categories, while insureds are more likely to prevail in the latter three categories of cases, as well as in cases where a misrepresentation is discovered during the claims process. In our sample, most of the cases fall into the first four categories, leading us to conclude that insurers tend to prevail more often in our sample.

The paper then concludes by noting our findings and discussing their importance to various stakeholders. We note that overall, insurers appear to be proficient at determining in which cases they are likely to prevail on summary judgment, due to their high degree of success in our sample. We theorize that this result is explained partly by selection bias in the non-random sample and partly due to variance in state laws governing the insurer’s rescission rights. Insureds, insurers, agents and brokers, regulators, and litigators could all potentially benefit from this broad review of litigation involving material misrepresentations and the remedy of insurer rescission.

The Remedy of Policy Rescission

The harsh potential penalty of policy rescission is allowed primarily as a tool to reduce the occurrence of insurance fraud. In this context, fraud requires showing an intent to deceive on the part of the insured. Historically, however, fraud or fraudulent intent was not a prerequisite requirement to the invocation of policy rescission. Early common law developed with policy statements by the insured being construed as warranties, meaning that any inaccuracy, regardless of materiality, could be used as a pretext for an insurer to rescind the policy (Keeton, 1970). Concern over the ability for insurers to use the doctrine of warranty to implement post-loss underwriting led to most states holding that insureds’ statements on a policy application should be construed as representations. This meant that the insurer now had to show materiality before invoking the rescission remedy.

Further limitations on the insurer’s right to rescind a policy may exist in certain lines of insurance. For example, in life insurance, incontestable clauses commonly exist limiting the insurer’s right to invoke rescission to two years from the inception of the policy. Some states will continue to allow rescission in life insurance beyond two years, but only if an intent to deceive can be established (Ingram, 2005). In the area of health insurance, concern exists over the ability for insurers to retroactively cancel policies on the basis of seemingly unrelated, or perhaps even unintentional, misrepresentations. The federal Patient Protection and Affordable Care Act (PPACA) limited health insurers’ use of policy rescission, inserting new requirements that now require an intent to deceive or fraudulent activity (Childers and Kraham, 2012). Some states place further restrictions on the
insurer’s use of policy rescission when material misrepresentations arise in the
claims process, as opposed to those found in an application.
Ingram (2005) mentions four possible constructions of state laws governing when
insurers are justified in invoking policy rescission as a remedy. They are as
follows:

1) The existence of any material misrepresentation.
2) Intent to deceive or a material misrepresentation.
3) Intent to deceive or an increase in the risk of loss.
4) Intent to deceive and materiality.

The propriety of policy rescission has been challenged by insureds in various
state and federal courts. In the paper that follows, we examine a sample of 29 court
cases disposed of via summary judgment to better understand the dynamics of
material misrepresentation litigation. The law governing an insurer’s remedy in the
case of rescission varies from state to state as noted above, meaning that cases
with similar facts in different states could potentially be differentially adjudicated.
We find that in our sample, insurers experience great success when invoking
rescission remedies triggered by insureds’ material misrepresentations, and as
mentioned previously, we theorize that this result is brought about partly by these
variances.

Sometimes, material misrepresentations are clear, and the outcome appears to
be exactly what one might expect. For example, in Bowens v. Nationwide
Insurance Company, the homeowners policy application asked if any of the
household members had been convicted of a felony in the past 10 years. The
insured answered “no” and signed the blank attesting that all information provided
in the application was true and correct, but had actually had a felony conviction
and had served time in prison within the stated time period. A significant fire loss
occurred, and upon investigation of the statements in the application, the insurer
denied the claim and invoked its rescission rights due to the material
misrepresentation. The misrepresentation was shown to be material, as
Nationwide’s underwriting guidelines specifically stated that persons with felony
convictions in the past 10 years are not acceptable for coverage. The insured
contested the insurer’s decision, but the insurer prevailed on summary judgment.

A similar case on the commercial side is Williams v. American Western Home
Insurance Company, where the insured represented that all cooking surfaces were
covered by fire suppression systems and that there were no existing fire code
violations. Significant fire damage occurred. A post-claim investigation revealed
that the open flame causing the fire was from a cooking surface not covered by a
fire suppression system and that there had been a previous citation for a fire code
violation that remained uncorrected at the time of the loss. Consequently, the
insurer denied the claim, and upon summary judgment, the court ruled that the

1. U.S. District Court, N.D. Mississippi, Eastern Division, No. 1:10CV310-B-S.
2. U.S. District Court, E.D. Michigan, Southern Division, No. 11-10963.
contract was void ab initio because of the presence of a material misrepresentation in the contract application. The cases that are examined in this paper all involved insurers seeking to void an issued policy because of an alleged material misrepresentation on the part of the insured. In these cases, summary judgment motions are often filed by one of the parties to the lawsuit. In our sample, the insurer often pursues this avenue.

Summary Judgment Applications

A key distinction in our sample is whether summary judgment is appropriate. Where questions of fact remain, a trial is necessary. Where no facts are in dispute and only questions of law remain, summary judgment may be used. Ordinarily, the materiality of a misrepresentation is a question of fact to be determined by a judge or jury at trial. In our sample, which consists of summary judgment motions, the court has already determined the misrepresentation to be material or not material as a matter of law.

From the standpoint of strategy on an insurer’s part, it would seem most advantageous to avoid a jury trial. Ables (2007) makes this point emphatically, stating, “As all defense counsel know, when a trier of fact gets an opportunity to review almost any matter relating to insurers and their claims handling, the insurer will generally not prevail.” (Ables, 2007). Consequently, requests for summary judgment by insurers in material misrepresentation cases are not surprising. The determination of whether a misrepresentation is a matter of law or a matter of fact may be examined and reversed on appeal. For example, in Omni Insurance Group v. Poage, three parents had joint custody of their son, who maintained dual residences. The son was listed on the father’s auto insurance policy as an insured, but not on the mother’s. While the son was driving his mother’s car, an accident occurred. The mother had represented that there were no residents of the household that were not disclosed. Importantly, the mother’s policy excluded coverage for any resident who is not listed on the declaration page. The insurer denied the claim, citing the misrepresentation. The district court ruled in favor of the insured on summary judgment. The insurer appealed, and the appeals court remanded the case for trial, stating that summary judgment was not appropriate for a case where material facts were in dispute. In this case, there was a genuine question as to whether the son should be considered a resident of the mother; if so, the rescission remedy might be appropriate and allowable. If not, then the policy would be expected to provide coverage, as the son was driving the car with the mother’s permission.

The fact that a case was disposed of via summary judgment does not necessarily imply that the insurer has prevailed. Sometimes, when material misrepresentations are alleged, the courts find in favor of the insured on summary

judgment. In *Golden Rule Insurance Company v. R.S.*, the insureds had applied for multiple health insurance policies from different insurance companies, paying premiums and making multiple claims for the same expenses as they arose. One insurer contested this behavior on material misrepresentation grounds, noting that dual addresses were given to the different insurance companies. The insureds claimed that they maintained dual residences by often staying at a friend’s house in a different state, and thus it did not rise to the level of a misrepresentation. On appeal, the judges agreed with the insureds’ argument, and the insurer did not prevail on these grounds.

More commonly in our sample, summary judgments favor insurers. In *Mountain City Ford, LLC v. Owners Insurance Company*, an employee without a driver’s license caused an accident where the injured parties were awarded more than $1 million. The at-fault employee was not listed in the application as a driver, but the premiums were calculated on the basis of the payroll of drivers, and this particular employee’s compensation was listed in the total. Thus, the insured argued that the insurer had accepted premium to cover this driver. The insurer countered that their guidelines would not allow them to cover an unlicensed driver, and that had they known, they would not have issued the policy. At the trial court level, the case was decided in favor of the insurer.

**Waiver and Estoppel**

There has been some litigation testing whether an insurer’s discovery of a material misrepresentation implies a time limit to use a rescission remedy. In other words, in some cases, insureds have argued that because an insurer discovered a material misrepresentation but did not immediately move to rescind the policy, the insurer has implicitly allowed the material misrepresentation to remain without consequence, and has thus waived its right to invoke policy rescission. In this instance, the policy could be said to be voidable, but not *void ab initio*.

For example, in *State Bar Ass’n Mut. Ins. v. Coregis Ins.*, a firm lawyer had converted client funds for his own use. When renewing his professional liability insurance policy with Coregis, in the application he stated that he was not aware of any “circumstance, act, error, omission, or personal injury which may result in a

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5. In this case, another involved insurer contested the multiple payments under the other-insurance provision contained in the policy. That insurer successfully secured a remand of the declaratory judgment to the trial court for further examination of the issue.
7. On appeal, the verdict was upheld, although several additional issues were also addressed. For example, the insured made a motion for a judgment notwithstanding the jury’s verdict, based on the unusually close relationship between the insurance agency and the employer, which strengthened the insured’s argument that the insurer should have known the true situation. The insured also alleged errors in the trial court’s jury instructions.
claim” against him. There were other lawyers in the firm who were sued in connection with this case, and counterclaims against multiple parties. The circuit court stated that the material misrepresentation rendered the policy void ab initio, and thus Coregis had no duty to defend its insured. On appeal, the court found that material misrepresentations render insurance contracts voidable, not void ab initio. Because Coregis had acted promptly to inform the client that it was reserving rights pending resolution of the matter, the appeals court affirmed the summary judgment verdict of the circuit court in favor of the insurer. The final outcome of this case suggests that in Illinois, a material misrepresentation renders the policy voidable, not void ab initio, and the insurer may, perhaps unintentionally, waive rescission rights if it fails to act promptly. Coregis reinforces the language in Illinois Code Section 154,9 which places a one-year limitation on the insurer’s rescission option in certain types of insurance.

Another interesting application of this concept in the same state is American Service Ins. v. United Auto Ins.,10 where a minor child had recently received a driver’s permit but was not listed on the auto insurance application as an “operator” of the vehicle. He caused an accident involving only property damage. While investigating, the insurer noted a “coverage issue” but apparently did not explain it to the insured. The insured continued paying premiums without the child listed as a driver, and the insurer continued accepting those premium payments. About seven months later, the child caused another accident. The insurer rescinded the policy as of a date effective prior to the first accident and returned premiums to the insured. On summary judgment, the trial court upheld United’s argument and allowed its policy rescission to stand. On appeal, the issue of whether United had waived its rescission rights was raised, given that there were actually two accidents involving the unlisted child, and that time had passed between the two events. The appeals court ruled that the trial court acted properly in allowing a policy rescission on summary judgment in this case, because the one-year time limitation in Section 154 of the Illinois Code was not exceeded.

In some situations, a court may restrict the insurer’s right to rescind a policy by invoking the doctrine of estoppel. This legal doctrine is sometimes used to prevent one party from taking certain actions that might produce an unfair result due to the other party’s reasonable reliance on the first party’s promises. Because promises of coverage are made in insurance contracts, courts take care to examine the degree to which the insured relied on those promises, and may choose to cite the legal doctrine of estoppel to prevent the insurer from using policy rescission as a remedy in the event a material misrepresentation is discovered.

9. “... With respect to a policy of insurance as defined in subsection (a), (b), or (c) of Section 143.13, except life, accident and health, fidelity and surety, and ocean marine policies, a policy or policy renewal shall not be rescinded after the policy has been in effect for one year or one policy term, whichever is less. This section shall not apply to policies of marine or transportation insurance.”

10. Appellate Court of Illinois, First District, First Division, 2011, No. 1-09-3070.
For example, in one case mentioned in Ingram (2006), the insured was asked if any prior applications for insurance had been cancelled. In fact, a prior application with the insurer’s corporate parent had been cancelled, along with others. The insured falsely answered “no.” The court ruled that the insurer was estopped from invoking the rescission remedy in this case, holding that the insurer’s prior dealings with the insured should have alerted it to the prior cancellation.

Data

We searched the database of U.S. court cases accessible via www.leagle.com and www.next.westlaw.com for the phrases “material misrepresentation” and “insurance.” The Westlaw Next search result returns hundreds of cases. Of those, Leagle.com returns 44 cases decided since 2000 across all lines of insurance in both federal and state courts. In 15 of those cases, significant additional issues were present so that the case was not decided solely on the basis of the presence of a material misrepresentation. The remaining 29 cases comprise our sample. In those cases, insurers prevailed on summary judgment in 19 of them, while insureds prevailed in 10. We assign the cases to categories based on the primary arguments made by the insureds. We construct the following seven categories of argument: 1) there was no intent to deceive; 2) there was no causal connection between the misrepresentation and the loss; 3) the agent/broker filled out the application; 4) the insurer had a duty to investigate representations made on the contract; 5) state law supersedes policy language; 6) ambiguity exists in the questions on the application; and 7) an innocent third party is affected by a policy rescission. We proceed by detailing and analyzing the cases as they appear by the categories identified above.

Intent to Deceive

A common argument of insureds facing rescission for material misrepresentation is that the misrepresentation in question was innocent. In other words, the insured was not deliberately trying to mislead the insurer into offering coverage it otherwise would not have offered. Unfortunately for insureds, this argument is not powerful in most states.


12. We note that an insured prevailing on summary judgment sometimes means a case is remanded for, or proceeds to, trial, which does not guarantee that the insured will prevail on the merits in the end.
For example, in *Nationwide v. Nelson*, the insured had been convicted of a felony but answered the question on the application that he had not. The defendants insisted that it was not a deliberate attempt to mislead the insurer, but the court ruled that intentional misrepresentation is not required to void the policy *ab initio*. The court stated, “When it comes to insurance applications, Kentucky law makes no distinction between honest mistakes and intentional lies.”

Some states, in fact, do require an intent to deceive for an insurer to invoke a rescission remedy. For example, in *Kiss Construction NY, Inc. v. Rutgers Casualty Insurance Company*, a company listed the nature of its business as 100% interior painting. Later, when the company acted as a general contractor in the construction of a three-family building, some injuries occurred. Rutgers sought to void the policy *ab initio*, because the actual work of the business incorporated excavation and paving in addition to painting. The court cited an earlier case, *Dwyer v. First Unum*, showing that intent to deceive can be determined as a matter of law if the insured knows that certain facts are material to its risk and chooses to omit them in the application. Because the firm had been involved in similar construction work for some time before this particular insurance application without disclosing it, the appeals court ruled that the policy was *void ab initio*, and that the insurance company could avoid defending or paying on the claim, but was also ordered to return premiums to the insured.

Missouri statutes governing non-life insurance indicate that policies may not be canceled except for: 1) non-payment of premiums; 2) fraud or material misrepresentation; and 3) certain conditions that may increase the hazard present. Missouri case law has established a requirement to establish an intent to deceive to allow an insurer to invoke a rescission remedy. In *Childers v. State Farm Fire and Cas.*, a fire destroyed the insureds’ residence and items within. Upon investigation, the insurer discovered that many of the items listed on the initial inventory of losses had not been damaged and denied the claim. The district court ruled that the insurer was justified in invoking its rescission remedy, and the appeals court affirmed, further ruling that misrepresentations by one insured can adversely affect the recovery rights of a joint insured, if the intent of those misrepresentations is to deceive the insurer.

Misstatement of items damaged in the claims process, while material, may not always present *prima facie* evidence of intent to deceive under Missouri law. For example, in *Young v. Allstate*, a misrepresentation was alleged in the claims process relating to the initial inventory of items included on a proof of loss form in connection with a fire loss. The insureds later admitted that the initial inventory included items that were not damaged by the fire. At that point, the insurer denied the entire claim on the basis of material misrepresentation. The district court

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15. Missouri Statutes 375.002.

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granted summary judgment for the insurer, ruling that the insureds’ failure to revise the inventory of damaged items until just before being examined under oath would make it impossible for a reasonable juror to conclude that the insureds had not intended to deceive the insurer. On appeal, the insureds argued that there was no intent to deceive in the inventory of losses provided. The appeals court reversed the district court’s decision, concluding that summary judgment was inappropriate because there were genuine issues of fact requiring a jury determination with regard to the alleged misrepresentations and whether their existence implied the necessary intent to deceive.

No Causal Connection Between Misrepresentation and Actual Loss

In these types of cases, insureds often make the argument that there is no relationship between the actual loss and the misrepresentation on the application and that, therefore, the claim should be paid. Ingram (2005) notes that, in most jurisdictions, a causal connection between the misrepresentation and the loss is not necessary for the insurer to invoke the rescission remedy. We find similar results in our sample. The actionable issue is not whether the misrepresentation was related to the loss. Rather, it is whether the misrepresentation is related to the risk assumed by the insurer.

An interesting application of this idea occurs in Garcia v. American.18 Mr. Garcia was insured under a group life insurance policy and subsequently died in a traffic accident. Upon further investigation, the company discovered that he had provided a false Social Security number (SSN) and that he was not a U.S. citizen. The company refused payment, citing the material misrepresentation. Mrs. Garcia, the beneficiary, sued the life insurance company. The district court ruled in favor of the insurance company, and on appeal, the verdict was affirmed. The appellate court cited the false identity as material because it would not allow the insurance company a proper opportunity for underwriting,19 nor would it allow proper cross-checking with the U.S. Department of the Treasury’s Office of Foreign Assets Control’s Specially Designated Nationals List, which could identify drug traffickers, money launderers and terrorists. The appellate court concluded that false SSNs expose the insurance company to potentially serious penalties since it cannot properly comply with certain legal requirements. Thus, the court reasoned that rescission was appropriate.

19. The policy was a $20,000 life and accidental death policy (with a potential $40,000 payout at stake). In its denial, the insurance company stated that it relies on an individual’s identity to assess potential health risks, the financial and moral fitness of an applicant, and the likelihood of a filing a false claim.
In Dormer v. Northwestern Mutual Life Insurance Co., the applicant for disability insurance failed to completely disclose other health conditions that the insurer contended would have resulted in a refusal to issue a disability policy. She also stated that she had not ever received disability payments in the past, failing to disclose that she had received prior disability insurance payments some 20 years in the past. Under New York law, in disability coverage, which falls under the life and accident section of the insurance code, rescission may only be utilized beyond a two-year incontestable period in the case of material misrepresentation intended to defraud the insurer. The district court concluded in a bench trial that the failure to disclose these material facts constituted a material misrepresentation and permitted the insurance company to rescind coverage. On appeal, this decision was affirmed in favor of the insurer.

In Lawhon v. Mountain Life Insurance Company, the plaintiff had purchased credit disability insurance concurrent with a vehicle and subsequently became disabled. He filed for benefits, which were denied on the basis of misrepresentations in the application. Specifically, the plaintiff had received treatment for chronic obstructive pulmonary disease (COPD) and two hip replacement surgeries. None of this was disclosed in the application, and the ultimate injury was to his back. Under Tennessee law, material misrepresentations may void the policy only when they either are made with the intent to deceive or increase the risk of loss. The trial court originally found that the back injury could not have been affected by the undisclosed conditions. The appeals court, citing testimony that Mountain Life had never issued a policy to someone with COPD, reversed in favor of the insurer, stating that the ultimate decision involved not whether the misrepresentation was related to the loss, but whether it was related to the overall risk of loss. Additionally, the plaintiff was required to pay costs of the appeal, despite prevailing at the trial court level.

In Pettinaro Enterprises LLC v. Continental Casualty Company, the plaintiff owned a building that was vacant at the time of loss. It had previously been leased to a tenant, but the lease had expired, and the tenant had vacated before the loss occurred. The building was destroyed by fire. In the Proof of Loss form, the plaintiff made a claim for lost rents. Because the building was not occupied at the time, the insurer denied the entire claim on the basis of the material misrepresentation in the Proof of Loss. The claim would not have been paid had the insurer known that the building was vacant for 60 continuous days prior to the loss. The district court found in favor of the insurer, and the U.S. Third District Court of Appeals, Second Circuit, 2011, No. 10-0227-cv.

20. The relevant section reads, “After 2 years from the date of issue of this policy no misstatements, except fraudulent misstatements, made by the applicant in the application for such policy shall be used to void the policy or to deny a claim for loss incurred or disability (as defined in the policy) commencing after the expiration of such 2 year period.” N.Y Ins. Law 3216(d)(1)(B)(ii).

21. Tenn. Code Ann. 56-7-103


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Court of Appeals affirmed, citing the 1884 Supreme Court precedent that infers an intent to defraud from the making of a false statement that one knows to be false.\textsuperscript{25}

In \textit{Harper v. Fidelity},\textsuperscript{26} the insured had misrepresented several facts in the life insurance application and subsequently passed away within the two-year incontestability period. Among other issues, the plaintiff argued that the misrepresentations were not related to the ultimate cause of death. Because Wyoming law\textsuperscript{27} allows policy rescission where the misrepresentation would have either changed the insurer’s underwriting decision or the rate at which coverage would have been provided, and because the insurer provided evidence that underwriting guidelines would have prevented coverage being offered to the plaintiff had true facts been presented, the policy rescission was upheld by the district court and affirmed on appeal.

\textbf{Agent/Broker Completes Application}

Sometimes, insureds argue that the agent or the broker completed the application for them and, therefore, the insured should not be held responsible for any misrepresentations therein. Ingram (2005) notes that knowledge held by the agent is generally imputed to the insurer. Given this, it is understandable that insureds might argue that the agent omitted relevant facts while completing the application. While it is certainly true that the agent or broker has an incentive to paint the insured in the best possible light, in our sample, it appears that this argument is not helpful to insureds.

In the aforementioned \textit{Nationwide v. Nelson}, the defendants argued that the agent who sold them the policy knew that the applicant had a felony conviction, and by letting him fill out an application, he negligently or intentionally let them present false information on the application. Kentucky courts have recognized that insurance agents can assume a duty to advise the insured, but it requires additional consideration beyond a premium or an explicit request for advice. The court found that the agent owed no duty to the insured, and thus dismissed the agent from the action.

Cases exist involving brokers, not just agents, completing applications for their insureds. For example, in \textit{Suit Gallery Five Star Men’s Wear, Inc. v. Granite State Insurance Company},\textsuperscript{28} the retailer suffered a burglary. The insurer refused to pay because two previous burglaries were not disclosed at the time of application, and the insured was asked to provide instances of prior losses. The insured argued that the broker provided only one quote, and thus should be held to be an agent of the company rather than a broker. The court cited case law that stated if an insurance broker provided information on an application, the contents are still the

\begin{itemize}
\item \textsuperscript{25} U.S. Supreme Court, 1884, \textit{Claflin v. Commonwealth Ins. Co.}, 110 US 81.
\item \textsuperscript{26} Wyoming Supreme Court, 2010, No. S-09-0119.
\item \textsuperscript{27} Wyo. Stat. Ann. 26-15-109
\item \textsuperscript{28} Court of Appeals of California, Fourth District, Division Three, 2011, No. G042622.
\end{itemize}
responsibility of the insured to verify. Further, Section 331 of California’s Insurance Code states that concealment, whether intentional or not, entitles the injured party to rescind insurance. Five Star further argued that incontestability clauses used in life and disability insurance should apply by analogy, but the court refused to do so and affirmed for the insurer.

In Meadlock v. American Family Life Assurance Company of Columbus, the insured failed to disclose heart issues on the application and subsequently died of ventricular fibrillation. The insurer refused to pay, citing material misrepresentations. The plaintiff argued that the misrepresentations of health status in the life insurance application resulted from the agent not reading all the questions or from the agent deliberately making false representations by ignoring the proper answers and substituting his own. The plaintiff further alleged that the agent forged the insured’s signature on the policy. The court reasoned that the insured had the opportunity to review the policy and did not correct the misrepresentations, so even if the allegations were true, rescission of the policy was proper. It affirmed in favor of the insurer.

In the case of Royal Maccabees Life Ins. Co. v. Malachinski, the defendant represented that no other disability insurance was in force. In fact, he had a substantial group policy. Royal Maccabees made several disability payments before discovering the misrepresentation, and sued to void the contract and recover those payments. One of the defendant’s arguments was that the broker knew he had a group policy and that that knowledge should be imputed to the company. The court followed Illinois case law in finding that because the broker was not an exclusive agent of Royal Maccabees, his knowledge cannot be imputed to the company. Further, the court found that the misrepresentation of other insurance was material, because the two policies together represented more than 100% of the defendant’s working income. The court reasoned that it was likely that the insurance company would have refused to insure in this amount in this case, given affidavits about company policy in this regard. Summary judgment for the insurer to rescind the disability coverage was granted.

In Precision Auto Accessories, Inc. v. Utica First Insurance Company, a fire loss destroyed the plaintiff’s building. Similar to the facts in Suit Gallery Five Star above, the insurer rescinded the policy after discovering that previous losses had not been disclosed at the time of application. The plaintiff argued that it did not willfully misrepresent the loss history and that the incorrect application resulted from the negligence of the broker. The court specifically rejected both arguments, citing New York case law in stating that a “material misrepresentation, even if innocent or unintentional, is sufficient to warrant a rescission of the policy” and

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30. Handwriting experts were employed by both parties, and they failed to agree. The court ultimately ruled this aspect immaterial to the case.
33. Appellate Division of the Supreme Court of the State of New York.
that “the signer of a contract is conclusively bound by it regardless of whether he or she actually read it,” and affirmed in favor of the insurer.

In Bleeker St. Health and Beauty Aids, Inc. v. Granite State Ins. Co., the insured was asked if the building contained, among other things, any deep-fat fryers. The insured answered “no,” but there was a deep-fat fryer in the restaurant that shared a building. The building suffered a fire loss caused by improper disposal of cigarette butts (i.e., the fryer was not involved). The insured contended that the materiality of the misrepresentation was a matter of fact for a jury to determine, not a matter of law, given that the applicant relied on the broker to complete the application. The court ruled that the insured was bound by the statements on the application, even if not reviewed. Under New York law, the court noted that to justify policy rescission, the insurer must demonstrate via reference to policy manuals that it would have not issued the policy had it known the true facts. The insurer was able to demonstrate that it would not have issued a policy had it known of the presence of the deep-fat fryer, and the court found in favor of the insurer on summary judgment.

**Insurer Has Duty to Investigate**

Similar to arguing that the agent or broker filled out the application, some insureds have further argued that insurers have a duty to verify the truthfulness of application statements or accept them as true, sometimes within a certain time frame. To an extent, this is analogous to a life insurance policy’s incontestability clause. Ingram (2005) mentions that in most cases, the insurer has no duty to investigate representations on an insurance application, but notes that when an insurer has cause to question an assertion, some courts have ruled that an insurer should be estopped from policy rescission. Some states have created case law that seems to provide some merit for this particular argument.

In Titan Insurance Company v. Auto-Owners Insurance Company and Titan v. Hyten, an interesting application of this idea is present in Michigan law. With the decision of State Farm Mut. Auto Ins. Co. v. Kurylowicz in 1976, Michigan law forbade rescissions in the case of “easily ascertainable” fraud. In other words, in Michigan, insurers had a duty to investigate representations on applications in certain cases. The purpose was to protect the injured third party, to guarantee a source of recovery. For example, in Titan v. Auto-Owners, an insurance applicant signed an application without listing additional insureds. She did indicate she was married in the application. Her husband was involved in a serious at-fault auto accident. The insurer asked to be excused from providing more than the statutory

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limits of coverage because of the misrepresentation. The trial court awarded summary judgment to the insured, reasoning that the misrepresentation was “easily ascertainable” because the insured had indicated she was married. On appeal, the court affirmed the district court’s decision, not only because of the “easily ascertainable” standard, but also because of the involvement of an innocent third party.

In *Titan v. Hyten*, the insured had a suspended driver’s license. She expected it to be reinstated on a certain date and postdated an insurance application to that date. Unfortunately, her license was not reinstated until later. After reinstatement, she was involved in an auto accident. Her insurer denied the claim on the basis of the material misrepresentation about the license suspension. At trial, the court decided to uphold the *Kurylowicz* precedent, reasoning that this fraud was “easily ascertainable,” and because a third party was injured, prevented the insurer from invoking the rescission remedy. On appeal, the Michigan Supreme Court decided to overrule the *Kurylowicz* precedent to remove the duty to investigate on an insurer’s part where “easily ascertainable” fraud is involved. The case was remanded back for trial because the materiality of the misrepresentation was determined to be a matter of fact requiring a jury’s determination rather than a matter of law.

A main argument in *Jackson v. Hartford* was that the insurer made no more than a perfunctory effort to request information. After the insured died within the two-year contestability period, the insurer investigated and discovered that the insured had previously been treated for a gunshot wound to the head and had a prior felony conviction. The insurer claimed that had it known these facts, it would not have issued the policy. The plaintiff claimed that she had written nothing on the application but a signature and that the agent had completed the policy on his own. Because none of the questions were asked of any of the other adult insureds, the plaintiff argued that the insurer did not properly investigate and should be estopped from denying the claim on the basis of material misrepresentation. The court stated that under Maryland case law, an applicant for insurance is held to the representations on the application even if a third party fills out the application, and mentions that this is still the case even if the third party inserts misrepresentations or false information.

The decedent was asked on the application if he had been examined by a physician for any condition and whether he had been convicted of a felony within the last five years. Both answers were misrepresented. The court suggested that the prior gunshot wound was not material, noting it did not result from criminal activity but from a random accident, and judged it a question of fact to be determined by a jury. The other misrepresentation, involving a prior felony

40. Under Michigan law, only amounts in excess of the statutory minimums may be avoided in the case of (some) material misrepresentations.
42. The plaintiff contested this conclusion as well, although the plaintiff’s expert witness was found to have no knowledge of the company’s underwriting guidelines.
conviction, was found to be material. The court found in favor of the insurer, noting that the insurer does not have to prove it would not have issued the policy, but only that a material misrepresentation exists in order to invoke the rescission remedy. The court further noted cases in other states such as Arizona where the presence of a material misrepresentation on the application would not automatically grant the insurer the right of rescission.43

State Law Supersedes Policy Language

Misrepresentations in life insurance policies are governed slightly differently in some states. In most policies, an incontestability clause limits the rescission right of the insurer, generally imposing a two-year period for an insurer to contest the issuance of a life insurance policy. Beyond that period, a policy is incontestable, except for certain reservations a company may make. Some policies do not impose a limit to discover material misrepresentations. However, a state may impose more stringent guidelines than what a policy contains.

Such is the case in *Halberstam v. The United States Life Insurance Company in the City of New York*.44 A trust had applied for life insurance on a principal. The insured died after the incontestability period had expired. Upon investigation, the insurer claimed that it had been provided with blood samples that did not match those taken from the actual insured, and it denied the claim. Its incontestability clause said that the policy would not be contested after two years “except for non-payment of premiums and material misrepresentations.” The plaintiff contested the insurer’s decision, but further argued that New York law did not allow for policy rescission beyond two years, even in the case of material misrepresentation. The court noted one exception to New York’s stringent statute: that if an imposter applied for insurance, then the contract is not with the insured. Thus, the insurer could still challenge on the basis of material misrepresentation where someone other than the insured took the medical exam and gave blood, because the named insured, being a stranger to the contract, does not obtain the benefits of the incontestability clause. In this case, because a trust purchased the policy, the court ruled the contract was between the trust and the insurer, and that the trust was not a stranger to the contract even if an imposter had provided the blood test. The court ruled in favor of the insured, citing New York’s statute45 and several cases that allow no other exceptions to the two-year mandated incontestable clause. In this case, the more stringent wording of the state statute prevailed over the policy language.

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44. New York Supreme Court, Kings County, 2012, NY Slip Op 22126.
45. New York State Ins. Law 3203 (a)(3).
Ambiguity in Policy

It is well established in insurance law that ambiguities are to be construed against the insurer, because insurance contracts are contracts of adhesion (Miller, 1988). It should, therefore, not be surprising to discover that some insureds seek to mitigate the impact of a material misrepresentation by arguing that application questions are ambiguous. As we shall see, this argument is sometimes successful.

For example, in *Hingham v. Mercurio*, an umbrella policy asked the family to list all motor vehicle operators on the application. A son who owned a separately insured auto was not listed on the application. Had he been listed, the cost of the policy would have increased by $25 (18%). A serious car accident ensued, with the son driving a friend’s car at the time. The insurer rescinded the policy, citing the misrepresentation.

The plaintiffs argued that they were unsure whether or not to list the son, as he had his own underlying auto policy, and claimed they relied on the agent’s advice in not listing him as an “operator.” The application had asked for a list of “household members and all operators of vehicles as required by company.” The previous section of the policy asked for information about household vehicles. The court ruled that there was ambiguity in whether the contract was asking for operators of household vehicles or operators of any vehicle whatsoever. Further, the “as required by company” language of the contract provides little clarification, but added relevance to the testimony that the family consulted the agent on how to answer. Consequently, the court found for the insured and ordered the insurer to pay the claim. The decision was affirmed on appeal in favor of the insured.

In *Ocean’s 11 Bar and Grill v. Indemnity Insurance Corporation, RRG*, ambiguity in the policy played a major role in the court’s decision. An undescribed incident occurred, prompting the insurer to conduct an investigation, which revealed some uncertainty involving alcohol server training. On the application, the business was asked, “Does the applicant allow persons other than employees trained in their Formal Alcohol Awareness training program to serve alcohol to patrons?” The insured answered in the negative. The insurer argued that there was no formal training provided, because the restaurant did not participate in an industry-certified training program, and that this constituted a misrepresentation allowing rescission of the policy. The insurer argued that by providing its own extensive training program, it had satisfied the requirement and had properly answered the question. The court ruled that “Formal Alcohol Awareness training” was ambiguous, because it was not clear that it referred to industry-certified training, and it denied the insurer’s summary judgment motion to allow rescission of the policy.

Rescission’s Impact on Innocent Third Parties

Ingram (2005) notes that courts sometimes consider the effect on an innocent third party when deciding if policy rescission is an appropriate remedy. One instance we discover in our sample is Blundy v. Secura,48 where a father insured a vehicle that was owned by his son. The son was involved in an accident, and would have been entitled to personal injury protection (PIP) no-fault benefits. The insurer claimed that had it known the son owned the vehicle, it would have impacted the rate at which coverage was provided, in the form of a lower multi-vehicle discount extended to the father on his premium.49 Michigan law requires an intent to deceive for an insurer to invoke the rescission remedy.50 Further, because the son was injured and not a party to the contract, the insurer was prevented from voiding the policy.51 The district court’s granting of the insured’s summary judgment motion was upheld by the appeals court.

Claim Misstatements

Sometimes, the material misrepresentation challenged in court occurs in the claims process, rather than on the application. The aforementioned Young v. Allstate is an example, as is Pettinaro v. Continental Casualty Company on the commercial side. The remedy for the insurer is still policy rescission, which can sometimes affect not only the disputed damages, but indeed, the entire claim (including the undisputed portion).

For example, in Hackbarth v. State Farm,52 a fire loss damaged the insured’s home. The policy provided some $680,000 in dwelling coverage, and a potential $550,000 for personal property and living expenses. The insurer ultimately paid an amount over $600,000. The plaintiff sued for a higher payout. Through investigation, the insurer discovered that several losses had been misstated in the original claim and sought to void the policy, which would require a return of the original claim payout. Under the terms of the policy,53 this result is possible only when the misrepresentation is made “willfully and with intent to defraud.” The

49. There were other grounds the insurer cited as reasons to avoid the policy, but this argument is most on point with regard to potential material misrepresentation.
52. U.S. District Court, District of Minnesota, 2013, Civil No. 11-690 (DSD/FLN).
53. We note that the insurer’s own policy terms require the misrepresentation to be willful and with intent to deceive, rather than the insurer being limited to that language by statute.
court found for the insurer, and not only denied the plaintiff’s motion, but required the return of the original claim amount.

Material misrepresentations in the claims process may be more difficult to establish as a matter of law, and may instead require a jury determination, as in the aforementioned Young v. Allstate. Similarly, in Felman Production, Inc. v. Industrial Risk Insurers,54 the insurer filed for summary judgment asking the court to declare that claims misrepresentations for business interruptions in the Proof of Loss form entitled it to void the policy ab initio. There were six separate communications where the insurer claimed that the insured concealed or misrepresented facts. In all of these cases, the court decided that the existence of a misrepresentation was not clear enough to be considered so as a matter of law; rather, the court explicitly said that these issues were questions of fact for a jury to determine. Consequently, the insurer’s motion for summary judgment was denied.

Conclusion

Material misrepresentations on an insurance application or in the claims process expose insureds to the potentially harsh consequence of policy rescission. Policy rescission amounts to a declaration that the policy is void ab initio and that no claim payment responsibility exists. States place differing limits on the ability of an insurer to utilize the rescission remedy, and those limits have been tested in state and federal courts. The preceding analysis explores different arguments employed by insureds to avoid rescission in summary judgment motions. We find that when insureds argue that they had no intent to deceive, that there is no causal connection between the misrepresentation and the loss, that the agent or broker filled out the application, or that the insurer had a duty to investigate the representations made on the application, insureds generally have difficulty prevailing in summary judgment cases. Conversely, we find that in our sample, if insureds can establish that state law supersedes policy language, that ambiguity exists in the questions asked on the application, or that an innocent third party would be affected by rescission, they are more likely to prevail. We further find that insureds survive summary judgment more often when misrepresentations occur in the claims process, because these are often matters of fact for a jury to decide.

In our sample, we note that many of the decisions involve summary judgment. This means, de facto, that any questions about the materiality of a misrepresentation have been settled; it is clear to the judge(s) that the misrepresentation is or is not material. If it were not clear, a jury determination would be required, and the record might not exist in our sample. Consequently, our sample has a clear selection bias, which might tend to overestimate the insurer’s likelihood of prevailing.

Further, we note that many of the arguments used by insureds facing potential rescission for material misrepresentation might be successful in some states, but not others. For example, it might seem reasonable to rationalize that if the misrepresentation is not material to the loss, it should not be a reason to use policy rescission. Indeed, some have argued that insurers should avoid rescission in these cases to prevent possible bad faith claims (Ables, 2007). In some states, the law requires that policy rescission requires misrepresentations to be material to the loss; in most others, it is not. The combination of selection bias in our sample and insureds’ beliefs that are not supported by state laws likely explains the advantage experienced by insurers in our sample.

Insurers, insureds, and litigators should take note of the differing limitations states place on the rescission remedy. Differences in these state laws can dramatically influence settlement and litigation strategy. Regulators should take note as well and perhaps encourage legislators to consider modifications to existing laws to promote consistency across states with regard to the insurer’s rescission remedy. Agents and brokers should also take care to ensure applications contain accurate information, both to increase insureds’ confidence that claims will be timely paid and to protect themselves from the cost of litigation of the type described above.

Future Research

We have seen differences in courts’ interpretations of insureds’ arguments involving material misrepresentations based on differences in state laws, in whether the misrepresentation occurred in the claims process or on the application, and in different lines of insurance. Future research will further refine the differences in court rulings in cases involving material misrepresentation and policy rescission by examining them by line of insurance (i.e., health and disability, property/casualty and life insurance). Insurers, insureds, agents and brokers, regulators, and litigators will all benefit from additional research in this area.
References

Market Structure and the Profitability of the U.S. Health Insurance Marketplace: A State-Level Analysis

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Abstract

Health insurance premiums have more than doubled over the past 10 years, which has been suggested to be the result of high market concentration in the health insurance industry. In this paper, we conduct a state-level analysis in which we examine the health insurance marketplace across the states and, more important, investigate the relation between market concentration and profitability. We find that there has been an increase in the number of insurers operating in most states over the sample period; accordingly, the extent of market concentration has declined in recent years. We also find evidence of a positive relation between market concentration and insurer profits but are unable to definitively determine if this result is due to anticompetitive behavior or greater efficiency of larger health insurers. To the extent that the provisions of the federal Patient Protection and Affordable Care Act (PPACA) will impact the number of insurers in the marketplace and/or the operational efficiency of health insurers, PPACA will likely affect the profitability of the health insurance industry.
Introduction

Health care reform has been a contentious political issue for many years. In the center of the discussions lies the debate on what has been driving the steadily increasing cost of health insurance. A survey from the Kaiser Family Foundation finds that the average annual premiums for single and family coverage have increased significantly, rising at a rate more than three times as fast as the growth in national average wages. Politicians have suggested that the health insurance industry is earning excessive profits by colluding and raising premiums. Additionally, consumer advocates such as Health Care for America Now believe that decreasing competition in the health insurance market is a major cause for such spiraling increases in health insurance premiums.

Despite the great attention that has been focused on the substantial increase in health care costs (Hixon, 2012), few prior academic studies have empirically examined the relation between market concentration within the health insurance marketplace and insurers’ underwriting profits. In this paper, we attempt to address this void in the literature by examining trends in the health insurance markets across states and, more important, investigating the potential relation between market concentration and the underwriting profitability of U.S. health insurers. As noted in prior literature, because competition among insurers is generally geographically focused, a state-level analysis is appropriate to explore this issue (for example, see Bajtelsmit and Bouzouita, 1998).

There are several hypotheses put forth in the economic and financial literatures that consider the potential relation between competition, industry

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1. According to Kaiser Family Foundation’s 2013 Employer Health Benefits Survey, the average annual premiums have increased from $2,196 and $5,615 in 1999, to $5,791 and $15,745 in 2012 for single and family coverages, respectively (Exhibit 1.11). This corresponds to increases of 164% and 180%, respectively. During the same period, national average wages only increased moderately, rising from $29,229.69 in 1999, to $42,498.21 or about 45%. (These statistics were obtained from the Social Security Administration. See www.ssa.gov/oact/cola/central.html for more information.)


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concentration and profits. These hypotheses propose varying reasons for the existence of a relation between market concentration and firm performance, including collusion, efficient operations and perceived product differentiation. Based upon the predictions of these prevailing hypotheses, we would expect to observe a non-trivial relation between profitability and market concentration. Yet, empirical research yields mixed results (see Caves and Barton, 1990; Haskel, 1990; Green and Mayes, 1991; Nickell, 1996; Hays and Liu, 1997). Within the insurance area, while several early studies (see Ippolito, 1979; Cummins and Harrington, 1988; Carroll, 1993) do not find any relation between concentration and performance, later studies do find evidence of such a relation (see Chidambaran, Pugel and Saunders, 1997; Bajtelsmit and Bouzouita, 1998; Choi and Weiss, 2005; Weiss and Choi, 2008). Such variation in prior empirical results may be due to a host of factors, including barriers to entry into the marketplace as well as market conditions specific to each industry (Aiginger, 1994). This suggests that a study specific to health insurers is warranted so as to determine whether there is a relation between market concentration and profitability within the health insurance industry.

In this paper, we conduct a state-level analysis of the health insurance marketplace. Specifically, we provide information on the marketplace and how the health insurance market structure has changed over time. We also empirically examine the relation between market structure and profitability, proxied by insurers’ underwriting margins. By way of preview, our results indicate that during the period 2002 through 2010, the number of insurers varied widely across states. Additionally, we observe an increase in the average number of health insurers in the marketplace by nearly 66% during the sample period. At the same time, we also find that, while there was an increase in the degree of market concentration between 2002 and 2005, the level of market concentration has notably declined thereafter. In our multivariate analysis, we find that market concentration and insurers’ underwriting performance are positively related; However, similar to previous state-level studies (e.g., Carroll, 1993; Bajtelsmit and Bouzouita, 1998), we are unable to provide definitive evidence as to whether the positive profit-concentration relation is the result of collusion among health insurers or due to efficient operations.

3. Some prior literature considers competition, often measured as the number of firms in the market, while others focus on concentration. In this paper, our primary variable of interest is the Herfindahl-Hirschman Index (HHI) calculated using premium data, which is more commonly considered a measure of concentration. We focus on this measure and generally use the word “concentration” throughout this study because there may be some markets with a large number of insurers but with one or only a small number having significant market shares. In these areas, even though the number of firms in the market is high, it may not be viewed as a competitive marketplace. However, we fully recognize that competition and concentration are closely related and do consider the impact of the number of insurers in the marketplace on profitability as a robustness test.

4. For detailed information about the change in the number of health insurers and the level of market concentration in each state during the sample period, see Appendix A.
Our research makes an important contribution to existing literature. Despite the existence of a number of studies examining the relation between market competition and industry profitability within the various sectors of the insurance industry, we are unaware of any studies that have performed a multivariate analysis of the concentration-performance relation in health insurance markets, at the state level, using health insurer financial data from the NAIC. Given the distinct differences in the characteristics of the U.S. health insurance and property-liability insurance markets and the ever-increasing important role that the health insurance industry plays in the overall economy, we believe our analysis of health insurance markets is an important and timely contribution to the existing literature relating to insurance markets in general and health insurance markets specifically.

This study also has important policy and regulatory implications. A significant aspect of the ongoing health care debate is whether the market conduct and operations of health insurers negatively impacts the affordability of health insurance. If it does, then government intervention through legislation such as PPACA, or other federal regulatory remedies that influence health insurance market concentration or the efficiency of health insurer operations, would also likely influence health insurance costs incurred by consumers. For example, provisions of PPACA—such as those regarding medical loss ratios and rebating, limitations on rating factors, required essential benefits and coverage of preventive services, and prohibiting the use of pre-existing conditions—all serve to increase the affordability and availability of health insurance coverage to the population at large in the short run. However, some of these provisions, at least in the short run, may serve to increase claims costs, which could ultimately lead to higher premiums for everyone. Additionally, increased claims costs may result in consolidation within the health insurance industry and/or some insurers exiting the health insurance marketplace. This could potentially lead to less competition within the marketplace and even fewer choices for consumers. As such, our evidence regarding competition in health insurance markets provides important perspective to policymakers, regulators and other market participants.

We organize the remainder of our paper as follows. First, we discuss prior studies that are relevant to our analysis. We then discuss our data sources and methodology. Next, we provide summary information on the U.S. health insurance markets at the state level and present the results of our empirical analysis. Finally, we summarize our findings and make concluding remarks.

5. While studies such as Dafny (2010) and Dafny, Duggan and Ramanarayanan (2012) consider the effects of market concentration on premium levels, these studies rely on samples of employer-offered health insurance plans rather than the insurer-level data available in the NAIC health insurer database.

6. A summary of the major provisions of PPACA can be found on the U.S. Department of Health and Human Services website at www.hhs.gov/healthcare/facts/timeline/timeline-text.html. Additionally, there are a number of existing studies that discuss specific provisions of PPACA, some of which are discussed in the following section.
Previous Studies

The literature on market competition has its roots in industrial organization theory and several views are widely discussed and empirically tested. The structure-conduct-performance (SCP) paradigm posits that firms in less competitive markets have more market power and predicts a positive relation between market concentration and profits. Another theory discussed in the literature, the relative market power (RMP) hypothesis, suggests that firms with larger market shares and differentiated products may exploit market share and gain larger profits. Additionally, the efficiency structure hypothesis proposes that more efficient firms in the marketplace will enjoy higher market shares and higher profits.

Many studies have examined the relation between market competition and firm performance in various insurance markets. Chidambaran, Pugel and Saunders (1997) find a positive relation between concentration and performance among a sample of property-liability insurers. Choi and Weiss (2005) also examine competition among property-liability insurers and find support for the efficiency structure hypothesis. In addition, Weiss and Choi (2008) do not find evidence in support of the SCP hypothesis among a sample of U.S. automobile insurance

7. Proponents of the SCP paradigm explain market performance as being endogenously determined by a given market structure that is considered exogenous (Reid, 1987; Scherer and Ross, 1990). They argue that concentration causes collusion among larger firms. The result is greater market power and higher profits among these firms. Using data from sources such as the U.S. banking industry, researchers have tested whether the SCP paradigm applies to the banking industry. Prior studies typically use the HHI or n-firm concentration ratio (CRn) as the measure of competition. These studies find that banks in more concentrated local markets are associated with higher rates on SME loans (i.e., loans to small and medium-size enterprises) and lower rates on retail deposits (e.g., Berger and Hannan, 1989; and Hannan, 1991). However, market concentration, as measured by HHI or CRn was shown to be only weakly associated with measures of profitability after controlling for the market share of the bank on the right hand of the equation.

8. Proponents of this theory (e.g., Shepard, 1982; Rhodes, 1985), suggest that a firm’s position in the market is associated with superior perception of market participants. There is some support for the RMP hypothesis in the literature. For example, Berger (1995) finds evidence of a positive relation between market share and profitability in the banking industry, even after controlling for concentration and efficiency.

9. The efficiency hypothesis proposed by Demsetz (1973) argues that larger firms enjoy economies of scale and possibly also economies of scope. It is this superior efficiency that enables the larger firms to garner a larger share of the market. Other researchers have also argued that the existence of a positive relationship between competition and firm performance may indeed support the efficiency hypothesis and both competition and profits are driven by the market share gains of efficient firms (e.g., Smirlock, Gilligan and Marshall, 1984; Rhoades, 1985; Smirlock, 1985; Shepherd, 1986; Berger, Demirguc-Kunt, Levine and Haubrich, 2004).

10. It should be noted that Chidambaran et al. (1997) measure concentration as the share of net premiums of the four largest firms. When the HHI is used as an alternate measure of concentration, no relation is observed between concentration and firm performance.
companies and find mixed results relating to the relative market power and efficiency structure hypotheses.

Additionally, Carroll (1993) and Bajtelsmit and Bouzouita (1998) both examine competition and profits in insurance markets at the state level and are the most relevant to our current analysis.\textsuperscript{11} Carroll (1993) examines both the SCP hypothesis and the efficiency hypothesis using state-level workers’ compensation data. Carroll (1993) does not observe the positive relation between market concentration and profits predicted by the SCP and efficiency hypotheses.\textsuperscript{12} However, she suggests that the construction of some of the variables may lead to this result and her findings may, therefore, not be entirely inconsistent with the SCP and efficiency hypotheses. Bajtelsmit and Bouzouita (1998) examine the relation between market competition and profitability in the U.S. personal automobile insurance market and, unlike Carroll (1993), they find a significant and positive impact of market concentration on profitability for combined liability and physical damage lines. Bajtelsmit and Bouzouita (1998) conclude that their analysis provides evidence in support of the SCP hypothesis. The authors note that the results could also provide support for the efficiency hypothesis in that “higher profitability in the more concentrated states is the result of greater efficiency of large firms as suggested by Demsetz (1973)” but are unable to provide conclusive evidence on its validity. When considered jointly, the findings of Carroll (1993) and Bajtelsmit and Bouzouita (1998) indicate that no strong and consistent support has emerged for explaining the state-level concentration-profits relation. Additionally, these varying results suggest that the relation may differ across industries or even business segments within the same industry.

Other studies have utilized various data sources and methods of analyses to examine topics related to competition in health insurance markets. For example, Robinson (2004) uses data from sources such as Goldman Sachs Global Equity Research, investor reports and InterStudy directories to perform a summary examination of trends in state-level health insurance market concentration and performance from 2000 to 2003. Dafny (2010) uses a sample of employer-offered health plans and finds evidence that health insurers exercise market power to charge more profitable employers higher premiums. Using a similar sample, Dafny, Duggan and Ramanarayanan (2012) also find evidence of a positive relation between concentration and premiums in health insurance markets.

From a broad perspective, our analysis contributes to the body of literature that has grown substantially following the enactment of PPACA, which examines

\textsuperscript{11} Similar to Carroll (1993) and Bajtelsmit and Bouzouita (1998), we consider both the SCP and the efficiency hypotheses in the current study.

\textsuperscript{12} The study employs the market share of direct writers in order to evaluate the efficiency hypothesis, as it is hypothesized that a link exists between efficient operations and direct writers.
various aspects of health insurance market operations. For example, McCue, Hall and Liu (2013), using NAIC data, find evidence that PPACA’s minimum medical loss ratio requirement leads individual health insurers to reduce cost ratios and operating margins. Karaca-Mandic, Abraham and Simon (2013) also use NAIC data in their analysis and provide evidence on the appropriateness of the medical loss ratio as a target measure of market power in individual health insurance markets. Additional studies discuss the PPACA legislation and various topics closely related to the enactment of the legislation (e.g., Harrington, 2010a; Harrington, 2010b; Monahan and Schwarcz, 2013; Eibner, Cordova, Nowak, Price, Saltzman and Woods, 2013), as well as evaluate differences between individual health insurance take-up at the national and state levels (Parente, Feldman, Abraham and Xu, 2011). While prior studies do consider a variety of issues related to the health insurance industry, our state-level analysis provides a much more complete examination of the relation between market concentration and profitability by including a larger sample size and a more in-depth analysis.

### Hypothesis, Data and Methods

#### Hypothesis

Our hypothesis considers the relation between state-wide health insurance market concentration and state-wide health insurer profits. The previously discussed, SCP and efficiency hypotheses both suggest a positive relation between profit and concentration, although the former attributes the relation to anticompetitive behavior, while the later suggests the relation is derived from comparative advantages in production/services. Given empirical evidence from prior studies, we propose the following hypothesis:

There is a positive relation between health insurance market concentration and health insurance market underwriting profit at the state level.

13. Topics considered in this area of the literature consider numerous facets of health insurance market operations following the enactment of PPACA. For example, Jost (2014) provides perspective on the implementation of PPACA; Sommers, Kenney and Epstein (2014) provide evidence on the influence of Medicaid expansion efforts; Grob, Schlesinger, Davis, Cohen and Lapps (2013) consider PPACA’s efforts to assist consumers in health insurance coverage; Buchmueller, Carey and Levy (2013) evaluate whether PPACA will lead employers to drop health insurance coverage; Kapur, Karaca-Mandic, Gates and Fulton (2012) examine the influence of small-group health insurance reforms on firm growth; and Jones and Greer (2013) address states’ political environments and health insurance exchanges.

14. As discussed previously, Carroll (1993) does not find a relation between concentration and profits, while the results of Bajtelsmit and Bouzouita (1998) provide support of a positive relation between concentration and profits.
A positive and statistically significant coefficient on the market concentration measure in the ensuing empirical analysis will support this hypothesis. Such evidence would be consistent with both the SCP and efficiency structure theories. However, we do want to acknowledge a limitation of our study. Because both the SCP and efficiency structure theories propose a positive relation between market concentration and profitability, a finding supporting our hypothesis has two alternative explanations: 1) there is collusion among insurers with large market shares; or 2) insurers with large market shares operate more efficiently. These alternative explanations could have very different impacts on consumers. More specifically, if this finding is the result of exertion of market power and collusion by health insurers, this could ultimately lead to higher health insurance costs. Alternatively, if the relation is the result of more efficient operations, this could translate to lower premiums for insureds. As such, regulations or other market factors that influence concentration or the efficiency of firm operations within health insurance markets are likely to have non-trivial consequences for health insurance consumers and future study is needed.

Data

To test our hypothesis, we take advantage of the comprehensive data from the NAIC health insurance company statutory filings supplied by SNL Financial. The NAIC database consists of financial and operating data that all insurance companies are statutorily required to provide to state insurance regulators. We utilize data from the health annual statement of NAIC filings, which contain detailed operating information specific to insurers specializing in health insurance lines, including revenues, expenses, income, managed care information, physician remuneration information and by-state, by-line premiums and losses at the firm level.15 By aggregating this information to the state level, the dataset allows us to examine health insurance markets using a large sample of private insurers that are deemed by the NAIC as health insurers and operate across multiple health-related lines of insurance.

15. While we believe that the NAIC health insurance database provides an appropriate characterization of the health insurance market during our sample period, restricting our sample to only firms that file health annual statements with the NAIC inherently results in the exclusion of life insurers with health insurance business from our sample. An examination of the Supplemental Health Care Exhibits in the life insurance database indicates that, of the total combined health premiums earned by health and life insurers, on average, more than 90% of the premium volume is reported by health insurers. Additionally, Schedule T of the life insurance annual statements combines premiums for accident and health coverages. Therefore, including this data would provide an inaccurate representation of the health insurance market because it would not distinguish between accident and health insurance premiums for life insurers from this data sources. Finally, while the Supplemental Health Care Exhibit to the life insurance annual statements do separately report premiums specifically for health products, these supplements are only available since 2010. As such, we believe the omission of life insurers does not significantly bias our results but allows us to utilize a much longer sample period.

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Our dataset has advantages over those used in prior studies such as Dafny (2010) and Dafny et al. (2012), which utilize employer-level plan data for selected geographic regions only; and Parente, Feldman, Abraham and Xu (2011), which use data from four large employers with operations in multiple states. More specifically, because we utilized the NAIC database, our sample is larger and more complete than those used in prior studies, as ours includes information on all private health insurers required to file regulatory statements with the NAIC in nearly all states. As such, our results are more generalized than findings from the prior studies mentioned above.

With the exception of California, we include in our sample all insurers operating in all states from 2002 to 2010\(^{16}\) that filed a health annual statement with the NAIC.\(^{17}\) California is excluded due to data limitations on California-domiciled health insurers.\(^{18}\) We then aggregate insurer-level data to the group level in order to ensure variables such as the HHI or market share measure reflect the combined operations of insurer conglomerates rather than the separate operations of multiple individual-affiliates within a group. The NAIC data reports operations of a given insurer by state (such as premiums and losses) which allows us to aggregate the premiums and losses of health insurance groups to the state-level. Our final sample is then a panel of state-year observations.

**Methods**

An appropriate test of our hypotheses considers the relation between state-level market concentration and the performance of health insurers while

16. We only include data through 2010, given the passage of PPACA in that year. Specifically, its provisions were set to go into effect over a number of years and these major changes to services covered and policy structure, as well as guaranteed insurability and limitations on medical loss ratios, are likely to impact health insurers in a variety of ways, some of which are discussed in later sections of this paper. As such, the purpose of this paper is to determine the relationship between market concentration and profitability pre-PPACA. An empirical analysis of the full impact of PPACA will not be possible until all of the provisions have gone into effect and there are several years of post-PPACA implementation data to examine. At that time, it will be possible to determine if there have been changes to market concentration, if those changes can be related to the implementation of the provisions of PPACA, and if this has had an impact on the profitability of the health insurance market. We leave this for further research.

17. It should be noted that there is considerable variation in the size of the states. We include a state population variable to help control for the potential impact of this variation. Additionally, we perform an unreported regression analysis in which we exclude observations with Studentized residuals greater than three or smaller than negative three. Our results remain consistent, suggesting our results are unlikely to be driven by any highly influential observation.

18. We exclude the state of California from our analysis due to the fact that a significant amount of data for California health insurers is missing from the NAIC annual statement database. We attempted to obtain such information directly from the California Department of Insurance but were advised that their data is also incomplete because, in California, only certain segments of the health insurance markets are required to file annual statements with the California Department of Insurance.

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controlling for other factors that may influence market performance. We follow prior studies such as Bajtelmsmit and Bouzouita (1998) and measure industry performance as the ratio of net premiums earned less losses incurred divided by net premiums earned. The measure of performance utilized in the current study does not consider expenses, because insurers do not report such information by state. As noted in Bajtelmsmit and Bouzouita (1998), although state-level studies are common in the insurance area and are appropriate to examine the impact of market concentration on profitability when markets are geographically focused, this is a potential drawback of state-level studies. However, the inclusion of independent variables that are likely to impact expenses can help control for some, if not all, of the potential variation of expenses across states. As an additional attempt to address this potential issue, we replicate our regression analysis including only insurers that do business in a single state (in which case all of the expenses incurred by the insurer would be attributable to business in that single state) and the results are consistent with those presented in the following section.

Following prior studies in the insurance literature, we measure concentration as the state-level HHI based on direct premiums written. Formally, we estimate the following model:

\[ Performance_{jt} = \alpha + \beta_1 Concentration_{jt} + \beta_2 \lambda_{jt} + \epsilon_{jt} \]

where,

- \( Performance_{jt} \) = the ratio of net premiums earned less losses incurred divided by net premiums earned in state \( j \) in year \( t \)
- \( Concentration_{jt} \) = the state-level HHI, which is calculated as the sum of the squares of insurer \( i \)'s market share (based on direct premiums written) in state \( j \) during year \( t \)
- \( \lambda_{jt} \) = a vector of state-level variables to control for market performance in state \( j \) during year \( t \)

We first use ordinary least squares (OLS) regressions to estimate Equation 1. However, due to endogeneity concerns regarding market concentration noted in prior studies, we also use an instrumental variables (IV) model approach. Specifically, it is possible that unobserved factors influence both concentration and performance in each market. Additionally, there may be some simultaneous causality bias. As such, we instrument \( Concentration_{jt} \) with both the one-year lag of \( Concentration_{jt} \) in state \( j \)'s neighboring state (similar to the approach used by McShane, Cox and Butler, 2010) and the number of insurers operating in state \( j \)

\(^{19}\) The lines of business considered are those reported on the NAIC health annual statement by every insurer in the state, which can include individual comprehensive, group comprehensive, vision, dental, Medicare, Medicare supplement, Medicaid, federal employee health benefits, stop-loss, disability and long-term care insurance.
during year $t$ and test the concentration variable for the presence of endogeneity.\textsuperscript{20} The null hypothesis of the endogeneity test is that the regressor is exogenous. The results of the tests indicate rejection of the null hypothesis at the .0001 level, which indicates that the regressor is endogenous.\textsuperscript{21} As such, while we report the results using both the OLS and IV approaches, we focus our discussion of the results in the following section on the IV models.\textsuperscript{22} The results of under-identification tests and the Sargan-Hansen tests indicate that all models are properly identified and the variables used as instruments are valid instruments. In addition, all models include robust standard errors.\textsuperscript{23}

Concentration is our primary variable of interest. If we find a statistically significant coefficient on Concentration, this would provide evidence of a relation between market concentration and profitability within the health insurance industry.

With the variables represented by vector $\lambda_t$, we control for a number of other state-level factors that could potentially impact underwriting profits. First, we include the percentage of net premiums written in each of the lines of business, as different insurance products may be associated with varying levels of profitability. The omitted line is the other category, which includes stop-loss, disability and long-term care coverage.\textsuperscript{24} We also include a measure of insurers’ underwriting risk to control for the possibility that uncertainty in claims levels impacts insurers’ profitability.

Additional state-level measures included in $\lambda_t$ are the uninsured rate, the unemployment rate, median income, state population and the number of large employers in each state in each of the sample years. We expect higher levels of persons without health insurance (i.e., higher uninsured rate) to be indicative of factors influencing insurer profits such as underwriting risk or the demand for health insurance. Because employment levels are likely correlated with the demand in the group health insurance market, higher unemployment levels might be associated with lower demand for group health insurance. All else being equal, this might, in turn, lead to lower underwriting profits, especially if insurers in the state have more business in the group health insurance lines. Also, because large

\textsuperscript{20} State $j$’s neighbor is any state that shares a geographic border with state $j$. Because Alaska and Hawaii do not have bordering states, we are forced to exclude these states from the IV regression analyses. The exclusion of California (discussed earlier) and the requirement of a one-year lag for the neighboring state instruments results in 376 observations for the IV regression models, as opposed to the 440 observations included in the OLS regression models.

\textsuperscript{21} Specifically, we utilize the “endog” option in Stata to test whether the concentration variable is, in fact, endogenous.

\textsuperscript{22} In addition, we estimate all models with year dummies included.

\textsuperscript{23} Given that the measure of underwriting risk does not have much variation for the states across years, it is not feasible to include state dummies or use any type of clustering approach. However, in unreported results, we find that our main results are robust to alternative model specifications that include state and year effects.

\textsuperscript{24} The disability, stop-loss and long-term care lines are combined into a single category, as these lines represent a small portion of the business written by health insurers and vary in reporting methods during the sample period.
employers may choose to self-insure health benefits and utilize health insurers for administrative services only arrangements or stop-loss insurance, differences in the number of large employers in a state may be associated with differences in health insurer profitability.

Higher income individuals are more likely to have access to health insurance and are better able to afford the out-of-pocket costs associated with health care services. As such, these individuals may be healthier, relative to lower income individuals, demand more health insurance and/or purchase greater amounts of non-comprehensive lines of insurance (such as dental and vision insurance), which could impact the profitability of health insurers. Also, the size of the state market could influence health insurer profitability. For example, insurers in states with larger populations, all else being equal, are expected to have a greater ability to spread fixed costs over a larger base of potential policyholders. It is also possible that health insurers in states with larger populations have greater flexibility in physician network arrangements because of a higher supply of physicians. In both cases, this could lead to greater profitability for health insurers. We therefore include the natural logarithm of the state population as a proxy for market size.

In \( \lambda_{it} \), we also include various state-level population demographic variables intended to control for the potential influence of the health and socioeconomic status of the population on insurer profits. This includes the number of deaths per 1,000 people and the percentage of the population that may be considered higher health risks. If states with a higher number of deaths are associated with longer hospital stays and more treatment, especially more expensive potentially life-extending treatments, we would expect this variable to be negatively related to insurer profitability. However, if more deaths are associated with shorter hospital stays and less treatment due to the hasty death of individuals, we might expect this variable to be positively related to profitability, as claims costs would be lower, all else being equal. In addition, given the health risks associated with obesity, smoking and drinking, we would expect all three of these variables to be negatively related to profitability as these factors would all likely increase claims costs.

Lastly, we include the five-year Treasury yield as a measure of market performance. If the overall market is performing well, higher investment returns may allow insurers to reduce the cost of coverage to remain competitive or attempt to gain greater market share. If this is the case, we would expect higher investment returns to be associated with lower underwriting profits. Complete variable descriptions are presented in Table 1 and summary statistics are presented in Table 2.
Table 1: Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Profits</td>
<td>Net premiums earned in state j for all insurers in year t less losses in state j for all insurers in year t.</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>Hill of state j calculated as the sum of the squares of insurer i's market share (measured as direct premiums written) in state j during year t.</td>
</tr>
<tr>
<td>Competition</td>
<td>Number of insurer with some direct premiums written in state i during year t.</td>
</tr>
<tr>
<td>Underwriting Risk</td>
<td>Variance of the loss ratio measured as total losses incurred divided by direct premiums written if insurers operating in state i.</td>
</tr>
<tr>
<td>Proportion Nonline</td>
<td>The proportion of premiums written by nonline insurers in state j during year t.</td>
</tr>
<tr>
<td>Percent Federal Employee</td>
<td>The percentage of premiums written in federal employee benefits program coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Group Comprehensive</td>
<td>The percentage of premiums written in group comprehensive coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Individual</td>
<td>The percentage of premiums written in individual comprehensive coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Medicaid</td>
<td>The percentage of premiums written in Medicaid coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Medicare</td>
<td>The percentage of premiums written in Medicare coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Medicare Supplement</td>
<td>The percentage of premiums written in Medicare Supplemental coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Vision</td>
<td>The percentage of premiums written in vision coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Dental</td>
<td>The percentage of premiums written in dental coverage, for state j during year t.</td>
</tr>
<tr>
<td>Percent Other</td>
<td>The percentage of premiums written in casualty, long-term care and stop-loss coverage, for state j during year t.</td>
</tr>
<tr>
<td>T-Bill Rate</td>
<td>The yield on the five year Treasury security for year t.</td>
</tr>
<tr>
<td>Uninsured</td>
<td>The number of persons without health insurance, per capita, for state j during year t.</td>
</tr>
<tr>
<td>Unemployment</td>
<td>The number of unemployed, per capita, for state j during year t.</td>
</tr>
<tr>
<td>Large Employers</td>
<td>The percentage of establishments with &gt;1000 or more employees in state j during year t.</td>
</tr>
<tr>
<td>Median Income</td>
<td>The median income, in 2010 dollars, of persons in state j during year t.</td>
</tr>
<tr>
<td>State Population</td>
<td>The natural logarithm of the population of state j.</td>
</tr>
<tr>
<td>Deaths</td>
<td>The number of deaths per 1,000 people in state j during year t.</td>
</tr>
<tr>
<td>Obese</td>
<td>The number of persons given by CDC data as obese, per capita, in state j during year t.</td>
</tr>
<tr>
<td>Smokers</td>
<td>The number of persons, per capita, using tobacco cigarettes during year t in state j.</td>
</tr>
<tr>
<td>Heavy Drinkers</td>
<td>The number of persons, per capita, consuming, on average, two or more drinks per capita in state j during year t.</td>
</tr>
</tbody>
</table>
Table 2: Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profits</td>
<td>0.1476</td>
<td>0.0323</td>
<td>0.0639</td>
<td>0.2165</td>
</tr>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>0.3812</td>
<td>0.2064</td>
<td>0.0814</td>
<td>0.9900</td>
</tr>
<tr>
<td>Competition</td>
<td>19.3220</td>
<td>9.7064</td>
<td>2.0000</td>
<td>50.0000</td>
</tr>
<tr>
<td>Underwriting Risk</td>
<td>0.0007</td>
<td>0.0011</td>
<td>0.0000</td>
<td>0.0075</td>
</tr>
<tr>
<td>Proportion Monoline</td>
<td>0.0972</td>
<td>0.1480</td>
<td>0.0001</td>
<td>1.0000</td>
</tr>
<tr>
<td>Percent Federal Employee</td>
<td>0.0861</td>
<td>0.0602</td>
<td>0.0000</td>
<td>0.3525</td>
</tr>
<tr>
<td>Percent Group</td>
<td>0.5594</td>
<td>0.1390</td>
<td>0.0742</td>
<td>0.9210</td>
</tr>
<tr>
<td>Comprehensive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Individual</td>
<td>0.0588</td>
<td>0.0437</td>
<td>0.0000</td>
<td>0.3076</td>
</tr>
<tr>
<td>Percent Medicaid</td>
<td>0.0500</td>
<td>0.1071</td>
<td>0.0000</td>
<td>0.5642</td>
</tr>
<tr>
<td>Percent Medicare</td>
<td>0.1237</td>
<td>0.1116</td>
<td>0.0000</td>
<td>0.7161</td>
</tr>
<tr>
<td>Percent Medicare</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplemental</td>
<td>0.0327</td>
<td>0.0321</td>
<td>0.0000</td>
<td>0.3160</td>
</tr>
<tr>
<td>Percent Vision</td>
<td>0.0054</td>
<td>0.0137</td>
<td>0.0000</td>
<td>0.1965</td>
</tr>
<tr>
<td>Percent Dental</td>
<td>0.0239</td>
<td>0.0285</td>
<td>0.0000</td>
<td>0.2582</td>
</tr>
<tr>
<td>Percent Other</td>
<td>0.0200</td>
<td>0.0341</td>
<td>0.0000</td>
<td>0.6274</td>
</tr>
<tr>
<td>T-Bill Rate</td>
<td>3.3756</td>
<td>0.9214</td>
<td>1.9300</td>
<td>4.7500</td>
</tr>
<tr>
<td>Uninsured</td>
<td>0.1352</td>
<td>0.0385</td>
<td>0.0438</td>
<td>0.2535</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.0292</td>
<td>0.0099</td>
<td>0.0120</td>
<td>0.0743</td>
</tr>
<tr>
<td>Large Employers</td>
<td>0.0938</td>
<td>0.0329</td>
<td>0.0000</td>
<td>0.2097</td>
</tr>
<tr>
<td>Median Income</td>
<td>10.7487</td>
<td>0.1638</td>
<td>10.2874</td>
<td>11.1281</td>
</tr>
<tr>
<td>State Population</td>
<td>15.0703</td>
<td>0.9677</td>
<td>13.1224</td>
<td>17.0402</td>
</tr>
<tr>
<td>Deaths</td>
<td>44.9003</td>
<td>40.7765</td>
<td>3.0000</td>
<td>173.7600</td>
</tr>
<tr>
<td>Obese</td>
<td>0.2511</td>
<td>0.0364</td>
<td>0.1600</td>
<td>0.3540</td>
</tr>
<tr>
<td>Smokers</td>
<td>0.2037</td>
<td>0.0400</td>
<td>0.0580</td>
<td>0.3260</td>
</tr>
<tr>
<td>Heavy Drinkers</td>
<td>0.0514</td>
<td>0.0127</td>
<td>0.0190</td>
<td>0.0870</td>
</tr>
</tbody>
</table>

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Summary Statistics

Before reporting the results of the empirical model, we first take a closer look at the state health insurance markets and how these markets have changed over time. Figure 1 and Figure 2 show the average number of insurers and average levels of concentration during the sample period. These figures provide some evidence that the average number of health insurers operating in the marketplaces has increased over time. Additionally, while there was some growth in concentration in the early part of the sample, the U.S. health insurance markets overall have become less concentrated since 2005.

In examining the change during the sample period for each individual state, we find that, on average, every state experienced a positive annual growth in the number of insurers operating in its jurisdiction. Additionally, average growth rates varied significantly across the states, from less than 1% to nearly 28%. When more closely examining changes in market concentration across the states, we find that health insurance markets in 19 states have become less concentrated, while the remaining 30 states experience an average annual increase in market concentration, with the largest increase being nearly 40%.

**Figure 1:** Average Number of Insurers per State by Year

![Graph showing average number of insurers per state by year](image)

Note: The lined line is the linear trend line over the sample period. For detailed by-state information, see Appendix A. As noted in the paper, this does not include California.

25. Detailed information regarding the number of insurers operating in each state, the level of market concentration in each state, and the average change in these variables during the sample period can be found in Appendix A.
Intense debate relating to health care reform has often centered on the extent to which changes in the health insurance marketplace have led to changes in the cost of health insurance. Although we are unable to obtain the exact price consumers pay for health insurance policies, we consider a proxy: direct premiums written per enrollee in each state.\textsuperscript{26} We find that all but four states in our sample have experienced average annual increases in premiums per enrollee.\textsuperscript{27} This is consistent with findings in prior studies and surveys that consumers are paying more for health insurance than they have in the past.

In an effort to determine what may be driving this increase in health care costs, we next consider a measure of claims costs (i.e., health insurance losses paid per enrollee) during this same period.\textsuperscript{28} We find that for all but three states, the average annual change in losses per enrollee was positive. Additionally, the three states in which the average change in losses per enrollee was negative are three of

\textsuperscript{26} This variable is calculated using data from the state pages of the NAIC annual health insurer filings. Specifically, we divide the sum of the direct premiums written for all insurers in a given state by total enrollment for all insurers in the same state.

\textsuperscript{27} Detailed information concerning premiums written per enrollee, losses per enrollee and the average annual changes in these variables over time for each state is reported in Appendix B.

\textsuperscript{28} This variable is calculated using data from the state pages of the NAIC annual health insurer filings. Specifically, we divide the sum of the provision of health care services paid by all insurers in a given state by total health enrollment for all insurers in the same state.
the four states that experienced a decline in the average direct premiums written per enrollee. In fact, comparing the average change in price to the average change in claims costs during the period, we find that the average change in price is highly correlated with the average change in claims costs. This seems to suggest that the increase in the cost of coverage is primarily driven by increases in claims cost.

If the increase in the price of health insurance is indeed driven by an increase in claims costs, we would expect to see little change in the loss ratio of the health insurers, as insurers adjust premiums to reflect changes in claims experience. This is what we find when we calculate the loss ratio by dividing losses paid by direct premiums written. The loss ratios of health insurers exhibit little change over the sample period: the average annual change in the loss ratio of health insurers across states is close to 1%, ranging from –1.06% to 0.98%.

**Empirical Model Results**

The empirical model results are presented in Table 3. As shown in IV – Model 1, we find that the impact of market concentration on underwriting profits is statistically significant and positive, suggesting that states with greater market concentration (as indicated by the higher HHI) are associated with higher underwriting profits. In terms of economic significance, if evaluated at the mean, a 10% increase in market concentration is associated with a 3.4% increase in underwriting profits at the state level. This result provides support for our

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29. These are the same data elements gathered from the state pages that are used in calculating premiums and losses per enrollee.

30. For more detailed information on the loss ratio of the state and changes in loss ratios over the sample period, see Appendix C.

31. It should be noted that Idaho has a large premium-to-enrollee ratio. Because this could be a reporting error, we re-run the models reported in Table 3, dropping this state from the analysis to ensure that this state is not driving the results observed. Results excluding this state are consistent with those reported here. Additionally, we estimate the results using two-way fixed effects and the results are similar to those reported here with one notable exception; i.e., the concentration variable is positive and significant in the OLS models. However, given the loss of degrees of freedom and the reduction of cross-sectional variation associated with this modeling approach and the lack of variation in the underwriting risk measure across the years, we elect to present the results including just the time effects. Finally, we add two additional variables: the first is equal to one for states with prior approval rate regulation for individual markets and zero otherwise; and the second is equal to one for state with prior approval rate regulation for group markets and zero otherwise. New Hampshire is excluded from this analysis because it is the only state with different rate regulations for small and large group markets. The results are generally consistent with what is reported here and neither rate regulation variable is significant.

32. Other papers use the number of firms operating in a given market as a measure of competition. As such, we construct a model similar to that which is reported here but replace our measure of concentration with this measure of competition. When we consider a measure of competition, or the number of insurers in the state, we find a significant negative relation, suggesting that greater levels of competition results in lower profitability.
hypothesis that market concentration has an impact on the underwriting profitability of health insurers in the market.

Coefficients of several control variables also are significant. We find that insurers in states with a higher proportion of uninsured individuals are associated with larger profits and health insurers in states with larger populations and a higher proportion of large employers also exhibit higher profits. In addition, states with higher median income and a larger percentage of obese individuals are associated with lower profits. Interestingly, even though the share of Medicare and Medicaid business in our sample is approximately 20%, on average, these variables do not explain market concentration or health insurer profitability. Given that enrollment in both programs are likely to increase in the future, it will be interesting and important for future researchers to consider how the size of these programs impacts future levels of market concentration and health insurer profitability.\footnote{Note that one of the major provisions of PPACA is the expansion of Medicaid. In addition, the number of individuals who collect from Medicare will increase with the aging population, particularly as it relates to the retirement of the baby boomer generation.}
## Table 3: Model Results

<table>
<thead>
<tr>
<th>Model</th>
<th>OLS – Model (1)</th>
<th>4D – Model (1)</th>
<th>OLS – Model (2)</th>
<th>4D – Model (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration</td>
<td>0.0118***</td>
<td>0.136***</td>
<td>0.0624</td>
<td>0.1055***</td>
</tr>
<tr>
<td>Underwriting Risk</td>
<td>3.061</td>
<td>0.0377**</td>
<td>0.3643</td>
<td>-3.7888***</td>
</tr>
<tr>
<td>Proportion Homeowners</td>
<td>0.066***</td>
<td>0.114***</td>
<td>[0.028]</td>
<td>[0.036]</td>
</tr>
<tr>
<td>Percent Federal Employee</td>
<td>0.0297</td>
<td>0.0208</td>
<td>0.0809</td>
<td>0.1659**</td>
</tr>
<tr>
<td>Percent Group Comprehensive</td>
<td>0.0000</td>
<td>0.0049</td>
<td>0.0442</td>
<td>0.0472</td>
</tr>
<tr>
<td>Percent Individual Comprehensive</td>
<td>0.0612</td>
<td>0.1553</td>
<td>0.0665</td>
<td>-0.0652</td>
</tr>
<tr>
<td>Percent Medicaid</td>
<td>0.0373</td>
<td>0.0137</td>
<td>0.0202</td>
<td>0.0647</td>
</tr>
<tr>
<td>Percent Medicare</td>
<td>0.0004</td>
<td>-0.0033</td>
<td>0.0152</td>
<td>0.0083</td>
</tr>
<tr>
<td>Percent Medicare Supplemental</td>
<td>0.2405***</td>
<td>-0.2723</td>
<td>0.2585***</td>
<td>-0.2612</td>
</tr>
<tr>
<td>Percent Visits</td>
<td>-0.0137</td>
<td>0.0327</td>
<td>-0.3085</td>
<td>-9.7558</td>
</tr>
<tr>
<td>Percent Deaths</td>
<td>-0.0020</td>
<td>0.0090</td>
<td>-0.0344</td>
<td>0.0340</td>
</tr>
<tr>
<td>T-Bill Rate</td>
<td>0.0027</td>
<td>0.0017*</td>
<td>0.0017***</td>
<td>0.0004**</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.0283***</td>
<td>0.1670***</td>
<td>0.2523***</td>
<td>0.3136***</td>
</tr>
<tr>
<td>Median Income</td>
<td>0.0127</td>
<td>-0.2901</td>
<td>0.0929</td>
<td>-0.0893</td>
</tr>
<tr>
<td>State Population</td>
<td>0.0001</td>
<td>0.0060*</td>
<td>0.0000</td>
<td>0.0064</td>
</tr>
<tr>
<td>Deaths</td>
<td>-0.0500</td>
<td>-0.0000</td>
<td>-0.0000*</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Obesity</td>
<td>-0.1732***</td>
<td>-0.1830***</td>
<td>-0.0787</td>
<td>-0.1769***</td>
</tr>
<tr>
<td>Smokers</td>
<td>0.0172</td>
<td>0.0565</td>
<td>0.0555</td>
<td>0.0555</td>
</tr>
<tr>
<td>Heavy Drinkers</td>
<td>-0.0103</td>
<td>-0.1030</td>
<td>-0.2244</td>
<td>-0.1056*</td>
</tr>
<tr>
<td>Large Employers</td>
<td>0.200***</td>
<td>0.223***</td>
<td>0.179***</td>
<td>0.170***</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0017**</td>
<td>0.0748</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Observations</td>
<td>390</td>
<td>376</td>
<td>440</td>
<td>376</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.717</td>
<td>0.0574</td>
<td>0.7670</td>
<td>0.1557</td>
</tr>
</tbody>
</table>

This table presents the results of estimates, equation 1. All models include year dummies and most standard errors are reported. Columns with "OLS" in the title include the results when dummy variables were used, while columns with "4D" in the title include the results when an instrumental variables approach was used. The dependent variable in all models is the difference in statewide premium rate income and excess costs, noted by no standard errors are provided for a given year, during a given year. The independent variables modelled as follows: Concentration is the number of persons whose premium written per 1,000 employees in a given state, in a given year. Percent Federal Employee is the percentage of premiums written directly written in a given state, in a given year. Percent Group Comprehensive is the percentage of premiums written directly written in a given state, in a given year. Percent Individual Comprehensive is the percentage of premiums written directly written in a given state, in a given year. Percent Medicaid is the percentage of premiums written directly written in a given state, in a given year. Percent Medicare Supplemental is the percentage of premiums written written in a given state, in a given year. Percent Visits is the percentage of persons written whose visits are written in a given state, in a given year. T-Bill Rate is the percentage of persons written whose visits are written in a given state, in a given year. Unemployment is the percentage of persons written whose visits are written in a given state, in a given year. Median Income is the percentage of persons written whose visits are written in a given state, in a given year. State Population is the percentage of persons written whose visits are written in a given state, in a given year. Deaths is the number of deaths per 1,000 persons in a given state, in a given year. Obesity is the number of persons given by the U.S. Centers for Disease Control and Prevention (CDC) data in these, per capita, in a given state, in a given year. Smokers is the number of persons, per capita, using tobacco cigarettes in a given state, in a given year. Heavy Drinkers is the number of persons, per capita, consuming average, two or more drinks per capita in a given state, in a given year. Note that *** p<0.01, ** p<0.05, * p<0.1
As previously discussed, both the SCP and efficiency structure hypotheses predict a positive profit-concentration relation and, as noted in previous state-level insurance studies (e.g., Carroll, 1993; Bajtelsmit and Bouzouita, 1998), the two hypotheses are difficult to disentangle at the state level. While property/casualty studies use the proportion of premiums written by direct writers as a proxy for efficiency (e.g., Carroll, 1993), because of differences in industry composition and reporting requirements, we must construct an alternative measure. We utilize the proportion of premiums written by monoline health insurers in a given state during a given year to account for potential differences in efficiency of operations among health insurers operating in the state. As shown in IV – Model 2, when this variable is included as an additional variable in our models, its coefficient is positive and significant, while the coefficient on the concentration measure remains significant and positive.

The result of the monoline variable is important because, while it does not provide definitive proof of the efficiency structure hypothesis, it does not rule it out, either. As such, it is possible the profit-concentration relation is not the result of anti-competitive behavior on the part of health insurers. More specifically, if, as in other segments of the insurance industry, differences in efficiency exist between monoline and multi-line health insurers, then our results suggest that efficient operations of large firms may ultimately influence profit levels. Given that we are unable to conclude whether the relation observed between concentration and profitability conclusively supports the SCP or efficiency structure hypothesis, future study is certainly warranted.

34 Many studies in the property-liability, life and health industries indicate that product line diversification influences factors relating to efficiency, such as economies of scale, economies of scope, internal capital markets and agency costs (e.g., Meador, Ryan and Schellhorn, 1997; Cummins, Weiss and Zi, 2007; and Liebenberg and Sommer, 2008). While certainly not a perfect measure, given evidence of a relation between the efficiency of insurer operations and the product strategy of insurers, we propose that the use of the proportion of monoline insurers operating in a given state is a reasonable control for differences in operational efficiency. When we analyze health insurer expense ratios at the firm level we find evidence that monoline health insurers are associated with higher expense ratios than multi-line insurers. This suggests that these insurers may be less efficient.
Conclusion

In this study, we examine the market structure and underwriting performance of U.S. health insurers at the state level between 2002 and 2010. We find that the average number of insurers operating in the states has generally increased, and, in the more recent years, the degree of market concentration has declined. We also find that the cost of health insurance, as proxied by direct premiums per enrollee, has increased. However, a closer look at the losses per enrollee reveals that such increases in health insurance premiums are accompanied by a corresponding increase in losses per enrollee, which is found to be highly correlated with the increase in premiums per enrollee. This suggests that the substantial increase in the cost of health insurance claims may be a significant driver of increasing health insurance costs.

In our multivariate analysis, we find evidence that market concentration and insurers’ underwriting profits are positively related. More specifically, insurers in states with greater market concentration are more profitable than insurers in states with lower levels of market concentration. As noted in Bajtelsmit and Bouzouita (1998), this positive relation between concentration and profitability may be due to a number of factors—including price collusion, differences in products or efficiency—and it is, therefore, not clear if this relation is evidence in support of the SCP or efficiency structure hypotheses. As an attempt to provide some additional insight into the potential cause of the variation in profitability across the health insurance markets, we include a control variable for efficiency in the model and find some evidence that efficient operations of firms may explain some portion of the profit-concentration relation. However, due to data limitations and the absence of evidence in prior health insurance studies, we are unable to definitively determine whether comparative advantages in efficiency result in a positive relation between concentration and profits in health insurance markets. While our evidence of a positive profit-concentration in health insurance markets is a novel contribution to the literature, future research is clearly warranted, especially as it relates to the SCP hypothesis, the efficiency hypothesis or other factors that might further explain the relation between market concentration and insurer profitability in the health insurance industry.

Our results are relevant to the current and ongoing discussion of health care reform in the U.S. Our finding that increasing health insurance costs are associated with increasing health insurance claims suggests that the nature and extent of benefits utilization and other factors influencing claims costs should be a major consideration for policymakers going forward. For example, exploring what factors drive such substantial increases in health insurance claims and, more important, finding incentives and/or mechanisms to control such increases in claims may help to make health insurance more affordable. In addition, evaluating/re-evaluating regulations surrounding health insurance policy provisions to improve more efficient benefits utilization may aid in reducing the costs of health insurance.
As noted earlier, a number of the provisions of PPACA, such as coverage of preventive services and essential health benefits, in addition to the elimination of pre-existing condition provisions and lifetime limits, can increase the coverage provided to individuals. These provisions, at least in the short run, may cause claims costs to increase. Some early research on the impact of PPACA has found some evidence suggesting this may be the case. More specifically, McCue, Hall and Liu (2013) examine the medical loss ratios (MLRs) and expense ratios of insurers providing comprehensive health insurance in 2010 and 2011, and find that insurers experienced increased MLRs and lower administrative expense ratios. The same study also finds that insurers’ operating margins fell by 1.3 percentage points. If this decrease in underwriting performance is representative of the experiences of insurers market-wide, this could ultimately influence the nature of competition in the health insurance market or impact health insurer efficiency. If this were to occur, our results suggest that the profitability of insurers would be impacted by such measures.

Historically, health insurance markets were primarily regulated by the states. Because state-based regulation can provide regulators the opportunity to respond to issues facing local insurance markets more quickly than federal regulation, state-based regulation may have an advantage over federal regulation in affecting competition and profitability in the health insurance marketplace in some states. With the passage of PPACA, concerns have been raised with regard to what impact this federal health insurance reform will have on health insurance markets. Proponents of federal regulation argue that uniformity in laws and regulations improves insurer efficiency and decreases other costs incurred by insurers resulting from duplicative regulation. To the extent that health insurers with large market shares could leverage these improvements in efficiency and reductions in costs to increase market share, federal regulation may increase concentration and profitability in health insurance markets. Alternatively, if the effects of efficiency and costs are leveraged by insurers with small market shares, then federal regulation could decrease market concentration and reduce insurer profitability in the marketplace. While McCue, Hall and Liu (2013) provides some early evidence of the impact of federal regulatory reform on health insurers, the effect of PPACA may not be known for some time because its provisions are set to go into effect over several years. As such, another fruitful area of future research appears to be the extent to which federal regulatory measures, such as PPACA, impact the health insurance marketplace.
Our analysis also highlights the need for future research pertaining to government health insurance programs’ influence on competition and profitability in the health insurance market. More specifically, our data suggest that Medicare and Medicaid make up more than 20% of health insurance business for the average health insurer, yet the degree of participation in these programs does not significantly influence profitability. Because Medicaid expansion is one of the key provisions of PPACA, future research could consider the extent to which increased insurer participation in the Medicaid program influences market competition and concentration in health insurance markets. Similarly, as more members of the baby boomer generation reach retirement age, the number of people who collect Medicare will increase; future research could consider what impact this will have on the health insurance market.
### Appendix A: Number of Insurers and Concentration by State

<table>
<thead>
<tr>
<th>State</th>
<th>2002</th>
<th>2010</th>
<th>Average</th>
<th>2002</th>
<th>2010</th>
<th>Average</th>
<th>2002</th>
<th>2010</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>3</td>
<td>12</td>
<td>8</td>
<td>27.99%</td>
<td>0.59</td>
<td>0.89</td>
<td>0.95</td>
<td>-1.36%</td>
<td></td>
</tr>
<tr>
<td>AL</td>
<td>9</td>
<td>17</td>
<td>11</td>
<td>13.85%</td>
<td>0.64</td>
<td>0.60</td>
<td>0.59</td>
<td>5.24%</td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>6</td>
<td>21</td>
<td>14</td>
<td>19.87%</td>
<td>0.63</td>
<td>0.45</td>
<td>0.60</td>
<td>3.81%</td>
<td></td>
</tr>
<tr>
<td>AZ</td>
<td>18</td>
<td>33</td>
<td>25</td>
<td>8.71%</td>
<td>0.85</td>
<td>0.38</td>
<td>0.59</td>
<td>2.31%</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>16</td>
<td>26</td>
<td>21</td>
<td>7.25%</td>
<td>0.16</td>
<td>0.24</td>
<td>0.20</td>
<td>4.93%</td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td>10</td>
<td>20</td>
<td>14</td>
<td>9.65%</td>
<td>0.33</td>
<td>0.30</td>
<td>0.33</td>
<td>-1.10%</td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td>13</td>
<td>19</td>
<td>15</td>
<td>6.02%</td>
<td>0.30</td>
<td>0.26</td>
<td>0.29</td>
<td>-0.76%</td>
<td></td>
</tr>
<tr>
<td>FL</td>
<td>25</td>
<td>39</td>
<td>33</td>
<td>6.69%</td>
<td>0.12</td>
<td>0.16</td>
<td>0.16</td>
<td>3.94%</td>
<td></td>
</tr>
<tr>
<td>GA</td>
<td>18</td>
<td>28</td>
<td>23</td>
<td>7.29%</td>
<td>0.45</td>
<td>0.22</td>
<td>0.38</td>
<td>-7.16%</td>
<td></td>
</tr>
<tr>
<td>HI</td>
<td>6</td>
<td>13</td>
<td>9</td>
<td>13.51%</td>
<td>0.76</td>
<td>0.34</td>
<td>0.47</td>
<td>-8.62%</td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>12</td>
<td>20</td>
<td>17</td>
<td>7.26%</td>
<td>0.29</td>
<td>0.70</td>
<td>0.54</td>
<td>17.42%</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>6</td>
<td>20</td>
<td>14</td>
<td>18.28%</td>
<td>0.41</td>
<td>0.48</td>
<td>0.56</td>
<td>6.72%</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>0.41%</td>
<td>0.26</td>
<td>0.52</td>
<td>0.41</td>
<td>14.08%</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>22</td>
<td>29</td>
<td>26</td>
<td>4.66%</td>
<td>0.14</td>
<td>0.44</td>
<td>0.27</td>
<td>19.17%</td>
<td></td>
</tr>
<tr>
<td>KS</td>
<td>19</td>
<td>22</td>
<td>20</td>
<td>2.70%</td>
<td>0.17</td>
<td>0.24</td>
<td>0.17</td>
<td>6.23%</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>19</td>
<td>21</td>
<td>20</td>
<td>3.40%</td>
<td>0.24</td>
<td>0.35</td>
<td>0.30</td>
<td>5.14%</td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>11</td>
<td>21</td>
<td>15</td>
<td>8.89%</td>
<td>0.30</td>
<td>0.32</td>
<td>0.34</td>
<td>2.67%</td>
<td></td>
</tr>
<tr>
<td>MA</td>
<td>14</td>
<td>38</td>
<td>20</td>
<td>9.14%</td>
<td>0.74</td>
<td>0.34</td>
<td>0.29</td>
<td>-0.88%</td>
<td></td>
</tr>
<tr>
<td>MD</td>
<td>23</td>
<td>26</td>
<td>23</td>
<td>2.16%</td>
<td>0.26</td>
<td>0.34</td>
<td>0.31</td>
<td>3.63%</td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>6</td>
<td>15</td>
<td>11</td>
<td>18.50%</td>
<td>0.60</td>
<td>0.56</td>
<td>0.60</td>
<td>-0.83%</td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>37</td>
<td>37</td>
<td>35</td>
<td>0.41%</td>
<td>0.26</td>
<td>0.28</td>
<td>0.30</td>
<td>13.43%</td>
<td></td>
</tr>
<tr>
<td>MN</td>
<td>9</td>
<td>18</td>
<td>14</td>
<td>10.56%</td>
<td>0.40</td>
<td>0.30</td>
<td>0.35</td>
<td>3.49%</td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>27</td>
<td>32</td>
<td>29</td>
<td>2.46%</td>
<td>0.17</td>
<td>0.19</td>
<td>0.16</td>
<td>1.32%</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>5</td>
<td>18</td>
<td>10</td>
<td>20.38%</td>
<td>0.72</td>
<td>0.63</td>
<td>0.55</td>
<td>38.10%</td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>4</td>
<td>17</td>
<td>10</td>
<td>22.04%</td>
<td>0.94</td>
<td>0.47</td>
<td>0.67</td>
<td>-6.92%</td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>13</td>
<td>23</td>
<td>16</td>
<td>9.24%</td>
<td>0.43</td>
<td>0.58</td>
<td>0.53</td>
<td>3.72%</td>
<td></td>
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<tr>
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<td>WI</td>
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<td>8.95%</td>
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</table>

*Note:* "No. of Insurers" is defined as number of insurers with some direct premiums written in state / during year x HHB of state, calculated as the sum of the squares of insurer i’s market share (measured as direct premiums written in state) during year.
## Appendix B: Price and Claims Costs by State

<table>
<thead>
<tr>
<th>State</th>
<th>DPW per ENROLLEE</th>
<th>Average Annual %</th>
<th>LOSSES per ENROLLEE</th>
<th>Average Annual %</th>
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<td>293.23</td>
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Note: "DPW per ENROLLEE" is the total direct premiums written in state j divided by the total enrollees insured in state j. "LOSSES per ENROLLEE" is the total losses in state j divided by the total enrollees insured in state j.

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Ap
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Ratios b
by State

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1051–1060.


Public Policy and Regulation to Reduce Underlying Risks: Two Insurance-Mitigation Strategies Following the Recent Gulf Coastal Property Insurance Crisis

Lorilee A Medders*
Charles M. Nyce**
Patrick F. Maroney***

Abstract

Hazard mitigation is a valuable tool for reducing the damages to residential properties that may result from catastrophic events, such as hurricanes. Because of the upfront costs associated with retrofitting buildings to protect against loss, incentives are often used by insurers and policymakers/regulators to promote mitigation on existing structures. These incentives may include, *inter alia*, tax credits and mitigation grants or financing assistance. Property insurance premium credit programs, which are intended to reflect reductions in expected losses achieved through property improvements, do not exist solely as mitigation incentives. Nevertheless, insurance premium credit programs may be the most influential of all the mitigation policies on individual property owners’ choice to fortify existing structures, primarily due to the immediate savings that can be obtained via the reduced insurance premium.

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This paper examines insurance-related public policy for the promotion of hurricane wind mitigation, and specifically compares and contrasts the strategic intent and implementation of such policy, as well as the performance of the insurance markets impacted by these policies. Limited policy success and unintended consequences may result from a non-optimal strategy or an improperly implemented mitigation premium credit program. Our work focuses on property insurance-mitigation programs in two states: Florida and Mississippi. Both states utilized loss relativity studies to implement insurance discount programs, yet with strikingly different approaches. Our analysis does not indicate that either program has experienced full participation by homeowners via actual mitigation activity.

The striking contrast in outcomes lies within the insurance marketplace, both private and public. While no evidence exists that the Mississippi wind insurance discounts have harmed the state’s market for residential property insurance, the Florida program correlates with poor market performance despite a lack of hurricanes in the intervening years.

Introduction and Motivation

The size and value of coastal properties have grown significantly. Estimated insured values for the coastal counties from Texas to Maine are in excess of $10.5 trillion (AIR Worldwide, 2013). In Florida alone, the coastal exposures as of late 2013 were an estimated $2.9 trillion. The use of total insured property values, however, in catastrophe prone areas as a measure of insurer exposure has caveats. The true exposure held by the insurance market depends on the underlying risk of structures as well as these nominal insured (replacement cost) values.

Adequately mitigated properties pose substantially lower risk to insurers’ financial statements than do unmitigated (or inadequately mitigated) structures, all else the same. While mitigated properties may hold higher replacement cost due to the property improvement value of the mitigation features, wind damage to these mitigated properties should be reduced because of these improvements. The same result should apply to newer houses built to more stringent new building codes. Cost-effective efforts to reduce potential losses through property hardening have been shown to reduce the financial exposure of citizens, insurers and government to risk, and are, therefore, in accord with sound public policy.

The cost of adding hurricane wind resistance features to new construction is typically lower than for existing construction and can be rolled into overall construction costs. Furthermore, building codes may require property owners and builders to make financial trade-offs in favor of improved storm worthiness (e.g., smaller square footage with a stronger roof system, hurricane shutters in lieu of a swimming pool). Because of the potentially high costs associated with retrofitting existing buildings for hurricane wind resistance, special incentives may
be employed by policymakers to promote mitigation on existing structures. Although the primary basis for mitigation-related insurance premium credits is as a reflection of modeled loss savings, insurance premium discount programs likely have the most impact of all the incentive policies on an individual property owner’s decision to make wind improvements to existing structures, primarily due to the immediate savings that can be obtained via the reduced insurance premium. Nevertheless, limited policy success and unintended consequences may result from a non-optimal strategy or an improperly implemented mitigation premium discount program. This paper discusses the importance of properly incenting insurance premium discounts (credits) for the promotion of hurricane wind mitigation. We specifically focus on a comparison between and programs implemented in two Gulf Coast states—Florida and Mississippi—that were both significantly impacted by the 2004–2005 hurricane seasons.

Florida and Mississippi make a particularly interesting set of contrasts for comparison. Each faces significant hurricane wind exposure due to storms in the Gulf Coast. Both states implemented public policies intended to promote wind mitigation following the difficult 2006 Gulf Coast property insurance and reinsurance environment, prescribing how the discounts would be applied to insurance premiums. While other Gulf Coast states such as Texas, Louisiana and Alabama also began to emphasize wind mitigation, Florida and Mississippi led the way with specific legislation, formal loss relativity studies and substantial wind mitigation programs by 2008–2009, observable by their neighboring states. During the time frame since implementation of these policies, neither Florida nor Mississippi has suffered a land falling hurricane. As a result, an exploration of policy outcomes can be made without the complexity of introducing any hurricane (or event) effect to the study.

Table 1 shows the significant coastal values represented in Florida and Mississippi, as well as in other key coastal states. More important, from a state-level public policy perspective, the table also reveals the importance of coastal insured values to each state’s total insured value, at 79% and 13% for Florida and Mississippi, respectively. Both states in this study, therefore, have seen increased exposure to the risk of hurricanes and other coastal storms. Based on state categorizations of “coastal,” 24 of Florida’s counties are coastal and Mississippi boasts five coastal counties. According to the National Oceanic and Atmospheric Administration (NOAA), however, which asserts a broader definition of “coastal” than do most individual states, Florida and Mississippi include 61 and 12 coastal

1. Such incentive programs typically include tax credits and/or mitigation grants or loan financing. Property insurance premium credits, loss-model-based reflections of expected loss savings, may become de facto incentive programs, as well.

2. While Florida’s Atlantic coast is also exposed, only the return periods for hurricanes on the South coast (Miami-Dade area) compare to those on the Gulf Coast.

3. It is worth noting that all U.S. states have seen disproportionately high rates of population growth in coastal counties during the past 50 years, as well as increasing importance of the role of these areas to the overall economy.
counties, respectively. Reduction of the underlying risk is critical to decrease economic costs of windstorms, and the need in overall dollar terms is particularly great in Florida.

By contrast with the indications of Florida’s relative riskiness offered via the insured value data, the need for reducing the underlying property risk is especially great in Mississippi if one looks at building codes as a proxy for the likely storm worthiness of the existing housing stock. The Insurance Institute for Business and Home Safety (IBHS) released a report in early 2012 that assessed residential building codes across 18 states exposed to hurricanes, ranking Florida first and Mississippi last with respect to building code effectiveness (IBHS, 2012; IBHS, 2015). Mississippi had no regulatory process in place for building codes as of the time of the initial IBHS rankings (2011–2012), with the exception of seven counties being required to follow the wind and flood provisions of the 2003 International Residential Code.

Since the initial IBHS report, Mississippi enacted legislation indicating acknowledgement of its building code problems, a move that was cited in the 2015 update of the IBHS ratings for why Mississippi recently rose from the

<table>
<thead>
<tr>
<th>State</th>
<th>State Total</th>
<th>Coastal Counties</th>
<th>Percent Total</th>
<th>State</th>
<th>State Total</th>
<th>Coastal Counties</th>
<th>Percent Total</th>
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<td>27.7</td>
<td>64.0</td>
<td>23%</td>
</tr>
<tr>
<td>Delaware</td>
<td>208.9</td>
<td>81.9</td>
<td>39%</td>
<td>New Jersey</td>
<td>2,120.9</td>
<td>713.9</td>
<td>34%</td>
</tr>
<tr>
<td>Florida</td>
<td>3,601.1</td>
<td>2,802.3</td>
<td>79%</td>
<td>New York</td>
<td>4,742.2</td>
<td>2,923.1</td>
<td>62%</td>
</tr>
<tr>
<td>Georgia</td>
<td>192.2</td>
<td>106.7</td>
<td>6%</td>
<td>North Carol</td>
<td>1,795.1</td>
<td>163.5</td>
<td>9%</td>
</tr>
<tr>
<td>Louisiana</td>
<td>83.0</td>
<td>253.9</td>
<td>30%</td>
<td>Rhode Island</td>
<td>207.5</td>
<td>55.3</td>
<td>27%</td>
</tr>
<tr>
<td>Maine</td>
<td>285.5</td>
<td>164.6</td>
<td>58%</td>
<td>South Carol</td>
<td>83.6</td>
<td>239.3</td>
<td>28%</td>
</tr>
<tr>
<td>Maryland</td>
<td>1,203.4</td>
<td>17.3</td>
<td>1%</td>
<td>Texas</td>
<td>4,500.7</td>
<td>1,175.3</td>
<td>20%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>1,541.4</td>
<td>840.6</td>
<td>54%</td>
<td>Virginia</td>
<td>1,761.7</td>
<td>182.8</td>
<td>10%</td>
</tr>
</tbody>
</table>


5. At the time of the 2012 IBHS rankings, Florida’s Residential Building Code was consistent with the wind provisions of the 2009 International Residential Code (IRC), and Florida was fully consistent with the 2006 IRC. Since that time, Florida’s building codes have become consistent with the 2012 International Construction Code (ICC).
6. States were scored and then ranked from highest to lowest effectiveness based on multiple factors, including not only the code itself, but also universality of application statewide, local level enforcement, and licensing/education requirements for code officials, contractors and subcontractors.
bottom to third from last in its building code effectiveness rating. Once the effects of its code improvements can more readily be seen in its building stock, it is possible Mississippi will improve further in its ratings.

Prior to 1990, neither of these two states (or any other hurricane-prone states) had significant or widespread building codes, nor did they provide significant incentives to homeowners to fortify existing properties. When considering that most Florida and Mississippi properties were constructed between 1960 and 1990, the importance of mitigating the existing housing stock in both states becomes clear.

A Review of the Value of, and Obstacles to, Wind Mitigation

The insurance and economics literature are rich with studies on the value of disaster mitigation. Mitigation not only decreases expected losses, but also increases the value of the property and decreases the burden placed on the public in the event of a catastrophic event. Despite its value as both a private and public good, the market for property mitigation still is underinvested. All else the same, we expect property owners to engage in home mitigation in an effort to prevent or

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7. Mississippi enacted legislation in spring 2014 that allows cities and counties to adopt “any of the last three editions of the International Building Code and any additional codes as adopted by the Mississippi Building Code Council” as a minimum standard (Adams, 2014a). Unfortunately, the law also included a provision that allows counties to opt out entirely (Adams, 2014b).

8. It is notable here that, assuming adequate enforcement of building codes, given enough time Florida and South Carolina may someday enjoy housing stock that is predominantly wind resistant without additional efforts, while Mississippi, at its present rate of progress can continue to expect substantial loss damage each time a major storm makes landfall near its vicinity.

9. Fronstin and Holtman (1994), reviewing the damage following Hurricane Andrew, found that “consumers have substituted homeowners insurance for structurally sound homes that are built to withstand hurricanes.” That study found that older homes in South Florida (built prior to Florida’s real estate development boom in the 1960s) suffered proportionally less damage than newer homes (largely built post 1960). Residential building codes in Miami-Dade County, Florida, were subsequently strengthened in 1993 and 1994. A barrage of storms during the 2004 and 2005 hurricane seasons tested the effectiveness of these codes. Risk Management Solutions (2009) demonstrated that lower losses were suffered in 2004 and 2005 by structures built in compliance with the most up-to-date (post-2002), strengthened building codes.


11. Kleindorfer and Kunreuther (1999a, 199b) and Christoplos, Liljelund and Mitchell (2001) found that mitigation not only reduces direct losses (i.e., saves lives, reduces injuries and lowers property losses), but also measurably increases the public good through alleviation of the indirect poverty effect of catastrophes.
reduce losses and/or to reduce insurance premiums. Research has shown that homeowners may not, in fact, behave in the ways we expect, for various reasons.

Policy and industry studies have indicated repeatedly that perceived lack of affordability and/or lack of return on their investment are the primary reasons property owners do not engage in mitigation.\(^\text{12}\) Cost is ranked even higher as a constraint among minorities and low-income homeowners, who unfortunately are also more likely to own properties in the most need of hardening (Peacock, 2003; IHRC, 2004; Medders, 2011). The perceived lack of an acceptable return on investment, especially given the potential length of payback period (i.e., until a storm strikes and savings from mitigation are actualized), is exacerbated when property insurance pricing is not adequately risk-based.

The evidence in the prior literature—theoretical and empirical—strongly indicates that risk-based insurance pricing is a primary criterion related to the proper promotion of mitigation to reduce the risk to the individual, the insurer and government. While insurance transfers risk of financial loss from the individual to the insurance company, it inherently creates an incentive for insurance companies to develop a pricing scheme that rewards policyholders who mitigate. So, while the availability of insurance reduces the incentive to make mitigation expenditures, all else the same, insurance prices can be adequately high to encourage mitigation.\(^\text{13}\)

Differing Strategic Policies

Both Florida and Mississippi experienced watershed disaster events that served as impetus to consider property mitigation as a primary platform for public policy in 2007. The unprecedented run of hurricanes impacting Florida in 2004 and 2005, as well as the devastating impact of Hurricane Katrina on the Mississippi coast, impacted the regulation of the financial system utilized to pay

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12. Kunreuther et al. (1978) showed the probability of disaster is underestimated by most, leading to underinsurance. Kunreuther and Pauly (2006) submitted that individuals treat insurance as an investment, rather than as protection, and will drop coverage if a “return” is not realized. Thus, after several years with no loss, or if the probability of loss is low, individuals may “forget” about the chance of a loss.

13. See Klein and Kleindorfer (2003) for a mathematical illustration of the relationship between insurance and mitigation. Ehrlich and Becker (1972) found that insurance and mitigation are treated as substitutes by individuals. Kunreuther and Kleffner (1992) further show that if full (no or low deductible) insurance is required, the incentive to engage in mitigation is reduced. Precisely because insurance serves a vital purpose in protecting property owners from catastrophic financial loss in the event of a windstorm, it inherently results in reduced financial consequences to the property owner on a post-loss basis. Therefore, the incentive to make mitigation expenditures is reduced, all else the same. Kelly and Kleffner (2003) found that if premiums are not risk-based, policyholders will invest less in mitigation. Inadequate, excessive and/or unfairly discriminatory insurance premiums result in market problems (e.g., underinsurance, overinsurance, non-optimal mitigation efforts, fraud).
for disaster events and both states suffered sharp spikes in reinsurance rates. In all of the Gulf Coast insurance markets, primary insurers selling homeowners insurance were struck by reduced capacity and unprecedented pricing increases from reinsurers. The general response among insurers was to raise rates to cover the increased reinsurance costs and/or pull out of markets that were no longer considered profitable. State governments in affected regions responded to what was both an availability and affordability market problem with myriad legislation and regulation intended to quell consumer concerns about insurance policies, while at the same time attempting to encourage homeowners to improve the storm-worthiness of their properties. Florida and Mississippi strategies were markedly different, with markedly different results.

**Florida’s Strategy: A Statewide Focus on Insurance Affordability**

Florida’s strategy following the 2006 insurance crisis cannot be fully understood without knowledge of the mitigation reforms previously enacted. Florida was ahead of most states in 2006 on promoting mitigation for existing structures, as well as new construction. Efforts to incentivize wind mitigation were underway in the early 1990s. After devastating losses from Hurricane Andrew, in 1993 the Florida Legislature enacted Section 627.0629, Florida Statutes, to require rate filings for all residential property insurance include appropriate discounts, credits or other rate differentials, or appropriate reductions in deductibles, for properties on which fixtures actuarially demonstrated to reduce the amount of loss in a windstorm have been installed (§13, ch.93-410, Laws of Florida). In 1997, the now Florida Office of Insurance Regulation (OIR) issued rule 69O-170.017 F.A.C. The rule required shutter discounts at least equal to the Insurance Services Office (ISO) discounts. In 2000, Section 627.0629, Florida Statutes, was amended to provide rate filings for residential property insurance must include “actuarially reasonable” discounts, credits or other rate differentials, or appropriate reductions in deductibles, for properties on which fixtures “or construction techniques “

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14. Hurricane Andrew also impacted Florida’s insurance markets, but the public policy effects were limited primarily to the southernmost region of the state, namely Miami-Dade and Monroe counties.

15. The literature has given considerable attention to the government insurance markets for disaster risk. Grace and Klein (2009), Newman (2009, 2010), Medders, Nyce and Karl (2010) and others examine these markets and their effects. Overall, the literature supports the concept that government markets for disaster insurance may bolster private insurance markets if the focus of government intervention is on availability, not affordability of insurance. In markets where the political economy embraces insurance affordability as its charge, negative externalities may result in a crowding out effect on the private market.15

16. The OIR was at that time legally referred to as the Florida Department of Insurance.
demonstrated to reduce the amount of loss in a windstorm have been installed “or implemented.”

In 2002, Applied Research Associates (ARA) conducted two studies to quantify wind loss reduction for wind mitigation construction features. “Development of Loss Relativities for Wind Resistive Features of Residential Structures” focused on single-family homes (ARA, 2002). The result of the implementation of the study as credits was a specific matrix of premium credits based on more than 600 combinations of mitigation features, each with multiple categories and complex category definitions.

In 2003, the OIR rescaled the results of the ARA loss relativity study for single-family homes to make the weakest structure, rather than the average structure, the base house for application of mitigation credits. Knowing that most insurers were using the average house as the base house for base rate setting, the OIR tempered the implementation of the mitigation credits at 50% of value.

The mitigation credit structure was 100% implemented in 2006 and 2007 without allowing insurers to adjust their base rates to reflect the weakest structure as the base house. Under the Florida windstorm mitigation insurance discount program, a homeowner could receive disproportionate sizable discounts off the hurricane portion of the insurance premium based on any single feature, or set of features, shown in the ARA study to reduce loss damages during a windstorm. Inspected homes that were verified to have better-than-worst-house construction features were eligible for mitigation discounts. Eligible construction characteristics included: 1) roof geometry; 2) gable end bracing; 3) roof deck attachment; 4) roof-to-wall connection; 5) secondary water resistance; 6) roof covering; 7) doors; and 8) protection of openings.

17. New language added to the statute stated, “The fixtures or construction techniques shall include, but not be limited to, fixtures or construction techniques which enhance roof strength, roof covering performance, roof-to-wall strength, wall-to-floor-to-foundation strength, opening protection, and window, door, and skylight strength. Credits, discounts, or other rate differentials for fixtures and construction techniques which meet the minimum requirements of the Florida Building Code must be included in the rate filing. All insurance companies must make a rate filing which includes the credits, discounts, or other rate differentials by June 1, 2002” (s.99, ch.2000-141, Laws of Florida). The Florida Legislature subsequently amended the law and changed the filing date to December 31, 2002, and then to February 28, 2003.

18. “Development of Loss Relativities for Wind Resistive Features for Residential Buildings with Five or More Units” addressed condominium and renter occupancies in buildings with five or more units.

19. Technically, insurers were allowed to provide actuarial justification for an alternative. Informational Memorandum OIR-07-03M issued February 27, 2007, reminded insurers that the requirement to double the mitigation credits stood, and stated that the “windstorm mitigation discount filing shall not include any modification of the rating factors or base rates for any purpose, including the offset of revenue impact on current business.” Both the memorandum and the “presumed factor” report issued by the OIR noted that insurers could submit a “true-up” filing by September 30, 2007, in which the imbalances could be addressed, even if higher base rates were required. In practice, however, no overall rate level increases were approved during the window for review of such filings.
The tables describing mitigation credit percentages were complex. A 2011 publication by the Florida Division of Emergency Management suggested that most single-component mitigation features, based on the allowable categories above, result in a credit of 11% to 82%. A business rule built into the insurer’s rating system is allowed to cap the total credits at just above 82% of the hurricane risk premium.

Review of the implementation of the loss relativity studies to create mitigation credits raises concerns for several reasons. Namely, 1) a mismatch between the “base” house for base rates and the base house for credits; 2) use of a single model (ARA) to derive the credits; 3) use of a single metric to define credits; and 4) over-application of the credits to premium components beyond the scope of the ARA study all contribute to questions regarding the appropriateness of the program’s implementation.

Mismatch Between Base Rates and Credits

Use of the “weakest risk” structure as the base house without allowing for a recalibration of the actuarially indicated base rate to also represent that “weakest risk” structure distorted the parallel between loss relativities for the base house and the weakest house. Indeed, an ARA loss costs relativity study (ARA, 2008), in reviewing the conversion of its 2002 study to mitigation credits by the OIR, stated, “If the rate differentials are implemented as credits from the weakest building, then the base rates should be adjusted to reflect the weakest building.” It also noted: “Generally, base rates are more reflective of the expected loss costs, statistically averaged over strong and weak buildings, which is significantly different from the loss costs of the weakest structure. If the credits are computed from the weakest building but are applied using rates that are derived from an average building, then there is a significant economic disconnect. This disconnect can be alleviated with a proper rate effect or offset calculation that reflects the rate differentials and an insurer’s distribution of business.”


21. The ARA report also commented on the problems associated with the way the Florida program was implemented on Page 188 where the report states, “…Florida’s insurance implementation of its wind mitigation program needs significant improvement. Maximum long-term success will occur when an insurance company inspects its book of business in the high wind zones, provides each building owner with a mitigation report that includes rate differential information (economic incentives) for improvements to the building, and applies the loss relativities as rate differentials. Applying the loss relativities as rate differentials avoids the problems associated with a credit program that is based on normalization of relativities to the weakest structure.”

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Single Model for Defining Expected Loss Savings

Effectively, ARA-generated relativities were used in calculating the windstorm loss-reduction credits. However, other hurricane loss simulation models22 are more widely used in pricing insurance and reinsurance in regulated environments and the global markets. Insurers and reinsurers have a choice of multiple catastrophe loss models for business purposes. These alternative models differ in their assumptions, thereby producing significantly different modeled loss outcomes.23 Because most insurers and reinsurers do not utilize ARA models for base rate-setting, material differences exist typically between the models used for pricing (model of insurer’s choosing) and the model prescribed by the OIR for implementing mitigation credits (ARA). Given that insurers use various models to generate their base rates, the use of a single model in setting mitigation credits may elevate the actuarial risk of arriving at an unfairly discriminatory rate.

Single Metric for Defining Expected Loss Savings

Relative loss cost (i.e., modeled expected annual average losses per unit of insured value) was the only metric used to define mitigation credits, despite the fact that some components of base premiums—particularly, the cost of capital component, which amounts to 25% or more of each Florida premium dollar—are dependent on the volatility of losses rather than their long-term average. Given that reinsurers set premiums for insurers using risk loads, often a percentage of the standard deviation of modeled losses or a percentile of the modeled loss distribution, a different cost factor may be the appropriate metric used to derive a relative cost. Modeled mitigation features should indicate modifications in the cost of capital component, not just the expected annual hurricane loss component, of premiums. Insurers maintain a combination of internal capital and capital “rented” by transferring risk to reinsurers or securities investors. Accepted actuarial models link the cost of such capital to the volatility, not just the average, of the hurricane loss distribution. Thus, relativities that contemplate measures of loss volatility may be more appropriate than those based solely on relative loss costs.

Over-application of Credits

According to multiple research and industry sources,24 the OIR, via its evaluation of rate filings during the 2007–2012 time period, effectively mandated application of the mitigation credits to risks or components of final premium beyond the scope of the ARA study (at least for use by Citizens, the state’s largest homeowners insurance company by that time), such as non-loss components of premium (which cover overhead and fixed expenses), Coverage B premiums.

22. In addition to ARA, AIR Worldwide (AIR), EQECAT (EQE), Risk Management Solutions (RMS) and the Florida Public Model (FPM) all provide hurricane loss models that have been approved by the Florida Commission on Hurricane Loss Projection Methodology.


(for detached structures that may not be built of reinforced materials), renters and unit-owners policies contents coverage (which may not benefit from structural mitigation in the same fashion as the dwelling itself) and the non-hurricane portion of base rates, such as tornadoes and hailstorms (to which the simulation did not demonstrate the reduction in wind losses as required by the enabling statute). Additional, the institution of structure-level wind-mitigation credits created overlap with existing credits in the homeowners insurance market. The ISO Building Code Effectiveness Grading Schedule (BCEGS) differentiated wind risk according to the quality and effectiveness of building codes in each community prior to implementation of the ARA study-based windstorm mitigation discount program. Insurers offered BCEGS credits at the community level that now overlapped with the structure-level wind-mitigation credits.

Effectively, Florida’s public policy strategy to reduce the underlying risks of windstorm to the state became implemented as a program to improve property insurance affordability. Worse, evidence suggests that insurance affordability was disproportionately provided to properties in the highest risk areas and often highest valued neighborhoods in the state (Nyce and Maroney, 2010). More recently (since 2012), the OIR has softened its position on the implementation of the policy, allowing insurers to adjust their base rates and approving alternative loss relativity studies for setting discounts. As a result, insurance consumers have seen price increases across the state since 2010, during a period when the state has seen no hurricanes and reinsurance rates have fallen.

**Mississippi’s Strategy: A Coastal Focus on Mitigation Affordability**

Mississippi’s coastline was devastated by Hurricane Katrina in 2005, which eclipsed even the Category 5 Hurricane Camille in 1969 as the benchmark for destruction acknowledged by long-time residents. The political aftershocks bore some resemblance to Florida’s experience after Hurricane Andrew: recognition of the disturbance to the residential property insurance market, a rethinking of the role of the residual market, and a desire to promote wind loss mitigation efforts in order to avoid repeating the destruction of life and property in future inevitable storms.

Prior to Hurricane Katrina, neither insurers nor most insureds in the Mississippi homeowners market had a large financial reason to consider pressing for wind-mitigation insurance incentives. Most of the Mississippi incentive program was based on the same community-level discount program as offered in Florida. The BCEGS offered premium credits of up to 30% for residential policies.

25. If credits are applied to the entire wind premium rather than just to the portion designated to cover loss costs, over-application of the credits occurs because only loss costs, and perhaps some portion of reinsurance costs, are reduced through home hardening efforts. Because the fixed-expense portion of the wind premium is not reduced through mitigation, the application of a credit to the entire premium may result in “over discounting.”

26. While the BCEGS credits were tempered, the overlap still exists.
written in communities graded better by the ISO. Post-2005, however, the same reinsurance shocks that impacted Florida were experienced by Mississippi homeowners insurance companies, albeit to a lesser degree than experienced in Florida. State policymakers and regulators in Mississippi responded more slowly and deliberately than had the Florida Legislature and the OIR. Early post-2005 mitigation efforts were led by the state-chartered insurer of last resort, Mississippi Windstorm Underwriting Association (MWUA), which was established in 1987.  

The Mississippi Legislature passed a comprehensive statute directed at wind loss mitigation in 2008. It established a Comprehensive Hurricane Damage Mitigation Program (Program) as a framework that included, among other items, a cost-benefit study on wind loss mitigation measures, itself including guidance regarding insurance premium credits and actuarially sound modifications to rating plans. It also established a program advisory council of experts to oversee the strategic implementation of the statute, which included bankers, insurance agents, insurer representatives, builders, academic engineers, and legislative and regulatory officials. Mississippi’s public policy initiative combined insurance premium incentives with flexibility in allowing private insurers to implement premium credits that fit their products and business capabilities, and an emphasis on finding sustainable private and public sector funding to shorten the all-important payback period for consumer investments in wind loss mitigation.

In 2010, rules from the Mississippi Insurance Department (MID) began to encourage property-level coastal mitigation via credits. Homes insured by the MWUA meeting the IBHS “FORTIFIED” designations—both new construction and retrofits—earn premium credits of up to 30% (coordinated with the BCEGS credits). Homes that have been retrofitted with specific “groups” or packages of mitigation features earn additive premium credits of up to 30%. Today, dwellings certified for one of the IBHS’ “Fortified for Existing Homes” standards receive the following credits:

- Strengthen the roof system to the IBHS Bronze standard: 17%
- Meet the IBHS Bronze standard and strengthen the windows and doors to the IBHS Silver standard: 25%

27. Unlike Florida’s Citizens, the MWUA is restricted both geographically—writing only locations in the six counties closest to the Gulf Coast—and in its products—offering only coverage for wind and hail (from hurricanes, tornadoes or straight-line storms).

28. Section 83-1-191, General Laws of Mississippi.


30. Previously, there were four groups of retrofits:

- Roof system (12% premium credit): hurricane clip roof anchorage, bracing of gable ends, protection of soffits.
- Opening protection (8%): shutters or impact-resistant window glass, reinforced entry doors, reinforced garage door.
- Roof surface (5%): wind-resistant shingles, secondary water barrier.
- Site hazards (5%): clear trees surrounding and threatening structure in high winds.
Meet the IBHS Silver standard and strengthen the structural system to the IBHS Gold standard: 30%.

The systems concept provides a way to incorporate the engineering consensus that a home is a system that fails in high winds according to its weakest link. It encourages specific mitigation actions in exchange for easy-to-grasp insurance discounts, and allows an additive approach whereby one consumer expenditure/effort builds on previous efforts, reducing the premium further each time. Private insurers were encouraged to offer mitigation discounts on a voluntary basis through midyear 2013, after which the program became mandatory for all residential insurers.\(^\text{31}\)

AIR Worldwide completed a contracted study in 2010 that provided a technical assessment for the state of Mississippi regarding its residential exposure base, ranges of costs for combinations of retrofits, and a model-driven and actuarially consistent development of indicated insurance premium credits for mitigation features and combinations.\(^\text{32}\) Key exposure results of the study included:\(^\text{33}\)

- The key construction features affecting Mississippi residential wind losses include roof geometry, roof covering, roof deck attachment scheme, roof anchorage to walls, secondary water barrier roof underlayment, window protection, garage doors, pool enclosures and the age of construction (even after controlling for the previous features).
- The Mississippi residential building stock is almost exclusively wood frame, as evidenced by original data collection performed by Louisiana State University (LSU) in coastal neighborhoods on behalf of AIR.
- Homes built after the adoption of the International Residential Code (IRC 2003), generally meaning homes permitted after 2006 in coastal Mississippi performed better, on a modeled loss basis, than homes built between 1995 and 2006, and much better than homes built before 1995.

\(^{31}\) Nationwide, State Farm and Travelers participated early in providing insurance premium discounts for meeting IBHS FORTIFIED standards. See www.mid.ms.gov/mitigation/mitigation-discounts.aspx.

\(^{32}\) See www.mid.state.ms.us/pdf/chdmp_study.pdf.

\(^{33}\) The housing stock in Mississippi is less diverse and of poorer quality than the housing stock in Florida. This entails good news (the potential improvement in wind risk from mitigation is large) and bad news (economic limitations on coastal consumers are more severe and incenting mitigation is, therefore, more difficult).
Importantly, the AIR study emphasized that actuarially sound premium credits could not be expected to be of the same magnitude for every insurer, primarily because the non-wind portion of premium is structured differently among insurers. Care should be taken to properly integrate premium credit programs with existing rating algorithms and elements with minimal overlap. More specifically, the report suggested that implementation of a rate differential program should:

1. Require accurate determination the presence/absence of wind mitigation features.
2. Encourage building owners to invest in cost-effective mitigation to achieve lower insurance rates.
3. Encourage insurance companies to collect wind mitigation data on their portfolio of buildings so that rates can be accurately determined.
4. Provide for adequate and fair rates for insurance companies. The implementation of rate differentials should be a “win-win” situation for the insurance company and the building owner.
5. Encourage reinsurance programs to reflect the actual distribution of wind mitigation features within an insurance company portfolio.
6. Promote continued improvements to the Florida Building Code.
7. Promote validation, updates and refinements to loss mitigation modeling, building ratings and rate differentials.

Mississippi requested the AIR study not only for advice as to appropriate insurance discounts for mitigation, but also for advice on the costs of various mitigation features, as well as on the implementation of the financial grant and consumer education and outreach portions of the program. Thus, the various components of the overall mitigation incentive program in Mississippi were largely planned in unison, with complementarity in mind, and several of the mistakes made in the Florida mitigation discount program were avoided. As simple points for comparison, for instance, Mississippi’s private residential property insurers continued to 1) set their own “base” house for both their base rates and mitigation credits; 2) choose the catastrophe loss model(s) to be used in setting rates and deriving the credits; 3) select the metric(s) to define credits; and 4) apply the credits to premium components only within the scope and to the extent of modeled results showing loss savings.

Effectively, Mississippi’s public policy strategy to reduce the underlying risks of windstorm to the state’s coastal areas was implemented as a program to improve property mitigation guidance and affordability. Although the state’s program provides no standardized way in which mitigation efforts are rewarded

34. The AIR report provided guidance on expected costs of specific mitigation activities relative to a structure’s total value. For instance, according to the report, a package of efforts strengthening the roof system typically costs between 4% and 8% of the structure’s value; secondary water barriers are costly on their own, but only cost a bit extra to install if done at the time the roof system is upgraded; and shutters cost 3% to 5% of the structure’s value, which is largely independent of the costs of roof system modifications.
via insurance discounts, it does provide standardization for most coastal properties. The MWUA insures the vast majority of homeowners residing in the coastal counties, and the MWUA’s mitigation discount program is not only standardized but also follows the systems approach, rewarding homeowners for strengthening the “weakest links” in the storm-worthiness of their properties. While insurance consumers in Mississippi coastal counties overall have experienced insurance price increases, these increases are commensurate with the modeled risk and provide incentive for mitigation activities to decrease costs.

Market Outcomes

The two states’ insurance-mitigation programs are now both more than five years old, allowing ample time to examine performance. Due to differences in the states’ economies, insured values and geographic exposure to wind risk, we cannot argue that we provide a fully in-common comparison basis. We do, however, assert that the differences in market outcomes between the two programs is striking in contrast, despite other factors that may contribute to the success or failure of state public policy in these cases.

Florida and Mississippi both implemented an insurance-mitigation program, combined with a property inspection program to perform individual wind-mitigation assessments, a financial grant program to encourage retrofits and a consumer-awareness and education program to accompany their respective insurance-mitigation program. Although exact numbers are difficult to obtain, both states have seen a relatively high percentage of eligible homeowners apply for and obtain windstorm mitigation inspections.35 The inspection totals do not likely correlate well with actual mitigation efforts in either state, because there is a strong incentive to obtain an inspection for purposes of receiving insurance discounts for existing mitigation features. In fact, in Florida, residential property insurers were required to award billions of dollars annually in wind mitigation insurance discounts,36 yet the data indicate that well over half of homeowners have taken no mitigation actions at all to earn their premium credits.37 Research by Carson, McCullough and Pooser (2012) further indicates a low uptake rate in mitigation grant projects and evidence of the mixed mitigation incentives at work in the program. Neither state has experienced overwhelming success with the


36. Citizens alone awarded nearly $1 billion in premium credits in 2008, at a time when its base rates had been rolled back to pre-2005 levels.

37. The main residential mitigation grant program in Florida, the My Safe Florida Home program, was defunded midyear 2009 after only two years of activity, and approximately 33,500 retrofit grants awarded (out of more than 6 million homes estimated to potentially benefit from retrofit. See the Florida “My Safe Florida Home 2008 Annual Report.”
mitigation grant programs to date, with less than 1% of potential homeowners participating.38

The mandated implementation of mitigation credits had an adverse impact on revenues for Florida’s homeowner insurers. First, premium reductions were not met with commensurate reductions in losses or related costs. This led to higher loss ratios, expense ratios and combined ratios (all measures of insurer underwriting performance) (Florida Catastrophic Storm Risk Management Center, 2010a; FCSRMC, 2010b; FCSRMC, 2011; FCSRMC, 2013; FCSRMC, 2014). This means that, from the standpoint of underwriting performance alone, non-mitigated homes can be expected to be relatively more attractive to insurers than the mitigated homes, quite opposite the intended result. Overall, the 2007–2010 actual underwriting performance of Florida’s homeowners insurance market has been poor, despite the fact that there have been no hurricane losses in Florida during the same period of time. Thus, insurers have not accumulated surplus in storm-free years, resulting in less capital available to pay for future catastrophic losses. Much of this failure can be explained by lower rate levels rather than higher losses or expenses; for example, in the third quarter of 2010, the average premium per $1,000 of insured value, an actuarial measure of insurance rates, was more than 20% lower than it was in the final quarter of 2005 (FCSRMC, 2010a; FCSRMC, 2010b; FCSRMC, 2011; FCSRMC, 2013; FCSRMC, 2014). Mississippi’s insurance marketplace is thriving by comparison, with coastal rates no longer rising overall (indeed, some falling) since 2010, in large part due to lack of hurricanes and eased reinsurance rates (FCSRMC, 2010a; FCSRMC, 2010b; FCSRMC, 2011; FCSRMC, 2013; FCSRMC, 2014). The insurance-mitigation program has “done no harm” to the private market loss ratios, expense ratios or combined ratios. The MWUA has been deemed actuarially sound,39 unlike the still financially recovering Citizens.

Conclusions and Implications

Both Florida and Mississippi were heavily impacted by storms in 2004 and 2005. The pricing impact in Florida at 2006 renewal was substantially more extreme than that experienced in Mississippi overall. More of Florida is coastal and Florida’s coastal properties are considered highly valued, relatively, for insurance purposes, so it is not surprising that reinsurers and insurers reevaluated

38. The Coastal Retrofit Mississippi (CRM) program for primary residences on and near the coast continues today, funded by private-public partnerships with the Federal Emergency Management Agency’s (FEMA) Hazard Mitigation Grant Program. The participation in actual grant projects completed through CRM has been light, at fewer than 250 (out of more than 75,000 homes estimated to potentially benefit from retrofit) at an average grant of $7,500. See www.smpdd.com/wp-content/uploads/2014/06/MississippiHousingDataProject_Dec31Update1.pdf and http://coastalretrofits.ms/org/News/Coastal%20Retrofit%20Overview.pdf.


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their Florida property lines business more stringently than they did in other hurricane-prone states. Insurance affordability became key in Florida because rates hikes were widespread and severe throughout the state. In Mississippi, the rate hikes and loss of availability were limited primarily to a relatively small coastal region and a handful of counties.

Among other market responses, Florida quickly mandated a wind mitigation insurance discounts program that was complex. As a result, the wind loss mitigation premium credits came to be viewed by many insurers and homeowners as a “black box,” and holding incentives for homeowners to capitalize on the inspection and rating process for maximum immediate (insurance premium) benefit, rather than do the work to make the home safer (Florida Commission on Hurricane Loss Projection Methodology, 2010).

Florida and Mississippi policymakers have utilized the results of mitigation loss relativity studies to make mitigation a public policy priority. These states demonstrate different approaches to building strategic mitigation policy from these relativity studies, however, and have enacted insurance-mitigation legislation that differs accordingly. Florida engaged in an affordability program while Mississippi opted for a risk-based pricing approach. Although it is difficult to measure actual mitigation efforts undertaken (no reporting of mitigation is required), we assert that the incentive structure in Mississippi is far more likely to result in mitigation than the structure in Florida. Furthermore, even if no mitigation efforts resulted from either program, the Mississippi strategy has shown itself to be superior in that it does no harm to the private insurance market while trying to respond to challenges in the marketplace.
References


Florida Catastrophic Storm Risk Management Center, 2010b. “Mitigation Credit Study: Final Report,” submitted to the Florida Department of Financial Services, Florida State University: Tallahassee, FL.


Integrated Determination of Insurer Capital, Investment and Reinsurance Strategy

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Krzysztof M. Ostaszewski***
Wei Hao****

Abstract

Based on the criteria of the Swiss Solvency Test, Solvency II, RBC and minimizing total frictional cost, we establish integrated models to determine the adjustment capital required, investment strategy and reinsurance strategy by numerically analyzing the effect of several important parameters. Results illustrate that when the cost of reinsurance is low or the frictional cost of capital is high, reinsurance is especially attractive as an effective instrument for capital management. However, when the cost of reinsurance is high or the frictional cost of capital is low, capital can partly or fully substitute for reinsurance. Furthermore, in most cases, setting the regulatory capital level either by Solvency II or the Swiss Solvency Test leads to greater prudence than determining insurer capital level by minimizing total frictional cost, except when the cost of capital is very low.
Introduction

Insurers use various strategies, methods and tools to manage risk, including reinsurance, increasing the amount of capital held and optimizing the investment portfolio. In this light, insurer risk management may be viewed as a system engineering project whereby managers assess the costs and benefits of various financial tools to determine optimal risk management strategies to achieve overall profitability and financial strength.

While capital provides a safety net that helps an insurer reduce the likelihood of financial distress, increasing the amount of capital held is costly (Staking and Babbel, 1995). Developments in global insurance regulation are aimed at risk-based supervision that accounts for all financial, insurance and business risks, particularly asset and liability risks. For example, the Swiss Solvency Test (SST) proposes the concept of target capital. Solvency II, the European Union (EU) framework for prudential regulation of insurers, presents the concept of the solvency capital requirement (SCR). In the U.S., necessary economic capital is defined by the NAIC in terms of an insurer's RBC. Eling, Schmeiser and Schmit (2007), Eling and Holzmuller (2008), Holzmuller (2009), Cummins and Phillips (2009), and Gatzert and Wesker (2012) analyze and compare the recent developments in global solvency regulation.

Dhaene et al. (2003) discuss the determination of optimal capital by minimizing the capital cost above risk-free interest and insolvency cost. Chandra and Sherris (2006) note that minimizing frictional cost of capital produces an optimal capital level based on value at risk (VaR) at much lower levels than observed. They established single-period and multiple-period optimization models under the assumption that the return on insurer assets is deterministic. For a discussion of other research addressing capital and capital allocation, see Mao and Ostaszewski (2010).

1. As discussed in Luder (2005), the Swiss Solvency Test (SST) is a stochastic risk model that includes scenarios for market risk, insurance risk and credit risk in order to determine target capital.

2. Solvency II aims to be a forward-looking, risk-sensitive regulatory structure, focusing on capital adequacy, governance and overall risk management through a total balance sheet approach. Solvency II further develops insurance regulation, similar to developments in bank regulation in Basel II.

3. Frictional cost of capital is defined as taxation and investment cost on assets backing the required capital over the projected lifetime of underlying risk. See: Smith (2010) and www.pwc.com/gx/en/actuarial-insurance-services/pdf/european-insurance-cfo-forum-mcev.pdf.
In this paper, we extend the work in Chandra and Sherris (2006) by establishing a multi-period optimization model that jointly considers the effect of capital level, reinsurance and investment strategy. We establish a stochastic objective function that minimizes the sum of the frictional capital costs, the reinsurance cost and the cost of financial distress to simultaneously determine optimal capital, reinsurance and investment strategy. We consider the structure of assets and liabilities of property-liability insurers with a numerical analysis of the impact of several important parameters on the optimal capital level, reinsurance and investment strategy. We discuss the different models of determining the necessary economic capital known as target capital under the SST, the SCR under Solvency II and the RBC under the U.S. method (NAIC). We use an example to facilitate the discussions.

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Model Based on Minimizing the Friction Cost

The Optimization Model with No Constraint of Insolvency

Our optimization model deals with determining the insurer's optimal capital level. We consider the relationship between bankruptcy cost, frictional capital cost, the expected total frictional cost (the difference between these first two costs) and the amount of adjustment capital required. It is important for insurers to determine the optimal amount of capital to hold, since capital is costly and holding higher levels of capital increases its frictional cost. Holding higher levels of capital generally decreases the probability of insolvency, with a resulting decrease in the expected bankruptcy cost. However, higher levels of capital will increase the frictional cost of capital. In practice, the insurer decides whether to raise or shed some capital (which we refer to as adjustment in capital required) based on the determined optimal capital level. Thus, the insurer faces a trade-off for which the insurer needs to determine the optimal level of capital to hold.

While reinsurance allows insurers to mitigate underwriting risks, Fier, McCullough and Carson (2013) provide empirical evidence that insurers also use reinsurance to adjust capital across affiliated firms within internal capital markets. Beyond the use of reinsurance, effective investment strategy also can help in hedging underwriting risks. In what follows, we will take the approach of integrating risk management and capital management to establish an integrated model for the simultaneous determination of the optimal capital level, reinsurance and investment strategy. We assume proportional reinsurance and one risky asset invested by the insurer, with variables as defined in Table 1.

The expected total frictional cost at time $t$, $\text{FC}_t, t = 1, 2, ... T$ is defined as the sum of the reinsurance cost, the frictional cost of capital and the expected cost of bankruptcy $^4$ at time $t$, with $t = 1, 2, ... T$, that is:

$$\text{FC}_t = \sum_{j=1}^{T} P_j (1 - a) q + c_i E[X(t) | X(t) > 0] - c_r E[X(t) | X(t) < 0] + C_s$$

where the surplus $X(t)$ is also called RBC (Schmeiser and Siegel, 2013).

---

4. Bankruptcy costs can be defined broadly as either direct bankruptcy costs or indirect bankruptcy costs. Direct bankruptcy costs are those explicit costs paid by the debtor in the reorganization/liquidation process, including legal, accounting, filing and other administrative costs related to the liquidation of the firm’s assets. Indirect bankruptcy costs are the opportunity costs of lost management energies, which could lead to lost sales, lost profits, higher cost of credit, and/or possibly the inability of the enterprise to obtain credit or issue securities to finance new opportunities. (See Chandra and Sherris, 2006.)
By establishing the stochastic objective function of minimizing the sum of the reinsurance cost, the frictional cost of capital and the expected cost of bankruptcy, we can find the optimal portion of risky asset to invest, the optimal proportion of reinsurance, the optimal capital level and, therefore, the optimal risk-based capital.\footnote{The factors affecting retention rate of reinsurance include the investment rate of return and risk, the underwriting risk, and the price and quantity demanded of insurance products.}

The objective function is:

\[
\min \quad FC_n = \sum_{j=1}^{n} P_j (1 - \alpha) \sigma_j K(t) - c_j E(\Delta X(t) / \Delta X(t) < 0) + C_a,
\]

where \( K(t) \) is the capital needed to be raised or to be reduced at time \( t \), and we refer to it as the adjustment capital required. \( C_a \) (\( C_a \geq 0 \)) is the adjustment cost associated with raising or shedding external capital.\footnote{For multi-period optimization models, it is important to consider the adjustment cost because the adjustment cost will affect the interval of adjusting the capital to the target value. (Please see Leary and Roberts, 2005; Flannery and Rangan, 2006; and Strebulaev, 2007). We thank an anonymous reviewer for this comment.} Assume that the surplus of property-liability insurers satisfies the following stochastic differential equation:

\[
dX(t) = \left[ X(t) \left( \mu - \sigma \right) + \alpha(t) \right] dW_1 + \alpha(t) \sigma \, dW_2
\]

with the boundary condition \( X(0) = x \), where \( W_1 \) is a geometric Brownian motion with drift of \( \mu \) and volatility of \( \sigma \), \( W_2 \) is a diffusion process with diffusion coefficient of \( \sigma \); \( W_1 \) and \( W_2 \) are independent of each other, and \( \pi \) is the portion of investment in risky assets. Substituting equation (3) into equation (2), we can obtain the optimal solutions of adjustment capital, reinsurance and investment strategy for \( t \), where \( t = 1, 2, \ldots T \).

The Optimization Model with Constraint of Solvency II

We use VaR \( (1 - \alpha = 99.5\%) \) of the net asset as the SCR defined in Solvency II. Given confidence level \( \alpha \in (0, 1) \), the VaR of the net assets at the confidence level \( 1 - \alpha \) is given by the smallest number \( l \) such that the probability of the loss \( X \) exceeding \( l \) is not larger than \( \alpha \). The SCR at time \( t \) is:

\[
\text{SCR}_t = \text{VaR}_t(\Delta X_t) = \inf \{ \Delta X_t : P(\Delta X_t > l) \leq \alpha \} = \inf \{ l : \mathcal{F}_{\Delta X_t}(l) \geq \alpha \}
\]
where $X(t)$ satisfies stochastic differential equation either (3) and $\Delta X_t = X(t) - X(t-1)$.

Similar to the discussion above, we establish the objective function of minimizing the total frictional cost with the constraint that $\Pr(\Delta X_t \leq -SCR_y) = \alpha$, that is,

$$\min \sum_{\gamma=1}^{T} P(t) (1 - \eta) \gamma K(t) \gamma - \gamma E(X(t) / X(t) < 0) \cdot C_\gamma$$ (5)

subject to:

$$\Pr(\Delta X_t \leq -SCR_y) = \alpha, \ t = 1, 2, ..., T.$$ 

With simulation, we can reach the optimal solutions of the reinsurance retention ratio and the proportion of risky assets invested by the insurer and SCR defined in Solvency II.

The Optimization Model with Constraint of the SST

The SST proposes the concept of target capital, which equals the one-year risk capital defined as the expected shortfall of the change in risk-bearing capital during a one-year period. The risk-bearing capital is defined as the difference between the market-consistent value of the assets and the best estimate of the liabilities.

Based on the definitions above, we establish the formula for calculating the target capital ($TC$) at time $t$:

$$TC_t = ES_\alpha = \frac{1}{\alpha} \int_0^\alpha \gamma R_y (\Delta X_t) dy$$ (6)

where $X_t$ satisfies stochastic differential equation (3), $\Delta X_t = X_t - X_{t-1}$ and $ES_\alpha$ is the expected shortfall with confidence level of $\alpha$. We use $\gamma$ as the variable of the integral.
We establish the objective function of minimizing the total frictional cost with the following constraint:

\[ TC_t = ES_a = \frac{1}{\alpha} \int_0^\alpha V aR_y (\Delta X_t) d\gamma \ t = 1, 2, ..., T. \]

That is,

\[ \min F C_t = \sum_{j=1}^n P_j (1-a) r + K(t) c - c_j E (X(t) / X(t) < 0) + C_a \]

subject to:

\[ K(t) \geq TC_t. \]

**Numerical Analysis Based on an Example**

In this section, we present an example to illustrate the optimal results and make comparisons among models based on different criteria discussed above. For the ratio of capital cost, we use the results from Kielholz (2000), which is the average ratio of capital cost for nonlife insurance companies in 1998. (See Table 1 of Kielholz (2000).) For the bankruptcy cost, we use the results of Lewis (2009), who employs sample data from 1985–2005 to estimate the ratio of total bankruptcy cost to firm value. We use Standard & Poor’s (S&P) 500 stock market index data and rates of return for Treasury bills during the period 1983–2007 to estimate the drift and the volatility of the rate of return on risky assets (stocks) and the risk-free interest rate. For other data (described below), we rely on results from Chandra and Sherris (2006). We focus on calculating the optimal adjustment capital required in the first year, which can be seen as the single-period model similar to the single-period model in Chandra and Sherris (2006). That is, we assume that there are no costs associated with adjusting to the optimal level of capital and consider only the frictional cost of capital and the cost of financial distress. Table 2 lists the input data for the analysis.

---

7. The information used in the numerical analysis here is drawn from prior studies and on estimates made by the authors; the results may vary with different underlying assumptions.
Table 2:
The Input Data for the Example

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment costs</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of frictional costs of capital</td>
<td>13.18%</td>
</tr>
<tr>
<td>Initial capital $X(0)$</td>
<td>1</td>
</tr>
<tr>
<td>Ratio of total bankruptcy cost to firm value $c_f$</td>
<td>16.3%</td>
</tr>
<tr>
<td>Expected claim payment $E(P_N)$</td>
<td>20</td>
</tr>
<tr>
<td>Premium income scenario 1 $P_1(1)$</td>
<td>10</td>
</tr>
<tr>
<td>Premium income scenario 2 $P_1(2)$</td>
<td>20</td>
</tr>
<tr>
<td>Premium income scenario 3 $P_1(3)$</td>
<td>25</td>
</tr>
<tr>
<td>Volatility of claim loss $\sigma_z$</td>
<td>4</td>
</tr>
<tr>
<td>Volatility of the return rate of risky assets (stocks) $\sigma_l$</td>
<td>0.1557</td>
</tr>
<tr>
<td>Drift of the return rate of risky assets $\mu$</td>
<td>0.1381</td>
</tr>
<tr>
<td>Risk-free interest rate $r$</td>
<td>0.0512</td>
</tr>
</tbody>
</table>

Reinsurance contracts are privately negotiated, and the contract conditions may vary widely. The factors affecting the rate of reinsurance cost is very complicated. Because exact rates of reinsurance cost $\eta$ are unknown to us, we calculate optimal solutions based on a range of values for each $\eta$. We also give the range of the rate of reinsurance cost, which is not economical to the insurer or does not satisfy the requirement of insolvency regulation with lowest total frictional cost and vice versa. The optimal solutions, *, are listed in Table 3, Table 4 and Table 5. From Table 3, we find that the rate of reinsurance cost, $\eta$, and the premium income, $P_1$, are important factors that affect the optimal results. When the rate of reinsurance cost is small or the premium income is small, the optimal retention rate $a^*$ is small or equal to zero, which means the reinsurance partially or completely replaces capital to transfer claim risk.
From Table 3, we also find when the level of premium income is low ($P_1 = 10$ in our case), the adjustment capital required is positive and increases with the increase of the rate of reinsurance cost. This means it is necessary for the insurer to increase capital so as to offset underwriting risk. Higher reinsurance cost will decrease the net income of the insurer and also prompt the insurer to increase capital held so as to reduce the insolvency risk caused by higher reinsurance cost.

Table 3: Optimal Solutions Obtained by Optimization Model Without Constraint

<table>
<thead>
<tr>
<th>$\eta$</th>
<th>$K(I)^*$</th>
<th>$\pi^*$</th>
<th>$\alpha^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$P_1 = 10$</td>
<td>$P_1 = 20$</td>
<td>$P_1 = 25$</td>
</tr>
<tr>
<td>0.05</td>
<td>0</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
<tr>
<td>0.10</td>
<td>0.5</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
<tr>
<td>0.15</td>
<td>2.0</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
<tr>
<td>0.20</td>
<td>9.7</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
<tr>
<td>0.25</td>
<td>10.3</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
<tr>
<td>0.30</td>
<td>10.3</td>
<td>-1.1</td>
<td>-6.8</td>
</tr>
</tbody>
</table>

From Table 3, we also find that when the level of premium income is low ($P_1 = 10$ in our case) and when the rate of reinsurance cost is low ($\eta = 0.05$ in our case), the optimal retention rate is zero, and there is no risky investment. This means that it is optimal for the insurer to transfer all underwriting risk to the reinsurance due to the low reinsurance cost. However, when the rate of reinsurance cost increases, the investment strategy changes from more aggressive to more conservative, the retention portion is increasing, and the capital held is increasing. When $\eta \geq 0.2$, the optimal retention rate is 1, the optimal capital is great, and underwriting risk is reduced by increasing capital instead of buying reinsurance due to higher reinsurance cost.

Finally, from Table 3, we found that when the level of premium income is higher ($P_2 = 20$, and $P_3 = 25$ in our cases), the optimal capital is negative, which means that it is optimal for the insurer to reduce capital held so as to decrease capital cost. Also, higher premium income can be used to offset insolvency risk. In addition, the optimal retention rate is equal to 1 whether the rate of reinsurance cost is lower or higher. And all surplus is invested in risk-free assets. This suggests that the premium income and the return of risk-free assets are great enough to offset insolvency risk.

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### Table 4:
Optimal Solutions Obtained by Optimization Model Based on Solvency II

<table>
<thead>
<tr>
<th>$\eta$</th>
<th>$K'(1)^*$</th>
<th>$\pi^*$</th>
<th>$a^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_1 = 10$</td>
<td>$K = 20$</td>
<td>$P_1 = 25$</td>
<td>$P_1 = 10$</td>
</tr>
<tr>
<td>$\eta = 0.05$</td>
<td>0</td>
<td>7.1</td>
<td>4.9</td>
</tr>
<tr>
<td>$\eta = 0.10$</td>
<td>0</td>
<td>9.6</td>
<td>4.9</td>
</tr>
<tr>
<td>$\eta = 0.15$</td>
<td>0.6</td>
<td>10.3</td>
<td>4.9</td>
</tr>
<tr>
<td>$\eta = 0.20$</td>
<td>2.1</td>
<td>10.3</td>
<td>4.9</td>
</tr>
<tr>
<td>$\eta = 0.25$</td>
<td>4.7</td>
<td>10.3</td>
<td>4.9</td>
</tr>
<tr>
<td>$\eta = 0.30$</td>
<td>11.0</td>
<td>10.3</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Note: $P_1$ – premium income; $\eta$ – the rate of reinsurance cost; $K(1)^*$ – the optimal adjustment capital required; $\pi^*$ – the optimal portion of risky assets; $a^*$ – the optimal portion of retention.

### Table 5:
Optimal Solutions Obtained by the Optimization Model Based on the Swiss Solvency Test

<table>
<thead>
<tr>
<th>$\eta$</th>
<th>$K'(1)^*$</th>
<th>$\pi^*$</th>
<th>$a^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_1 = 10$</td>
<td>$K = 20$</td>
<td>$P_1 = 25$</td>
<td>$P_1 = 10$</td>
</tr>
<tr>
<td>$\eta = 0.05$</td>
<td>0</td>
<td>3.1</td>
<td>5.7</td>
</tr>
<tr>
<td>$\eta = 0.10$</td>
<td>0</td>
<td>10.2</td>
<td>5.9</td>
</tr>
<tr>
<td>$\eta = 0.15$</td>
<td>0.6</td>
<td>11.3</td>
<td>5.9</td>
</tr>
<tr>
<td>$\eta = 0.20$</td>
<td>5.9</td>
<td>11.3</td>
<td>5.9</td>
</tr>
<tr>
<td>$\eta = 0.25$</td>
<td>6.3</td>
<td>11.3</td>
<td>5.9</td>
</tr>
<tr>
<td>$\eta = 0.30$</td>
<td>11.4</td>
<td>11.3</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Note: $P_1$ – premium income; $\eta$ – the rate of reinsurance cost; $K(1)^*$ – the optimal adjustment capital required; $\pi^*$ – the optimal portion of risky assets; $a^*$ – the optimal portion of retention.
From Table 4 and Table 5, we find that the optimal adjustment capital required is greater with the constraints of Solvency II and the SST than without these constraints of insolvency. The tables illustrate that Solvency II and the SST tend to be more prudent in terms of determining optimal capital level.

From Table 4 and Table 5, we also find that the investment strategies are more aggressive when optimal adjustment capital required is greater or the premium income is greater. The higher capital and higher premium income can help the insurer to hedge the investment risk so as to allow for more aggressive investment strategies. All of these findings provide insight on the decision of optimal capital, investment and reinsurance strategies.

Next, we perform a sensitivity analysis of the optimal adjustment capital required, investment and reinsurance strategies to the change in several critical parameters, including the ratio of the frictional cost of capital, \( c_c \); the rate of reinsurance cost, \( \eta \); the drift of the rate of return on risky assets, \( \mu \); the volatility of the return rate of the risky assets invested, \( \sigma \); the volatility of claim loss rate, \( \sigma_1 \); and the ratio of total bankruptcy cost to firm value, \( c_f \).

The Effect of Changes in \( c_c, \eta \)

Table 6 and Table 7 display the optimal values of the proportions of reinsurance retention and the risky assets invested and the capital adjusted by the insurer for different values of the ratio of capital cost \( c_c \) and the rate of reinsurance cost \( \eta \), when we use the criteria of minimizing the total control cost. The confidence level is set equal to 0.5% for Solvency II and 1% for the SST. We present the results for the second scenario of premium income. (The analyses of the other two scenarios of premium income are similar.)

The results in Table 6 show that the optimal investment strategy, \( \pi^* \), tends to be more aggressive when the ratio of capital cost, \( c_c \), is small and the optimal adjustment capital required, \( K(1)^* \), is large with the optimization model without constraint of insolvency. (The optimal portion of risky assets (\( \pi^* \)) equals 0.55 when the ratio of capital cost, \( c_c \), is 0.02, and the optimal adjustment capital required, \( K(1)^* \), is 13.5.) However, the investment strategies tend to be more conservative with increases in the ratio of capital cost and with decreases in the optimal adjustment capital required. The portion of risky assets becomes zero when the optimal adjustment capital required is very small or negative. Because lower capital level means higher insolvency risk, the insurer should select a more conservative investment strategy in order to reduce investment risk and further to reduce insolvency risk. However, based on the estimation from the second and third model (with constraint of insolvency), the optimal capital levels are much higher than those estimated by the first model (without constraint of insolvency).
Table 6:
Optimal Capital Level, Reinsurance Retention Ratio
and Risky Assets Invested by the Insurer When the Ratio of Reinsurance Cost is Greater than 0.15

<table>
<thead>
<tr>
<th>$\eta \geq 0.15$</th>
<th>$\eta \geq 0.15, z = 0.005$</th>
<th>$\eta \geq 0.15, z &lt; 0.01$</th>
</tr>
</thead>
<tbody>
<tr>
<td>( r_c )</td>
<td>0.02 0.10 0.06 0.04 0.10 0.14 0.16</td>
<td>0.02 0.10 0.06 0.04 0.10 0.14 0.16</td>
</tr>
<tr>
<td>$\alpha^*$</td>
<td>1 1 1 1 1 1 1</td>
<td>1 1 1 1 1 1 1</td>
</tr>
<tr>
<td>$\pi^*$</td>
<td>0.55 0.35 0.35 0.35 0.45 0.45 0.55 0.55 0.55 0.55 0.55 0.55 0.55</td>
<td>0.55 0.45 0.45 0.45 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0.55 0.55</td>
</tr>
<tr>
<td>$K(I)^*$</td>
<td>13.5 13.5 11.0 11.0 11.0 11.0 11.0</td>
<td>13.5 13.5 11.0 11.0 11.0 11.0 11.0</td>
</tr>
<tr>
<td>$F_{C1}^{*}$</td>
<td>0.2700 0.5200 0.8117 1.018 1.2275 1.6944 1.9500</td>
<td>0.2700 0.5200 0.8117 1.018 1.2275 1.6944 1.9500</td>
</tr>
</tbody>
</table>

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However, it is slightly decreasing with the increase of the rate of capital cost, and the optimal investment strategies are more aggressive than those determined by the first model for most cases—except for two cases in which the rate of capital cost is very low ($r_c = 0.02, 0.04$ in our cases). Given the constraint of low probability of insolvency, the insurer must hold more capital to reduce insolvency risk, even though the capital is expensive. The higher capital level allows the insurer to follow a more aggressive investment strategy so as to increase investment return and decrease total frictional cost.

In addition, the total cost $FC_1$ (frictional cost of capital and the cost of bankruptcy) is larger for Solvency II and the SST than that for the optimization model without constraint of insolvency. The exceptions are the cases in which the ratio of capital cost $c_c \leq 0.04$ and the optimal adjustment capital required by Solvency II and the SST, $K(1)^*$, is higher than what was determined by the optimal model without constraint of insolvency—except for the cases where the ratio of capital cost $c_c \leq 0.04$. That is, in most cases, Solvency II and the SST are more prudent in determining optimal adjustment capital required than by only minimizing the total frictional cost.

The results of Table 6 also show that the optimal insolvency probabilities, $Pr^*(X(t) < 0, 0 \leq t \leq 1)$, determined by the optimization model without constraint of insolvency, become larger when the ratio of capital costs increases. Therefore, regulation based on Solvency II or the SST appear to be more binding in this situation. Finally, the results show that the optimal adjustment capital required by the SST is slightly greater than that from the Solvency II results.

The results in Table 7 indicate that if the frictional cost of capital is very high or the reinsurance cost is very low, reinsurance can partially replace the capital need and effectively serve as an instrument of capital management. (See the values in the last four columns corresponding optimal retention ratios $a^*$, which are small.) Table 7 indicates that most of the premium is ceded to the reinsurer so as to transfer claim risk.
Table 7:
Optimal Capital Level, Reinsurance Retention Ratio and Risky Assets
Invested by the Insurer When the Ratio of Reinsurance Cost is 0.05

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<tr>
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</tr>
<tr>
<td>$FC^*_1$</td>
<td>0.270</td>
<td>0.5200</td>
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<tr>
<td>$K^*(I)$</td>
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<td>13.00</td>
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<td>$E(X^*(I))$</td>
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<td>16.70</td>
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<tr>
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<td>0.270</td>
<td>0.5200</td>
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<table>
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<tr>
<td>$FC^*_1$</td>
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<td>0.5200</td>
</tr>
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</table>

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Table 7 note: \(\alpha\) – the confidence level; \(\eta\) – the rate of reinsurance cost; \(K(1)^*\) – the optimal adjustment capital required; \(\pi^*\) – the optimal portion of risky assets; \(\sigma^*\) – the optimal portion of retention; \(FC_1^*\) – the optimal total friction cost; \(E(X(1))^*\) – the optimal expected surplus at time 1; \(Pr^*(X(t)<0,0\leq t\leq 1)\) – the optimal insolvency probability; \(\mu\) – the drift of return rate of risky assets; \(\sigma_1\) – the volatility of return rate of risky assets; \(\gamma\) – the risk-free interest rate; \(\sigma_2\) – the volatility of claim loss; \(c_i\) – the ratio of frictional capital cost; \(c_f\) – the ratio of the total bankruptcy cost to firm value.

Table 7 also indicates that the investment strategies determined by the second model and third model are more aggressive than those determined by the first model for most cases—except for two cases that the rate of capital cost is very low (\(r_c = 0.02, 0.04\) in our cases). Higher capital level or a higher portion of reinsurance can decrease probability of insolvency and underwriting risk so as to allow the insurer to take more aggressive investment strategy, obtain more investment return and decrease total frictional cost.

Figure 1 depicts the relationship between the rate of frictional cost of capital, the probability of insolvency based on optimal model without constraint of insolvency, and the confidence level of Solvency II and the SST from the numerical results of the example.

Figure 1:
The Relationship Between the Rate of Frictional Cost of Capital, the Probability of Insolvency Based on a Model Without Constraint of Insolvency, and the Confidence Levels for Solvency II and the Swiss Solvency Test (\(\eta \geq 0.15\))
Figure 1 shows that the probability of insolvency based on the optimization model without constraint of insolvency is much greater than with VaR constraint based on Solvency II and with tail value at risk (TVaR) constraint based on the SST in most cases—except for the cases where the ratio of capital cost $c_c \leq 0.04$. The results also indicate that setting the regulatory capital level based on either Solvency II or the SST leads to greater prudence toward the risk of insolvency than determining capital by only minimizing the total frictional cost—except for the cases where the ratio of capital cost is very small.

Figure 2 describes the relationship between the optimal adjustment capital determined by the optimization model without constraint of insolvency, based on Solvency II and the SST and the rate of frictional cost of capital when the cost of reinsurance for each exposure $\eta \geq 0.15^8$ and other data as described above in the example. The results in Figure 2 indicate that the optimal adjustment capital determined by the optimization model without constraint of insolvency decreases as the rate of frictional cost of capital, $c_\alpha$, increases, since larger frictional cost of capital will make the total control cost increase, and it is necessary to decrease capital in order to keep the total control cost minimized.

Figure 2:
The Relationship Between Optimal Adjustment Capital and the Ratio of Capital Cost of Three Models ($\eta \geq 0.15$)

---

8. The reason that we choose $\eta \geq 0.15$ is that the optimal retention portion of reinsurance is equal to 1 when $\eta \geq 0.15$. In order to make analysis and comparison conveniently, we first discuss the cases without reinsurance. In Figure 3 and Figure 5 (also see Table 7), we will set a smaller value of $\eta$ and discuss the cases with reinsurance.
The results in Figure 2 also show that the optimal adjustment capital required by Solvency II (SCR) increases with the increase of \( c_c \) since surplus decreases and the probability of default increases when \( c_c \) increases, and it is necessary to increase capital in order to keep the default probability equal to 0.005 constantly. Finally, Figure 2 shows that the optimal adjustment capital determined based on the SST is slightly greater than that based on Solvency II, and the proportion of retention of reinsurance is equal to 1 for all three models.

Figure 3 and Figure 4 illustrate the changes in optimal adjustment capital and optimal proportion of retention of reinsurance for three models respectively, when the reinsurance cost of each exposure is 0.05. From Figure 3 and Figure 4, we find that reinsurance will partially replace capital needs and may serve as an effective instrument of capital management when the cost of reinsurance is relatively low and the frictional cost of capital is relatively large for these three models. Figure 3 and Figure 4 also show that the optimal strategy of capital and reinsurance is quite different based on Solvency II and the SST when the frictional cost of capital is high and the reinsurance cost is low.
The Effect of Changes in $\mu$, $\sigma_1$, $r$, $\sigma_2$ and $c_f$

Table 8, Table 9 and Table 10 list the optimal adjustment capital required, the proportions of reinsurance retention and the risky assets invested by the insurer when the parameters of $\mu$, $\sigma_1$, $r$, $\sigma_2$ and $c_f$ change based on three models, respectively. The data in Table 8 show that the optimal adjustment capital required, $K(1)^*$, remains constant when parameters change. The optimal portion of risky assets, $\pi^*$, is zero when parameters change, and the main reason is that the optimal adjustment capital required is negative. Because there is no risky investment, all optimal solutions remain unchanged when the return rate and volatility of risky assets, $\mu$ and $\sigma_1$, change. The optimal total frictional cost, $FC_1^*$, increases, but optimal probability of insolvency, $Pr^* (\chi(t) < 0, 0 \leq t \leq 1)$, is almost unchanged when the risk-free interest rate, $r$, and the ratio of bankruptcy cost to the firm value, $c_f$, increase.

It is important to notice that the optimal values of $Pr^* (\chi(t) < 0, 0 \leq t \leq 1)$ and $FC_1^*$ increase, but the optimal capital level remains unchanged as the volatility of claim loss, $\sigma_2$, increases, and optimal retention portions are all equal to 1 no matter what value of claim loss, $\sigma_2$, takes. These results illustrate that high reinsurance cost ($\eta = 0.15$ in our cases) will lead the insurer to retain all premium income even in the situations of greater claim risk. The optimal economic strategy for the
insurer is to keep capital unchanged, but this approach will increase the insurer's probability of insolvency when the volatility of claim loss, $\sigma_2$, increases. This is the limitation of model one. Minimizing total frictional cost from the insurer's perspective may conflict with the objective of regulation. The data in Table 8 also show that the optimal investment strategy is that all surplus is invested in risk-free assets. The return of risk-free assets can help to offset part of claim risk and help to reduce total frictional cost.

Table 9 indicates that with the constraint of Solvency II, the optimal capital, $K(1)^*$, slightly decreases with the increase of the drift of return rate of risky assets, $\mu$, and slightly increases with the increase of volatility of return rate of risky asset, $\sigma_1$, and risk-free interest rate, $r$. And the optimal adjustment capital is much greater than determined earlier based on the optimization model without constraint of insolvency. From Table 9, we also observe that the optimal solution of $K(1)^*$ greatly increases as the volatility of claim loss, $\sigma_2$, increases. The increase of claim risk will lead to increased capital in order to keep the insolvency probability within the criterion of Insolvency II. But the optimal retention portion are all equal to 1 for all values of $\sigma_2$, meaning that it is optimal for the insurer to raise capital instead of purchasing reinsurance in order to reduce underwriting risk due to higher rate of reinsurance cost. Therefore, based on the analysis above, we illustrate based on various assumptions and with regard to varying regulatory standards that capital and reinsurance can be substitutes. On the one hand, when reinsurance cost is rather low but capital cost is rather high, reinsurance can partially or fully substitute for capital, as shown in Table 7. On the other hand, capital can partially or fully substitute for reinsurance when capital cost is rather low but the reinsurance cost is rather high, as in Table 6. Finally, we find from Table 9 that optimal adjustment capital remains fairly constant when the ratio of total bankruptcy cost to firm value, $c_f$, increases, but the total frictional cost, $FC_1^*$, increases with the increase of $c_f$.

From Table 10, we find that the change patterns are similar to those in Table 9 when the parameters change. However, the optimal adjustment capital, $K(1)^*$, and the optimal total frictional cost, $FC_1^*$, are slightly greater than those in Table 9. That is, the criteria of the SST are slightly more prudent in determining the optimal adjustment capital.

It should be noticed that Table 8, Table 9 and Table 10 indicate that the optimal total frictional cost (and other optimal solutions) are very sensitive to the change of the volatility of claim loss, $\sigma_2$, but the optimal frictional cost (and other optimal solutions) changes very slightly as other parameters change, given the condition that the rate of reinsurance cost $\eta = 0.15$. So, $\sigma_2$ is the most important parameter affecting total frictional cost. In the following, we will further discuss the sensitivity of the optimal solutions as $\sigma_2$ increases when $\eta$ takes smaller values ($\eta = 0.10$) for three models, respectively.
Table 8:
Optimal Adjustment Capital Required, Reinsurance Retention Ratio and Risky Assets Invested by the Insurer with Varying Parameters of $\mu$, $\sigma_1$, $r$, $\sigma_2$ and $c_j$ Based on the Optimization Model Without Insolvency Constraint

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<th>$\alpha^*$</th>
<th>$\pi^*$</th>
<th>$K(1)^*$</th>
<th>$E(X_1^*)$</th>
<th>$\Pr^*(X(t) &lt; 0, 0 \leq t \leq 1)$</th>
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Note: $\alpha$ – the confidence level; $\eta$ – the rate of reinsurance cost; $K(1)^*$ – the optimal adjustment capital required; $\tau^*$ – the optimal portion of risky assets; $\sigma^*$ – the optimal portion of retention; $FC_1^*$ – the optimal total friction cost; $E(X_1^*)$ – the optimal expected surplus at time 1; $Pr^*(X(t) < 0, 0 \leq t \leq 1)$ – the optimal insolvency probability; $\mu$ – the drift of the return rate of risky assets; $\sigma_1$ – the volatility of the return rate of risky assets; $r$ – the risk-free interest rate; $\sigma_2$ – the volatility of claim losses; $c_1$ – the ratio of frictional capital cost; $c_2$ – the ratio of the total bankruptcy cost to firm value.
| $\eta = 0.15, r_e = 0.1318, \alpha = 0.005$ |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| $\mu$ 0.08      | 0.09            | 0.10            | 0.11            | 0.12            | 0.13            | 0.14            | 0.15            |
| $\sigma_1$ 0.10 | 0.11            | 0.12            | 0.13            | 0.14            | 0.15            | 0.16            | 0.17            |
| $\sigma_2$ 0.1  | 0.11            | 0.12            | 0.13            | 0.14            | 0.15            | 0.16            | 0.17            |

Table 9:  
Optimal Adjustment Capital Required, Reinsurance Retention Ratio and Risky Assets Invested by the Insurer with Varying Parameters of $\mu, \sigma_1, r, \sigma_2$ and $c_f$ Based on the Optimal Model with Solvency II

<table>
<thead>
<tr>
<th>$\alpha^*$</th>
<th>$\pi^*$</th>
<th>$K(I)^*$</th>
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Table 9 (Continued)

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Note: $\alpha$ – the confidence level; $\eta$ – the rate of reinsurance cost; $K(1)^*$ – the optimal adjustment capital required; $\pi^*$ – the optimal portion of risky assets; $a^*$ – the optimal portion of retention; $FC_1^*$ – the optimal total friction cost; $EX(1)^*$ – the optimal expected surplus at time 1; $Pr*(X(t)<0,0\leq t\leq 1)$ – the optimal insolvency probability; $\mu$ – the drift of return rate of risky assets; $\sigma_t$ – the volatility of return rate of risky assets; $r$ – the risk-free interest rate; $\sigma_c$ – the volatility of claim loss; $c_f$ – the ratio of frictional capital cost; $c_f$ – the ratio of the total bankruptcy cost to firm value.
Table 10:
Optimal Adjustment Capital Required, Reinsurance Retention Ratio and Risky Assets Invested by the Insurer with Varying Parameters of $\mu$, $\sigma$, $r$, $\sigma_2$ and $c_f$ Based on the Optimal Model with the Swiss Solvency Test

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<td>$FC_{1^*}$</td>
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<td>$\sigma_1$</td>
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<td>$K(1)^*$</td>
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Note: $\alpha$ – the confidence level; $\eta$ – the rate of reinsurance cost; $K(1)^*$ – the optimal adjustment capital required; $\pi^*$ – the optimal portion of risky assets; $a^*$ – the optimal portion of retention; $FC_1^*$ – the optimal total friction cost; $E(X(t))^*$ – the optimal expected surplus at time 1; $Pr(\gamma<0.6<1)$ – the optimal insolvency probability; $\mu$ – the drift of return rate of risky assets; $\sigma_r$ – the volatility of return rate of risky assets; $\rho$ – the risk-free interest rate; $\sigma_l$ – the volatility of claim loss; $c_f$ – the ratio of frictional capital cost; $c_f$ – the ratio of the total bankruptcy cost to firm value.

Table 11 lists the results. Table 11 indicates that the optimal retention portion is still equal to 1 as $\sigma_2$ increases, although the rate of reinsurance cost decreases from 0.15 to 0.1 for model 1 (without constraint of insolvency). This means that reinsurance cannot help the insurer to decrease total frictional cost, so the insurer still retains all premium income but invests all surplus in risk-free assets to increase income and reduce the risk of claim loss. Table 11 also indicates that for model 2 based on Insolvency II and model 3 based on the SST, optimal retention portion decreases with the increase of $\sigma_2$ and optimal capital level is much lower in that the rate of reinsurance cost is larger ($\eta = 0.15$) when $\sigma_2 > 4$ (see Table 9 and Table 10.) The insurer reduces the capital cost through reinsurance while satisfying the regulation requirement.
### Table 11:
Optimal Adjustment Capital Required, Reinsurance Retention Ratio and Risky Assets Invested by the Insurer with Varying Parameter of \( \sigma_2 \) and Based on Three Optimization Models Respectively (Given \( \eta = 0.10 \))

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<td>-1.1</td>
<td>-1.1</td>
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<td>0.4941</td>
<td>0.4974</td>
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<td>2.1880</td>
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Summary and Conclusion

In this paper, we established integrated models to determine the insurer’s optimal adjustment capital required, reinsurance and investment strategy. We performed numerical analysis using simulation with a property-liability insurer as an example. The results show that reinsurance may be used as an effective instrument of capital management, particularly when the frictional cost of capital is high and/or the reinsurance cost is low. However, capital can partly or fully substitute for reinsurance when capital cost is low and reinsurance cost is high.

We find that the optimal investment strategy is for the insurer to accept more risk when the optimal adjustment capital required and/or the premium income are larger. Setting the regulatory capital level either by Solvency II or the SST leads to greater prudence than determining insurer capital level by minimizing total frictional cost in most cases, except when capital cost is very small. Future research may benefit from numerical analysis for life insurers.
References


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How to Set Rates if You Must: An Efficiency-Based Methodology for Setting Promulgated Insurance Rates with an Application to Title Insurance

Jing Ai*
Patrick L. Brockett**
Linda L. Golden***
Utai Pitaktong****

Abstract

In a competitive insurance market, competition enforces cost and pricing efficiency. In some markets, however, either competitive economic environments do not exist or considerations exist such that the regulators set rates. This can occur with the introduction of new types of insurance (e.g., agricultural insurance...
in emerging markets) or in markets with insufficient information for consumers to make informed choices. Regardless of the desirability of rate regulation, it does happen. The objective of this paper is to explore how to develop better methods for setting regulated rates. This paper presents a data envelopment analysis (DEA) approach to determine efficient levels of expenses to use as an input into rate making by regulators when market competition determined levels of expenses are unavailable. Thus, we develop an efficiency-based rate promulgation methodology and use title insurance in Texas to illustrate this process. Using data from the Texas Department of Insurance (TDI), we show how our methodology, in conjunction with current TDI procedures, can improve the rate promulgation process for title insurance. The insights from our empirical analysis are generally applicable to other cost plus pricing models.
Introduction

A primary directive of insurance regulation as it relates to rate setting is that rates not be inadequate, excessive or unfairly discriminatory. The “not excessive” standard occurs to protect the consumer from companies overcharging for services and making “excessive” profits. In theory, forces of market competition under complete information should provide a form of self-policing since an insurer who is “overpricing” a product will lose its customers (and profit) to the competition that does not overcharge, thus bringing rates down.¹

However, regardless of one’s view on market set rates versus the desirability of regulator set insurance rates, promulgated rates do exist. This might occur, for example, when it is perceived that competition alone fails to provide economic discipline on prices, or because of other economic externalities motivating regulators to step forward and promulgate the insurance rate to protect the consumer and/or the insurer.

This promulgation of rates occurs most frequently in new insurance markets, markets having little competition and in lines of business associated with individual consumers (as opposed to commercial insurance). Additionally, when the government is the insurer (e.g., in noncommercial national flood insurance), rates are promulgated without the benefit of market competition enforced discipline. The objective of this paper is to answer the following question: Given that rate regulation happens, is there a way to set promulgated rates better than we do currently? This paper presents a methodology for setting rates efficiently, if regulators’ must promulgate, and applies it to pricing title insurance.

The most important components of rate setting are the determination of the expected losses and expenses (and profit). There are sophisticated statistical models available in the actuarial literature to estimate expected losses, such as those presented in Klugman, Panjer and Willmot (2008). Competition motivates insurers to adopt increasingly better methods for estimating losses, and regulators who set rates also have access to the actuarial data and actuarial techniques useful for determining loss estimation as well.

In a competitive economic environment with knowledgeable participants, market efficiency will force the insurers to control expenses to achieve profitability. In a promulgated rate environment, however, the regulator must set rates so as to reward efficiency in expense handling and discourage inefficiency, all the while setting a single overall rate for the marketplace and allowing for a reasonable profit for insurance firms.

This paper provides a data envelopment analysis (DEA)-based method to assist the regulator in determining an efficient level of expense allocation.

¹. However, when the insurance itself is peripheral to the purchase of another product, such as title insurance associated with home purchase or credit insurance associated with automobile purchase, consumers may not focus on this cost and may not exert significant pricing pressure on the market to bring prices to economically efficient levels.
We develop a rate promulgation methodology that can be used in the absence of market competition forcing pricing efficiency. This is illustrated using regulator promulgation of title insurance rates in Texas. Title insurance is a common line of business associated with virtually every mortgaged home purchase. Thus, it has a widespread impact on the population. For this reason, title insurance pricing and related consumer-centered issues have drawn a lot of attention from regulators and legislatures (e.g., GAO, 2007; Crocker and Kleit, 2009). However, except for a few interesting overview studies (e.g., Sirmans and Dumm, 2006; and Dumm, Macpherson and Sirmans, 2007), there is little discussion of this important line of business in the recent literature, especially with regard to the rate-setting role that regulators often play in title insurance.

In the process of empirically illustrating our proposed method, this paper gives an overview of the title insurance market focusing on an explicit discussion of how the rates are currently set in Texas. The illustration then provides an efficiency analysis of the title insurance market using Texas data, including efficiency comparisons within and across various organizational forms and sizes of title insurance agents. We address issues posed in title insurance rate hearings and faced by the industry and regulators.

**Overview of the Manual Rate Promulgation Methodology**

The “manual rate” process is the most appropriate for promulgated rates for a homogeneous group of exposures. In “manual rate” promulgation, different classes of risks are priced from a set of basic rating tables. The price for an insurance policy is obtained by determining the class into which the hazard falls and then reading the factor (say dollars to charge per $1,000 of coverage) from a table for this class. Then, that factor is multiplied by the number of exposure units encompassed by the policy.

The pure premium method is a basic method that can be used for developing the factors that contribute to the creation of the manual rate table. The pure premium method determines factors based on exposure and expected loss. Specifically, the rate R is given by:

\[ R = \frac{E[L] + F}{1 - V - Q}, \]

where \( R \) is the indicated rate per unit of exposure, \( E[L] \) is expected discounted present value of losses per unit of exposure, \( F \) is fixed expense per exposure unit, \( V \) is a variable expense factor, and \( Q \) is a profit and risk contingency factor.

Once this value is calculated for each class, a manual rate table is created with the factor (per exposure unit) for each class. In a competitive market setting, each
company uses its firm’s proprietary data and other information to determine the three main components in (1) (i.e., expected loss payment [loss ratio], expense reimbursement [expense ratio] and allowable business profits [target profit rate]). See Ai and Brockett (2008) and Casualty Actuarial Society (1990) for more details.

To promulgate insurance rates, regulators assume the task of determining each of the rate components based on aggregate industry level data. Thus, the promulgated insurance rates should still satisfy the general ratemaking objectives to be adequate, not excessive, and not unfairly discriminatory. As detailed in the numerous title insurance rate setting hearing documents (e.g., State Office of Administrative Hearings, 2009; Texas Department of Insurance, 2010), insurance regulators face the challenge of incentivizing efficient operations in a marketplace lacking competition while also setting a uniform rate.

In (1), the expected loss component is amenable to standard loss modeling and estimation using well-studied actuarial techniques, and the allowable profit rate can be determined based on the general economic and financial market conditions. Inefficiency in promulgated rate setting lies most plausibly in the expense component of the insurance rate. When promulgating rates, expenses have to be predicted at the aggregate level using historical data reported by different companies (e.g., by a standard regression model for title insurance in Texas), so in most of the current regulatory rate setting methodology, higher expenses (as reported companies) lead to higher allowable expenses for promulgated rates.

Because of the importance of expense determination in rate promulgation, title insurance in the U.S. is a natural context to develop and illustrate our efficiency-based rate promulgation methodology. Unlike most other lines of insurance, title insurance losses account for only a small percentage of the premium, thereby making it critical to appropriately estimate expenses. This market serves as a clean environment to study rate promulgation, focusing on the expense component of the rate.

A DEA-Based Methodology for Improved Rate Promulgation Based on Efficiency

We design a rate promulgation methodology to address inefficiencies arising from the lack of market competition and distorted agent incentives. Since we cannot rely on market competition to arrive at an efficient equilibrium price, the

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2. This is not to imply that the expected loss determination is non-controversial in rate setting hearings, only that the discussion there involves standard actuarial considerations that are routinely examined and decided by regulators. Moreover, the loss ratio in title insurance is very low compared to the expense ratio, so expected loss determination is less contentious (cf., Nyce and Boyer, 1998).

3. In 2008, title insurers paid 5% of their premiums back to customers on claims as compared to 70% for other types of insurance (insure.com 2009).
central question is how to establish a benchmark reference that promotes efficiency in rate setting. The current rate setting process in title insurance in Texas uses the entire set of companies in the marketplace as the reference set for determining expenses. Thus, there is no distinction between efficient and inefficient companies. It is desirable to input efficient companies for marketplace rate setting, and DEA provides a methodology for measuring firm efficiency as a starting point for more informed rate setting.

DEA benchmarking emulates the competitive market by identifying a reference set of market participants that are operating more efficiently in providing products or services in comparison with their peers. We derive our efficiency measure using the widely accepted frontier efficiency analysis model, DEA.

The DEA efficiency analysis is of the “win at your own game” type, allowing market participants to compete along identified dimensions of “inputs” (costs and expenses) and “outputs” (products and services), thus assessing the efficiency with the ratio of outputs to inputs. The market participants that can beat others in the “competition” are deemed efficient in converting the inputs into outputs. Efficient firms, those on the efficiency frontier, produce more output for their given level of input than do others in the marketplace. Once the operationally efficient market participants are identified, we set the insurance rate considering only their data for rate promulgation.

In the next section, we present a brief overview of the DEA method for efficiency determination and discuss the specific DEA model we selected for our analysis. An overview of title insurance and the Texas title insurance market, the context of our empirical analysis, is subsequently provided. We then discuss detailed model assumptions, input and output selections, and data descriptions for our DEA analysis. Lastly, we build on the DEA analysis results to develop an illustration of the proposed rate promulgation methodology.

Overview of the DEA Method and Choice of the DEA Model

To find the set of efficient insurance providers for rate promulgation, we adopt the widely used frontier analysis approach, DEA (DEA, cf., Cooper, Seiford and Tone, 2007). DEA evaluates the efficiencies of entities, or the decision-making units (DMUs), relative to their competitive peers in the marketplace. By generalizing the simple ratio definition of efficiency (one output over one input) to multiple inputs and outputs, DEA produces a production frontier consisting only of relatively “efficient” entities.

In DEA, entities are allowed to “compete” in their own ways by varying their combinations of inputs and outputs in light of different strategies and, yet, they are still comparable with each other with respect to their efficiencies. Any entities off the efficiency frontier are deemed “inefficient” and are given guidelines on how to improve by the efficiency analysis. Via careful choice of inputs and outputs in
DEA, we can select the relatively more efficient insurance providers to determine the benchmark for the promulgated rate setting, rather than relying on the entire set of providers operating in the insurance market as is currently done.

Figure 1 illustrates this concept graphically. Consider a collection of seven DMUs with a single input production a single output.

**Figure 1:** Illustration of the Efficiency Frontier

Example of seven DMUs with one input and one output: A = (2,2); B = (3,5); C = (4,1); D = (5,3); E = (6,7); F = (9,8); and G = (10,7). Those units on the efficiency frontier line are efficient.

DEA identifies the relatively efficient production units that yield the highest output relative to their input among a specified set of units. These efficient units (lying toward the top and to the left) are represented on the graph by A, B, E and F. The line connecting the efficient units is called the efficiency frontier or “envelopment surface” because it encapsulates or envelopes all the production units’ performance. The DEA units strictly inside the envelope or frontier—namely DMUs C, D and G—are said to be inefficient in the DEA analysis.

Two ways to see the inferiority of these interior production unit points are to note that for an inefficient unit, another collection of DMUs could produce the same amount of output with less output, or it could produce more output while using the only same amount of input. For example, comparing the interior unit D horizontally with A and B, we see D could perhaps produce as much output as it does, but with less input (since a linear combination of A and B located on the line between A and B horizontal from D has the same output as D but uses less input than D). Alternatively, by comparing D vertically with B and E, we see we could use a linear combination of B and E to produce more output than D while using only the same input.

The DEA method has been used extensively by researchers to study insurance company efficiencies in various business functions. Cummins and Weiss (2013)
provide a review of 74 papers that use the frontier efficiency methods to study insurers. A review provided by Eling and Luhnen (2010) contains 83 studies. In fact, many DEA models have been developed and applied to solve different practical problems in many fields (cf., Cooper, Seiford and Tone, 2007).

The classic BCC model (Banker, Charnes and Cooper 1984) is one of the most widely used DEA models allowing for variable returns to scale. We briefly summarize the BCC model in its original form below to highlight the intuitions of the DEA efficiency measure and analysis. A computer program to implement DEA in multiple dimensions is readily available in Cooper, Seiford and Tone, 2007.

Consider a collection of n DMUs that use multiple inputs to produce multiple outputs. We assume that DMU\(_i\) uses an amount \(x_{ij}\) of input \(i\) in production of outputs \(y_{ij}\). Similar to other efficiency measures using the ratio of outputs to inputs, DEA provides a measure of efficiency with multiple inputs and outputs, but it uses a weighted sum of inputs in the denominator and a weighted sum of outputs in the numerator (because there are multiple inputs and outputs).

**BCC Ratio Measure of Efficiency**

The BCC model incorporates multiple inputs and outputs and evaluates the efficiency of any unit (called DMU\(_0\)) by solving the following mathematical programming problem for DMU\(_0\) with inputs \(\{x_0\}\) and outputs \(\{y_0\}\):

\[
\text{Max } \{u_j \text{ and } v_i\},
\]

\[
\frac{\sum_{j=1}^{s} u_j y_{ij} - u_0}{\sum_{i=1}^{n} v_i x_{ii}},
\]

subject to

\[
\sum_{j=1}^{s} u_j y_{rj} - u_0 \leq 1, \quad r = 1, 2, \ldots, n,
\]

\[
\sum_{i=1}^{n} v_i x_{ri} \leq 1, \quad r = 1, 2, \ldots, n,
\]

\[
u_j \geq 0, j = 1, 2, \ldots, s, \quad v_i \geq 0, i = 1, 2, \ldots, m,
\]

and \(u_0\) is unconstrained in sign. Here the \(\{u_j\}\) and \(\{v_i\}\) are called virtual multipliers, and the ratio in (2) can be viewed as an indexed output over an indexed input, generalizing the usual ratio measure of efficiency with one output over one input. The computation in (2) is performed for all DMUs in turn by taking each sequentially as DMU\(_0\) in (2) until an efficiency ratio is calculated.
The BCC model allows for variable returns to scale for the DMUs, and whether increasing, constant or decreasing returns to scale are present depends on whether the optimal value of $u_0$ is less than, equal to or greater than zero. The ratio measure (1) is always less than or equal to one (since DMU$_0$ is included in the constraint set). If the ratio is less than one, some other group of DMUs can use the same inputs and same weights to produce larger outputs than DMU$_0$. A wealth of other DEA models was developed over the years for various theoretical and practical considerations. See Cooper, Seiford and Tone (2007) for details.

To develop our proposed promulgated ratemaking approach, we specifically choose an alternative DEA model, the range adjusted model (RAM) (Cooper, Parker and Pastor, 1999). The RAM model has the same intuition of output to input as the BCC model and produces the exact same set of fully efficient entities as the classical models such as the BCC model (Banker, Charnes and Cooper, 1984) or the CCR model (Charnes, Cooper and Rhodes, 1978).

The RAM model also allows us to correctly rank order even the inefficient entities by their relative operational efficiencies, while some other models do not. In addition, the RAM measure of efficiency is dimensionless and is invariant to changes in location or scale of both inputs and outputs. Using the RAM efficiency scores, we can obtain the desirable reference set of entities using pre-selected efficiency cutoff points to include both fully efficient and partially efficient ones. Therefore, it is appropriate for building our rate promulgation methodology in order to accommodate a regulatory perspective wherein enforcing full efficiency may not always be feasible or desirable.

The RAM model has been used in the insurance literature to evaluate efficiencies of different marketing systems and organization forms (cf., Brockett et al., 2005) and to compare different modeling approaches of insurer efficiency (Leverty and Grace 2010). See Cooper, Parker and Pastor (1999) for more details and the precise mathematical formulation.

Overview of Title Insurance and the Texas Rate Promulgation Process

Title insurance protects the property purchaser against defects in the ownership title of real property (such as previous owners or heirs having claim to the title, or workers or banks having listed liens against the property). It is an

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4. By converting (2) to an equivalent linear program, this is computationally easy to perform, and there are many readily available programs to do this analysis.

5. This is an important property for a DEA model to have when examining financial intermediaries since one wants the results not to depend on whether one uses dollars or pennies (or thousands of dollars) to numerate the variables.
indemnity insurance against past events rather than future events, and it can be thought of as mainly an errors and omissions insurance policy.

Lenders on real property insist on such insurance as a prerequisite to funding on financed mortgages to protect themselves (and the purchasers). It is a sizable market in the U.S. For example, in Texas in 2008, title insurers wrote more than 2.5 million policies with premiums in excess of $1 billion. However, unlike other insurances, the loss ratio is a relatively small part of the total premium. Sirmans and Dumm (2006) provide a comprehensive overview of the history and current development of the title insurance industry.

Although title insurance has hardly been in the public limelight, its importance is far-reaching and has drawn a lot of attention from the regulatory bodies. A report (GAO, 2007) by the Government Accountability Office (GAO) to the U.S. House of Representatives Financial Services Committee highlighted the significance of title insurance to the large consumer base (i.e., home purchasers). The report identified issues including the low level of competitions and the resulting unduly high prices with an analysis of a representative sample of six states: California, Colorado, Illinois, Iowa, New York and Texas. It also has recommendations for regulatory changes centered on better supervision over market conduct, better availability of cost data and better analysis of cost efficiency for proper rate setting. In addition, regulator-driven studies have been completed at the individual state level to investigate the price related issues.

Since a wave of early studies (e.g., Johnson, 1966; Hofflander and Shulman, 1977; and Rosenberg, 1977), the relatively little academic literature on title insurance has focused on the price, competition (or lack thereof) and efficiency of the industry (cf., Todd and McEnally, 1974; and Koch, 1993). More recently, Dumm, Macpherson and Sirmans (2007) extend Nyce and Boyer’s (1998) initial one-year analysis (with 1996 data) to an analysis on the financial performance of the title insurance companies for an extended period of time from 1995 to 2004. Based on their analysis, the authors say further studies are needed to examine competition and price level in the title insurance market. This article is in response to this call for further research via rate setting, an issue unaddressed in prior research.

In practice, title insurance rates are promulgated or heavily regulated in many states in the U.S. In Texas, title insurance rates are discussed at biennial rate hearings, and allowable rates for the market are promulgated by the insurance commissioner in an official regulatory order. The parties that participate in the hearings present extensive evidence and usually include the TDI staff, Texas Land Title Association (TLTA), the Office of Public Insurance Counsel (a consumer advocate group), and various major title insurance companies (e.g., Fidelity National Title Insurance Company).

The discussions in the rate hearings focus primarily on the determination of the loss provision, the expense provision and the profit provision. Each party will

present its own rate change proposal and provide supporting documentation of their research methodology and findings. Administrative law judges then make recommendations on the rate change, which the commissioner considers before deciding on the promulgated rate.

In order to further characterize the current ratemaking process and provide a basis for our empirical analysis, we briefly summarize the findings (i.e., Finding of Facts (FOFs) in the Commissioner’s Order) and decisions that appear in the latest Official Order of the Commissioner of Insurance of the State of Texas, “In the Matter of the 2008 Texas Title Insurance Biennial Rate Hearing,” published Nov. 4, 2010. For losses, the commissioner found that it is reasonable to have a 5% loss and loss adjustment expenses (LAE) provision in the rates, using the most recent five-year (2003–2007) average of policy year losses and LAE developed to ultimate. The commissioner also found a 6% profit provision to be reasonable, derived from an 11.25% after-tax cost of capital, a 4.06% after-tax investment income, a 1.75% premium leverage ratio and a 30%–31% tax rate.

The most critical issue in the rate setting process is the determination of reasonable expenses (since this constitutes such a sizable proportion of the rate). This was obtained by projections from a regression model of expenses on premium volume or policy counts. To estimate this regression model, the commissioner found it reasonable to use the most recent 10-year (1998–2007) industry-level aggregate data. A set of data adjustments for the expense items was also found to be necessary to arrive at a reliable estimation, which is detailed in a later section.

All title insurers were used in the regression regardless of their expense efficiency because there appeared to be no other reasonable methodology for determining how to cut firms for inclusion or exclusion in the promulgated rate setting process. This firm inclusion/exclusion decision is the issue we present criterion and a methodology to solve.

The impact of the organizational form and size of the title insurance agent was another issue brought to the attention of the hearing committee. Title insurance agents in Texas are classified into three types according to their organization forms: 1) independent; 2) affiliated; or 3) direct operations agents. Independent agents represent the largest number of producers.

In 2007 (the latest year for which we have data), there were 507 independent, 92 affiliated and 17 direct agents. Respectively, they wrote 40%, 46% and 15% of all agent-retained premiums.

Compared with independent agents, direct and affiliated agents may have better access to resources and expertise—such as the latest technology, market information and legal assistance—due to their close relationship with the underwriters. Perhaps due to this, although much smaller in number, direct and affiliated agents are much larger in volume than the independent agents. Based on 2007 data, the median retained premium for the group of affiliated agents is six times that of the independent agents, and the median for the direct agent group is 16 times larger.
Using the simple measure of on-level expense ratio, and as shown in Figure 2a and Figure 2b, different agent types appear to differ in their expense levels over time and by size—an issue of concern in the rating hearings. Per Figure 2a, among the three types of agents, a pecking order is suspected to be in place with direct operations being the most efficient, followed by affiliated agents and lastly independent agents. Also, agents were divided into five size groups based on

7. In Figure 2a and Figure 2b, outliers with extremely large expense ratios (>5) are removed to smooth out the curves. The impact on the general trends of removing outliers is small, as shown in the figures.

8. An on-level expense ratio is the ratio of expenses over the on-level premium. The on-level premium is the adjusted historical premium amounts based on the current rate, to account for the rate difference between rates then and rates now.
retained premiums with an equal number of agents in each group (Figure 2b). The size 1 group contains the smallest agents, and the size 5 group contains the largest agents. Underwriters are also included in the graph for comparison purposes.

Although the issues with respect to the agent types and sizes were discussed at the hearing, no specific analysis was submitted to support the conjectured effects on rates. Therefore, the commissioner disregarded these in the rate promulgation. After we develop a direct measure of operational efficiency for our rate promulgation methodology, we address these issues and discuss them in the Appendix.

An Empirical Illustration of the Efficiency-Based Rate Promulgation Methodology with Application to Title Insurance

Financial statement data is obtained from the Title Insurance Agents Statistical Report and the Title Insurance Underwriter’s Statistical Report. The reports are available on the TDI website at: www.tdi.texas.gov/reports/report8.html#title_rpts. Because the underwriter data is only available at the industry aggregate level, in our DEA efficiency analysis we focus on title insurance agents, which happen to be the most important market participants in this market. We include underwriter data later in the regression analysis.

Using data from 2005–2007,9 we first construct the input and output variables for the efficiency analysis of expenses. We use written testimonies by the presenting parties, the Administrative Law Judges’ recommendation and the most recent Commissioner’s Official Order for the 2008 Texas Title Insurance Rate Hearing to set up the rest of our analysis, ensuring that our results are verifiable and comparable to those presented in the hearing and applicable to future rate setting processes. This includes data adjustments of the expense items for the efficiency and regression analysis (data period 1998–2007), the regression model for expense ratio estimation, and the estimated loss ratio and target profit rate used in the rate promulgation.

9. More recent data is available, but this data is the most recent which was used in a TDI determination of rates and factors and processes. Accordingly, we used this data so as to be able to compare results with the actual TDI promulgated rates using detailed records of TDI processes in setting rates.
Data Adjustment of Expense Items and DEA Inputs and Outputs

When providing title insurance, agents consume resources to provide title search services and title defect protection in real estate transactions to fulfill the regulatory requirement and protect consumers/lenders. We model the title insurance agents’ “production function” from the regulator’s perspective (because the regulator sets rates). The outputs measure the amount of services provided, and the inputs measure the resources consumed in providing these services. As such, the two output variables selected are the agent’s retained title premium and the number of title policies written.

We use two input variables to categorize total agent expenses: 1) capital and labor; and 2) operational expenses. We combine capital (title plant lease) and labor (engaged in title search) because they are substitutes, and together they constitute the core expenses that support title agents’ operations. Operational expenses include expenses incurred to support daily operational functions, such as rent, utilities, office expenses (e.g., fax, mail and office supplies), and ordinary business expenses (e.g., accounting fees, legal expenses and insurance), as well as advertising and promotion, employee travel, education, and unidentified “other expenses” items in the agent’s financial report.

We also make three adjustments to the data following the hearing documents. First, we adjust the reported data to include expenses only for the rate-regulated title functions. Besides title insurance, title agents often are engaged in other related services such as escrow and non-policy services. These services are not rate-regulated and are not part of the hearing or the rate promulgation exercise. Therefore, we only include expense items identified to be related to the title insurance business in the agent-reported data.

Second, we exclude expense items that are inappropriate for the expense ratio calculations (e.g., bad faith claims, and fines and penalties). Certain pass-through items such as tax certificates and recording fees are excluded from both title revenues and expenses because the difference between revenues and expenses from these items has been considered insignificant.

Third, we adjust the historical data to arrive at on-level premiums. On-level premiums refer to premiums that would have been earned had the current rates been in effect for the entire data period. The on-level adjustment accounts for the...
impact of rate differences making historical data compatible and is considered necessary by the commissioner. We use the present rate level factor calculated and presented in the direct testimony by the TDI staff (cf., Crawshaw, 2009). We exclude agents’ data if they listed zero capital and labor expense or if they listed zero retained title insurance premiums.

A detailed documentation of the output and input variable definitions, including all the data adjustments, is given in Appendix A. A summary of such constructed input and output variables for the DEA efficiency analysis is presented in Table 1 for the sample period (years 2005–2007).

**Table 1:** Summary Statistics for DEA Inputs and Outputs

<table>
<thead>
<tr>
<th>Panel A Year 2005</th>
<th>Panel B Year 2006</th>
<th>Panel C Year 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Premiums (t)</strong></td>
<td><strong>Output Premiums (t)</strong></td>
<td><strong>Output Premiums (t)</strong></td>
</tr>
<tr>
<td>Year</td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>2005</td>
<td>6,481,874</td>
<td>1,920,997</td>
</tr>
<tr>
<td>2006</td>
<td>5,504,420</td>
<td>1,704,219</td>
</tr>
<tr>
<td>2007</td>
<td>3,834,942</td>
<td>1,568,260</td>
</tr>
</tbody>
</table>

Using the properly constructed inputs and outputs data, we run two sets of DEA analyses using the RAM model for the years 2005–2007 to make our results comparable to those in the most recently completed 2008 rate hearing. The first set of analyses obtains DEA evaluations among all title agents. The second analysis contains a separate DEA evaluation for each group of title agents within the three organizational forms: 1) affiliated; 2) direct operations; and 3) independent agents. This is to allow each group to have a representation of a reasonable size in the selected benchmark set for rate promulgation in the event that a particular group
should dominate the efficiency frontier. In the DEA analyses, each title insurance agent is viewed as a DEA “production unit” searching and examining titles to minimize losses and maintaining profits. A separate set of DEA analyses are run for each of the years in the three-year period 2005–2007.

While the housing market crash and the financial crisis starting in 2006 had non-negligible impact on the title insurance market, the most significant impact was on the incurred loss component due to increased title searches (including fraudulent behavior)—not on the expense ratio component upon which our analysis focuses. In addition, data from the Real Estate Center at Texas A&M University (http://recenter.tamu.edu/) shows the housing market has seen both rise and fall in our sample period. By covering both trends in the selected sample period, we capture a relatively complete cycle in our analyses. In the subsequent regression analysis, we also follow the commissioner’s order to adjust the projected premium for the adverse impact of the housing market crash.

The DEA efficiency analysis results are presented in Table 2 and Table 3, including the number of efficient agents and the percentage of efficient agents. Because the DEA efficiency analysis is run each time using a single year’s data, we have identified and counted the number of agents that are efficient in all three years (“all years”) and those that are efficient in at least one of the three years (“any year”). The “any year” definition is used to identify the efficiency-based reference sets for further analysis in order to accommodate possible fluctuations in efficiency over time.

Table 2 presents DEA efficiencies when all agents are evaluated together. It also presents the number of agents that are included in what we call a supra median efficiency set to accommodate a regulatory perspective for a more complete market coverage in ratemaking. The RAM model is used to run DEA analysis with all agents for each of the years in the data period 2005–2007. The efficiency evaluation for “all years” identifies agents that are efficient in all three years. The efficiency evaluation for “any year” identifies agents that are efficient in any of the three years. The supra median efficiency set consists of the top 50% of agents ranked by efficiency, and it is subsequently included in the regression models for expense projection.11 As can be seen in Table 2, about 2% to 3% of the agents are fully efficient.

11. We also performed DEA analysis with an alternative cutoff point of top 80% in efficiency; i.e., agents that rank within the top 80% are all included in the supra median efficient set. With this almost full market coverage, this top 80% efficient set of agents behaves only slightly better than the set of all agents, and sometimes similar to the set of all agents. Therefore, we do not present results for this set of agents in DEA result Table 2 and Table 4, regression results Table 7 and Table 8, and figures in the Appendix B.
Table 2:
DEA Efficiency Results (All Agents Together)

<table>
<thead>
<tr>
<th>Year</th>
<th># of Agents</th>
<th># of Efficient Agents</th>
<th>% of Efficient Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>593</td>
<td>16</td>
<td>2.70</td>
</tr>
<tr>
<td>2006</td>
<td>609</td>
<td>14</td>
<td>2.30</td>
</tr>
<tr>
<td>2007</td>
<td>617</td>
<td>14</td>
<td>2.27</td>
</tr>
<tr>
<td>All Years</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any Year</td>
<td>24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 on the next page presents the efficiency analysis results when each group of agents is evaluated separately. The RAM model is used to run a separate DEA analysis within each group of agents for each of the years in the data period 2005–2007. The efficiency evaluation for “all years” identifies agents that are efficient in all three years. The efficiency evaluation for “any year” identifies agents that are efficient in any of the three years. The “union” set of efficient agents in Panel D encompasses all efficient agents from the DEA evaluations for each of the three groups.

In particular, as shown in Table 3, almost 50% of the direct operations agents are efficient in the small group of 15–17 direct agents. About 15% of affiliated agents are efficient within their own group. In stark contrast, only 2% of the independent agents are operating efficiently, out of the large group of 500 independent agents. This might be due to the fact that independent agents in Texas are very diverse, can be much smaller in size, may not specialize in the title insurance business alone, and do not usually have access to the expertise and support of title underwriters. Panel D of Table 3 presents a reference set that encompasses all efficient agents from the DEA evaluations for each of the three groups.

Further, we calculate expense ratios for the efficient agents to verify if they incur lower expenses on average. We carry out the calculations based on both the efficiency evaluation pooling all types of agents together and the other evaluation where each type of agents is evaluated separately. Since there are a few agents with extremely large expense ratios, possibly due to data reporting problems that we are not able to identify, we present the median on-level expense ratios by efficiencies in Table 4. The on-level expense ratio is the expense over the on-level premium. Consistent with our hypothesis, while the median on-level expense ratio for all agents is above 0.95, efficient agents typically have much lower expense ratios of 0.6–0.7. This significant reduction suggests that averaging expenses incurred by all agents without discriminating on the basis of production efficiency will increase promulgated rates.
Table 3:
DEA Efficiency Results (Each Group of Agents Run Separately)

<table>
<thead>
<tr>
<th>Panel A Affiliated Agents</th>
<th># of Agents</th>
<th># and % of Efficient Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>84</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>88</td>
<td>13</td>
</tr>
<tr>
<td>2007</td>
<td>92</td>
<td>14</td>
</tr>
<tr>
<td>All years</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Any year</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B Direct Operations Agents</th>
<th># of Agents</th>
<th># and % of Efficient Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>17</td>
</tr>
<tr>
<td>All Years</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Any Year</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C Independent Agents</th>
<th># of Agents</th>
<th># and % of Efficient Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>493</td>
<td>7</td>
</tr>
<tr>
<td>2006</td>
<td>506</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>508</td>
<td>11</td>
</tr>
<tr>
<td>All Years</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Any Year</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel D The Union Set of Efficient Agents from Each Organizational Form</th>
<th># of Agents</th>
<th># and % of Efficient Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>593</td>
<td>29</td>
</tr>
<tr>
<td>2006</td>
<td>609</td>
<td>30</td>
</tr>
<tr>
<td>2007</td>
<td>617</td>
<td>33</td>
</tr>
<tr>
<td>All years</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Any year</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>
Table 4:
Median On-level Expense Ratios by Agent Efficiencies
(All Agents Together)

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Agents</td>
<td>0.9504</td>
<td>0.9616</td>
<td>0.9912</td>
</tr>
<tr>
<td>Efficient Agents Only</td>
<td>0.6369</td>
<td>0.5950</td>
<td>0.7253</td>
</tr>
<tr>
<td>Supra Median Efficient Agents (Top 50%)</td>
<td>0.9194</td>
<td>0.9438</td>
<td>0.9849</td>
</tr>
</tbody>
</table>

In Table 5, agent efficiencies are evaluated by the RAM model of DEA analysis with all agents for each of the years in the data period 2005–2007. The set of “supra median efficient” agents consists of agents that are ranked among the top 50% in efficiency. Median on-level expense ratios are calculated for each set of agents for each year.

Figure 3 clearly illustrates the relationship between agent efficiencies and expense ratios. For each year in the period 2005–2007, agents are first ranked by their efficiency scores (on the horizontal axis), and the median on-level expense ratio is calculated cumulatively for each efficiency score percentile (on the vertical axis). Figure 3 shows that median expense ratio increases almost monotonically as less efficient agents are successively included, with the most significant jumps occurring approximately before 50% of the agents are included.

For each year in 2005–2007, agents are ranked by their efficiency scores obtained by the RAM DEA analysis of all agents. Median on-level expense ratios are calculated cumulatively for each percentile on the Y-axis and plotted against the corresponding efficiency percentiles on the X-axis.

Table 5 illustrates the median expense ratio vs. agent efficiency when an agent’s efficiency is evaluated only within its own organizational form. Consistent with Figure 2a, affiliated and direct operations agents generally have lower expense ratios than independent agents. However, all efficient agents across the groups have significantly lower expense ratios than other agents in their group. Interestingly, although independent agents tend to incur much higher expenses in general, expense ratios for the most efficient ones are comparable with, and sometimes even lower than, those of the efficient direct operations agents and affiliated agents.

This finding has important implications for ratemaking. One of the major debates in the rate hearings is regarding whether a separate expense ratio (and insurance rate) should be promulgated for each group of agents. Our findings suggest if we use the improved ratemaking methodology and thus focus on (more) efficient agents only, between-group differences in expense efficiencies are much mitigated. Therefore, our findings support the commissioner’s view that separate rate promulgation should not be warranted.
Figure 3:
Efficiency Score Cumulative Percentile (Most Efficient to Least Efficient) Versus Cumulative Median On-level Expense Ratio (All Agents Together)
Table 5:  
Median On-Level Expense Ratios by Agent Efficiencies  
(Each Group Separately)

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Affiliated Agents</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0.8272</td>
<td>0.8635</td>
<td>0.3343</td>
<td></td>
</tr>
<tr>
<td>Efficient Only</td>
<td>0.5743</td>
<td>0.6568</td>
<td>0.6675</td>
<td></td>
</tr>
<tr>
<td>Panel B</td>
<td>Direct Operations Agents</td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td>All</td>
<td>0.7694</td>
<td>0.7425</td>
<td>0.7991</td>
<td></td>
</tr>
<tr>
<td>Efficient Only</td>
<td>0.7396</td>
<td>0.6325</td>
<td>0.3426</td>
<td></td>
</tr>
<tr>
<td>Panel C</td>
<td>Independent Agents</td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td>All</td>
<td>0.9825</td>
<td>0.9949</td>
<td>1.0182</td>
<td></td>
</tr>
<tr>
<td>Efficient Only</td>
<td>0.3607</td>
<td>0.7795</td>
<td>0.3372</td>
<td></td>
</tr>
<tr>
<td>Panel D</td>
<td>The Union Se. of Agents</td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td>All</td>
<td>0.9548</td>
<td>0.9695</td>
<td>0.9862</td>
<td></td>
</tr>
<tr>
<td>Efficient Only</td>
<td>0.4012</td>
<td>0.7582</td>
<td>0.31337</td>
<td></td>
</tr>
</tbody>
</table>

Note that in Table 5, agent efficiencies are evaluated when a RAM DEA analysis is run for each agent organization form for each year in the data period 2005–2007. In Panel D, “efficient only” “union set of agents” include efficient agents from any of the three DEA analysis for the three different agent organization forms. Median on-level expense ratios are calculated for each set of agents for each year.

Regression Analysis for Expense Ratio Estimation in Rate Setting

Following conventional industry methodology and the Texas insurance commissioner’s order, we run regression analysis to obtain the projected expenses and calculate the projected expense ratio for use in the title insurance ratemaking formula. Unlike the current rate promulgation process by the TDI that uses the expenses of all title agents, we define three smaller efficiency-based sub-sample sets to use in the regression: 1) the set of fully efficient agents wherein agent efficiency is evaluated among all types; 2) the set of fully efficient agents wherein agent efficiency is evaluated within their own agent type; and 3) the set of agents
ranked among the top 50% in efficiency when evaluated among all agent types, i.e., the supra median efficient agents.\footnote{We also ran the regression analysis using an additional sub-sample of supra median efficient agents with an 80% cutoff point to obtain an almost full market coverage by excluding only the agents that were in the bottom 20% in efficiency. The results are much closer to those using all agents, although we can still find that the projected expense ratio (as in Table 8) using regression results from this alternative reference set is slightly lower than using all agents. We only discuss the 50% supra median efficient set of agents in the paper to conserve space.}

Across the above three sets, we define the reference set of efficient (or supra median efficient) agents as the set of agents that are efficient (or supra median efficient) in at least one of the three years—i.e., the “any year” definition as previously described. This is to compensate for the possible fluctuation in efficiencies found in a single year. As a baseline case, a set of regressions are also run with all agents included, as was done when the insurance rates were promulgated by the commissioner’s order.

In addition to agents’ expenses, title underwriters’ expenses should also be included in the regression for the expense ratio estimation. We obtain underwriter’s financial data from the “Underwriters Experience Report” to the TDI (www.tdi.texas.gov/reports/report8.html#title_rpts).

Similar to data adjustments for the agent data, we make two adjustments to the underwriter data. First, we exclude certain expense items not appropriate for ratemaking purposes, including damages paid for bad faith suits, fines or penalties for violation of law, donations/lobbying, and trade association dues. Losses and loss adjustment expenses incurred also are excluded because they are already accounted for in the loss provision. Second, only the part of expenses associated with the rate-regulated title function are included in the expense projection for rate promulgation. Unlike the agent data, underwriters’ reported expenses are not broken into different components showing whether they are related to the title function or the other functions (such as escrow service). As a result, we perform a reallocation at the aggregate level by allocating to the title insurance function a proportion of the expenses according to the ratio of underwriters’ retained premium to their total title income. The expense item “net addition to unearned premium reserve” is not subject to this adjustment.\footnote{This data adjustment is consistent with what is done by the TDI in its direct testimony for the rate hearing.}

Because underwriter data is available only at the industry aggregate level, we are not able to run a similar set of efficiency analyses for the underwriters (so as to exclude from aggregate expense consideration the expenses from those inefficient underwriters), and we are forced to include all underwriters in the sample set for the regression analysis. Note that in title insurance, underwriters’ financial obligations lie primarily in the title losses and loss adjustment expenses, which constitute only a small proportion of the insurance rate. In addition, underwriters’ expense is much less than the agents’ expense and thus only accounts for a small portion of the total expense ultimately included in the promulgated rate. Therefore,
this simplification should have relatively minor impact on the expense ratio estimates and the promulgated rate.

Table 6 gives a description of the underwriter data relative to agent data at the aggregate level for the 10-year period 1998–2007, our regression analysis sample period following the commissioner’s order. We can see that agents retain around 85% of the premium collected and incur much higher expenses. Agents’ expense ratios are in most cases higher than underwriters’ expense ratios.

Table 6: Description of Underwriter Data

<table>
<thead>
<tr>
<th>Year</th>
<th>UW Premium/ Agent Premium</th>
<th>UW Expenses/ Agent Expense</th>
<th>Agent IR</th>
<th>Underwriter ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>0.2066</td>
<td>0.159</td>
<td>0.8076</td>
<td>0.6545</td>
</tr>
<tr>
<td>1999</td>
<td>0.2397</td>
<td>0.2129</td>
<td>0.9237</td>
<td>0.7180</td>
</tr>
<tr>
<td>2000</td>
<td>0.2182</td>
<td>0.1923</td>
<td>0.9169</td>
<td>0.7373</td>
</tr>
<tr>
<td>2001</td>
<td>0.1840</td>
<td>0.1956</td>
<td>0.8928</td>
<td>0.692</td>
</tr>
<tr>
<td>2002</td>
<td>0.1748</td>
<td>0.1720</td>
<td>0.8815</td>
<td>0.676</td>
</tr>
<tr>
<td>2003</td>
<td>0.1879</td>
<td>0.1962</td>
<td>0.8164</td>
<td>0.526</td>
</tr>
<tr>
<td>2004</td>
<td>0.2406</td>
<td>0.2277</td>
<td>0.8586</td>
<td>0.503</td>
</tr>
<tr>
<td>2005</td>
<td>0.2045</td>
<td>0.2009</td>
<td>0.8924</td>
<td>0.767</td>
</tr>
<tr>
<td>2006</td>
<td>0.2068</td>
<td>0.1888</td>
<td>0.8960</td>
<td>0.7182</td>
</tr>
<tr>
<td>2007</td>
<td>0.2305</td>
<td>0.2028</td>
<td>0.9221</td>
<td>0.482</td>
</tr>
</tbody>
</table>

Note that in Table 6, the retained premiums and the expense ratios (ER) are all adjusted to be on-level. In column 2 (3), the ratios of underwriters’ retained premium (expenses) to agents’ retained premium (expenses) are calculated. Column 4 and Column 5 present the expense ratios for agents and underwriters, respectively.

We use a time series regression model (4) to estimate the combined expenses of title agents and underwriters, using four samples of data. These are: (a) underwriters and all agents; (b) underwriters and efficient agents evaluated among all types; (c) underwriters and efficient agents evaluated within each type; and (d) underwriters and top 50% supra median efficient agents.14

14. We also performed another set of regression analysis using a number of policies written as the predictor variable for expenses: \( \text{Expense}_i = a + b \times (\text{Number of Policies}) \). However, there are some discrepancies in the number of policies written in the agent and underwriters’ reported data entailing a necessary adjustment of the observed number of policies for the regressions. Due to data limitations, this adjustment can be rather ad hoc. For example, in the direct testimony by the TDI staff (Crawshaw, 2009), a “judgment” factor of 0.45 is applied to calculate the total number of policies from the agent reported number of owner policies and agent reported number of total policies. We have run our analysis using only the number of owner policies and the adjusted total number of policies by the TDI method, and find the model significance (adjusted \( R^2 \) and F-value) is significantly lower across the samples than the presented model (4). Nonetheless, using parameter estimates from this alternative regression model, we can still find that the projected expense ratio using all agents as the reference set is about 9% higher than that using only the efficient agents. The insights from this alternative regression model are largely consistent with those presented in the paper. Therefore, we did not present these additional results in the paper.
\[ \text{Expense}_t = a + b^*\text{Premium Volume}_t \]  

In the various testimonies in the 2008 Texas Title Insurance Rate Hearing, several interested parties presented regression models similar to (4).\(^\text{15}\) Following the commissioner’s order, we take historical data from year 1998 to year 2007 (i.e., 10 years total) to find the predicted expense ratio for the year 2011, the beginning year for the promulgated rate change to take effect. We have adjusted all expenses and premium volumes to 2005 cost levels by using the gross domestic product (GDP) deflator obtained from the Bureau of Economic Analysis (www.bea.gov/national/nipaweb/TableView.asp?SelectedTable=13&Freq=Qtr&FirstYear=2006&LastYear=2008, last updated Feb. 29, 2012).

The regression analysis results are presented in Table 7. The results show that on-level premium is a strong predictor for expenses, as indicated by the high adjusted R\(^2\) and the small p-values.\(^\text{16}\)

Four samples are used: 1) underwriters and all agents; 2) underwriters and efficient agents where efficiency is evaluated among all agents; 3) underwriters and efficient agents when efficiency is evaluated within each agent’s own organization form; and 4) underwriters and the supra median efficient agents whose efficiency ranked among the top 50% as evaluated among all agents. An agent’s efficiency is calculated by the RAM model of DEA analysis for each of the years 2005–2007. An agent is determined to be efficient if it is efficient in at least one of the three years. Adjusted R\(^2\) and F statistic value are also presented for each model. P-values of the F statistics are presented in the parentheses. *** indicates statistical significance at the 1% level.

Based on the regression results in Table 7, we next calculate the projected expenses for year 2011. We derive the projected expense ratio by scaling the projected expenses by the projected premium volume. Following the commissioner’s order, because of the economic downturn, the projected premium volume in 2011 is assumed to be 15% lower than the average of 2006 and 2007.

\(^\text{15}\) Ultimately, neither the commissioner’s order nor the administrative judges’ recommendation to the commissioner formally gave a definitive specific regression model to use. We used (4) in a manner consistent with testimony.

\(^\text{16}\) Across the samples, the intercept has an extremely large p-value, suggesting that it is statistically indistinguishable from zero. As the intercept represents fixed expenses in this regression model, a plausible explanation is that it can be hard to separate out fixed expenses from variables expenses (varying with premium written) when the agents record their data items or report to the TDI. Due to the data limitations and the scope of our paper, we are not able to further investigate this issue. However, note that our predictor variable and the model itself are highly statistically (and economically) significant.
Table 7: Regression Analysis Results

<table>
<thead>
<tr>
<th>Panel A: All Agents</th>
<th>Panel B: Efficient Agents Evaluated Among All Agent Types</th>
<th>Panel C: Efficient Agents Evaluated Within Each Agent Type</th>
<th>Panel D: Supra Median Efficient Agents (Top 50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter Estimate</td>
<td>Premium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter Estimate</td>
<td>53.657</td>
<td>-25.67</td>
<td>-25.730</td>
</tr>
<tr>
<td>p-Value</td>
<td>0.4519</td>
<td>0.959</td>
<td>0.959</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.9581</td>
<td>0.948</td>
<td>0.959</td>
</tr>
<tr>
<td>F</td>
<td>206.95(0.0000)</td>
<td>142.15(C.0000)</td>
<td>216.20(C.0000)</td>
</tr>
</tbody>
</table>

The projections are executed for the four samples of data culled for efficiencies and are presented in Table 8. As was done for expenses, for the efficiency-based samples, premium is included only from agents that are deemed efficient (or supra median efficient) by the appropriate definition.

Table 8: Expense Ratio Projections

<table>
<thead>
<tr>
<th></th>
<th>Projected Premium ($)</th>
<th>Projected Expenses ($)</th>
<th>Projected Expense Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Agents</td>
<td>11,279,195</td>
<td>9,935,418</td>
<td>0.8809</td>
</tr>
<tr>
<td>Efficient Among All</td>
<td>5,018,869</td>
<td>4,016,336</td>
<td>0.8002</td>
</tr>
<tr>
<td>Efficient Within Each Type</td>
<td>6,082,603</td>
<td>4,983,341</td>
<td>0.8193</td>
</tr>
<tr>
<td>Supra Median Efficient Agents</td>
<td>8,595,202</td>
<td>7,237,999</td>
<td>0.8421</td>
</tr>
</tbody>
</table>

For Table 8, the projected premium for each sample for 2011 was calculated as 15% less than the average premium of that same sub-sample for the years 2006 and 2007. Projected expenses were calculated by substituting the projected premium into the regression model (3) using the parameter estimates in Table 7. The projected expense ratio is the projected expense over the projected premium volume. Four different samples are used for the projections: 1) underwriters and all agents; 2) underwriters and efficient agents when efficiency is evaluated among all agents; 3) underwriters and efficient agents when efficiency is evaluated within

17. Durbin-Watson test statistics are obtained to examine autocorrelations in the time series regressions, and they support the validity of the regression model.
each agent type/organization form; and 4) underwriters and the supra median efficient agents (top 50% as of efficiency when evaluated among all agents). An agent is determined to be efficient if it is efficient in at least one of the three years.

Table 8 shows that the projected expense ratio with all agents’ data is significantly higher than that with just the efficient subsets of agents. In fact, the subset of fully efficient agents evaluated among all agent types projects an expense ratio more than 9% lower than that produced with all agents’ data. Even when we use the supra median efficient agents (top 50% ranked by efficiency scores) to include much more of the market, the expense ratio projected is still significantly lower than using all agents’ data as is currently done. The findings illustrate that it is important to evaluate the operational efficiencies of title insurance agents in setting rates. Excluding data produced by the least efficient agents will lead to a significantly lower expense ratio provision, and that should be considered in the ratemaking process.

Thus, this DEA efficiency analysis has substituted economic efficiency notions from efficient frontier production behavior for competitive market enforced efficiency. Using the DEA efficiency-based rate promulgation methodology not only discourages inefficient expenses by excluding these extra expenses of highly inefficient producer in the estimated expense ratio or the promulgated title insurance rate, it also actively rewards efficiency. This is because the more efficient agents can still have a lower expense ratio than that implied by the promulgated rate if the reference set of firms includes all supra median efficient agents.

The efficiency-based methodology also produces a useful by-product giving guidance to the inefficient agents as to how to improve (cf., Brockett et al. 2008, Brockett et al. 2001). For each individual agent, the efficiency analysis will show exactly which inputs are being overused. Once the sources and relative magnitudes of the inefficiency are pointed out, the efficiency analysis also produces a benchmark set of agents who can utilize less expense to produce the same amount of products/services. See Brockett et al. (2001) for details.

**Premium Calibration for a Prototype Title Policy**

Based on the projected expense ratios, we can calculate the indicated rate change for rate promulgation using the ratemaking formula (1). According to the commissioner’s order, the proposed promulgate expected loss ratio is 5%, and allowable profit rate is 6%. Therefore, the difference in indicated rate change that occurs by taking expense efficiency into account (as opposed to setting rates using all efficient and inefficient agents) is obtained as the difference between applying formula (1) with the expense ratio projection based on all agents and applying formula (1) with the expense ratio projection based only on the more efficient agents.
Because expected losses and profit rate are the same in the two cases (and variable costs are incorporated into the fixed costs), after computation this reduces to the difference in projected expense ratio (determined by the regression) divided by (1-profit rate) = (0.8809–0.8002)/(1-0.06) = 8.59% difference in indicated rate change. The difference in indicated rate change between using all agents’ data and the supra median efficient agents’ data is (0.8809–0.8421)/94%=4.13%.

The economic implication of this promulgated rate differential can be significant. For example, for a house worth $100,000, the current promulgated premium (from the 2006 Rate Hearing) is $843.18 Consequently, the proposed efficiency-based methodology leads to a reduction in promulgated insurance rate change ranging between $35 (based on supra efficient agents) and $72 (based on fully efficient agents) from the current rate promulgation methodology. If the property prices are much higher, which would occur in most other cases, the economic impact will be much more significant.

The efficiency-based promulgated rate rewards “best practice” performance, while the originally promulgated rate rewards average expense performance. By using the new DEA based rate promulgation method, the regulator will be able to potentially increase social welfare and motivate the insurers’ quest for expense efficiency; a quest self-motivated by market competition in market-set rate environments.

In Appendix B, we further explore our efficiency analysis results and discuss a few related key controversies in the Title Insurance Rate Hearing, including: 1) if independent agents are “handicapped” and are consistently less efficient in expenses than affiliated and direct operations agents; and 2) if smaller agents are consistently less efficient in expenses than larger agents. We find strong evidences that larger agents are indeed more expense-efficient and some support for the relative inefficiency of independent agents. These findings likely also have policy implications for future rate setting practices.

Conclusions and Implications

This paper proposes an efficiency-based methodology for insurance rate promulgation, DEA. In order to provide a rate that is “not excessive” to the consumers, the rate promulgation methodology developed herein can substitute economic efficiency via DEA frontier analysis in lieu of market competition-based efficiency. The DEA method helps regulators determine what companies to use in the determination of allowable expenses, including expense-efficient companies and excluding expense-inefficient ones. This provides a more rigorous method for

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18. $100,000 is the largest reference house value for the title insurance rate setting in Texas. Title insurance rates for all house values greater than $100,000 are obtained based on the rate for a house worth $100,000. Therefore, we select this value in our illustrative premium calibration. The corresponding title insurance rate of $843 is obtained from the TDI’s website at www.tdi.texas.gov/orders/titlerates2004.html.
determining companies to include in ratemaking than currently exists. Some states, such as Texas, include all firms due to the lack of a justifiable methodology for determining an appropriate cut off for firm inclusion. We develop an empirical example showing the savings that can be obtained using the DEA efficiency-based method.

Using an efficiency measure developed from the widely accepted frontier analysis model DEA, we identify (relatively) more efficient insurance agents and base the rate promulgation only on their experience, rather than all agents’ experience as is done in most current rate promulgation practices. We illustrate our methodology in the context of the Texas title insurance market for three reasons. First, title insurance provides an appropriate environment to study efficient rate promulgation. Second, title insurance is actually promulgated or heavily regulated in most of the states in the U.S. In particular, title insurance is promulgated by the insurance commissioner through a biennial rate hearing in the Texas market. This allows us to improve upon and make a comparison with the actual ratemaking methodology used in practice. Third, because of the rate hearings, Texas title insurance data is publicly available for empirical illustrations of the methodology.

In an efficiency analysis of the Texas title insurance market during 2005–2007, we find that there is significant heterogeneity in efficiency across the insurance agents. On average, the efficient agents have an expense ratio 30% lower than the aggregate of all agents. Even the supra median efficient agents have significantly lower expense ratios. We also find that larger agents tend to operate more efficiently than smaller agents, and some evidence suggests that direct operations agents and affiliated agents are more efficient than independent agents.

Based on the efficiency analysis results and the most recent commissioner’s order for the Texas title insurance rates, we find that the proposed efficiency-based rate promulgation methodology has an economically significant impact on the promulgated rate change using data from 1998 to 2007. By substituting the efficiency-based reference sets for the aggregate market reference sets in the regression model for ratemaking, the resulted percentage rate change is 4% to 9% lower.

Future research can look into improving the estimation of the loss and profit components in the insurance rates. Further work is also needed to look into the driving forces of heterogeneity in efficiency across agent types and sizes, as well as explore applications to other promulgated rate environments such as credit insurance.
Appendix A

Variable Descriptions and Data Adjustments for DEA Efficiency Analysis

We selected two output variables and two input variables to assess title insurance agent efficiencies using the DEA analysis. Table A1 includes a list of the output and input variables (bolded) along with the corresponding data items (not bolded) from the Title Insurance Agent Statistics Reports submitted by the title insurance agents to the TDI (available at www.tdi.texas.gov/reports/report8.html#title_rpts). The two output variables—namely, total premium written and the number of policies written—measure the services that the title insurance agents have provided, and the two input variables include the core expense “Capital and Labor” to perform the title search services and the “Operational Expenses” incorporating all normal operating expenses they incur in doing business. For each title insurance agent and each of the three years in the data period for the DEA analysis (2005–2007), we obtain from the raw data reports the specific data items shown beneath the corresponding output and input variables in Table A1 and add them up to obtain the desired output and input variable values.

Table A1:
Description of Input and Output Variables for DEA Efficiency Analysis

<table>
<thead>
<tr>
<th>OUTPUT VARIABLES</th>
<th>INPUT VARIABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium Written</td>
<td>Capital and Labor</td>
</tr>
<tr>
<td>Number of Policies Written</td>
<td>Operational Expenses</td>
</tr>
<tr>
<td>Total Retained Premium</td>
<td>Salary</td>
</tr>
<tr>
<td></td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Title Plant &amp; Lease</td>
</tr>
<tr>
<td></td>
<td>Accounting &amp; Auditing</td>
</tr>
<tr>
<td></td>
<td>Insurance</td>
</tr>
<tr>
<td></td>
<td>Interest Expense</td>
</tr>
<tr>
<td></td>
<td>Legal Expense</td>
</tr>
<tr>
<td></td>
<td>Licenses, Taxes &amp; Fee</td>
</tr>
<tr>
<td></td>
<td>Postage &amp; Freight</td>
</tr>
<tr>
<td></td>
<td>Telephone &amp; Facsimile</td>
</tr>
</tbody>
</table>

|                        | Rent                        |
|                        | Utilities                   |
|                        | Equipment & Vehicle Lease   |
|                        | Depreciation                |
|                        | Directors Fee               |
|                        | Dues, Boards & Associations |
|                        | Advertising & Promotion     |
|                        | Employee Travel, Lodging & Education |
|                        | Other Expense               |
|                        | Damages for Bad Faith Suit  |
|                        | Fines or Penalties          |
|                        | Donations/Lobbying          |
|                        | Trade Association Fees      |

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Following the commissioner’s order and other hearing documents, three data adjustments are performed. First, in the raw data reports, all the expense data items are broken into title insurance-related and non-title insurance-related. We selected and included data items that are supposedly related to title insurance identified with “_TITLE” in the raw data files.

Second, a list of expense items are excluded from the “Operational Expense” input since they are deemed to be inappropriate for the promulgated rate. The list of excluded expenses is specified in Table A1.

Third, an on-level adjustment is made to historical premium amounts based on the current rate in order to account for any rate differences that have occurred in the data periods for the DEA efficiency analysis and the subsequent rate-setting regression model. All historical rate changes in the Texas title insurance market were promulgated by the rate hearings. We take the present level rate factors calculated and presented in the direct testimony of the TDI staff (Crawshaw, 2009), and we calculate the on-level premiums by multiplying the original premiums by the factors. The factors calculated for our data period (1998–2007) are presented in Table A2.

<table>
<thead>
<tr>
<th>Year</th>
<th>Present Rate Level Factor</th>
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</thead>
<tbody>
<tr>
<td>1998</td>
<td>0.835</td>
</tr>
<tr>
<td>1999</td>
<td>0.850</td>
</tr>
<tr>
<td>2000</td>
<td>0.850</td>
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<tr>
<td>2001</td>
<td>0.850</td>
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<tr>
<td>2002</td>
<td>0.859</td>
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<tr>
<td>2003</td>
<td>0.905</td>
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<tr>
<td>2004</td>
<td>0.935</td>
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<tr>
<td>2005</td>
<td>0.968</td>
</tr>
<tr>
<td>2006</td>
<td>0.968</td>
</tr>
<tr>
<td>2007</td>
<td>0.997</td>
</tr>
</tbody>
</table>

Please note that in Table A1, the output variables’ names (premium written and number of policies written) and the two input variables (capital and labor and operational expenses) are in bold, and the corresponding data items from the original agent reported data are listed beneath each output or input variable. The rightmost column contains the list of expense data items excluded from the calculation of the input variable “Operational Expenses” per the Texas insurance commissioner’s order and other rate hearing documents. All expense data items from the original agent reported data are the ones allocated (by the agents) to the title insurance business, identified with “TITLE” in the names of the data items.
For Table A2, the present rate level factors are used to make “on-level” adjustments to historical premium volume, in order to account for rate changes that have occurred during the historic data period. The factors in this table are taken from the direct testimony of the TDI staff (Crawshaw, 2009), where the factors were calculated based on historical rate changes promulgated by previous rate hearings. The on-level premiums are then calculated by multiplying the original premiums by these factors.
Appendix B

Discussions of Other Key Controversies in the 2008 Rate Hearing

In this section, we discuss a few other key controversies in the Title Insurance Rate Hearing that our methodology can address. These include: 1) whether independent agents are “handicapped” and are less efficient in expenses than affiliated and direct operations agents; and 2) whether smaller agents are less efficient in expenses than larger agents. These issues were discussed in the direct testimonies and other hearing documents. However, little evidence was provided to support a conclusive recommendation and as a result, no specific resolutions were given in the commissioner’s order. DEA can shed light on these issues.

Figure A1:
Median On-Level Expense Ratio for Efficient Agents by Agent Type in 1998–2007 (Efficient in Any Year as Evaluated Within Its Own Agent Type)\(^{19}\)

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\(^{19}\) Median on-level expense ratios are calculated for these sets of efficient agents during the ten-year period 1998–2007. Outliers (agents with on-level expense ratios greater than 5) are removed to smooth out the curves although the insights are largely the same if these outliers were included.
How to Set Rates If You Must

First, we test the suspected pecking order hypothesis for different agent organization forms with respect to their operating efficiencies. Figure A1 and Figure A2 plot the median on-level expense ratios from 1998–2007 (our sample period for the rate-setting regression analysis) for the efficient agents who were evaluated within their own groups and among all agents, respectively. Based on the two efficiency evaluations, we select the agents that are efficient in at least one of the three years (2005–2007) for which DEA analysis was conducted (i.e., the “any year” definition), and we calculate their on-level expense ratios for the years 1998–2007.

Figure A2:
Median On-Level Expense Ratio for Efficient Agents by Agent Type in 1998–2007 (Efficient in Any Year Evaluated Among All Agents Together)

Although the percentages of efficient affiliated and direct operations agents are much higher than that of independent agents, the median on-level expense ratios for the efficient independent agents are not necessarily larger than those of efficient affiliated and direct operations agents. These seemingly conflicting results suggest that the independent agents in general are less efficient, but the top performers can be very competitive against other types of agents. Our findings are consistent with the commissioner’s order in that the pecking order of agent

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20. We select agents that are efficient in at least one of the three years rather than in all three years in order to obtain a reasonable size of efficient agents to plot the figures.

21. The issue of whether the efficient performers in one group differ statistically from the efficient performers in another group can be statistically investigated using the Mann-Whitney type of rank statistics as presented in Brockett et al. (2005). See Brockett and Golany (1996) for a detailed description of an analytical approach to use rank statistics for efficiency comparisons between different programs (i.e., groups of DMUs).

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organization forms cannot be conclusively supported and does not warrant a rate
differential between independent agents and other agent types.

Figure A3 and Figure A4 contain similar sets of graphs of expense ratios by
agent types for the supra median efficient agent sets (i.e., top 50% in efficiency).
To identify the supra median efficiency sets, agent efficiency is evaluated among
all agents for each of the years in 2005–2007. A set of agents that is supra median
efficient in any of the three years (i.e., the “any year” definition) and a set that is
supra median efficient in all three years (i.e., the “all years” definition) are used to

The comparisons across different agent types using only the supra median
efficient agents are similar to those with all agents, where direct operations agents
have the lowest expense ratios, and independent agents have the highest expense
ratios. The insights here are more consistent with the suspected theory that
independent agents tend to be less efficient than direct operations and
affiliated agents.

Figure A3:
Median On-Level Expense Ratio for Supra Median Efficient
(Top 50%) Agents by Agent Type in 1998–2007 (Efficient in All Years,
Evaluated Among All Agents)
Additionally, we examine the impact of agent size on expense efficiency. Figure A5 and Figure A6 on the next page present median on-level expense ratio comparisons among efficient agents who belong to the large size group or the small size group. Because there are only a small number of efficient agents, we identify efficient agents in any of the three years (2005–2007) (i.e., the “any year” definition) and use only two size groups in these graphs to ensure a minimum number of agents in each group.22 We can see that smaller agents, even when they stand out as fully efficient in using the expenses to provide core title services in competitions with agents of all sizes, still have higher expense ratios than those efficient agents of larger sizes.

Figure A7 and Figure A8 on the next page present similar results for the two sets of supra median efficient agents (i.e., top 50% in efficiency) using “any year” and “all years” definitions. The plots for the set of supra median efficient agents confirm strongly that larger efficient agents have consistently lower expense ratios across the years. These findings provide evidence that smaller agents seem to be less efficient than larger agents, and the projected expense ratio may be inflated when smaller agents are included in the rate promulgation.

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22. The curves are still quite volatile because of the small number of data points for each curve.
Figure A5:
Median On-Level Expense Ratio for Efficient Agents by Agent Size Halves in 1998–2007 (Efficient in Any Year, Evaluated Within Each Agent Type)

Figure A6:
Median On-Level Expense Ratio for Efficient Agents by Agent Size Halves in 1998–2007 (Any Year, Evaluated Among All Agents)
Figure A7:
Median On-Level Expense Ratio for Supra Median Efficient Agents (Top 50%) by Agent Size Halves in 1998–2007 (All Years, Evaluated Among All Agents)

Figure A8:
Median On-Level Expense Ratio for Supra Median Efficient Agents (Top 50%) by Agent Size Halves in 1998–2007 (Any Year, Evaluated among All Agents)
References


Crawshaw, M., 2009. Direct Testimony of Dr. Mark Crawshaw in the matter of 2008 Texas Title Insurance Biennial Rate Hearing, SOAH Docket No: 454-09-0129.G.


A Preliminary Examination of Health Insurers Participating on Federally Facilitated Marketplaces

Cassandra R. Cole, Ph.D.*
J. Bradley Karl, Ph.D.**

Abstract

The federal Patient Protection and Affordable Care Act (ACA) mandated the creation of health insurance exchanges and 2014 marked the first year that coverage obtained through the exchanges takes effect. However, there currently exists little empirical evidence regarding the operational characteristics and financial performance of the insurers that have elected to participate on health insurance exchanges. As such, this paper examines the quarterly financial statement data reported to the NAIC of health insurers that elected to operate on health insurance exchanges in 2014. In the aggregate, the evidence presented in this paper suggests that insurers currently participating on exchanges are larger, well-established companies whose profits (expenses) are lower (higher) relative to previous time periods and other insurers not participating on exchanges. While data constraints preclude definitive conclusions regarding the effects of participation in insurance exchanges on insurer performance, the paper provides an important preliminary analysis that helps to inform regulators, policymakers and other health insurance market participants. Our analysis also highlights several areas of research that can be pursued by future researchers when data constraints become less binding.
Introduction

The federal Patient Protection and Affordable Care Act of 2010 (ACA) enacted measures that will likely change the health insurance market in a dramatic fashion (Harrington, 2010). One of the most significant changes brought about by the ACA is the creation of health insurance exchanges that facilitate the individual mandate by providing a place where Americans can “one-stop shop for a health care plan, compare benefits and prices, and choose the plan that’s best for them.”1 Through these exchanges, consumers can purchase health insurance policies from participating health insurers that cannot deny coverage, cannot discriminate against applicants based on pre-existing conditions and are limited to rating only on the four approved factors.2 The policies sold on the exchanges must also comply with specific regulations outlined by the ACA, such as the minimum medical loss ratio rule,3 and must provide coverage for essential health benefits, including inpatient care, outpatient care, prescription drugs, mental health care and maternity.4 As a result, the marketplaces (health insurance exchanges) for the purchase of health insurance coverage created by the ACA are considerably different than the marketplaces in existence pre-ACA era, especially as it relates to individual health insurance policies.5

Given the economic and social implications of the ACA, it is not surprising that the literature considers a wide range of topics related to health insurance

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2. The four approved rating factors are age, family size, tobacco use and geographic area. It should also be noted that the ACA limits the spread of premiums among insureds for age, tobacco use and geographic area. For example, for those 21 and older, the insurer cannot charge the oldest insured a rate greater than three times the rate charged to the youngest insured. For detailed information about the approved rating factors, see “Overview: Final Rule for Health Insurance Market Reforms,” available at www.cms.gov/CCIIO/Resources/Files/Downloads/market-rules-technical-summary-2-27-2013.pdf.

3. The ACA requires insurers to spend a minimum amount of premiums on medical care and health care quality improvement. If the minimum requirements are not met, insurers must rebate the difference to enrollees. Rules regarding the medical loss ratio can be found at www.cms.gov/CCIIO/Programs-and-Initiatives/Health-Insurance-Market-Reforms/Medical-Loss-Ratio.html.


5. Prior to the creation of the health insurance marketplaces, if a consumer was in need of health insurance coverage, the individual would have to “search” for companies that provided coverage within the area, compare the types of policies available (in terms of price and coverage), make a decision as to which insurer had the policy that fit his/her needs at the best price and complete the application process with that particular insurer. Additionally, there was always the possibility that the insurer would not be willing to issue the policy. Health insurance exchanges are designed to simplify this process by creating standardization across policies (bronze, silver, gold, platinum and catastrophic), one-stop shopping and a less complicated application process. For more information on differences in buying coverage pre- and post-ACA, see http://kff.org/health-reform/perspective/how-buying-insurance-will-change-under-obamacare/.
exchanges. For example, Sommers and Rosenbaum (2011) examine enrollment levels and pricing in the marketplaces in the context of Medicaid eligibility. Using survey data, the authors find that the ACA would lead to changes in eligibility for Medicaid and result in a sizeable shift of adults from Medicaid to the health insurance exchanges, or vice versa, within the first year. Austin, Luan, Wang and Bhattacharya (2013) consider the cost of employer-sponsored health insurance and find that increasing the cost of coverage could lead to an influx of consumers into the exchanges, which would increase federal outlays by billions of dollars. Eibner Price, Vardavas, Cordova and Girosi (2012) consider the health insurance-related decisions of small employers as it relates to self-insurance or utilization of grandfathered plans on the cost of coverage for employers on the Small Business Health Options Program exchanges. Others areas considered by previous studies include consumer support (e.g., Day and Nadash, 2012; Sinaiko, Ross-Degnan, Soumerai, Lieu and Galbraith, 2013), issues that should be addressed in marketplace creation (e.g., Jost, 2010) and the structure/governance of health insurance exchanges (e.g., Kingsdale and Bertko, 2010; Cole, Karl and Wade, 2014).

Despite the abundance of research related to the ACA and health insurance exchanges, less is known about the operational characteristics of health insurance companies participating on the exchanges. For example, McCue and Hall (2013) find that the ACA’s regulations influence health insurers’ medical loss ratios and expense ratios. In addition, while Dafny, Gruber and Ody (2014) examine insurers participating in health insurance marketplaces, the focus of their study is competition and pricing issues. Finally, while existing studies (i.e., Gunja and Gee, 2014; Cox, Claxton, Levitt and Khosla, 2013; Cox, Levitt, Claxton, Ma and Duddy-Tenbrunsel, 2014; and Holahan, Peters, Lucia and Monahan, 2013) provide information on the number of insurers participating on exchanges, what the states are doing to encourage participation by insurers and how participation has changed from 2014 to 2015, some of these studies include information on only some states and none provide any information on the financial and operational characteristics of the insurers participating on exchanges.6

The lack of empirical evidence on the subject represents a large void in the literature. Health insurance exchanges are vital for achieving the long-term objectives of the ACA, and the viability of the exchanges will be largely influenced by the financial characteristics and performance of the participating insurers. For example, financial characteristics such as size, capitalization and product mixes of insurers participating on exchanges are associated with a variety of consequences related to solvency, economies of scale and scope, market competition and the ability to adequately meet policyholders’ needs. Similarly, information regarding the financial performance of participating health insurers

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6. There is a specific process that insurers must follow in order to participate on an exchange. For those interested in participating on federally facilitated marketplaces, detailed information is provided on the Centers for Medicare & Medicaid Services’ (CMS) website at www.cms.gov/CCIIO/Programs-and-Initiatives/Health-Insurance-Marketspaces/qhp.html.
provides insight into the firms’ current and future ability to adapt to, and achieve operational success in, the newly created marketplaces. Empirical information regarding the characteristics of insurers that elect to participate on exchanges should, therefore, be of interest to a number of stakeholders—including regulators, policymakers, health insurers, policyholders and other economic agents—as they work to understand the economic and social consequences of the various provisions of the ACA.

Current data limitations present one of the most significant challenges to filling the void in the literature related to health insurers participating on health insurance exchanges. The first open enrollment period under the ACA began Oct. 1, 2013, and 2014 was the first year that coverage was provided through plans purchased on health insurance exchanges. As a result, there is limited data available on health insurance firms since insurers began operating on the exchanges. Many researchers are also unaware of the identities of the insurers that actively participate on the exchanges. This article attempts to overcome these data limitations and uses the most up-to-date data available in order to provide early insight into the financial performance and characteristics of health insurers participating on federally facilitated marketplaces and state partnership marketplaces.

Our analysis indicates that health insurers that have participated on health insurance exchanges are, on average, larger (in terms of assets) and better-capitalized insurers with more direct premiums and enrollees than non-participating insurers. To the extent that large, well-capitalized insurers are associated with positive market attributes such as lower default risk or economies of scale and scope, this finding helps to inform regulators and insurance consumers. Also, not surprising when considering the regulatory purpose of the exchanges, our analysis indicates participating insurers are heavily involved in individual health and Medicaid business. However, in terms of relative health enrollment, the average insurer participating on the exchange is most concentrated in group health insurance. We also believe this is an informative finding, as it suggests insurers participating on the exchanges did not go “all in” for the individual health insurance market but, rather, kept a significant degree of product diversification.

Because many policy debates on the consequences of the ACA for the insurance industry center on medical loss ratios, operating expenses and profitability, we specifically examine the extent to which these factors changed in the time period after health insurers began operating on exchanges. We find no evidence that insurers electing to participate on health insurance exchanges experienced any statistically meaningful change in medical loss ratios. However, we document a robust correlation between an insurer’s decision to participate on a health insurance exchange and changes in expense ratios and return on assets.

7. It should be noted that while some organizations, such as the Robert Wood Johnson Foundation, maintain plan-level data on insurers operating on exchanges, to our knowledge, no existing dataset also contains financial and organizational information on the insurers.
In particular, we find evidence that insurers participating on health insurance exchanges experienced statistically significant increases (decreases) in expense ratios (ROAs). This change in financial performance from the pre-exchange period to the post-exchange period was greater than that experienced by insurers not participating on exchanges. Our difference-in-differences analysis indicates that the increase in expense ratios incurred by exchange insurers during the post-exchange period was approximately 2.6% to 3.1% greater than the increase incurred by insurers not participating on health insurance exchanges. A similar analysis indicates that ROAs of insurers participating on exchanges decreased by approximately 3.0% to 5.0% more than insurers not participating on exchanges.

It is important to note that we make no claims that exchanges caused expense ratios to rise and ROAs to fall. Many factors could be responsible for increasing expenses and decreasing profitability, such as differences across lines of business, regulatory constraints and high initial administrative costs associated with commencing operations on the exchanges. Expenses and profitability may also be impacted by higher utilization by consumers who have not previously had access to health insurance or changes in business mix. As such, the correlations we document do not imply that operating on a health insurance exchange is an unprofitable proposition for health insurers that is fraught with high expenses.

However, because higher levels of expenses and lower levels of profitability are generally undesirable in the private marketplace, the robust correlation we document should be of interest to policymakers and should be further investigated to determine if these differences persist over the long term. To the extent that the adverse changes in performance we document are due to high initial capital expenditures required to commence operations on exchanges and/or high initial utilization, the differences may be temporary. Alternatively, there could be regulatory-specific, firm-specific or market-specific factors associated with operating on exchanges that lead to higher expenses and lower profitability. If this is the case, regulators would likely want to enact measures to alleviate these problems and promote market stability for the millions of Americans that rely on health insurance exchanges to procure affordable health insurance coverage.

While our analysis is inherently limited by the nature of our data constraints, it nonetheless provides some of the first empirical insight into the operations of health insurers on exchanges. It is our hope that, when more data become available, future researchers will be able to examine, in more detail, whether the differences we document between exchange and non-exchange insurers—in terms of size, line of business mix and other operational characteristics—have any consequences for policyholders and the long-term stability of the health insurance marketplace. We also hope that regulators take note of the fact that, at least initially, operation on health insurance exchanges is correlated with significant reductions in financial performance, as investigating the cause and persistency of this observation will be important for determining appropriate measures for ensuring the success of health insurance exchanges.
In the next section, we provide more detail on the data and sample used in our analysis. The following section provides information on the financial characteristics and performance of the firms in our sample. The last section concludes with a discussion of the results and of future areas of research.

Sample Selection

The sample of insurers examined in this analysis is selected based on several criteria, the first of which relates to the type of exchange in which a given health insurer participates. As discussed in various prior studies (e.g., CMS, 2013; Dafny et al, 2014; Cole et al., 2014), the states had three options in their development of health insurance exchanges: a state-based marketplace, a state partnership marketplace or a federally facilitated marketplace.8 Dafny et al. (2014) examines only the insurers participating in federally facilitated marketplaces or state partnership marketplaces, and our study utilizes the same strategy. In addition to being consistent with prior literature, there are several additional advantages of this approach, the first being that it creates homogeneity within our sample regarding the operational and managerial characteristics of the exchange. That is, excluding firms operating on state-based marketplaces allows for a cleaner analysis of insurer operations on exchanges that is not biased by state-specific features related to the design and management a particular state-based marketplace, which vary widely by state.9 Another advantage of our approach is that, as discussed in more detail below, we need only rely on one data source (HealthCare.gov) to identify insurers participating on exchanges, which helps to ensure that an exchange insurer is not incorrectly classified as a non-exchange insurer (and vice versa). Further, because 34 states opted for federally facilitated marketplaces or state partnership marketplaces, the total number of insurers participating in both exchange types is sufficient for reliable statistical analysis.

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8. If a state-based marketplace is chosen, a given state uniquely designs the characteristics of the exchange, including governance structure, the selection method of plans, mandated insurer participation and consumer assistance. Sixteen states and the District of Columbia elected to create a state-based marketplace. In contrast, seven states selected the second option of creating a state partnership marketplace, which is a hybrid exchange whereby a state enters into a partnership with the federal government to run the exchange. Finally, 27 states selected the federally facilitated marketplace, which allows the federal government to design and operate the exchange. For more information regarding the states’ decisions regarding health insurance exchanges, see CMS (2013), Dafny et al. (2014) and Cole et al. (2014).

9. For example, Colorado’s state-based marketplace utilizes a clearinghouse model to select plans and is governed by a quasi-governmental entity, while Kentucky’s state-based marketplace utilizes a market organizer approach to select health plans and is governed by an existing state agency. See the Commonwealth Fund’s Web page, “Health Insurance Marketplaces,” for more information on the characteristics of a given state’s state-based marketplace: www.commonwealthfund.org/interactives-and-data/maps-and-data/state-exchange-map.
Additionally, the analysis focuses on the health insurance exchanges for individual policies. As noted in Dafny et al. (2014), while marketplaces for small-group policies exist (e.g., Small Business Health Options Program exchanges), they are not yet compliant with various ACA requirements and data pertaining to the plans are not available. As a result, it is not possible to include the marketplaces for small groups in the sample. In addition, recent studies of the effects of ACA regulations on health insurer financial performance indicate that the effects are greatest for individual health insurers (McCue and Hall, 2013), suggesting that the greatest policy relevance is derived from an analysis of the individual market.

The federal website, HealthCare.gov, lists the names of all individual health plans participating in the states where the federal government operates the marketplace. Using this data, 144 unique insurers are identified as participating in at least one of the 34 federally facilitated marketplaces or state partnership marketplaces during calendar year 2014. Next, the names of the insurers identified on HealthCare.gov are matched, by hand, to the names of insurers filing quarterly health insurance financial statements with the NAIC during 2014, as well as the first two quarters of 2015. The intersection of the NAIC health insurance database and the plan information on HealthCare.gov results in 122 unique insurers, or approximately 85% of the exchange-participating insurers.

Once a health insurer identified on HealthCare.gov is matched with its NAIC company code, additional financial data pertaining to the firm’s operations are gathered from the NAIC health insurance database. Because the aim of this article is to examine insurers that operated on the health insurance exchanges since their existence, analysis of annual reporting data will not suffice, as the 2014 annual statement data is the only available source of annual data as of the writing of this article. However, health insurers have reported quarterly statements for all of 2014 and the first and second quarters of 2015, and this data is available via SNL Financial. While the quarterly data does not contain as much detail as the annual...
filings, it is the best source available for providing insight into the attributes and financial performance of health insurers operating on the newly created health insurance exchanges.

The appropriate sample period of this analysis is the time immediately surrounding the opening of exchanges and, as a result, financial data reported for each quarter beginning in the first quarter of 2012 through the second quarter of 2015 are utilized. While some of the analysis in this article utilizes quarterly data for 2014 and 2015 only, other analysis utilizes pre-2014/2015 quarterly data, and the sample time period used in each part of the analysis is specifically reported. Data elements used in the analysis include balance sheet information, income statement information and line of business-specific information reported each quarter. The ensuing sections of this article discuss the summary statistics and provide analyses of the data.

Examination and Comparison of Characteristics and Performance

An important objective of this paper is to examine the characteristics of health insurers participating on health insurance exchanges and compare these characteristics to those not participating. This information is reported in Table 1. Mean values of various measures of insurer financial operations are presented for firms participating on exchanges and, for a given measure, the value reported represents the average value during all four quarters of 2014, as well as the first and second quarters of 2015. For comparison purposes, Table 1 also includes information regarding firms not participating on health insurance exchanges.

The table suggests that insurers participating on exchanges are relatively large insurers. Firms selling policies on exchanges have, on average, approximately $348 million in direct health insurance premiums written (DPW), $306 million in surplus, $631 million in assets, $325 million in liabilities and more than 365,000 enrollees. All of these mean values are larger than those of insurers not participating on exchanges and a t-test of means indicates that the differences are

13. If, for a given firm-quarter observation, a negative or similarly illogical value was reported for premiums, liabilities, assets, enrollment or expenses, the firm-quarter observation was dropped. The imposition of these filters slightly reduced the number of insurers operating in a given quarter.

14. The sample of firms not participating on health insurance exchanges consists of firms filing quarterly reports to the NAIC but not identified by HealthCare.gov as an exchange participant.
significant at the 1% level. While it is currently unclear if the larger size of exchange-participating insurers is associated with economies of scale and scope, future research on the subject would likely be of economic and policy relevance. Furthermore, Table 1 indicates that firms participating on exchanges are well-established, with an average age of approximately 26 years, which is only slightly larger than the age of those firms not participating on exchanges. This difference is also statistically significant.

Table 1 also reports the mean values of variables capturing insurer organizational structure and extent of geographic diversification. The value reported for the “group” variable suggests that approximately 79% of exchange-participating insurers are affiliated with an insurer group, while the value reported in “licenses” indicates these insurers, on average, are licensed to operate in approximately three states. Results of t-tests do not indicate that participating and non-participating insurers differ in terms of organizational structure and geographic diversification.

Table 2 provides information on the proportion of a firm’s total enrollees that are attributable to a given line of business in all four quarters of 2014 and the first and second quarters of 2015. Given the Medicaid expansion provision of the ACA, as well as the fact that exchanges were established to facilitate individual health insurance purchases, it is not surprising that Medicaid and individual comprehensive health enrollments comprise a large majority of the average firm’s total enrollees. What is noteworthy is that, on average, group health insurance represents the largest line of business for firms in terms of relative enrollment. In particular, the information in Table 2 suggests that, of all the enrollees in a given firm, on average approximately 30% of those enrollees are in group health insurance. This may be due to the fact that health insurers heavily involved in the group health insurance market elect to provide individual coverage on health insurance exchanges because the limitations on rating factors now make providing this coverage more similar to providing group insurance coverage. More specifically, health insurers providing coverages on exchanges can only vary premiums among insureds on four factors: age; family size; tobacco use; and geographic location. This is similar to group insurance, which is typically experience-rated and coverage for members of the same group generally varies

15. In unreported tests, we also find similar statistically significant differences in these characteristics are present in the years before the exchanges were operational. This suggests that the differences reported in Table 1 are not solely attributable to the fact that ACA insurers play a role in two markets (i.e., traditional insurance markets and insurance exchanges) while the non-ACA insurers only play a role in the traditional insurance market.

16. There are a total of 11 lines of business in which health insurers operate: individual comprehensive; group comprehensive; Medicaid; Medicare; Medicare supplement; Federal Employees Health Benefits Program; dental; vision; disability; stop-loss; and long-term care. For the purposes of this analysis, the disability, stop-loss and long-term care lines are combined into the “other” category, as these are relatively small lines of business for almost all health insurers.
based on whether a person elects individual or family coverage and, in some cases, whether the insured is a smoker.\textsuperscript{17}

While there are potential benefits associated with operating in group, individual and Medicaid lines of business, there is evidence of a diversification discount in the insurance industry (e.g., Liebenberg and Sommer, 2008). Given the relative concentration in group, individual and Medicaid lines of business among participating health insurers found in this article, future analysis could consider the costs and benefits of product line diversification from the perspectives of both the firms and the policyholders participating on health insurance exchanges. Additional perspective on the extent to which group health insurance operations complement individual health insurance business provided on insurance exchanges would also be beneficial.

From a broader perspective, Table 2 suggests that insurers participating on health insurance exchanges have a different mix of products relative to non-participating insurers. In fact, t-tests indicate statistically significant differences in mean enrollment between participating and non-participating insurers in every line except Medicare supplement. While part of these differences are no doubt attributable to the fact that exchanges facilitate coverage under Medicaid and individual policies, the summary analysis in Table 2 indicates insurers participating on health insurance exchanges are significantly more (less) concentrated in individual and group (Medicare and dental) lines of business relative to their non-participating counterparts. This suggests that only the subset of firms that had prior expertise in individual or group lines, or that made a strategic decision to focus on exchange business, elected to participate on health exchanges. Whether this has any implications for market competition, efficiency of operations, policyholder efficacy and similar topics, therefore appears to be an important area of future research.

Table 3 explores differences in three ratios related to the financial performance of participating and non-participating health insurers in the time periods before and after the exchanges began operations.\textsuperscript{18} This table allows us to examine the extent to which the financial performance of participating insurers changed after entering health insurance exchanges, relative to non-participating insurers, via a simple difference-in-differences analysis. For insurers that participated on exchanges, the often-discussed medical loss ratio was around 86% before participation on exchanges and did not change much in the post-exchange period. This suggests that the average participating firm is in compliance with the

\textsuperscript{17} For additional information on factors affecting group health insurance policies and differences in costs of single versus family coverage, see www.shrm.org/legalissues/federalresources/pages/link-health-insurance-rates-smoking.aspx and http://kff.org/state-category/health-costs-budgets/employer-based-health-premiums/.

\textsuperscript{18} Note that the pre-exchange time period in our sample includes the eight quarters of 2012 and 2013, while the post-exchange time period includes the four quarters of 2014 and the first two quarters of 2015. Participating health insurers are the same as previously defined. Also, the financial ratios are winsorized at the 1st percentile and 99th percentile to reduce the impact of outliers.
ACA’s minimum medical loss ratio rule for group and individual health insurers. Further, while the difference between mean medical loss ratios of participating and non-participating health insurers was statistically different both before and after the exchanges opened, the difference in these differences is not statistically significant. That is, the slight increase in medical loss ratios of exchange insurers in the post-exchange time period was not statistically greater than the change in medical loss ratios of non-exchange insurers.

However, Table 3 indicates that, relative to firms that did not participate on health insurance exchanges, participating insurers incurred higher expense ratios in the post-exchange time period. This is evidenced by the fact that mean levels of expense ratios for participating insurers increased from 11.33% in the pre-exchange period to 16.77% in the post-exchange period. Non-participating insurers, on the other hand, experienced a less modest increase of slightly more than 2% in the post-exchange period. The difference-in-differences value is statistically significant at the 1% level and indicates that the increase in mean expense ratios of participating insurers from the pre-exchange period to the post-exchange period was 3.14% greater than the increase in expense ratios of non-participating insurers. That is, relative to their counterparts that did not participate on health insurance exchanges, firms participating on health insurance exchanges saw larger increases in expense ratios in the post-exchange time period.

Table 3 also suggests that insurers participating on health insurance exchanges experienced a reduction in profitability, as proxied by ROA. While it is evident that mean ROA levels were lower for both participating and non-participating insurers in the post-exchange time period, the reduction in ROA is greatest for insurers that elected to participate on exchanges. In particular, mean ROA for participating insurers fell from 3.44% in the pre-exchange period to -3.47% in the post-exchange period while non-exchange insurers ROA fell from 4.46% to .56%. The statically significant difference-in-differences value indicates that the decrease in mean ROA of participating insurers from the pre-exchange period to the post-exchange period was 3.01% greater than the decrease in ROA of non-participating insurers.

19. The minimum medical loss ratio rule requires insurers operating in the individual and small group markets to spend a minimum of 80% of premiums collected on claims costs and quality improvements, while large group insurers are required to spend 85%. Those not meeting these requirements must rebate the excess to insureds. This requirement went into effect in 2011. Information on the minimum medical loss ratio rule, as well as the specifics on calculating medical loss ratio for the purpose of rebating, is available at www.cms.gov/ccio/resources/Regulations-and-Guidance/index.html#Medical Loss Ratio.

20. Because the medical loss ratio requirements differ by the particular line of business, it is difficult to determine the exact number of insurers in our sample that will be required to provide rebates. However, of the firms operating on exchanges in our sample, 31 had a medical loss ratio of less than 80% in the first quarter of 2014 and that number dropped to 19 in the second quarter of 2014, suggesting that the majority of the firms are in compliance with the individual lines’ minimum medical loss ratio requirement. It is left to future researchers to provide more information on insurers’ compliance with medical loss ratio requirements when operating on health insurance exchanges.

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Given that other firm-specific factors may distort the differences in medical loss ratios, expense ratios and ROAs observed in the simple difference-in-difference analysis, it is important to consider a multivariate approach that holds such factors constant. As such, Table 4 and Table 5 present the results of a multivariate regression approach. In the regression models, the sample period includes the first quarter of 2012 through the second quarter of 2015 and the observational unit is the insurer-quarter level (i.e., 14 time panels). The sample of firms analyzed is the same as those previously analyzed in the simple difference-in-differences approach and therefore includes firms both participating and not participating on health insurance exchanges. Variables included to control for other characteristics of the firm that could impact financial performance are organizational form, size, capitalization, enrollment, product and geographic diversification.

The regression results presented in Table 4 are a multivariate difference-in-differences regression with standard errors clustered at the firm level. The variable of interest is \( DD \text{ Estimator} \), which is equal to one for participating firms in the post-exchange period. The magnitude of this variable’s coefficient indicates the degree to which the financial performance of exchange insurers changed from the pre-exchange period to the post-exchange period relative to the change in performance of non-participating insurers from the pre-exchange period to the post-exchange period.

As given in Table 4, \( DD \text{ Estimator} \) is not statistically significant when medical loss ratio is the dependent variable, confirming the results of the previous univariate analysis that the medical loss ratios of exchange insurers did not change more than non-exchange insurers when operations on the exchange began. However, \( DD \text{ Estimator} \) is statistically significant in the regression models in which expense ratio and ROA are the dependent variables, indicating a significant correlation between participation on exchanges and changes in performance. More specifically, the coefficient of 2.74 indicates that insurers participating on health insurance exchanges experienced an average increase in loss ratios that was 2.74% greater than insurers not participating on exchanges. Similarly, we find that the reduction in ROA from the pre-exchange period to the post-exchange period for participating insurers was, on average, 2.70% greater than the change in ROA experienced by non-exchange insurers.

Table 5 also identifies the differences in financial performance of exchange and non-exchange insurers in the pre- and post-exchange periods, but uses a
different multivariate regression specification. Here, the variable of interest is also \textit{DD Estimator}. But, by also including firm-level control variables, firm fixed-effects and quarter fixed-effects in the model, the magnitude of the coefficient indicates how firm performance changed in the post-exchange period, while holding many other potentially confounding effects constant. The results in Table 5 are consistent with those reported in Table 4. Specifically, we find that insurers participating on exchanges experienced statistically significant increases (decreases) in expense ratios (ROAs). This is evidenced by the positive and statistically significant coefficient of \textit{DD Estimator} in the expense ratio regression and the negative and statistically significant coefficient on the same variable in the ROA regression.

In addition, several of the firm-specific controls had varying statistically significant effects on the dependent variables. Specifically, firms that are members of insurer groups have lower expense ratios and medical loss ratios but higher ROAs. The results also indicate that insurer size is significantly correlated with medical loss ratios and ROAs, suggesting that size may be positively associated with operational benefits such as economies of scale and scope. Firms with higher levels of premiums to surplus, on average, have higher medical loss ratios and lower ROAs, suggesting that the financial strength of the firm has non-trivial implications for financial performance. Also, levels of enrollment appear to be significantly correlated with medical loss ratios and ROAs, although the coefficient suggests the magnitude of this correlation is negligible. Finally, the degree of product concentration has mixed effects on the financial performance of health insurers in our sample.

Taken in their entirety, the results of our univariate and multivariate difference-in-differences analysis suggests that, relative to non-participating insurers, firms participating on health insurance exchanges experienced an increase in expense ratios and a decrease in ROAs. Given the short amount of time that the exchanges have been operating and the inherent data limitations, it is difficult to identify the exchanges as the cause of higher expenses and lower returns. Thus, it should be clear that our analysis does not make any definitive claims of causality as it relates to the effects of exchanges on health insurer performance. Rather, our analysis identifies a robust correlation between changes in financial performance and the decision to participate on a health insurance exchange. To our knowledge, no other research has identified this correlation and our hope is that future research can shed more light on the causes, or persistence, of the correlation identified in this article.

For example, if individual, group and Medicaid lines are associated with higher expenses and lower profitability, then the previously discussed differences in line of business operations between the two groups is a potential explanation that could be explored. Other possibilities include regulatory constraints, high initial administrative costs associated with commencing operations on the
exchanges and/or higher initial utilization.\textsuperscript{23} As more time passes and more data become available, it will be important to consider whether the higher expense ratios and lower ROAs persist and to work to identify the potential cause(s) of the differences in performance among insurers participating on health insurance exchanges in comparison to insurers that are not.

\section*{Conclusion}

Health insurance exchanges are one of the most significant changes to the health insurance market brought about by the ACA. While they present insurers with a new platform to sell certain health insurance products, the operations and regulations of exchanges represent a different marketplace than that which existed in the pre-ACA era. However, largely due in part to data limitations, little is known regarding the characteristics of the insurers participating on health insurance exchanges and the extent to which they have found success. This lack of evidence on the subject represents a large void in the literature, as the viability of the exchanges will be largely influenced by the financial characteristics and performance of the health insurers participating. Our study helps to fill this void in the literature by examining quarterly financial statement data reported to the NAIC by the health insurers participating on health insurance exchanges and, thus, helps to inform policymakers, regulators and other participants in the U.S. health insurance marketplace.

Our univariate analysis indicates that insurers participating on health insurance exchanges have significantly higher levels of premiums, surplus, assets and liabilities, and have more enrollees when compared to insurers not participating on health insurance exchanges. To the extent that large, well-capitalized insurers are associated with positive operational benefits, this finding helps to inform regulators and insurance consumers. We also provide evidence that insurers participating on exchanges have a different mix of business relative to those that do not. Specifically, these firms operate more in the individual health, group health and Medicaid lines. This finding, too, helps inform policymakers and other health insurance market participants in that it suggests insurers participating on health insurance exchanges retained a degree of product diversification.

\textsuperscript{23} As it relates specifically to initial costs of commencing business on exchanges, this is another important area of future research. That is, the differences in expense ratio and ROA we observe with our limited data may be due to a variety of factors—including investments in software development, underwriting research and marketing efforts—all of which are likely required to enter into the new exchange marketplace. If, when more data becomes available, researchers can support or refute the notion that high initial investment costs explain the inferior financial performance of exchange firms, this would help to provide valuable perspective on whether some insurers have more advantages in the ACA markets than others.

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We also conduct univariate and multivariate difference-in-differences analyses to investigate whether the expense ratios, medical loss ratios and profitability of insurers changed when commencing operations on health insurance exchanges. We find no evidence that insurers participating on health insurance exchanges experienced any statistically meaningful changes in medical loss ratios. However, we document a robust correlation between an insurer’s decision to participate on a health insurance exchange and changes in expense ratios and ROAs. In particular, our analysis suggests that the increase in expense ratios incurred by exchange insurers during the post-exchange period was approximately 2.6% to 3.1% greater than the increase incurred by insurers not participating on health insurance exchanges. Similarly, we find that the ROAs of insurers participating on exchanges decreased by approximately 3.0% to 5.0% more than insurers not participating on exchanges. While we are not able to determine whether exchanges caused the changes in performance, the robust correlation document in our analysis is likely of interest to regulators and policymakers attempting to ensure the viability of health insurance exchanges that millions of Americans rely on for obtaining health insurance.

Our research also highlights several areas of future research that are likely of interest to regulators and academics alike. Researchers could consider whether the large, well-capitalized insurers found to participate on the exchanges enjoy any economies of scale/scope or efficiency gains that help to ensure solvency or result in benefits to policyholders. Areas related to market conduct of the insurers on the exchanges—such as collusive behavior, product differentiation, comparative advantages and consequences for competition/concentration of these insurers—could also be considered. Whether differences in product line operations or geographic focus influence firm performance or have consequences for policyholders is another topic that could be studied when more data is available.

Other potentially fruitful areas of research relate to the long-term effects of exchange participation on health insurer performance. The initial evidence presented in this paper suggests that participation on health insurance exchanges adversely affected the expense ratios and ROAs of health insurers. However, due to the short sample period, it is important for future researchers to determine if this continues to be the case beyond the initial operating period. More specifically, it is particularly important to consider the long-term implications for financial performance for insurers participating on the exchanges, including a detailed examination of the initial costs incurred by insurers to commence operations on the exchanges and the extent to which, if at all, these costs persist as time passes. Further, it is important for future researchers to consider if the financial performance of insurers on the exchanges has any consequences for policyholders as it relates to overall satisfaction and potentially the quality of care provided.
### Table 1: Financial Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange Insurers</th>
<th></th>
<th>Non-Exchange Insurers</th>
<th></th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td></td>
</tr>
<tr>
<td>DPW</td>
<td>$348,706.00</td>
<td>$652,457.70</td>
<td>$145,569.64</td>
<td>$364,091.90</td>
<td>$203,137.40***</td>
</tr>
<tr>
<td>Surplus</td>
<td>$306,514.00</td>
<td>$619,419.20</td>
<td>$118,507.64</td>
<td>$459,327.50</td>
<td>$340,820.66***</td>
</tr>
<tr>
<td>Assets</td>
<td>$631,464.00</td>
<td>$1,154,038.00</td>
<td>$256,313.34</td>
<td>$878,710.70</td>
<td>$381,150.80***</td>
</tr>
<tr>
<td>Liabilities</td>
<td>$325,249.90</td>
<td>$623,010.80</td>
<td>$131,812.14</td>
<td>$435,399.80</td>
<td>$193,587.80***</td>
</tr>
<tr>
<td>Enrollment</td>
<td>365,297.00</td>
<td>877,526.20</td>
<td>229,080.14</td>
<td>671,656.90</td>
<td>136,217.80***</td>
</tr>
<tr>
<td>Age</td>
<td>26.3</td>
<td>21.30</td>
<td>23.6</td>
<td>18.20</td>
<td>2.77***</td>
</tr>
<tr>
<td>Group</td>
<td>0.9</td>
<td>0.61</td>
<td>0.75</td>
<td>0.42</td>
<td>0.02</td>
</tr>
<tr>
<td>Licenses</td>
<td>2.24</td>
<td>7.42</td>
<td>3.09</td>
<td>7.81</td>
<td>-0.15</td>
</tr>
</tbody>
</table>

This table examines differences in financial characteristics between firms participating in exchanges and those not participating during all four quarters of 2014 and the first two quarters of 2015. Information in the column “Exchange Insurers” pertains to insurers identified by HealthCare.gov as participating on exchanges in 2014. Information in the column “Non-Exchange Insurers” refers to all other insurers in the NAIC health insurance database not classified as an “Exchange Insurer.” There are 695 insurer-quarter observations for “Exchange Insurers” and 3,824 insurer-quarter observations for “Non-Exchange Insurers.” The column titled “Difference” represents the difference in mean values of a given financial characteristic between “Exchange Insurers” and “Non-Exchange Insurers” and indicates whether the difference is statistically significant using a t-test of means. Here, * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level.

The definitions of the variables in this table are as follows: **DPW** is the direct premiums written across all health insurance in a given quarter for a given insurer. **Surplus** is the amount of policiesholder surplus for a particular firm in a particular quarter. **Assets** is the amount of net admitted assets reported by a given insurer in a given quarter. **Liabilities** is the amount of liabilities reported by a given insurer in a given quarter. **Enrollment** is the total number of health enrollees across all lines of business for a given insurer in a given quarter. **Age** is defined as the calendar year minus the year a given firm commenced operations. **Group** is an indicator variable equal to one if a given firm is a member of an insurance group in a given quarter and zero otherwise. **Licenses** is the number of states a given insurer is licensed to operate in during a given quarter. All dollar figures are scaled by 1,000.

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Table 2:
Line of Business Operations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange Insurers</th>
<th>Non-Exchange Insurers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td>25.86%</td>
<td>30.98%</td>
<td>6.78%</td>
</tr>
<tr>
<td>Group</td>
<td>30.74%</td>
<td>29.77%</td>
<td>21.43%</td>
</tr>
<tr>
<td>Medicaid</td>
<td>22.19%</td>
<td>35.43%</td>
<td>18.14%</td>
</tr>
<tr>
<td>Medicare</td>
<td>5.19%</td>
<td>0.90%</td>
<td>19.00%</td>
</tr>
<tr>
<td>Medicare/Supplement</td>
<td>19.3%</td>
<td>5.07%</td>
<td>1.52%</td>
</tr>
<tr>
<td>FEHB</td>
<td>39.6%</td>
<td>11.06%</td>
<td>1.37%</td>
</tr>
<tr>
<td>Dental</td>
<td>22.6%</td>
<td>7.54%</td>
<td>21.97%</td>
</tr>
<tr>
<td>Vision</td>
<td>0.83%</td>
<td>3.37%</td>
<td>5.21%</td>
</tr>
<tr>
<td>Other</td>
<td>30.4%</td>
<td>9.97%</td>
<td>4.58%</td>
</tr>
</tbody>
</table>

This table examines differences in line of business operations between firms participating on exchanges and those not participating during all four quarters of 2014 and the first two quarters of 2015. Information in the column “Exchange Insurers” pertains to insurers identified by HealthCare.gov as participating on exchanges in 2014. Information in the column “Non-Exchange Insurers” refers to all other insurers in the NAIC health insurance database not classified as an “Exchange Insurer.” There are 695 insurer-quarter observations for “Exchange Insurers” and 3,224 insurer-quarter observations for “Non-Exchange Insurers.” The column titled “Difference” represents the difference in mean values of a given financial characteristic between “Exchange Insurers” and “Non-Exchange Insurers” and also indicates whether the difference is statistically significant using a test of means. Here, * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level.

All values in this table reflect the proportion of a firm’s level of enrollment in a particular line of business relative to the total enrollment across all lines of business during a given quarter. The definitions of the lines of business are as follows: Individual is individual comprehensive health insurance. Group is group comprehensive health insurance. Medicaid is Title XIX Medicaid insurance. Medicare is Title XVIII Medicare insurance. Medicare Supplement is Medicare supplement insurance. FEHB is Federal Employee Health Benefits Program insurance. Dental is dental insurance. Vision is vision insurance. Other is other types of insurance with health-related features such as stop-loss, disability and/or long-term care insurance.
Table 3: Univariate Analysis of Various Financial Performance Ratios

Panel A: Medical Loss Ratios

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange Insurers</th>
<th>Non-Exchange Insurers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-ACA</td>
<td>MLR</td>
<td>86.10%</td>
<td>8.23%</td>
</tr>
<tr>
<td>Post-ACA</td>
<td>MLR</td>
<td>86.57%</td>
<td>10.54%</td>
</tr>
</tbody>
</table>

Panel B: Expense Ratios

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange Insurers</th>
<th>Non-Exchange Insurers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-ACA</td>
<td>ER</td>
<td>11.33%</td>
<td>17.77%</td>
</tr>
<tr>
<td>Post-ACA</td>
<td>ER</td>
<td>16.73%</td>
<td>24.10%</td>
</tr>
</tbody>
</table>

Panel C: Return on Assets

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange Insurers</th>
<th>Non-Exchange Insurers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-ACA</td>
<td>ROA</td>
<td>3.44%</td>
<td>16.87%</td>
</tr>
<tr>
<td>Post-ACA</td>
<td>ROA</td>
<td>-3.47%</td>
<td>22.57%</td>
</tr>
</tbody>
</table>

This table examines differences in various financial ratios between firms participating in exchanges and those not participating during the time period of the first quarter of 2012 to the second quarter of 2015. The unit of observation is the firm-quarter level and, in total, there are 10,038 firm-quarter observations in the sample. Information in the column “Exchange Insurers” includes firms identified by HealthCare.gov as participating in exchanges in 2014. Information in the column “Non-Exchange Insurers” refers to all other insurers in the NAIC health insurance database not classified as an "Exchange Insurer." “Pre-ACA” refers to the time period in our sample before exchanges were implemented, which is the eight quarters of 2012 and 2013. Similarly, “Post-ACA” refers to the time in our sample after the exchanges went into effect, which is all four quarters of 2014 and the first two quarters of 2015. The column titled “Difference” represents the difference in mean values of a given financial ratio between “Exchange Insurers” and “Non-Exchange Insurers” and indicates whether the difference is statistically significant using a t-test of means. The column titled “DD” is the “Pre-ACA” difference in a given financial loss ratio between “Exchange Insurer” and “Non-Exchange Insurers” minus the “Post-ACA” difference in a given financial loss ratio between the two groups. Here, * indicates significance at the 10% level, ** indicates significance at the 5% level and *** indicates significance at the 1% level.

The definitions of the variables in this table are as follows: MLR is the medical loss ratio for a given firm in a given quarter, which is calculated as total medical and hospital claims, less any reinsurance recoveries, scaled by net premiums earned. ER is the expense ratio for a given firm in a given quarter and is calculated as general and administrative expenses scaled by net premiums earned. ROA is the return on assets for a given firm in a given quarter, which is calculated as a firm’s net income scaled by net admitted assets. All ratios in this table are calculated by SNL Financial using quarterly health insurance statement data reported to the NAIC.
Table 4: Multivariate Analysis A

<table>
<thead>
<tr>
<th></th>
<th>MLR</th>
<th>ER</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD Estimator</td>
<td>0.3198</td>
<td>2.742**</td>
<td>-2.6975**</td>
</tr>
<tr>
<td></td>
<td>[0.654]</td>
<td>[1.13]</td>
<td>[1.157]</td>
</tr>
<tr>
<td>Post-2014 Indicator</td>
<td>-0.3281</td>
<td>2.710***</td>
<td>-1.9664***</td>
</tr>
<tr>
<td></td>
<td>[0.373]</td>
<td>[0.49]</td>
<td>[0.536]</td>
</tr>
<tr>
<td>Exchange Indicator</td>
<td>0.8721**</td>
<td>1.359*</td>
<td>-1.5130**</td>
</tr>
<tr>
<td></td>
<td>[0.399]</td>
<td>[0.79]</td>
<td>[0.695]</td>
</tr>
<tr>
<td>Group Indicator</td>
<td>-3.5844***</td>
<td>-2.058***</td>
<td>5.5606***</td>
</tr>
<tr>
<td></td>
<td>[0.398]</td>
<td>[0.57]</td>
<td>[0.654]</td>
</tr>
<tr>
<td>Size</td>
<td>2.2216**</td>
<td>-3.259***</td>
<td>0.2502</td>
</tr>
<tr>
<td></td>
<td>[0.126]</td>
<td>[0.16]</td>
<td>[0.161]</td>
</tr>
<tr>
<td>Premiums to Surplus</td>
<td>0.0186**</td>
<td>-0.0131*</td>
<td>4.0685***</td>
</tr>
<tr>
<td></td>
<td>[0.009]</td>
<td>[0.08]</td>
<td>[0.022]</td>
</tr>
<tr>
<td>Total Enrollment</td>
<td>-0.0000***</td>
<td>0.0000</td>
<td>0.0000***</td>
</tr>
<tr>
<td></td>
<td>[0.000]</td>
<td>[0.00]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Product HHI</td>
<td>-2.6362***</td>
<td>2.822***</td>
<td>0.0547***</td>
</tr>
<tr>
<td></td>
<td>[0.645]</td>
<td>[0.72]</td>
<td>[1.022]</td>
</tr>
<tr>
<td>Number of States</td>
<td>-0.1950***</td>
<td>0.2941***</td>
<td>1.193***</td>
</tr>
<tr>
<td></td>
<td>[0.033]</td>
<td>[0.07]</td>
<td>[0.030]</td>
</tr>
<tr>
<td>Constant</td>
<td>63.9267***</td>
<td>48.322***</td>
<td>4.9162***</td>
</tr>
<tr>
<td></td>
<td>[1.734]</td>
<td>[1.93]</td>
<td>[2.344]</td>
</tr>
<tr>
<td>Observations</td>
<td>10,208</td>
<td>10,288</td>
<td>10,208</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.0861</td>
<td>0.1304</td>
<td>0.0273</td>
</tr>
</tbody>
</table>

*Firm-clustered standard errors in brackets.*

*** p<0.01, ** p<0.05, * p<0.1

The definitions of the variables in this table are as follows: MLR is the medical loss ratio for a given firm in a given quarter, which is calculated as total hospital and medical losses, less reinsurance recoveries, divided by net premium income. ER is the expense ratio for a given firm in a given quarter and is calculated as general and administrative expenses divided by premiums earned. ROA is computed as a firm’s net income divided by net admitted assets. DD Estimator is equal to one for firms participating in health insurance exchanges in the post-exchange period. Post-2014 Indicator is equal to one for all quarters during which exchanges were operational (i.e., the first quarter of 2014 to the second quarter of 2015) and zero otherwise, for a given firm. Exchange Indicator is equal to one for firms that were identified as participating on health insurance exchanges in 2014 and zero otherwise. Group Indicator is equal to one for affiliated firms and zero otherwise. Size is natural logarithm of net admitted assets. Premiums to Surplus is the ratio of direct premiums written across all health insurance policies by the amount of policyholder surplus for a particular firm in a particular quarter. Total Enrollment is the total number of health enrollees across all lines of business for a given firm in a given quarter. Product HHI is the Herfindahl-Hirschman Index based on a firm’s enrollment levels in a given line of business in a given year during a given quarter. Number of States is the number of states a given insurer is licensed to operate in during a given quarter. The sample of insurers examined here is the same as described in the footnotes for Table 3.
Table 5: Multivariate Analysis B

<table>
<thead>
<tr>
<th></th>
<th>MLR</th>
<th>ER</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD Estimator</td>
<td>-0.0665</td>
<td>2.6559**</td>
<td>-4.9904***</td>
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<tr>
<td></td>
<td>[0.650]</td>
<td>[1.180]</td>
<td>[1.152]</td>
</tr>
<tr>
<td>Group Indicator</td>
<td>0.8457</td>
<td>-2.2085*</td>
<td>-1.6973</td>
</tr>
<tr>
<td></td>
<td>[0.858]</td>
<td>[1.282]</td>
<td>[2.138]</td>
</tr>
<tr>
<td>Size</td>
<td>-2.6707***</td>
<td>-6.4472***</td>
<td>6.9864***</td>
</tr>
<tr>
<td></td>
<td>[0.988]</td>
<td>[1.477]</td>
<td>[1.564]</td>
</tr>
<tr>
<td>Premiums to Surplus</td>
<td>0.0175***</td>
<td>-0.0008</td>
<td>-0.0638***</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.003]</td>
<td>[0.018]</td>
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<tr>
<td>Total Enrollment</td>
<td>0.0000***</td>
<td>-0.0000</td>
<td>-0.0000***</td>
</tr>
<tr>
<td></td>
<td>[0.000]</td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Product HHI</td>
<td>-1.3753</td>
<td>7.2427</td>
<td>12.2061**</td>
</tr>
<tr>
<td></td>
<td>[2.987]</td>
<td>[4.778]</td>
<td>[5.233]</td>
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<tr>
<td>Number of States</td>
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<td>0.0682</td>
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<tr>
<td></td>
<td>[0.145]</td>
<td>[0.115]</td>
<td>[0.295]</td>
</tr>
<tr>
<td>Constant</td>
<td>199.4854***</td>
<td>82.7861***</td>
<td>-78.4182***</td>
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<tr>
<td></td>
<td>[11.000]</td>
<td>[14.911]</td>
<td>[16.572]</td>
</tr>
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</table>

Observations 10,208 10,208 10,208
R-squared 0.0090 0.0284 0.0155
Company Effects included Yes Yes Yes
Quarter Effects Included Yes Yes Yes

Firm-clustered standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The definitions of the variables in this table are as follows: MLR is the medical loss ratio for a given firm in a given quarter, which calculated as total hospital and medical losses, less reinsurance recoveries, scaled by net premium income. ER is the expense ratio for a given firm in a given quarter and is calculated as general admitted assets scaled by premiums earned. ROA is computed as a firm's net income scaled by net admitted assets. DD Estimator is equal to one for firms participating in health insurance exchanges in the post-exchange period. Group Indicator is equal to one for affiliated firms and zero otherwise. Size is natural logarithm of net admitted assets. Premiums to Surplus is the ratio of direct premiums written across all health insurance scaled by the amount of policyholder surplus for a particular firm in a particular quarter. Total Enrollment is the total number of health enrollees across all lines of business for a given firm in a given quarter. Product HHI is the Herfindahl-Hirschman Index based on a firm's enrollment levels in a given line of business in a given year during a given quarter. Number of States is the number of states a given insurer is licensed to operate in during a given quarter. Note that firm and quarter effects are included in the regressions. Also, the sample of insurers examined here is the same as is described in the footnote for Table 3.
References


Own Risk and Solvency Assessment: Origins and Implications for Enterprise Risk Management

David M. Pooser*
Paul L. Walker**

Introduction

Solvency Modernization Initiative

Although the debate about the causes of the 2008 financial crisis is unsettled, the crisis caused many regulators to rethink regulation of the global financial system and industries such as banking and insurance. Furthermore, the liquidity crisis and federal takeover at AIG led to an additional critical review of how insurance is regulated and how a group or holding company view of an insurance enterprise might be valuable. Some regulators were concerned that the failure of an insurance company might lead to a “contagion effect” of weakening financial status or even company failures within the insurer’s group or of other firms associated with that insurer (NAIC 2010; NAIC 2015a).†

† Even before the financial crisis, the NAIC was continuing to move toward risk-focused exams. That earlier push included emphasis on culture, governance, risk assessment and control environment. These were items that examiners were going to request and although there were no specific documentation requirements as part of this 2007 focus, there were expectations that examiners would ask management about these areas. See NAIC letter dated Jan. 18, 2007, at www.naic.org/documents/committees_e_examover_fehgt_letter_risk_focused_exams.pdf.

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These critical reviews of the financial sector and insurance industry eventually gave birth to the NAIC’s 2008 Solvency Modernization Initiative (SMI). The NAIC singled out the SMI as a focus for its 2010 agenda; on the agenda were considerations for changing RBC calculations, insurance company supervision and statutory accounting details (NAIC, 2010). Early documentation expressed concern over keeping up with global and economic changes, but the end goal was clearly stated as a focus on consumers: “We remain committed to maintaining a system that assures consumers that companies in our states have the financial means to meet policyholder obligations” (NAIC, 2010).

As part of its initiative, the NAIC looked to other modernization efforts such as Basel II, International Association of Insurance Supervisors (IAIS) efforts, Solvency II and other specific efforts found in jurisdictions such as the European Union (EU), Australia, Switzerland and Canada (NAIC, 2009). Early in the effort, the NAIC created a roadmap to guide the SMI, as shown in Figure 1. The road map included discussions on capital requirements, insurance group supervision, reinsurance, statutory accounting and financial reporting, and governance and risk management. The NAIC also emphasized that the SMI was not going to be just about solvency, but also would include a review of governance, risk management and more. The NAIC specifically mentioned enterprise risk management (ERM) as one of its “SMI ideas that merit consideration” (NAIC, 2009). As early as 2010, the NAIC considered requirements for ERM and Own Risk and Solvency Assessment (ORSA) for insurers that would be reported to the insurance regulator (NAIC, 2010). These considerations became more formalized in the NAIC’s Risk Management and Own Risk and Solvency Assessment Model Act (#505) (NAIC, 2012).

ORSA is described as an internal assessment (tailored to insurers based on size and complexity) performed by insurers that includes identification and evaluation of material and relevant risks for the insurers or insurance groups (NAIC, 2015b). Insurers should describe how their risks are managed and detail the sufficiency of capital for those risks. Additionally, the assessment should be done annually or whenever there are significant changes to insurers’ risk profiles (NAIC, 2014b). The goals of ORSA are to: 1) foster effective ERM (for all eligible insurers); and 2) provide a group perspective on risk and capital (for those insurers in an insurance group) (NAIC, 2014b). The stated purpose of Model #505 is to: 1) identify the requirements for a risk management framework; 2) provide guidance on completing an ORSA; and 3) provide guidance on completing the ORSA report (NAIC, 2012).
Model #505 has an effective date of Jan. 1, 2015, with filings beginning in 2015. It is up to each state to determine whether to pass Model #505 and to determine any necessary changes. Insurers are exempt from Model #505 (as written) if their direct premiums are less than $500 million and the insurance group’s direct premiums are less than $1 billion (NAIC, 2014b).^3

Figure 1: Solvency Modernization Initiative Roadmap

However, many smaller insurers may be likely to consider performing an ORSA. Advisory firm Baker Tilly notes that smaller insurers may consider ORSA because ERM is recognized as an industry best practice and will be considered by ratings agencies (Baker Tilly, 2014). An executive for insurance broker Willis notes that state regulators may require ORSA reports from troubled insurers of any size, which is supported by the NAIC Own Risk and Solvency Assessment (ORSA) Guidance Manual (Guidance Manual) (Ingram, 2013; NAIC, 2014b). Insurers with high growth potential may also consider performing an ORSA if their annual

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2. As of June, 2015, 35 states enacted the Risk Management and Own Risk and Solvency Assessment Model Act (#505), and the following three states are considering enactment (NAIC, 2015): Alabama, Massachusetts and Michigan. To date, the following states have not adopted Model #505: Arizona; Colorado; District of Columbia; Florida; Idaho; Maryland; Mississippi; New Mexico; North Carolina; South Carolina; South Dakota; Washington, DC; and West Virginia.

3. According to Model #505 (p. 3), this includes “direct written and unaffiliated assumed premiums, including international direct and assumed premiums” but excludes “premiums reinsured with the Federal Crop Insurance Corporation and Federal Flood Program.”

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premiums approach the $500 million threshold in order to prepare for this regulatory requirement. Walker, Pooser and Walker (2015) show that one-third of U.S.-based publicly traded insurers view ORSA as a material risk factor in their annual reports, which indicates that the insurance industry is concerned with the implementation of ORSA reporting requirements. As more states adopt Model #505, the industry’s concern with ORSA should only grow.

In this paper, we provide an overview of Model #505 and discuss the implications of each section within it. We then discuss the requirements ORSA places on insurers’ risk management framework and attempt to reconcile the requirements of Model #505 with the Insurance Services Office (ISO) and the Committee of Sponsoring Organizations (COSO) ERM frameworks. Finally, we discuss the implications of Model #505 for insurers, regulators and researchers.

The ORSA Guidance Manual – Overview

In order to facilitate ORSA implementation, the NAIC created the Guidance Manual to explain the purpose and requirements of ORSA, as well as exemptions from filing. The Guidance Manual specifically requires that non-exempt insurers maintain a risk management framework and conduct an ORSA. The Guidance Manual acknowledges that ORSA will be unique to each insurer and should reflect the insurers’ “business, strategic planning and approach to ERM” (NAIC, 2014b). Eligible insurers are required to file an ORSA Summary Report to their state insurance commissioners, and the Guidance Manual provides direction on the preparation of this report. According to the Guidance Manual, the insurance commissioners should expect that an ORSA Summary Report is a product of ERM and that it includes all “material and relevant” risks. The information within an ORSA Summary Report is also required to be consistent with the ERM information that companies would supply to senior managers and directors; i.e., insurers are not expected to withhold any information or change the information reported to the regulator (NAIC, 2014b).

The guidelines also require that the ORSA Summary Report should be supported by internal risk materials, which the regulator may request to review. As such, insurers should document their current ERM frameworks and processes. While the Guidance Manual states that the content of the ORSA and the supporting risk materials are confidential, many state regulators and others in the insurance industry have expressed concerns over the effectiveness of the confidentiality (NAIC, 2011; AM Best, 2015). While the ORSA Summary Report requires an internal-level disclosure of risk information, not all other regulatory and rating agency disclosures will contain the same level of detail (NAIC, 2014b). Insurers should consider how they will gather and communicate risk information to external monitors, as well as the sufficiency of their communication. One

consideration for insurers is that preparation of an ORSA Summary Report may provide a platform for the consistent reporting of risk data to other entities such as the U.S. Securities and Exchange Commission (SEC) and ratings agencies.

The ORSA Summary Report

The ORSA Summary Report should be the result of insurers’ own risk assessment. The ORSA Summary Report will be provided to the insurance regulator as the guide to understanding insurers’ material risks and the techniques employed to manage those risks. The ORSA Summary Report should contain three sections: 1) an ERM framework description; 2) an insurer assessment of risk exposures; and 3) a group assessment of risk capital and prospective solvency assessment (NAIC, 2014b).

Section 1 – ERM Framework Description

Section 1 of the ORSA Summary Report should contain a description of insurers’ ERM framework and the related risk principles/risk management policy statement. Model #505 sets forth minimum required reporting principles, which include: 1) risk culture and governance; 2) risk identification and prioritization; 3) risk appetite; 4) tolerances and limits; 5) risk management and control; and 6) risk reporting and communication. One implication of this section is that insurers will, perhaps for the first time, need to adopt a set of ERM principles to follow and communicate in their report.5 These new reporting requirements may be cumbersome for some insurers without an established ERM program and without organizational support to implement ERM. Several consulting firms—including Deloitte, KPMG, Ernst & Young, PricewaterhouseCoopers and Protiviti—are offering ORSA services to the insurance industry in order to assist insurers with filing an ORSA. Some insurers may look for ERM guidance from established frameworks such as those published by the COSO and ISO.6, 7

5. A survey conducted by St. John’s University and Protiviti (2015) shows that about 40% of responding insurers will begin conducting risk assessment as a result of ORSA and that 60% of responding insurers indicate a need for further training in ERM for management and the board of directors.

6. The NAIC states that “… insurers or insurance groups may utilize various frameworks in developing, implementing, and reporting on their ORSA processes (e.g., COSO Integrated Framework, ISO 31000 …)” in its 2014 Financial Analysis Handbook (NAIC, 2014a).

7. More aggressive insurers may develop an ERM vision statement, ERM charter, and a roles and responsibility for ERM plan. Harley-Davidson recently won an award for its ERM efforts and included all of these ERM elements (Walker, 2014).
Within Section 1 of the Guidance Manual, the first principle reported is risk culture and governance. Insurers must report the roles and responsibilities related to ERM, as well as their governance structure. Insurers must also report on their “risk culture.” No consistent definition of risk culture exists in academic or professional literature, although some authors attempt to provide a description of risk culture. For example, Roeschmann (2014) describes risk culture as “the product of organizational and group learning about what has or has not worked in the past,” which is a sort of experiential learning (at the corporate level). This idea is supported by the Institute of Risk Management (2012), which states, “The culture of a group arises from the repeated behavior of its members.” If these descriptions are accurate, firms may use the risk culture reporting requirement as an opportunity to describe how risk management has developed within the company based on successes and failures of the past.

A recent survey of insurers preparing to engage in ORSA suggests that risk culture, while critical, is not well-developed in many companies (St. John’s University and Protiviti, 2015). Ring, et al. (2014) note that regulators in banking and insurance industries, especially after the financial crisis, are requiring regulated companies to “take note of” and assess their own risk culture. Insurers should be prepared for regulators to ask how the company understands its risk culture and whether they have assessed that culture; the ORSA Guidance Manual sets forth that a minimum ERM framework establishes “a risk culture that supports accountability in risk-based decision-making” (NAIC, 2014b). This requirement may have implications for board members and managers, leading to questions about how risk culture is understood and how risk is measured within the firm.

The second principle from Section 1 of the Guidance Manual is risk identification and prioritization. This principle requires that insurers justify their risk identification process, assign responsibility of this task to someone within the company and that risk identification is performed within all parts of the business. The Guidance Manual states, “Any strengths or weaknesses noted by the commissioner in evaluating this section of the ORSA Summary Report will have relevance to the commissioner’s ongoing supervision of the insurer …” (NAIC, 2014b). This principle may be interpreted as a requirement to engage in a holistic ERM process (one that considers all risks across the firm) when coupled with the requirement to identify and categorize “relevant and material risks,” as well as the requirement from Section 2 of the Guidance Manual that insurers must assess both quantitative and qualitative risks identified in Section 1 (NAIC, 2014b). Additionally, because the ORSA Summary Report will have relevance on the insurance commissioner’s supervision of the insurers, an insufficient ERM process may lead to increased regulatory scrutiny for the firm.
The Guidance Manual requires that insurers describe how all of their major risks are identified—including qualitative and quantitative risks. For insurers and chief risk officers that traditionally focused on financial risks, this could be especially difficult (Ernst & Young, 2013). The Guidance Manual also explicitly states that insurers must identify and assess material risks. Additionally, insurers must be ready to explain why they believe they have identified all material and relevant risks. While the risk identification principle is cumbersome, it may have a long-term beneficial impact on insurers. There is evidence that the greatest destroyers of enterprise value are not financial risks but reputational risks and other types of low-frequency, high severity risks (Deloitte, 2014).

A potential area of concern for insurers relates to “missed risks”—losses that manifest and were never identified—as well as emerging risks. A weak risk identification process may lead to increased regulatory scrutiny of insurers (NAIC, 2014b). Insurers must ask if a failure to identify a risk that causes a loss or the failure to identify an important emerging risk will necessarily lead to increased scrutiny.

The third principle from Section 1 of the Guidance Manual requires a report of insurers’ risk appetite, tolerance and limits. The Guidance Manual recommends that insurers create a “formal risk appetite statement” with risk tolerances so that the board of directors can set strategy in accordance with documented risk principles. A COSO report defines risk appetite as “the amount of risk, on a broad level, an organization is willing to accept in pursuit of value,” (Rittenberg and Martens, 2012), which is consistent with definitions offered by other authors (e.g., Gai and Vause, 2005; Adalsteinsson, 2014). This principle should encourage insurers to explicitly document their willingness and tolerance to engage in risk across multiple risk categories. As stated in the Guidance Manual, each insurer’s ORSA Summary Report will be uniquely crafted by each insurance company, and this element of the report is one that may vary greatly across firms.

The fourth principle from Section 1 of the Guidance Manual is a description of insurers’ risk management and controls. While the Guidance Manual provides little detail on what is expected or what should be reported, the ISO 31000 ERM framework describes risk controls as activities that modify a risk (ISO, 2009), and a study by Ellul and Yerramilli (2013) shows that greater implementation of risk controls lead to reduced firm volatility in certain financial firms. This section of the ORSA Summary Report requires insurers to document measures used to reduce the frequency and severity of risks (i.e., risk controls) and the effect that this has on material risks. In addition, the Guidance Manual states that this principle should be an ongoing process, so insurers may need to show that risk

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8. Material risks are not defined by the NAIC in any of the ORSA documents we have reviewed, although examples of material risks are provided in the Guidance Manual. These examples include credit, market, liquidity, underwriting and operational risks.

9. It is likely that many insurers will tolerate risks differently across categories. (For example, some insurers may tolerate greater levels of underwriting risk depending on business mix and solvency.)
controls are continuously being evaluated, implemented and monitored on the
risks identified within the ORSA Summary Report.

The final principle in Section 1 of the Guidance Manual is risk reporting and
communication. This principle requires that insurers are transparent in
communication between the firm and its “key constituents” regarding risks and
risk management. A recent study showed that a lack of transparency and
communication can work against an ERM process and cause damage to a firm’s
risk culture (Walker et al., 2014). News stories of poor risk communication or risk
management at firms such as Lehman Brothers, General Motors and Washington
Mutual, which experienced insolvency and other problems, also give weight to the
importance of this principle. The Guidance Manual provides no definition of
constituents, so there may be some differences in interpretation among insurers
adopting ORSA. However, it is likely that key constituents will include
management, the board of directors and the insurance regulators.10

Section 1 of the Guidance Manual also requires insurers to report how the
firm monitors risk and how it detects and adjusts for changes in its risk profile.
The Guidance Manual states that the information contained in the Summary
Report should be consistent with ERM information reported to managers and
the board.

Section 2 – Risk Assessment

Section 2 of the ORSA Summary Report contains insurers’ assessment of risk.
Insurers are required to assess both qualitative and quantitative risks in normal and
stressed scenarios. (The Guidance Manual provides some guidance on the
interpretation of “stressed.”) Additionally, the impact of risks on the sufficiency of
capital to meet capital requirements should be addressed within this section.

While the Guidance Manual identifies several categories of risk that insurers
may consider, the Guidance Manual notes that certain categories—operational and
reputational risk are identified as examples—are difficult to measure using
conventional risk assessment techniques and may require qualitative risk analysis.
The Guidance Manual requires analysis of more than just financial and
underwriting risks (NAIC, 2014b). Further, the NAIC Financial Analysis
Handbook for 2014 notes that many of the risk categories for Section 2 may not
apply to all insurers or may be categorized differently by the insurance company
(NAIC, 2014a). The Guidance Manual encourages insurers to use models or
simulations when assessing the impact of risks to add rigor to their existing risk
management framework.11

10. A report by the International Association of Actuaries (2015) highlights the importance
of ORSA reporting to the board of directors and management of the firm.
11. Except in some cases, which we note below, managers within the firm are responsible
for creating reasonable inputs for these models.
Reporting requirements for risk assessment include descriptions and explanations of material risks, impact and likelihood estimates of material risks (while not explicitly required, the Guidance Manual does encourage probabilistic estimation of risks in Section 2), assumptions used to analyze risk, mitigation that might modify a risk, and outcomes of plausible loss scenarios. Insurers must report the potential impact of a risk on its balance sheet, income statement and future cash flows with Section 2.

Insurers also need to perform an analysis of expected losses, loss impacts or other outcomes. The inputs for these analyses should be justified in the ORSA Summary Report. For certain models or analyses (e.g., stress tests), the insurance regulator may provide inputs for insurers’ use or define the stress conditions to be used in these models.

Risk assessment should be performed at the level on which insurers are managed (i.e., at the group level if actively part of a group or at the company level if the legal entity operates independently). Section 2 also requires insurers to estimate risk interrelatedness. However, the wording of this requirement within the Guidance Manual is vague. The requirement appears to encourage management to consider relationships between risks categories that might, when combined, lead to insurance company failure.

Although this scenario may be unlikely, one interesting result from Section 2 is that insurers could potentially argue a need to hold less risk capital under ORSA than might be required by RBC requirements. “Insurers and/or insurance groups will be required to articulate their own judgment about risk management and the adequacy of their capital position” (NAIC, 2015a). Insurers should document their assessments in a clear, understandable and defensible manner.

Section 3 – Group Assessment

Section 3 of the ORSA Summary Report is the group assessment of risk capital and prospective solvency assessment. Insurers must detail how they combine qualitative and quantitative risk assessments to determine how much capital to hold for current and future business periods. This should be performed at the group level for insurers unless they are not part of a group.

The first subsection of Section 3, the Group Assessment of Risk Capital, requires insurers to report capital adequacy based on overall firm/group level risk. Insurers already have to satisfy RBC requirements based on underwriting risk, investment risk and other financial risks; Model #505 modifies the current law by requiring insurers to set aside risk capital for qualitative risks that are identified

12. For example, the Guidance Manual states, “History may provide some empirical evidence of relationships [between risk categories], but the future is not always best estimated by historical data, (NAIC, 2014b).”

13. The concern surrounding this occurrence is understandable given evidence from a recent study that showed that some of the largest declines in market value stem from multiple risks events manifesting around the same time (Deloitte, 2014).
and assessed in Section 1 and Section 2. The Guidance Manual also requires insurers to report how group capital and overall risk may be interrelated; external or internal changes may affect both values simultaneously. Finally, insurers need to report how their risk capital changes over time and why the value changes.

This subsection also details several methods that may be useful in assessing risk capital. Of important note, the assessment of group capital requires the elimination of double-counting assets (double gearing) for insurers in the same group. Insurers should also discuss liquidity of their capital and how quickly entities within the group can deploy capital from one to another. Additionally, insurers are to be alert to any material changes within their risk profile that might change capital adequacy measurement. Insurers may be asked by the insurance commissioner how they identify and attempt to manage such changes (e.g., macroeconomic or microeconomic changes) (NAIC, 2014b). If insurers already have an emerging risk identification process, these changes may be linked to the process. Alternatively, insurers may have tracking metrics and board reporting on new or changing risks on a regular basis. Recall, the ORSA is to be consistent with board reporting. Insurers should be ready for their board of directors to ask similar questions about changes in material risks.

The second subsection, the Prospective Solvency Assessment, requires insurers to estimate how they will prepare for future risk events based on their strategies and goals. This section relates to insurers’ long-term business plan and notes that insurers should prepare for potential losses and risks associated with executing this plan with risk capital. When reviewing this subsection of the Guidance Manual, we note similarities with the prior subsection. Where the prior subsection details insurers’ current preparation for risk conditions, this subsection allows insurers to tell insurance regulators how they will prepare for future risk conditions and potential changes to their risk profile. This may include an assessment of how today’s capital will progress and change and also includes future capital plans.

14. The Guidance Manual provides several examples of “considerations”—operational characteristics and other parameters specific to the insurance company—for assessing the adequacy of risk capital. Some examples of these considerations are definition of solvency, accounting regime, time horizon, risks modeled and more.

15. This prevents the insurance group from using the same capital to hedge two or more risks simultaneously through intra-group transactions.

16. The Canadian Office of the Superintendent of Financial Institutions (OSFI) details the board of director’s responsibilities related to risk assessment and management within the insurance industry. The OSFI places a large onus of responsibility on the board for ensuring that relevant risks to the firm have been identified and managed (OSFI, 2014). Similar responsibilities are being placed upon boards within U.S. jurisdictions (PWC, 2014).
The ORSA Framework

A unique feature of the Model #505 is that it explicitly states that insurers must assess the adequacy of their risk management framework (not just their risks). Given that ERM has been shown to add value (Hoyt and Liebenberg, 2011; McShane, Nair, and Rustambekov, 2011; Baxter, et al., 2013) and given some of the high-profile risk failures that insurers seek to avoid, knowing that the ERM process works carries potential value for an insurance company. Additionally, boards of directors may feel more confident knowing that their firms have a risk management framework that has been reviewed, documented and assessed (Lam, 2001; Gates, 2006).

The Guidance Manual specifically states that insurers are expected to “regularly, no less than annually, conduct an ORSA to assess the adequacy of its risk management framework, and current and estimated projected future solvency position” (NAIC, 2014b). Neither the COSO ERM framework (COSO, 2004) nor the ISO 31000 framework (ISO, 2009)—two established ERM frameworks—require the framework to be assessed. However, ISO 31000 does highlight continual improvement, monitoring and review of the framework, as well as improvement in the maturity of the framework.

Some insurers preparing for ORSA may already have an ERM framework in place. Model #505 requires all non-exempt insurers to have or adopt a risk management framework. The requirement to continually assess their risk management framework suggests that insurers might need to compare or benchmark their practices with other risk management standards. Two of the most widely adopted ERM frameworks are the COSO ERM Framework and the ISO 31000 Framework (RIMS, 2011). Table 1 on the following page compares the minimum reported principles required in Section 1 of the Guidance Manual with the risk management frameworks set forth by both COSO ERM Framework and ISO 31000. There is some overlap between ORSA and other common frameworks. There are also key differences. For example,

17. Harrington (2009) makes note of the importance of the importance of AIG’s losses on the insurance sector during the financial crisis but also notes that the majority of the insurance industry was mostly uninvolved during the financial crisis. Still, regulation has focused on the insurance industry as a part of the financial sector since the financial crisis and, therefore, ERM is a growing concern within the industry.

18. The ORSA framework is described in the ORSA Guidance Manual (NAIC, 2014b). The COSO and ISO 31000 ERM frameworks are described in documents that can be purchased from each organization. A robust comparison of the COSO and ISO frameworks (with several other ERM frameworks) is available in a 2011 RIMS report (RIMS, 2011).

19. For example, ORSA requires insurers to identify risks associated with their current business plan. Similarly, COSO emphasizes identification of risks that keep the company from meeting objectives. ISO also emphasizes achievement of objectives and adds that their framework can help a company improve its performance. Additionally, COSO, ISO and ORSA encourage probabilistic risk evaluation (considering the likelihood and impact of a loss) within their frameworks.
COSO’s ERM framework emphasizes the measurement of residual risk after other risk treatment techniques are implemented (COSO, 2004). ORSA provides little insight into the risk management process of the insurer and the measurement of residual risk.

ORSA also has some specific requirements not seen in other risk management frameworks. The ORSA Summary Report requires: 1) the equivalent of a chief risk officer signature; 2) the accounting basis used—generally accepted accounting principles (GAAP) statutory accounting principles (SAP), etc.; and 3) the time period to which the reported information applies (NAIC, 2014b). The ORSA Summary Report must also identify significant changes in material risks in each new reporting period. Insurers should be aware that some banking jurisdictions have passed internal capital adequacy assessments processes (ICAAP) and that those assessments have strict requirements over risk oversight and auditing. For example, the ICAAP supervisory statement for the Bank of England requires a sound risk process, linkage to strategic planning, board approval of risk tolerance and board of directors requirements to ensure management establishes a framework. It also requires an independent review (and potential use of internal or external auditors) of the related control structure. Insurers complying with ORSA might consider similar approaches (Bank of England, 2013).

<table>
<thead>
<tr>
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Impact of Model #505

Model #505 will create new challenges and opportunities for insurance companies, regulators and others stemming from the requirements to engage in ERM, report qualitative as well as quantitative risks, and hold a group-level view of capital adequacy. An important question for these parties will be: How does ORSA truly affect solvency? Insurance companies must currently satisfy solvency requirements related to their underwriting and financial risks. Does ORSA have the potential to upset current models and reporting requirements by adding a new element to solvency regulation? A potential concern is that ORSA reporting requirements will be duplicative with other regulatory requirements (American Academy of Actuaries [Academy], 2012). However, some authors argue that ORSA will help align ERM compliance with other reporting requirements and that ORSA may increase efficiency within the firm by encouraging improvement of an ERM process in the preparation of an ORSA (Spinard, Runchey and Collingwood, 2013). Overall, ERM is theorized to add value to a firm (Nocco and Stulz, 2006; Hoyt and Liebenberg, 2011). As ORSA requires insurers to maintain an ERM framework, a major question posed to the insurance industry will be: What are the value implications of this act?

Impact of ORSA on Insurance Regulators

The Guidance Manual states that the ORSA Summary Report “may” influence the “scope, depth and timing” of insurance commissioner examination procedures (NAIC, 2014b). Although the Guidance Manual suggests the ORSA Summary Report is relative to the complexity of the insurers’ risk profile (meaning a more complex profile should have a more complex report), it is plausible to assume that a poorly executed ORSA Summary Report may place an insurer under increased regulatory scrutiny. The Guidance Manual also mentions that strengths and weaknesses reported within the ORSA may affect the insurer’s ongoing supervision.

Insurance regulators will face new challenges stemming from ORSA because the collection, analysis and actions on new ORSA Summary Reports will be time- and resource-consuming. In an Academy report containing questions and answers related to the passage of ORSA, there are several notes that emphasize the need for state insurance regulators to devote more resources to the analysis of ORSA filings, including the potential hiring of new risk experts and the creation of departments to analyze ORSA reports (Academy, 2010). Within this 2010 report, in response to a question on the need for additional resources to cope with ORSA,

20. Russo, Resnick and Kwan (2014) note that the RBC formula does not account for all of the risk categories that will be reported in the ORSA (e.g., operational risk is not part of the RBC formula). Many existing solvency monitors are tailored to the entire insurance industry, while ORSA will be specifically crafted for each insurer.

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an executive from the Property Casualty Insurers Association of America (PCI) said, “We believe the costs for states will be significant.” Given the purpose of ORSA, insurance regulators that fail to devote adequate resources to understanding ORSA reports are unlikely to gain a higher-level understanding of insurers’ risk management decisions.

ORSA will also change the way that insurance regulators view capital adequacy among insurers. Part of the purpose of ORSA is to require insurers and insurance regulators to view qualitative risks (in addition to quantitative risks) as potential causes of financial distress (Shapella and Stein, 2012). Shapella and Stein (2012) argue that an ORSA should be more qualitative in nature than quantitative; the benefit from the ORSA process will only be realized if insurers effectively communicate these types of risks to insurance regulators.

**Impact of ORSA on Insurance Companies**

The numerous new requirements and potential changes from the Model #505 have created concerns for insurers. Walker, et al. (2015) report the top 20 risks identified by publicly traded insurers in SEC regulatory filings. The No. 1 risk reported (96% of firms identify this as a material risk) pertains to regulation within the insurance industry. A recent survey by St. John’s University and Protiviti Consulting of the U.S. insurance industry showed that insurers were concerned about many of ORSA’s requirements, including the preparation of an ORSA (St. John’s University and Protiviti, 2015). However, only 60% of respondents had conducted a gap analysis to determine what type of improvements would be required to maintain an ERM framework with new ORSA requirements. Roughly half of the respondents believed ORSA would alter the types of products sold and customers obtained. Additionally, according to the survey, nearly 60% of respondents believe managers and board of directors members will require additional training on ERM in order to comply with ORSA and that Model #505 will change corporate governance structure within their firms. Further, 40% of respondents stated that ORSA will cause them to start performing risk assessment, which indicates this practice is lacking from many large U.S. insurance companies.21

21. Other findings from the survey are that 60% of respondents believe ORSA will help improve management of emerging, strategic and financial risks, as well as risk culture. However, fewer than 50% of respondents believe ORSA will significantly affect operating, underwriting, market, liquidity and credit risks. This may indicate that insurers view ORSA as a means to improve qualitative risks but not quantitative risks—many of which have established models and methods of assessment.
In 2014, the SEC announced ERM was a national examination priority (SEC, 2014) which increases the pressure to engage in and report on firm risks for publicly traded insurers. With ERM requirements emerging from various governing bodies, a single risk repository or informative report by the insurer might lead to increased efficiency within the risk management and compliance areas of the firm and may also help reduce risk-related information asymmetries between insurers’ management, boards of directors and external monitors.

**ORSA Research Opportunities**

The stated goal of ORSA is listed as fostering effective ERM and providing a group level view of risk management and risk capital. There are many reasons companies are already doing ERM, including SEC board risk oversight requirements, rating agency pressure and pressure from shareholders for better risk management. Empirical research on ERM, which is still developing, has shown that ERM can lead to enhanced firm value (Hoyt and Liebenberg, 2011; Farrell and Gallagher, 2014; Grace, et al., 2015) and better decision-making processes (Gates, Nicolas, and Walker, 2012). With the passage of ORSA laws in many states within the U.S., researchers will likely begin to look at the potential value of ORSA within the insurance industry. Will it lead to increased value, or will it be viewed as burdensome regulation that lowers the ability of a company to compete in the market? Eastman and Xu (2015) approach this topic and find some evidence that insurers with ERM programs experienced higher stock returns than non-ERM insurers after the passage of Model #505. As more data becomes available on the company-specific attributes related to ORSA, more researchers will likely focus on the topic of firm value and ORSA.

There are other factors that researchers might consider, including: 1) how ORSA will change insolvency rates and capital adequacy; 2) rating agency responses to ORSA; and 3) the cost of capital for insurers under an ORSA regime. However, the full extent of research possibilities will require more information on the type of data available from ORSA filings.
References


The Economics and Regulation of Captive Reinsurance in Life Insurance

Scott E. Harrington*

Abstract

The use of captive reinsurance arrangements in life insurance has generated significant debate and led to recent adoption of new regulatory requirements by the NAIC. This paper provides an overview of the regulatory reserve requirements that spurred growth in captive reinsurance and how captive arrangements are used. It elaborates potential efficiencies and risks from the arrangements, as well as how insurers’ financial incentives, previous regulation, rating agency monitoring and monitoring by non-insurance creditors mitigate those risks. It provides evidence on the scope and structure of captive reinsurance using data from NAIC reporting requirements that became effective in 2013, and it compares A.M. Best ratings for life insurers with and without captive arrangements, documenting that most entities using captive reinsurance have relatively high ratings. Finally, it discusses the new NAIC regulatory framework for captive reinsurance arrangements and specific requirements for the amounts and types of assets permitted to back the arrangements.

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I. Introduction

Holding more capital to ensure payment of claims, protect going concern value, achieve desired financial ratings and/or meet regulatory standards increases insurers’ costs and generally requires commensurately higher premiums. The fundamental challenge of insurance solvency regulation is to establish financial reporting rules, controls and monitoring systems that help achieve the right balance between safety and soundness on the one hand and the cost of coverage to consumers on the other. This challenge is highlighted by debate over the use of captive reinsurance arrangements by life insurers, which has produced significant divisions among state regulators and among life insurance companies.¹

The use of captive reinsurance arrangements in life insurance has its roots in growth since the early 1980s of term insurance products and universal life insurance products with secondary guarantees (ULSGs), which provide consumers long-term death protection with level premium payments over time and little or no savings accumulation.² Like traditional, savings-oriented permanent life insurance products, the level premiums under these policies are expected to exceed the annual cost of benefits during the earlier years of the policy in order to fund benefits in excess of the level premiums in later years. Insurers are, therefore, required to establish liabilities, known as policy reserves, which reflect assumptions concerning the excess of the present value of expected future benefits over the present value of future premiums. The reserves required under statutory accounting principles (SAP) are based on conservative assumptions about future mortality and investment income compared with best estimates of the economic value of liabilities, thus providing a cushion against adverse experience in the calculated reserves. Reserves based on generally accepted accounting principles (GAAP), in contrast, are more closely aligned with the estimated economic value of liabilities.

Captive reinsurance arrangements primarily evolved in response to the adoption by state regulators in the early 2000s of more conservative statutory reserve requirements for level-term and ULSG products to mitigate the potential for certain policy features to cause insurers to understate their liabilities by manipulating those features. The new rules, however, created a quandary. Absent an alternative solution, the significant increase in required reserves for certain products would require insurers to hold more capital to avoid an increase in the probability of financial impairment and regulatory intervention, and an attendant decrease in financial strength ratings. That additional capital would materially

1. The term “captives” is used throughout this paper to refer to captives for life insurance, as opposed to captives for other types of risk and insurance. Issues similar to those addressed here have also arisen with respect to the use of captive reinsurance for variable annuities and long-term care (LTC) insurance.

2. Universal life policies with secondary guarantees (ULSGs) typically guaranty that the policy will remain in force for a specified period or indefinitely if the cash value becomes zero, provided that specified amounts of premiums have been paid.

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increase the costs of providing those products and premiums to consumers. Captive reinsurance arrangements evolved as a mechanism for managing capital to comply with the new rules at lower cost, facilitating lower insurance prices and more insurance protection.

The growth of captive reinsurance arrangements was accompanied over time by dialog and debate over potential risks from the arrangements and the efficacy of the formulaic reserve requirements that spurred their growth. In December 2012, the NAIC approved, with dissent by some commissioners, a regime of principle-based reserves (PBR) that, if adopted by 42 states accounting for at least 75% of relevant premiums, will largely replace traditional formula reserves with requirements that permit substantially more flexibility in establishing reserves in relation to factors that influence the underlying economic value of insurers’ liabilities. Once implemented, PBR is expected to reduce but not eliminate the use of captive reinsurance.

In June 2013, a report by the New York State Department of Financial Services (NYSDFS), following an earlier media report, brought national attention to potential hidden risks from captive reinsurance arrangements and motivated renewed attention and regulatory proposals by state regulators. Borrowing language from the debate over “shadow banking,” the report asserted that such “shadow insurance” arrangements involve “shell” corporations, often located offshore, which are engaged in financial “alchemy” with little public disclosure to hide financial weakness and inflate capital ratios. The report suggest the arrangements placed the broader financial system at risk, with parallels to the subprime mortgage crisis and federal bailout of the American International Group (AIG) in 2008. The study recommended a national moratorium on new captive

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3. Thirty-six states had passed relevant legislation as of mid-2015, and it is anticipated that principle-based reserving (PBR) will take effect in 2017 (Willkie Farr & Gallagher, 2015). Studies suggest that PBR would likely significantly reduce reported reserves for certain products for which current requirements exceed economic reserves (Milliman 2012, Towers Watson 2012).

4. Koijen and Yogo (2014a; also see 2014b and 2014c) purport to show that appropriate recognition of liabilities for “shadow insurance” arrangements would substantially reduce life insurers’ capital ratios and financial ratings and that expected capital impairment rates were much higher than implied by current financial ratings, producing large expected costs of life insurer insolvencies. Harrington (2014) highlights that study’s failure to consider how rating agencies actually evaluate captive arrangements and enumerates multiple biases in the estimates of expected costs. Koijen and Yogo (2012) estimate significant price reductions for immediate annuities and zero cash value universal life policies in late 2008, which they interpret as “fire sales” to improve reported capital during the financial crisis. The analysis basically assumes that failure to increase premiums significantly and immediately in response to sharply lower U.S. Department of the Treasury (Treasury) rates at that time and despite higher corporate bond yields constituted “fire sales.” The paper documents that companies most affected by the crisis on average shifted to safer assets, reduced shareholder dividends and raised external capital, which is clearly desirable from the perspective of safety and soundness. Niehaus (2014) provides evidence that internal capital flows among life insurance affiliates surrounding the crisis on average helped to improve capital ratios of weaker affiliates, which also is desirable from a safety and soundness perspective.
arrangements pending development of improved disclosure and uniform regulation.  

A subsequent NAIC study group white paper on captive arrangements recommended improved disclosure, greater uniformity of regulation and areas for further study, without a moratorium or significant new restrictions (NAIC, 2013). (The NAIC had earlier expanded financial reporting requirements for captive reinsurance transactions effective in 2013.) In late 2014, based on a series of reports by Rector & Associates (2013, 2014a, b), the NAIC approved a framework for further disclosure and, very importantly, for significant new requirements for insurers to receive balance sheet “reserve credit” for new captive reinsurance arrangements.

The present study—with financial support provided by the American Council of Life Insurers (ACLI)—explores the economics and regulation of captive reinsurance arrangements in life insurance to provide context and insight to help inform the policy debate. Section II provides an overview of the reserve requirements that spurred growth in captive reinsurance and how captive arrangements are used. Section III considers potential efficiencies and risks from the arrangements, and how insurers’ financial incentives, previous regulation, rating agency monitoring, and monitoring by non-insurance creditors mitigate those risks. Section IV provides evidence on the nature and scope of captive reinsurance using data from new NAIC reporting requirements for captive reinsurance in 2013. Section V summarizes A.M. Best ratings for life insurers with and without captive arrangements, documenting that most entities using captive reinsurance have relatively high ratings. The new NAIC framework for additional regulation of captive reinsurance is discussed in Section VI. The paper concludes with a brief summary and perspective on the use and regulation of the arrangements.

II. Reserving and Captive Reinsurance in Life Insurance

Reserves Based on Regulation XXX and AXXX

As noted, insurance company capital can be broadly defined in economic terms as the amount of assets held in excess of liabilities, which serves as a buffer

5. The New York State Department of Financial Services (NYSDFS) adopted expanded disclosure requirements for captive reinsurance in 2013. In 2014, the NYSDFS acknowledged that that statutory reserves for certain products significantly overstated anticipated mortality rates, and it issued draft regulations to relax reserve requirements for term life insurance issued beginning in 2015 (see Routhenstein, Schreiber and Silverman, 2014). The Federal Insurance Office (FIO) (2013) also recommended improved and consistent disclosure.
to help assure that policyholders’ claims will be paid if asset returns are lower than expected and/or claim costs turn out to be higher than expected. Specific calculations of regulatory capital for accounting purposes are based on SAP, which are conservative compared with GAAP. The term “economic capital” is often used to describe capital calculated with economic estimates of asset and liability values, which need not correspond with either SAP or GAAP values.

Other things equal, insurers that hold more capital in relation to their liabilities have lower insolvency risk and receive higher financial strength ratings than insurers with less capital. Strong financial ratings help insurers attract customers who care about security; they are a prerequisite in many cases for attracting a large customer base. Holding more capital is costly to insurers, thus on average requiring higher premiums to cover the increased costs. Insurers have strong incentives to manage capital efficiently to reduce costs and provide more attractive prices for any given level of financial strength. In addition to competitive market pressure for adequate capital and strong financial ratings, states impose elaborate minimum RBC requirements for insurers. Insurers that fail to meet the RBC minimums face various levels of regulatory intervention. Most life insurers hold capital substantially in excess of the RBC minimums in order to achieve high financial strength ratings, attract risk-sensitive customers, and reduce the likelihood of regulatory intervention or insolvency.

Because expected mortality rates increase with age, long-term life insurance policies with level premiums over time involve the payment of premiums in excess of mortality costs during the early life of policies to fund claim payments in later years when mortality costs are expected to exceed premiums. The sale of level premium policies, therefore, generates economic liabilities equal to the excess of the discounted value of expected future claims over expected future premiums. SAP and GAAP specify complex rules (or guidance) for calculating policy reserves. The more conservative the required assumptions, the greater the required reserve. SAP rules are more conservative than GAAP, producing larger SAP than GAAP reserves.

The actuarial mortality tables that are required for statutory reserve calculations are conservative and infrequently updated. Given inherent conservatism, lags in adjustment, long-term improvements in mortality, anticipated further improvements and diverse insurer underwriting standards, statutory reserves can significantly exceed economic reserves for certain life insurance products. The gaps between statutory and economic reserves motivate insurers to take actions to offset potential reductions in reported capital and the need to raise additional capital.

During the 1990s, regulators became concerned with strategies that some life insurers were using to reduce statutory reserves for certain level premium term policies and associated strains on capital associated with improved mortality. An insurer, for example, might have specified a relatively low level premium, with the

6. Statutory reserves also reflect other conservative assumptions, such as the assumption of no policy lapses for term insurance.
contractual ability to increase premiums up to a higher maximum amount in later years under extraordinary circumstances. Calculation of reserves using those higher maximums would reduce statutory reserves. After extensive debate, the NAIC adopted new reserve requirements for level premium term life insurance policies in 2000 that effectively required significantly higher reserves (known as Regulation XXX reserves) and that were subsequently implemented in all states. The new requirements were widely predicted to substantially increase the gap between statutory and economic reserves, putting upward pressure on term life insurance rates—even after the adoption of a revised mortality table in 2001. In 2003, the NAIC adopted new reserve requirements (known as AXXX reserves) for universal life policies with secondary guarantees, which in turn were implemented in all states. Those requirements were again modified in 2005, 2007 and 2012.

**Captive Reinsurance Structures**

Traditional methods of funding reserves have an inherent cost. The implementation of XXX and AXXX statutory reserves produced substantial pressure for insurers to adopt new methods of capital and reserve management to deal with the resulting capital strain from providing competitively priced products based on projected mortality, leading to the development and expansion of captive reinsurance arrangements. The arrangements have commonly been used to manage the difference between statutory XXX/AXXX reserves and economic reserves.

With captive reinsurance, the insurer writing the policy (the “ceding” insurer) enters into a reinsurance agreement with an affiliated reinsurer that is wholly owned by the insurer or, more commonly, its parent holding company. If certain conditions are met, and depending on the specific form of reinsurance, these sometimes complex and often customized arrangements allow the ceding insurer to take credit for reserves ceded and to reduce its required RBC associated with the policies ceded.

As is true for reinsurance with unaffiliated reinsurers, the ceding insurer receives such credit if the captive reinsurer is “authorized” by regulators in the ceding insurer’s state of domicile, which requires that the reinsurer be licensed or accredited in the ceding company’s state of domicile or in a state with equivalent laws to the domiciliary state. If not, the reinsurer—captive or otherwise—is considered “unauthorized,” and the ceding insurer generally receives reserve and/or required RBC credit only if the reinsurer’s obligations are collateralized by a qualified letter of credit (LOC) from an accredited bank, by the ceding insurer withholding specified funds on its balance sheet or by placing assets in a reinsurance trust account.

Captive reinsurance arrangements commonly take the form of “coinsurance,” a type of reinsurance used extensively in non-captive reinsurance. With coinsurance, the ceding insurer transfers assets and reserves to the captive. If the

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7. New York adopted similar requirements a few years earlier.
reinsurer is authorized in the ceding insurer’s state of domicile or meets the collateral requirements for credit for unauthorized reinsurance, a reduction in ceding insurer assets and reserves is allowed under statutory accounting and RBC requirements. As is true for non-captive reinsurance, captive reinsurance also can involve arrangements in which the ceding insurer transfers specified risks to the reinsurer without transferring associated assets. With “modified coinsurance” (modco), the ceding insurer maintains the assets and reserves on its balance sheet while transferring specified investment and mortality risk to the reinsurer and receiving credit in its required regulatory capital. With a “funds withheld” arrangement, the ceding insurer transfers policy reserves and specified investment and mortality risk, but it withholds the associated assets, reporting an offsetting accounts payable liability on its balance sheet. Because the ceding insurer maintains the assets, modco and funds withheld agreements generally entail less credit risk than regular coinsurance.

The details of captive reinsurance arrangements are often complex, and many variations are used. While the specific details generally are not publicly available, industry analysts, consultants and regulators typically highlight whether structures are funded or involve LOCs or related security (see, for example, Avitabile, 2012; Alberts, Hamilton, and Andurschak, 2013; Willkie Farr & Gallagher, 2013; Routhenstein, Schreiber, and Silverman, 2014; Stern, 2014). Under a basic funded structure involving coinsurance, the parent contributes capital to the captive. The ceding insurer cedes XXX or AXXX statutory reserves and transfers assets to the captive equal to the estimated economic reserves, which generally reflect some degree of conservatism compared with best estimates. The gap between statutory and economic reserves is then funded by the captive issuing surplus notes (or similar security) to a bank or other investors. The assets backing the estimated economic reserves and the proceeds from the notes are generally held in trust for the benefit of the ceding insurer. The assets backing the economic reserves and capital contribution from the parent are used to fund claim payments, with the proceeds from the lenders/investors used only if those sources of funds are inadequate. Funded solutions can be recourse—where lenders/investors have recourse to seek reimbursement from the parent company for any losses—or non-recourse. Funded structures became popular in 2003–2007, but the market for such structures largely disappeared with the onset of the financial crisis.

As an alternative to funded structures, many captive reinsurance arrangements employ structures where the gap between statutory and estimated economic reserves is collateralized by a bank LOC. Under a basic LOC structure, the parent contributes capital to the captive, the subsidiary ceding insurer cedes the statutory reserves and transfers assets to the captive equal to the estimated economic reserves, and the LOC backs the difference between statutory and estimated

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8. The NAIC’s Financial Analysis (E) Working Group recently conducted an extensive review of existing arrangements, but the details are not publicly available. Cowley and Cummins (2005) provide an early detailed treatment of securitization of insurance assets and liabilities in general.
economic reserves. LOCs can be short-term or long-term, unconditional or conditional, and recourse or non-recourse. While early captive arrangements involved short-term LOCs, the arrangements evolved over time to long-term agreements. The captive or parent can draw on an unconditional LOC for any reason. With a conditional LOC, draws generally are contingent on exhaustion of the captive’s other assets (including the parent’s capital contribution). Under a recourse structure, the LOC provider has recourse against the ceding insurer’s parent for any draws (i.e., the LOC entails a “parental guarantee”), as opposed to only having a claim against the captive in a non-recourse structure. Non-recourse LOCs became more common over time.

Funded structures involving credit-linked notes became popular as an alternative to LOCs in 2012–2013, with traditional reinsurers commonly serving as providers of financing (Routhenstein, Schreiber and Silverman, 2014). The basic structure involves the issuance by the captive of surplus notes to a special purpose vehicle (SPV) in an amount equal to the gap between statutory and economic reserves in exchange for a credit-linked note in the same amount. The credit-linked note is redeemable by the captive for cash in the event of a specified stress event, with an external counterparty, such as a reinsurer, funding the payment.

The regulation and accounting requirements for captive reinsurers are complex, varying across states and countries. Many captives are domiciled and regulated onshore in one of the states that has established specific rules and regulations to facilitate captive arrangements, including Delaware, South Carolina and Vermont. During 2010 and 2011, four states (Georgia, Indiana, Iowa and Texas) enacted Limited Purpose Subsidiary laws that permit domiciled insurers to establish captive vehicles with LOCs and parental guarantees as admitted assets. Other captives are located offshore and subject to regulation and taxation in offshore jurisdictions.

III. Benefits, Risks and Monitoring

Potential Benefits and Risks

Captive reinsurance arrangements can lower the cost to insurers and, thus, their customers of achieving a given level of financial strength in the presence of highly conservative, formula reserve requirements under statutory accounting. Insurance companies’ capital and risk management strategies are generally designed to achieve target financial strength ratings from insurance rating agencies that require capitalization and risk management well beyond regulatory minimums. The targets are chosen in view of the insurers’ underlying business models, policyholder preferences for safety and soundness, the potential loss of
companies’ franchise (going concern) value from financial distress, and the costs of holding capital.

Financial ratings are based on the likelihood of insurer financial difficulty, including very importantly the likelihood that the insurer will become subject to regulatory “impairment” and subject to regulatory action. Holding capital and risk constant, conservative regulatory reserve requirements that produce required reserves significantly greater than economic reserves increase the likelihood of impairment, with downward pressure on ratings. Insurers, therefore, are confronted with the choice between: 1) holding relatively more capital with attendant higher costs and need for higher prices to achieve impairment probabilities that are consistent with desired ratings, thus reducing the amounts of life insurance demanded by consumers; or 2) developing alternative mechanisms for achieving desired ratings at lower cost.

Captive reinsurance arrangements provide a mechanism for meeting rating agency criteria at lower cost than holding the additional assets and capital on insurers’ balance sheets that would be needed if captive reinsurance could not be used. While the details of the arrangements and specific effects on costs and prices are complex, the essence of the transactions is to obtain some amount of external financial support and/or guarantees, which can lower the cost of achieving desired levels of financial strength and ratings. As has been emphasized in the economic literature on securitization of financial obligations, sources of cost savings include broader diversification of risk; the segmentation of assets and/or liabilities to facilitate such diversification and risk evaluation by regulators, rating agencies and financing providers; and, in some instances, reducing tax costs, including those associated with corporate/investor double taxation of investment returns on capital.

Captive reinsurance arrangements also pose potential risks, including those associated with: 1) limited transparency; 2) levels of captive capitalization; 3) the riskiness and accounting treatment of captive assets; 4) the reliability of LOCs and related instruments as a source of financing; 5) the effects of parental guarantees; and 6) diverse state regimes for regulating captives. The key underlying risk is whether worse than expected mortality and/or investment experience could exert substantial pressure on the ceding insurer’s financial condition. That could occur directly if the captive’s assets and financing support proved insufficient to fund claims, or indirectly if parental guarantees of captive obligations ended up weakening the parent and its subsidiary insurers.

When assessing risks posed by captive reinsurance, it is important to recognize factors that can mitigate the risks. These include: 1) incentives for insurers to operate safely and soundly; 2) regulatory oversight of captive

9. For example, according to the A.M. Best Impairment Study (2013), impairment “is a substantially wider category of financial distress than an event of default. In particular, impairment frequently occurs when an insurer still is able to meet its current policyholder obligations, yet regulators have become sufficiently concerned … to intervene in the insurer’s business.”

10. Also see the discussion of potential risks by the Financial Stability Board (FSB) (2014).
reinsurance transactions; 3) rating agency scrutiny; and 4) lender monitoring and potentially beneficial aspects of parental guarantees.

The Role of Market Discipline and Incentives for Safety and Soundness

Insurance markets generally have been characterized by relatively strong market discipline and correspondingly low insolvency risk, reducing concern that major entities might be inherently prone to excessive risk taking. Many, if not most, policyholders prefer to deal with financially strong insurers. State guarantee systems are limited in coverage and scope, reducing the potential for moral hazard from protecting customers against losses from insurer insolvency compared with explicit and implicit federal guarantees of bank obligations. Insurance intermediaries (agents, brokers and advisors), private ratings of insurers’ financial strength and, for business products, knowledgeable corporate staff help match risk-sensitive policyholders with financially strong insurers. Insurance production and distribution often involve the creation of sizable insurer franchise value. This could diminish or evaporate if an insurer experienced financial distress, providing additional incentives for adequate capitalization and other forms of risk management by insurers. Also, many life insurance entities issue debt at the holding company level, which is subordinated to policyholder claims, creating another category of stakeholders concerned with insolvency risk and its management.

Consistent with strong market incentives for solvency, the life insurance industry weathered the worse financial crisis since the Great Depression reasonably well. The last significant episode of life insurer insolvencies, other than small entities, took place in the early 1990s, in conjunction with severe downturns in the markets for high yield debt and commercial real estate. Since that time, significant additional prudential requirements have been imposed on insurers, such as asset adequacy analysis, RBC requirements and codified accounting requirements. A notion that many major life insurers would risk their existence as going concerns through excessively risky captive insurance arrangements is inconsistent with incentives for safety and soundness and historical experience in the sector.

Regulatory Oversight

Captive reinsurance transactions are subject to significant regulation (predating the new regulation discussed below). The transactions generally receive two levels of regulatory scrutiny (see, for example, Willkie Farr & Gallagher,

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2013). First, and in addition to meeting regulatory requirements for the ceding insurer to receive reserve or RBC credit under SAP and state regulation, the terms of the reinsurance agreement with the captive must be approved by the ceding insurer’s primary state regulator. The review process often includes independent actuarial analysis of the transaction and estimated economic reserves. Domiciliary state regulators of ceding insurers also have requirements and/or guidelines for the use of reinsurance trusts, LOCs and investment of assets within or outside of the trust.

Second, the captive reinsurer must meet regulatory requirements in its state of domicile (or non-U.S. jurisdiction). The requirements encompass organization and licensing of the captive, the terms of the reinsurance arrangements, the use of surplus notes and LOCs, and financial reporting and examination. Thus, while questions might be raised about variation in regulation of captive reinsurance arrangements across jurisdictions and the specific details in some cases, any suggestion that the arrangements are unregulated or beyond the purview of regulators would be incorrect.

Rating Agency Scrutiny

The use of captive reinsurance arrangements to manage life insurance reserves and capital has received extensive discussion by leading insurance rating agencies for at least a decade, including recent reports dealing with the growth and security of such arrangements. Among other issues, rating agencies have considered how financing support for captives should be treated when assessing the ceding insurer’s financial and operating leverage and the extent to which ceded reserves are isolated from the rest of the ceding insurer’s business, with dedicated funding and de minimis risk of default. In addition, captives often cede some portion of mortality risk to traditional reinsurers, which rating agencies likewise evaluate when assessing risk associated with captive reinsurance arrangements.

A.M. Best. The A.M. Best Company bases its insurance financial strength ratings on quantitative and qualitative analysis, including discussions with management and calculation of Best’s Capital Adequacy Ratio (BCAR), the ratio of “adjusted capital” to estimated required capital from Best’s proprietary RBC model. Along with growing use of captive reinsurance, a 2006 A.M. Best report “Review of BCAR Treatment for XXX Captives” indicates that “A.M. Best has been monitoring the evolution of XXX solutions and its impact on direct writers’ [ceding insurers’] capital strength,” including consideration of transaction features “that could result in sending reserves back to the parent company.”

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12. This section draws heavily from Harrington (2014).
When discussing life insurance captives and XXX/AXXX reserves, A.M. Best’s March 25, 2013, report “Understanding BCAR for Life/Health Insurers” notes:

For A.M. Best to properly review the relationship between a captive and the direct writer, and to provide the appropriate treatment in the BCAR model, A.M. Best reviews the structure of the transaction and the schematics of the organizational structure/capital structure of the captive. In addition, A.M. Best reviews terms and provisions of any guarantees to determine other risks present in these transactions.

A June 2013 Best’s Briefing “Shedding Light on Captive Reinsurers,” released soon after the NYSDFS report, explained that “A.M. Best will continue to look through these transactions, and analyze groups on a consolidated basis using its capital model, BCAR, regardless of which affiliate entity assumes the risk.” An October 2013 A.M. Best Special Report, “Rating Factors for Organizations Using Life Captive Reinsurers,” indicates that A.M. Best “adheres to analytical processes and rating factors that are relevant for life insurance organizations using captive reinsurers,” including analysis of captive transactions on a consolidated basis using the BCAR. The report also indicates that A.M. Best considers the potential effects of decreasing LOC capacity or increasing LOC costs on the risk of the arrangement and that it evaluates “differences in the quality of collateral involved in these funding solutions, such as reinsurance trusts, long-term LOCs, short-term LOCs, contingent LOCs and parental guarantees.” The report concludes: “A.M. Best’s rating process entails a full understanding of insurance companies’ use of U.S. and offshore captives, and incorporates—through both quantitative and qualitative assessments—how the captive impacts an issuing insurance group’s balance sheet strength.”

Standard & Poor’s. A March 2004 Standard & Poor’s (S&P) report, “Evaluating the Effect of Regulation XXX on Insurers’ Capital,” discusses how improvements in expected mortality experience contributed to substantial increases in statutory versus economic reserves for certain products, how XXX requirements amplified those increases, and how the requirements affected insurers based on product mix, design, and underwriting standards. The report explained how alternative funding solutions involving affiliated reinsurers, trusts and LOCs affected S&P evaluation of capital adequacy. A follow-up report dated December 2004 discussed in detail criteria for evaluating reserve funding solutions, including criteria for treating such funding as financial leverage and the detailed stress testing required to evaluate economic reserves.

A March 2006 report elaborated how S&P would treat short-term funding solutions to XXX/AXXX reserve requirements, refinancing risks associated with short-term LOCs, how the market for multiyear LOCs had expanded, and criteria for treating the solutions as financial leverage in its evaluations based on maturity of the LOCs. A February 2012 S&P report, “The Changing Landscape of
XXX/AXXX Reserve Requirements Will Challenge U.S. Insurers,” reviewed the predominant use of short-term LOCs in the early 2000s, the growth of securitized arrangements during 2003–2007, and the predominance of LOCs after 2007, with increasing terms to maturity and decreased prices. It noted:

One constant we have observed is that the likelihood of a draw [on the LOC] is remote. Typically, for the XXX deals, there would have to be extended mortality in excess of 150% per annum. ... The AXXX issues would need combinations of extended low interest rate environment periods such as exist now, and lapse and mortality experience that differed significantly from expectations.

Moody’s Investors Service. A January 2004 Moody’s Investor Service report, “Hidden Credit Risks of Regulation XXX/Guideline AXXX Reinsurance Programs,” reviewed reserve requirements and credit risks associated with captive reinsurance solutions involving LOCs and reinsurance trusts, including potential risks associated with short-term LOCs in the form of possible LOC capacity squeezes and/or increases in LOC prices, as well as possible financing capacity squeezes and price increases from using reinsurance trusts. An August 2013 Moody’s report, “The Captive Triangle: Where Life Insurers’ Reserve and Capital Requirements Disappear,” described the magnitude of reserve transactions, how captive arrangements could increase capital efficiency and how they could increase an insurer’s credit risk. It discussed possible credit negatives from the arrangements, including lack of transparency, funding risks and light regulation of captives in some jurisdictions, as well as possible credit positives, including increasing regulatory scrutiny and the potential for increased transparency of captive transactions. The report noted, “While the use of captives by the industry is incorporated in our analysis, a growing reliance on captives places incremental negative pressure on the industry.” It specifically stated, however, that credit negatives associated with captives were “already incorporated into ratings.”

Potential Benefits of Lender Monitoring and Parental Guarantees

Providers of financial support for captive reinsurance through LOCs, surplus or credit-linked notes, or other means evaluate the likelihood that experience on the ceded business could produce draws on such funding, including the use of independent actuarial analysis. These entities, therefore, provide an additional source of risk evaluation and monitoring of captive reinsurance arrangements.

13. In March 2014, Standard & Poor’s issued a proposal for further revisions in its procedures for evaluating captive arrangements (Standard & Poor’s, 2014), including analyzing capital on a consolidated basis and directly adjusting reserves for excess conservatism.
The segmentation of particular blocks of business through captive transactions facilitates such evaluation.

In recourse transactions, under which the financing provider has recourse against the ceding insurer’s parent, the funding provider also evaluates and monitors the likelihood that the parent will be able to back up its guarantee in the event that adverse experience leads to draws on the lender and reimbursement claims against the parent. Parental guarantees in captive reinsurance arrangements also commit the parent to providing financial backup to the ceding insurer. The resources of the holding company, therefore, formally and legally stand behind such transactions. Although scenarios exist where meeting parental guarantees could weaken the parent and reduce its ability to serve as a future source of strength for its operating insurance subsidiaries, the existence of a parental guarantee nonetheless has the potential to enhance rather than undermine the security of the arrangements.

IV. Data on Captive Reinsurance Use

According to a Moody’s report (Moody’s Investor Service 2013; also see Koijen and Yogo, 2014a, and Office of Financial Research, 2014), at year-end 2012, life insurers reported $169 billion of reserve credits from business ceded to unauthorized affiliates and another $155 billion of modco reinsurance with unauthorized affiliates, which provided some capital relief without reducing reported reserves. The $324 billion was equivalent to 12% of total reserves and about 85% of total capital and surplus.

Until 2013, reinsurance schedules in life insurers’ statutory financial statements did not separately identify aggregate transaction statistics for captive reinsurance versus other affiliated reinsurance. In 2013, insurers were required to provide such information for authorized captives, unauthorized captives and all captives combined. To provide additional insight into the nature and scope of captive reinsurance using the new data, I identified the largest 100 affiliated life insurer groups and unaffiliated life insurers in terms of admitted assets in 2013 using data from SNL Financial. These top 100 entities represented 98% of industry assets and aggregate reserves and 95% of industry surplus. I then analyzed selected balance sheet and reinsurance data for those entities during 2007–2013. This time period follows the initial rapid growth of captive reinsurance in the early to mid-2000s.

Using 2013 data, 32 of the top 100 entities reported reserve credits and/or modified coinsurance (MODCO) reinsurance reserves with authorized or

14. The reinsurance data are from Schedule S, Section 3, Part 1, and Schedule S, Section 4. Given a change in reporting format, SNL Financial does not include summary data on affiliated life reinsurance prior to 2006. Reporting anomalies in 2006 favored beginning the analysis with 2007 data.
unauthorized captive reinsurers. Of those 32 entities, 14 used unauthorized captives only, nine used authorized captives only, and nine used both authorized and unauthorized captives. Six of the 32 entities were mutual organizations (compared with 25 mutual or similar organizations in the 68 entities in the top 100 without captives). I divided the 32 entities into two subgroups based on domestic versus international control. The “domestic” group includes 23 entities with captives with ultimate parents within the U.S. This group includes a number of U.S. organizations that own captives domiciled outside of the U.S. The “international” group includes nine entities with captives where the ultimate parents are incorporated outside of the U.S. The Appendix lists the 32 entities with captives, their use of authorized and/or unauthorized captives, and their domestic or international classification.

Table 1:
Large Entity Samples – 2013 Data

<table>
<thead>
<tr>
<th>Sample</th>
<th>No. of entities</th>
<th>No. with unauthorized captive reinsurance</th>
<th>No. with authorized captive reinsurance</th>
<th>Average adjusted reserves (BML)</th>
<th>Adjusted reserves</th>
<th>Percentage of life industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entities with captive</td>
<td>32</td>
<td>25</td>
<td>10</td>
<td>482.9</td>
<td>21.9%</td>
<td>60.3%</td>
</tr>
<tr>
<td>reinsurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>99.37%</td>
</tr>
<tr>
<td>Domestic entities</td>
<td>23</td>
<td>15</td>
<td>8</td>
<td>431.6</td>
<td>11.5%</td>
<td>35.5%</td>
</tr>
<tr>
<td>International entities</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>481.2</td>
<td>45.4%</td>
<td>35.8%</td>
</tr>
<tr>
<td>Entities without captive</td>
<td>68</td>
<td>1</td>
<td>6</td>
<td>156.6</td>
<td>42.2%</td>
<td>0%</td>
</tr>
<tr>
<td>reinsurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
</tr>
</tbody>
</table>

*Adjusted reserves equals reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.

Table 1 shows selected 2013 summary information for the 32 entities with captives and for the domestic and international subgroups. The sample entities with captives accounted for 54% of industry adjusted life reserves in 2013, where I define adjusted reserves as reported life (and annuity) contract policy reserves plus reserve credits taken for authorized and unauthorized captive reinsurance. The 32 entities accounted for 81% of industry reserve credits with unauthorized affiliates, including captives and non-captive affiliates, and nearly all of industry reserve credits with authorized and unauthorized captives. International entities with captives accounted for disproportionate shares of reserve credits with all unauthorized affiliates and unauthorized captives.

Trends in Unauthorized Affiliate Reinsurance

Because summary information on the use of captive reinsurance, whether authorized or unauthorized, was not separately identified in insurers’ statutory financial statements until 2013, to examine trends I calculated ratios of reserve credits and MODCO reserves with all unauthorized affiliates to adjusted reserves and to surplus during 2007–2013 for insurers identified as having captive
reinsurance in 2013 and for the entire industry. For this comparison, I defined adjusted reserves as the ratio of reported life reserves to the sum of life reserves and reserve credits with all unauthorized affiliates. The results, shown in Figure 1 (ratios to adjusted reserves) and Figure 2 (ratios to surplus), will reflect any combined trends in unauthorized captive reinsurance and unauthorized non-captive affiliate reinsurance. They will not reflect growth in authorized captive reinsurance or identify possible substitution of authorized for unauthorized captive reinsurance.

Figure 1:
Reserve Credit and MODCO Reserves for Unauthorized Affiliates as Percentage of Adjusted Reserves,* 2007-2013: Industry and Large Entities with Captive Reinsurance in 2013

*Adjusted reserves equal reported policy reserve plus unauthorized affiliate reserve credit.

Unauthorized affiliate reserve credits and MODCO reserves as a percentage of adjusted reserves for entities with captive reinsurance in 2013 grew from 14.2% of adjusted reserves in 2007 to 19.7% of adjusted reserves in 2013. Unauthorized affiliate MODCO reserves for these entities, which are retained on the ceding insurer’s balance sheet, increased from 6.3% to 11% of adjusted reserves. Unauthorized affiliate reserve credits as a percentage of adjusted reserves grew from 7.9% in 2007 to 10.1% in 2012 and then declined to 8.7% in 2013 in conjunction with an increase in unauthorized affiliate MODCO reserves. Figure 1
also shows that domestic entities with captives used much less captive reinsurance than international entities and that unauthorized affiliate MODCO reserves represented a much smaller percentage of total unauthorized affiliate reserve credits and MODCO reserves for international entities than for domestic entities. Unauthorized affiliate reserve credits as a percentage of adjusted reserves declined from 23.3% in 2012 to 19.4% in 2013 for international entities, and from 5.6% to 5% for domestic entities. For the aggregate life industry, unauthorized affiliate reserve credits and MODCO reserves represented 11.3% of industry adjusted reserves in 2013, up from 9.9% in 2007, with the growth attributable to MODCO reserves.

Figure 2: Reserve Credit and MODCO Reserves for Unauthorized Affiliates as Percentage of Surplus, 2007–2013: Industry and Large Entities with Captive Reinsurance in 2013

Figure 2 shows similar calculations for unauthorized affiliate reserve credits and MODCO reserves as a percentage of surplus as opposed to adjusted reserves. The patterns for surplus are generally similar to those for adjusted reserves, except that the percentages of surplus spiked moderately in 2008 as the financial crisis negatively affected surplus. For domestic entities with captives in 2013, unauthorized affiliate reserve credits in 2013 equaled 50% of surplus; unauthorized affiliate MODCO reserves equaled 106% of surplus. The

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corresponding percentages for international entities were 198% and 119%, respectively.

Figure 3: Sources of Collateral for Unauthorized Affiliate Reinsurance, 2007–2013: Large Entities with Captive Reinsurance in 2013

![Figure 3: Sources of Collateral for Unauthorized Affiliate Reinsurance, 2007–2013: Large Entities with Captive Reinsurance in 2013](image)

*Adjusted reserves equal reported policy reserve plus unauthorized affiliate reinsurance reserve credit.

Figure 3 shows sources of collateral for unauthorized affiliate reserve credits during 2007–2013 for the 32 large entities with captive reinsurance in 2013. The first panel shows percentages of total collateral represented by LOCs, trust assets and funds deposited with the ceding insurer. The second and third panels show each source of collateral as a percentage of adjusted reserves and surplus, respectively. LOCs represented 25% of total collateral in 2007, growing to 32% in 2010, and then declining to 29% in 2013. LOCs represented 3% or less of adjusted reserves and 30% or less of surplus for the 32 entities throughout 2007–2013.

Authorized and Unauthorized Captive Reinsurance in 2013

Figure 4 and Figure 5, as well as Table 2 and Table 3, use the newly reported summary data in 2013 for captive reinsurance transactions to present evidence on the type and prevalence of captive reinsurance in that year.
Figure 4:
Captive Reserve Credit and MODCO Reserves as Percentage of Adjusted Reserves* and Surplus in 2013: Industry and Large Entities with Captive Reinsurance

*Adjusted reserves equals reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.
Figure 4 shows captive reserve credits and MODCO reserves, including both authorized and unauthorized captives, as a percentage of adjusted reserves and surplus for the 32 entities, for the domestic and international subgroups, for the top 100 entities in terms of admitted assets, and for the entire industry. Thus, in contrast to Figures 1–3, the data include transactions with authorized captives but exclude transactions with unauthorized non-captive affiliates. In addition, to focus on captive reinsurance per se, adjusted reserves in Figures 4–9 and Tables 2–4 are defined as aggregate life reserves plus captive reserve credits, as opposed to aggregate life reserves plus all unauthorized affiliate reserve credits.

For all 32 entities with captives, captive reserve credits equal 12.5% of adjusted reserves and 129.1% of surplus in 2013. (See Figure 4.) Captive MODCO reserves equal 5.8% of adjusted reserves and 60.3% of surplus. Consistent with Figure 1 and Figure 2, the percentages shown in Figure 4 indicate much greater use of captive reinsurance by the international entities than by the domestic entities. The domestic entities with captives had captive reserve credits equal to 9.5% of adjusted reserves and captive MODCO reserves equal to 4.3% of adjusted reserves. The corresponding percentages for the international group are 20.7% and 9.9%. Compared to the results for all unauthorized affiliate reinsurance (including captive and non-captive affiliates, Figure 1 and Figure 2), the percentages of adjusted reserves and surplus represented by captive (authorized and unauthorized) reserve credits for domestic entities with captives are much larger than the percentages represented by MODCO reserves.

**Figure 5:**
Sources of Collateral for Unauthorized Captive Reinsurance in 2013: Large Entities with Captive Reinsurance
Percentages of total collateral for unauthorized captive reinsurance transactions represented by LOCs, trust assets, and funds deposited are shown in Figure 5. LOCs represented about 32% of total collateral for both the domestic and international entities. The domestic entities made relatively greater use of trust assets than funds deposited compared with the international entities.

Table 2:
Reserves for Industry and Large Entities in 2013 ($ millions)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Life Industry</th>
<th>Top 100</th>
<th>Top 100 with Captive</th>
<th>Int'l with Captive</th>
<th>Domestic with captive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported aggregate policy reserve</td>
<td>$2,372.2</td>
<td>$2,328.7</td>
<td>$1,201.7</td>
<td>$107.8</td>
<td>$293.9</td>
</tr>
<tr>
<td>Adjusted reserves*</td>
<td>$2,372.2</td>
<td>$2,500.2</td>
<td>$1,373.2</td>
<td>$1,302.8</td>
<td>$370.4</td>
</tr>
<tr>
<td>Reserve credit</td>
<td>$1.723</td>
<td>$1.715</td>
<td>$1.715</td>
<td>$95.0</td>
<td>$76.5</td>
</tr>
<tr>
<td>Authorized</td>
<td>$1.12</td>
<td>$0.804</td>
<td>$0.804</td>
<td>$0.614</td>
<td>$0.19</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>$1.111</td>
<td>$0.911</td>
<td>$0.911</td>
<td>$0.336</td>
<td>$0.575</td>
</tr>
<tr>
<td>U.S.</td>
<td>$1.722</td>
<td>$1.146</td>
<td>$1.146</td>
<td>$0.944</td>
<td>$0.520</td>
</tr>
<tr>
<td>Non-U.S.</td>
<td>$0.51</td>
<td>$0.251</td>
<td>$0.251</td>
<td>$0.06</td>
<td>$0.245</td>
</tr>
<tr>
<td>MODCO reserves</td>
<td>$40.1</td>
<td>$80.1</td>
<td>$80.1</td>
<td>$43.6</td>
<td>$36.5</td>
</tr>
<tr>
<td>Authorized</td>
<td>$4.4</td>
<td>$4.4</td>
<td>$4.4</td>
<td>$4.4</td>
<td>$0.0</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>$7.56</td>
<td>$7.56</td>
<td>$7.56</td>
<td>$39.1</td>
<td>$36.5</td>
</tr>
<tr>
<td>U.S.</td>
<td>$7.89</td>
<td>$18.9</td>
<td>$18.9</td>
<td>$13.2</td>
<td>$5.7</td>
</tr>
<tr>
<td>Non-U.S.</td>
<td>$11.1</td>
<td>$61.1</td>
<td>$61.1</td>
<td>$30.3</td>
<td>$30.8</td>
</tr>
<tr>
<td>Reserve credit + MODCO reserves</td>
<td>$212.4</td>
<td>$251.6</td>
<td>$251.6</td>
<td>$38.5</td>
<td>$113.0</td>
</tr>
<tr>
<td>Authorized</td>
<td>$56.6</td>
<td>$84.8</td>
<td>$84.8</td>
<td>$65.8</td>
<td>$19.0</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>$166.8</td>
<td>$166.8</td>
<td>$166.8</td>
<td>$72.7</td>
<td>$94.1</td>
</tr>
<tr>
<td>U.S.</td>
<td>$166.1</td>
<td>$165.3</td>
<td>$165.3</td>
<td>$0.076</td>
<td>$57.7</td>
</tr>
<tr>
<td>Non-U.S.</td>
<td>$16.3</td>
<td>$86.3</td>
<td>$86.3</td>
<td>$30.9</td>
<td>$55.3</td>
</tr>
</tbody>
</table>

Table 2 and Table 3 present further details on captive reinsurance transactions in 2013. Table 2 shows the reported aggregate reserve, adjusted reserves, and captive reserve credits and MODCO reserves for authorized versus unauthorized captives and for U.S. domiciled versus non-U.S. domiciled captives. Table 3 shows captive reserve credits and MODCO reserves as percentages of adjusted reserves and surplus for authorized versus unauthorized captives and for U.S. domiciled versus non-U.S. domiciled captives. Transactions with unauthorized captives represented the bulk of captive transactions for international entities with captives, whereas authorized captives were relatively more important for domestic entities with captives. Unauthorized captive reserve credits and MODCO reserves represented 25.4% of adjusted reserves for international entities versus 5.1% for authorized transactions. In contrast, authorized captive reserve credits and MODCO reserves for the domestic group represented 6.6% of adjusted reserves compared with 7.2% for unauthorized captive transactions. Perhaps not
surprisingly, international entities made much greater use of non-U.S. captives than did domestic entities. MODCO reserves for transactions with authorized captives were negligible for domestic entities and nil for international entities.

Table 3:
Captive Reserves as Percentage of Adjusted Reserves and Surplus for Industry and Large Entities in 2013

<table>
<thead>
<tr>
<th>Variable</th>
<th>Life Industry</th>
<th>Top 100 with Captive</th>
<th>Int’l with Captive</th>
<th>Domestic with captive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve credit/adj. reserves</td>
<td>6.8%</td>
<td>63%</td>
<td>12.5%</td>
<td>20.7%</td>
</tr>
<tr>
<td>Authorized</td>
<td>3.2%</td>
<td>32%</td>
<td>5.9%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>3.6%</td>
<td>35%</td>
<td>6.6%</td>
<td>15.5%</td>
</tr>
<tr>
<td>U.S.</td>
<td>5.8%</td>
<td>53%</td>
<td>10.7%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>1.0%</td>
<td>11%</td>
<td>1.8%</td>
<td>6.6%</td>
</tr>
<tr>
<td>MODCO reserves/adj. reserves</td>
<td>3.1%</td>
<td>32%</td>
<td>5.8%</td>
<td>9.9%</td>
</tr>
<tr>
<td>Authorized</td>
<td>0.2%</td>
<td>02%</td>
<td>0.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>3.0%</td>
<td>32%</td>
<td>5.5%</td>
<td>9.9%</td>
</tr>
<tr>
<td>U.S.</td>
<td>0.7%</td>
<td>08%</td>
<td>1.4%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>2.4%</td>
<td>24%</td>
<td>4.5%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Reserve credit + MODCO/adj. reserves</td>
<td>9.9%</td>
<td>101%</td>
<td>18.3%</td>
<td>30.5%</td>
</tr>
<tr>
<td>Authorized</td>
<td>3.4%</td>
<td>34%</td>
<td>6.2%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>6.5%</td>
<td>67%</td>
<td>12.1%</td>
<td>25.4%</td>
</tr>
<tr>
<td>U.S.</td>
<td>6.5%</td>
<td>65%</td>
<td>12.0%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>3.4%</td>
<td>34%</td>
<td>6.3%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Reserve credit/surplus</td>
<td>52.4%</td>
<td>54.8%</td>
<td>129.1%</td>
<td>234.7%</td>
</tr>
<tr>
<td>Authorized</td>
<td>24.7%</td>
<td>25.7%</td>
<td>60.5%</td>
<td>58.2%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>27.7%</td>
<td>29.1%</td>
<td>68.6%</td>
<td>176.5%</td>
</tr>
<tr>
<td>U.S.</td>
<td>44.7%</td>
<td>46.3%</td>
<td>110.2%</td>
<td>159.6%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>7.6%</td>
<td>8.2%</td>
<td>18.9%</td>
<td>75.2%</td>
</tr>
<tr>
<td>MODCO reserves/surplus</td>
<td>74.4%</td>
<td>75.5%</td>
<td>60.3%</td>
<td>112.0%</td>
</tr>
<tr>
<td>Authorized</td>
<td>1.3%</td>
<td>1.4%</td>
<td>3.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>23.0%</td>
<td>24.2%</td>
<td>56.9%</td>
<td>112.0%</td>
</tr>
<tr>
<td>U.S.</td>
<td>5.7%</td>
<td>61%</td>
<td>14.2%</td>
<td>17.5%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>18.6%</td>
<td>19.5%</td>
<td>46.0%</td>
<td>94.5%</td>
</tr>
<tr>
<td>Reserve credit + MODCO/surplus</td>
<td>76.7%</td>
<td>80.4%</td>
<td>189.3%</td>
<td>346.7%</td>
</tr>
<tr>
<td>Authorized</td>
<td>26.0%</td>
<td>27.1%</td>
<td>63.8%</td>
<td>58.2%</td>
</tr>
<tr>
<td>Unauthorized</td>
<td>50.7%</td>
<td>53.3%</td>
<td>125.5%</td>
<td>288.5%</td>
</tr>
<tr>
<td>U.S.</td>
<td>50.5%</td>
<td>52.3%</td>
<td>124.4%</td>
<td>177.0%</td>
</tr>
<tr>
<td>Non-U.S</td>
<td>26.2%</td>
<td>27.5%</td>
<td>64.9%</td>
<td>169.7%</td>
</tr>
</tbody>
</table>

*See Table 1 for sample descriptions. Adjusted reserves equal reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.*

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V. Captive Reinsurance and A.M. Best Ratings

Do captive reinsurance arrangements increase ceding insurers' insolvency risk? I know of no statistical modeling approach with available data that would likely provide convincing evidence on this question in view of the multitude of factors affecting insolvency risk, the complexity of captive arrangements and uncertainty concerning levels of insolvency risk that would prevail if the agreements were not used. Providing convincing evidence concerning the narrower question of whether captive insurance arrangements place downward pressure on insurers' financial ratings is also problematic.

This section of the paper has the more limited purpose of providing descriptive information on A.M. Best ratings for entities with and without captive reinsurance arrangements. It first summarizes 2013 A.M. Best ratings for insurers with and without captives for two samples: 1) affiliated group entities and unaffiliated companies among the top 100 in 2013 assets for which the lead company in the group or the unaffiliated company had an A.M. Best rating; and 2) all individual life insurance companies with an A.M. Best rating and available data. It then uses regression analysis to provide additional descriptive evidence of whether A.M. Best ratings are statistically related to the use of captive reinsurance after controlling for the relationship between ratings, insurer size (policy reserves), the ratio of reserves to surplus and organizational form (whether a mutual or mutual-like entity).

A.M. Best ratings at year-end 2013 were obtained from SNL Financial. For the top 100 entity sample, I used the lead company rating for each affiliated group. Individual company ratings were used for unaffiliated companies in the top 100 and for the individual company sample. All 32 of the top 100 entities with captive reinsurance in 2013 had an A.M. Best rating in 2013; 66 of the 68 entities without captives had ratings. Seventy-one of the 613 individual life companies with data reported by SNL Financial used captive reinsurance in 2013, and nine of the 71 companies did not have an A.M. Best rating. One hundred forty-eight of the 542 individual companies without captive reinsurance did not have an A.M. Best rating.

Distributions of Ratings

The first panel of Figure 6 shows percentages of rated entities by rating category (A++, A+, A and so on) in 2013 for the large entities using captive reinsurance (32 entities) and those not using captive reinsurance (66 entities). The second panel shows the percentage of adjusted reserves (policy reserves plus affiliated captive reserve credits, if any) written by entities falling in each rating category.
Figure 6:
A.M. Best Lead Company Rating Distribution for Large Entities in 2013

*Adjusted reserves equal reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.

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The distributions in Figure 6 are similar for entities with and without captives, except that no entities with captives received the highest A++ rating, with correspondingly more entities with captives receiving the second highest A+ rating. Specifically, 14\% percent of the rated entities without captives received A++ ratings. These entities were relatively large, accounting for 59\% of reserves for the 66 entities without captives. While no large entity with captive reinsurance received an A++ rating, 66\% of the entities with captives received an A+ rating, accounting for 68\% of adjusted reserves for the 32 entities with captives. Eighty-five percent of the large entities with captives had a rating of A or better (accounting for 93\% of adjusted reserves for the entities with captives), compared with 74\% of the entities without captives (accounting for 89\% of the group's adjusted reserves). Ninety-four percent of the entities with captives had a rating of A- or better (96\% of adjusted reserves), compared with 92\% of the entities without captives (96\% of adjusted reserves).

Figure 7 on the next page shows the rating distributions for individual companies with and without captive reinsurance. The patterns are broadly similar to those shown for the large entities in Figure 6. A smaller percentage of rated companies without captives received A++ ratings than for the large entity analysis. There also were relatively more (generally small) individual companies without captive reinsurance than with captive reinsurance in the lower rating categories. Twenty-six percent of the rated companies without captives had a rating below A-, but they only accounted for 4\% of the reserves for all rated companies without captives. Eight percent of the companies with captives had a rating below A-, accounting for 5\% of adjusted reserves for that group.

The data shown in Figure 6 and Figure 7 indicate that A.M. Best's evaluation of the risks from captive reinsurance arrangements did not prevent the assignment of relatively high ratings for a sizable majority of entities utilizing the arrangements. That, of course, does not imply that captive reinsurance arrangements necessarily have little or no risk. It simply indicates that the evaluation of the firms' overall risk generally yielded high ratings.

**Regression Analysis**

As noted above, firms' insolvency risk and associated financial ratings in general depend on numerous, and in many cases difficult to measure, factors, including the types of business written, the amount of business written relative to capital, firm size, asset risk, interest rate risk, underwriting standards, product and geographic diversification, organizational form, and reinsurance arrangements, whether captive or not. In order to provide additional descriptive evidence regarding the relationship between A.M. Best ratings and captive reinsurance, I estimated multivariate regression models of ratings, including measures of captive reinsurance and several key company characteristics that could influence risk and ratings.
Figure 7:
A.M. Best Rating Distribution for Individual Companies with Ratings in 2013

*Adjusted reserves equal reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.
I constructed the “dependent” variable for the regression analysis by assigning a value of 5 for an A++ rating, 4 for an A+ rating, 3 for an A rating, 2 for an A- rating, 1 for a B++ rating and 0 for a rating lower than B++. The specific explanatory variables included in the models are: 1) the natural logarithm (log) of the firm’s adjusted life reserves (a measure of the firm’s size or volume); 2) the ratio of reported reserves (i.e., net of reinsurance reserve credits) to surplus; 3) the ratio of captive reinsurance reserve credits to surplus; 4) an indicator for mutual or related organizational form; and 5) an indicator for unaffiliated companies (stand-alone companies not part of an affiliated group of insurers).

The regression estimates provide evidence of whether A.M. Best ratings were statistically related to the use of captive reinsurance after controlling for the other characteristics included in the model. Specifically, the estimated coefficient for the ratio of captive reinsurance reserve credits to surplus provides evidence of how the numerical rating index varies as that ratio changes holding the other variables constant. I am not asserting that the estimates have a “causal” interpretation. The estimated coefficients will reflect the influence of any variables that are: 1) not included in the model; and 2) correlated with ratings and the independent variables that are included. For example, if factors omitted from the model that reduce A.M. Best’s assessment of impairment risk are positively correlated with the use of captive reinsurance, the estimated coefficient for the ratio of captive reserve credits to surplus will reflect that correlation.

Table 4 shows the results from estimating the model using 2013 data for two samples. The first sample includes 96 of the top 100 groups and unaffiliated life companies in terms of 2013 assets. (For groups, the numerical rating index is based on the A.M. Best rating for the lead company.) Two of the top 100 entities did not have ratings. Two others (SCOR and Athene) were clear outliers and, therefore, excluded, although the implications did not depend on that exclusion. The second sample includes 416 individual life companies with A.M. Best ratings and positive reserves and premiums.

The estimation results for the control variables are sensible. First, for a given ratio of reserves to surplus, ratings are positively and significantly related to (log) adjusted reserves, a proxy for the entity’s size and, thus, size-related diversification of risk. Second, for a given size (log adjusted reserves), the ratio of

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15. The regression estimates reported in Table 4 below are those obtained with least squares estimation. I obtained results with the same implications using ordered probit estimation, which only considers the ordinal ranking of ratings. The standard errors reported are robust to heteroskedasticity in model errors and, for the individual company sample, to correlations in the errors among affiliated companies.

16. I estimated various versions of the models, including models that included captive modified coinsurance (MODCO) reserves and/or authorized versus unauthorized captive reinsurance, or including the log of reported reserves instead of adjusted reserves, with the same basic implications.

17. There also is a likely endogeneity issue between ratings and the use of captives that precludes causal interpretation.

18. For both samples, an entity is classified as a mutual if it or its ultimate parent is a mutual or similar organization (e.g., a farm bureau or similar cooperative organization).
reserves to surplus is negatively and significantly related to ratings: more reserves (policy liabilities) in relation to surplus lowers ratings. Third, for a given size and ratio of reserves to surplus, mutual organizations on average had higher ratings than non-mutual entities, which could indicate lower risk of mutuals on other dimensions, cushions for adverse experience in participating policy premiums or related influences. Fourth, for the individual company sample, the estimated coefficient for the indicator that a company is not part of an affiliated group is negative and statistically significant, which might be expected, for example, due to less diversification of risk or the lack of possible parental or affiliate assistance in the event of adverse experience.

Table 4:
A.M. Best Rating Regressions – 2013 Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Large Entities (Lead Co. Rating)</th>
<th>Individual Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of adjusted reserves*</td>
<td>0.348*** (0.066)</td>
<td>0.242*** (0.029)</td>
</tr>
<tr>
<td>Reserves/surplus</td>
<td>-0.104*** (0.030)</td>
<td>-0.078*** (0.015)</td>
</tr>
<tr>
<td>Captive reserve credit/surplus</td>
<td>0.135*** (0.044)</td>
<td>0.045 (0.028)</td>
</tr>
<tr>
<td>Mutual affiliation</td>
<td>0.642*** (0.179)</td>
<td>0.756*** (0.175)</td>
</tr>
<tr>
<td>Unaffiliated company</td>
<td>0.321 (0.292)</td>
<td>-0.788*** (0.167)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.794* (1.029)</td>
<td>-0.133 (0.365)</td>
</tr>
<tr>
<td>No. of observations</td>
<td>96</td>
<td>416</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.357</td>
<td>0.369</td>
</tr>
</tbody>
</table>

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

*Adjusted reserves equal reported policy reserve plus authorized and unauthorized captive reinsurance reserve credit.

The estimated coefficient for the captive reinsurance reserve credit to surplus variable, the measure of reliance on captive reinsurance, is positive for both samples and larger and statistically significant for the large entity sample. The
estimates, therefore, provide no evidence that, for any given size (log adjusted reserves) and ratios of reserves to surplus, increases in captive reinsurance reserve credits were associated with lower ratings. Instead, and at least for the large entity sample, increases in such credits were statistically associated with higher ratings. This result implies that the use of captive reinsurance was correlated with factors omitted from the model with positive ratings implications, which more than offset any perception of increased risk from captive reinsurance.\(^\text{19}\)

Reserves-to-Surplus and RBC Ratios

Figure 8 and Figure 9 on the following pages provide perspective on two additional dimensions for the large entity sample. Figure 8 plots for 2013 the ratio of adjusted reserves (reported reserves plus captive reinsurance reserve credits) to surplus versus the log of adjusted reserves, with the data points for entities with captive reinsurance labeled “C”. The plot shows a clear, positive relationship between the ratio of adjusted reserves to surplus and log adjusted reserves: Larger firms can operate with higher ratios of reserves to surplus. The plot also illustrates that larger entities within the large entity sample were more likely than smaller entities to use captive reinsurance.\(^\text{20}\)

Figure 9 plots for 2013 the ratio of “adjusted capital” to “company action level” RBC from the NAIC RBC model versus log-adjusted reserves for the large entities, again labeling companies with captive reinsurance arrangements. (The ratios of adjusted capital to “authorized control level” RBC are twice as large as those shown.) The six smallest entities and several entities with ratios above 10 are excluded to improve visualization. The plot illustrates that most entities with and without captive reinsurance had adjusted capital substantially in excess of the levels that would require the company to take action to develop a plan to improve its RBC ratio.\(^\text{21}\)

\(^{19}\) Based on a numeric A.M. Best ratings model with different control variables over multiple years, Koijen and Yogo (2014a) interpreted an insignificant coefficient estimate for an indicator that the insurer had reinsurance with an affiliated, unrated reinsurer (their proxy for captive reinsurance) as evidence that ratings did not reflect risk associated with captives, despite inherent limitations in statistical modeling and contrary to the historical literature on how rating agencies evaluate captive reinsurance.

\(^{20}\) Regression estimates (not shown) controlling for log adjusted reserves and mutual organization indicated that the ratio of adjusted reserves to surplus was significantly and positively related to captive reinsurance reserve credits to surplus, but that the ratio of reserves (net of captive reinsurance credits) to surplus was not statistically related to the use of captive reinsurance.

\(^{21}\) Regression estimates controlling for log adjusted reserves and mutual organization indicated a negative but statistically insignificant relationship between RBC ratios and the ratio of captive reinsurance credits to surplus.
VI. New NAIC Regulatory Framework

The NAIC Executive (EX) Committee in August 2014 adopted in concept a modified XXX/AXXX Reinsurance Framework (Framework) for standardized disclosure and captive reinsurance reserve credits proposed by Rector & Associates in its June 2014 report (Rector & Associates, 2014b), with the goal of early implementation pending development of specifics and approval by numerous NAIC committees. The Framework proposed expansion and standardization of disclosure of captive reinsurance arrangements and permitting ceding insurers in new captive reinsurance arrangements to receive reserve credit only if:

- The ceding insurer establishes full XXX/AXXX statutory (formulaic) reserves before any reinsurance credit.
- The ceding insurer receives collateral on a funds withheld, trust or MODCO basis in an amount and form that meets a “Primary Security
Requirement,” with the amount determined according to an “Actuarial Method,” which parallels PBR.

- The ceding insurer collateralizes the remaining portion of the statutory reserves with other assets and/or security acceptable to regulators.
- Either the ceding insurer or the captive holds an appropriate RBC “cushion.”

Figure 9: NAIC RBC Ratios vs. Log of Adjusted Reserves* for Large Entities in 2013 (C Indicates Entity with Captive Reinsurance)

As was true for the two earlier Rector & Associates reports (2013, 2014a), numerous comment letters were submitted to the NAIC in response to the organization’s June “modified” proposal.22 The letters highlighted substantial division among both insurers and state regulators on multiple dimensions. One issue was how LOCs should be treated under the Framework and, in particular, whether and under what conditions they could be counted towards the Primary Security Requirement. A second issue was whether the Actuarial Method would include the minimum formula reserve (known as the net premium reserve)

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contained in guidelines for PBR or some modification of that minimum. The two
issues are connected. The greater any minimum reserve, the more likely the
Primary Security Requirement will exceed economic reserves for some contracts,
which in turn could make LOCs, credit-linked notes or other funding mechanisms
a potentially attractive source of support for the excess of the Primary Security
Requirement over economic reserves.

In November 2014, the NAIC’s Principle-Based Reserving Implementation
(EX) Task Force adopted *Actuarial Guideline XLVIII—Actuarial Opinion and
Memorandum Requirements for the Reinsurance of Policies Required to be Valued
Under Sections 6 and 7 of the NAIC Valuation of Life Insurance Policies Model
Regulation* (AG 48) to be effective Jan. 1, 2015, for new reserve financing
transactions, including any post-2014 reserve financing transactions for any
policies issued prior to Jan. 1, 2015. AG 48 does not permit LOCs, credit-linked
notes or related instruments to be counted towards the Primary Security
Requirement, and the guideline’s Actuarial Method includes the net premium
reserve requirement. As a result, the ongoing implementation of AG 48 will likely
reduce but not eliminate the incentive for new captive reinsurance arrangements.

The adoption of AG 48 and related regulatory developments might be viewed
as a middle ground between no new regulation of captive reinsurance and more
severe measures, such as an indefinite moratorium on or prohibition of new
arrangements, or possibly subjecting many or even most captives to regulatory
requirements of traditional insurers and reinsurers.23 Given what is known about
the benefits and risks of captive reinsurance, and the divisions in opinion among
both insurers and regulators, the efficacy of adopting a new and complex
regulatory regime—in the midst of the anticipated albeit still uncertain transition
to PBR—is arguable. An alternative would have been to focus on additional and
potentially cost-effective improvements in disclosure and transparency to facilitate
better risk evaluation by regulators, rating agencies, financing providers and other
users of insurer financial statements, while respecting legitimate concerns over
proprietary information regarding the details of specific captive arrangements.

VII. Conclusion

The debate and controversy over captive reinsurance arrangements reflects the
fundamental problem that confronts insurance regulators: how to establish a
prudent framework for valuing and reporting long-term life insurance policy
reserve liabilities without increasing the costs to insurers and consumers from
excessive conservatism. Captive reinsurance arrangements evolved as a
mechanism for navigating the specific tension created by formulaic XXX/AXXX

23. The NAIC Financial Regulation Standards and Accreditation (F) Committee has
discussed a proposal that would require states to categorize captives assuming business in more
than one state or in a state other than the state of domicile as a “multi-state reinsurer” subject to
traditional regulatory requirements, or lose state status as accredited by the NAIC.

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reserve requirements for long-duration term life policies and ULSG. That tension will be reduced but not necessarily eliminated by recent NAIC actions and the extent to which PBR eventually supplants formulaic reserves.

In contrast to some assertions, the development and oversight of captive reinsurance arrangements have received substantial attention. Issues associated with life insurance regulatory reserve requirements in an environment of long-term improvements in mortality have been discussed for at least two decades. Regulation XXX/AXXX reserves and their potential adverse effects on the prices and affordability of certain term and universal life insurance products have been debated since the early 2000s. Captive reinsurance arrangements have required regulatory approval, generally by two different regulators, and they must meet various regulatory rules and guidelines. Rating agencies have considered the arrangements' potential effects on ceding insurers’ financial strength for at least a decade, and most entities employing captive reinsurance receive relatively high financial ratings.

Captive reinsurance arrangements have provided a method of satisfying formulaic reserve requirements at lower cost to insurers and policyholders than would be achievable without such arrangements—in an environment of generally strong market discipline and significant regulatory, rating agency and counterparty monitoring. The arrangements have allowed insurers to back the excess of formula over economic reserve estimates at lower cost, but generally only if: 1) the ceding insurer’s domiciliary regulator approves; 2) the captive’s domiciliary regulator approves; 3) rating agencies evaluate the risks to the ceding insurer and parent; and 4) external financing providers evaluate the risks and finance the arrangement.

Debate over the arrangements’ benefits and potential risks has been valuable. While it is unclear whether the new regulatory framework adopted by the NAIC was needed given available evidence on captive reinsurance arrangements’ benefits and risks and the expected movement to PBR, the organization was prudent to forego even tighter restrictions.
## Appendix

**Large Entities with Captive Reinsurance in 2013**

<table>
<thead>
<tr>
<th>Entity</th>
<th>Entity has Authorized Captive</th>
<th>Entity has Unauthorized Captive</th>
<th>International Entity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEGON</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Allianz Group</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Allstate Corp.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American International Group</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athene Holding Ltd.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>AXA</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Beneficial Financial Group</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUNA Mutual Insurance Group</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fidelity &amp; Guaranty Life Group</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Genworth Financial Inc.</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Global Atlantic Financial Group</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Great-West Insurance Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harford Financial Services</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Legis &amp; General Group</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lincoln National Corp.</td>
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<td>X</td>
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<td>Manulife Financial Corp.</td>
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<td>X</td>
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<td>MetLife Inc.</td>
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<tr>
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<tr>
<td>Nationwide Mutual Group</td>
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<td>Pacific MHC</td>
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<td>X</td>
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<tr>
<td>Principal Financial Group Inc.</td>
<td>X</td>
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<tr>
<td>Protective Life Corp.</td>
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<tr>
<td>Prudential Financial nc.</td>
<td>X</td>
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<td>Reinsurance Group America Inc.</td>
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<tr>
<td>Sammons Enterprises Inc.</td>
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<tr>
<td>Savings Bank Life InsCo of MA</td>
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<td></td>
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<tr>
<td>SCOR</td>
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<tr>
<td>Sun Life Financial Inc.</td>
<td>X</td>
<td>X</td>
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<td>Swiss Re Ltd</td>
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<tr>
<td>Torchmark Corp.</td>
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<td></td>
</tr>
<tr>
<td>Voya Financial Inc.</td>
<td></td>
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<td>X</td>
</tr>
</tbody>
</table>

*Ultimate parent or controlling party of the entity is incorporated outside of the U.S. The non-international ("domestic") entities have ultimate parents incorporated in the U.S.; several of the U.S. organizations own captives domiciled outside of the U.S.
References


New York State Department of Financial Services, 2013. “Shining a Light on Shadow Insurance: A Little Known Loophole that Puts Insurance Policyholders and Taxpayers at Risk.”


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Supreme Court of the United States


This case reviewed language of the federal Affordable Care Act (ACA) to determine whether Congress intended refundable tax credits to be available to qualified individuals in states with a federal exchange, rather than a state exchange. The ACA allows refundable tax credits to individuals who enroll in a health insurance plan through “an Exchange established by the State.” The IRS promulgated a rule making the tax credits available to all qualified individuals, regardless of which type of exchange was established in their state. Petitioners are Virginia residents who did not want to be required to purchase health insurance. If the tax credit was unavailable to them, because Virginia has a federal exchange, their income level would exempt them from the requirement. Petitioners argued that a federal exchange is not “an Exchange established by the State” and, therefore, they were not qualified for the tax refund and not required to purchase insurance.

The Court did not afford Chevron deference to the IRS’ interpretation due to the fact that Congress had not expressly delegated its power and because the agency has no expertise in health care policy. Nonetheless, the Court found that the provision allowing tax credits applies to residents of states with either type of exchange. The Court found that the phrase “an Exchange established by the State” was ambiguous when viewed in context of the statute as a whole, the goal of which was to improve health insurance markets by ensuring affordable coverage to a large number of individuals. The dissent argues that because the phrase “an
Exchange established by the State” is not ambiguous when read alone, there is no need to review the statute as a whole.

United States Courts of Appeal

Fontaine v. Metropolitan Life Ins. Co., 800 F.3d 883 (7th Cir. 2015)

This case revolves around the question of which standard of review should be applied to an appeal of the denial of benefits under a plan governed by ERISA. Beneficiary Mary Fontaine filed a claim for disability benefits with MetLife when her vision problems prevented her from working at the high level and pace her law firm required. MetLife denied her claim, finding that she did not meet the definition of disabled under the terms of her policy. After MetLife affirmed its initial denial, Fontaine filed a suit for wrongful denial of benefits. The ERISA plan at issue contained a clause providing that MetLife’s benefit determinations “shall be given full force and effect” unless they are shown to be “arbitrary and capricious.” But the Illinois Department of Insurance (DOI) had issued a regulation prohibiting such clauses. The Illinois regulation was modeled after the NAIC’s Prohibition on the Use of Discretionary Clauses Model Act (#42). The District Court found that the Illinois regulation applied, requiring de novo review of MetLife’s benefit determination. Upon review of the evidence, the court found that Fontaine was entitled to disability benefits.

On appeal to the Seventh Circuit, MetLife argued that the Illinois regulation was not applicable to the policy at issue and was preempted by ERISA. The Court affirmed the district court’s judgment, finding that the regulation did apply and was not preempted. Specifically, the Court found that the Illinois regulation at issue fell within ERISA’s savings clause because it “regulates insurance” as a law “directed towards entities engaged in insurance” and “substantially affect[s] the risk pooling arrangement between the insurer and the insured.” Furthermore, the Court found that it did not conflict with ERISA’s civil enforcement scheme. Finally, the Court dismissed MetLife’s arguments that the Illinois regulation did not apply to its policy. The NAIC filed an amicus brief in this case supporting Plaintiff-Appellee Mary Fontaine at the request of the Illinois DOI.

St. Louis Effort for AIDS v. Huff, 782 F.3d 1016 (8th Cir. 2015)

The director of the Missouri DOI appeals the District Court’s preliminary injunction enjoining enforcement of Missouri’s Health Insurance Marketplace Innovation Act (HIMIA). HIMIA regulates individuals who “provide[] information or services in connection with eligibility, enrollment, or program specifications of any health benefit exchange operating in [Missouri].” The District Court found that the law was preempted by the ACA. On appeal, the Eight Circuit affirmed in part and reversed in part, finding that the ACA’s preemption
clause was more limited than the district court had acknowledged. The case was remanded to the District Court.

The Court found that appellees would likely prevail on preemption arguments for three substantive provision of HIMIA as they applied to certified application counselors (CACs). The provision prohibiting CACs from providing advice regarding health plans could conflict with the federal duty to provide information and clarify distinctions among plans. Likewise, the provision preventing CACs from providing information about plans not offered on the exchange could conflict with the federal duty to clarify distinctions among plans. Finally, the provision requiring navigators to advise clients to consult with an insurance producer may interfere with the federal rule that CACs provide impartial information since, in Missouri, insurance producers include agents compensated by companies and brokers who are not required to provide complete and impartial information. The Court dismissed the due process claim that HIMIA was impermissibly vague.

*Allen v. USAA Cas. Ins. Co.*, 790 F.3d 1274 (11th Cir. 2015)

Policyholders appeal the District Court’s dismissal of their proposed class action seeking recovery of premium payments for building ordinance and law (BOL) insurance. BOL coverage is included with homeowners insurance to provide protection up to a percentage of the home’s value, in the event repairs or replacements require compliance with building ordinances adopted after the home was originally built. Policyholders argue that a Florida statute requires an insurer to obtain consent on a form approved by the Florida Office of Insurance Regulation (Regulation Office) if it raises BOL coverage above the 25% default coverage amount. Policyholders claim that their insurance provider raised BOL coverage from 25% to 50% without obtaining their consent on a Regulation Office form.

The Eleventh Circuit affirmed the District Court’s dismissal of the action. The Court found that the statute at issue requiring a 25% amount of BOL coverage was intended to ensure homeowners had minimum protection. In reading the statute as a whole, the Court found that an insurer would need to obtain consent on a Regulation Office form if a policyholder elected for less than 25% coverage but not if they elected for more. The Court further explained that even if the insurance company had violated the law, the only recovery available was enforcement of the contract, not recovery of premium payments.
United States District Courts


Medicare providers filed this action challenging the decision of the Secretary of the U.S. Department of Health and Human Services (Secretary) to deny reimbursement of Medicare bad debt (unpaid deductibles and copayments) based on her interpretation of the rules governing reasonable collection efforts. The Provider Reimbursement Manual (Manual) states that a provider must use similar collection efforts with its Medicare patients as it does with its non-Medicare patients. The Manual further provides that if collection agencies are used for non-Medicare debt, they must also be used for Medicare debt of like amounts. Providers used the same collection efforts for a one-year period but after that time, if any debts remained uncollected, they pursued only those of non-Medicare patients, seeking reimbursement from the Medicare program for the Medicare bad debt.

The Court found that the Secretary’s rule prohibiting differential treatment of Medicare and non-Medicare debt violated the Bad Debt Moratorium. The Moratorium was put into place by Congress in 1987 and froze the Secretary’s attempts to more closely scrutinize bad debt reimbursement requests. While the rule had been in place prior to the Moratorium, the Secretary’s interpretation of the rule had become inflexible. The Court acknowledged that the Secretary is typically afforded deference but found the denial of reimbursement to be unreasonable because it was based on mischaracterized pre-Moratorium decisions. The Court remanded the case for application of the more flexible approach to determining whether reasonable collection efforts were made.


This case involves MetLife’s motion to dismiss a putative shareholder class action alleging that it had violated securities laws and misled investors by failing to maintain sufficient reserves for incurred but not reported (IBNR) death benefit claims on its group life insurance policies and by overstating its earnings and financial strength in light of the insufficient reserves. Shareholders also allege that MetLife falsely misrepresented its mortality ratios. Shareholders claim that beginning in the 1980s, MetLife had been using the Social Security Administration’s Death Master File (SSA-DMF) to discontinue annuity payments to those who had deceased but not to locate individuals owed life insurance benefits. In 2007, MetLife allegedly began using the SSA-DMF to locate and pay beneficiaries of individual (but not group) life insurance policies. Beginning in...
2009, MetLife’s accounting practices were investigated by a number of states through a market conduct examination and by the New York Attorney General. MetLife waited until 2011 to begin using the SSA-DMF to locate and pay its group life insurance beneficiaries. Shareholders further contend that MetLife waited two years to disclose the state investigations and that once it did so, its stock prices dropped, causing them economic damages.

Before issuing an opinion on the motion to dismiss, the Court waited for the Supreme Court to decide a case with similar facts, *Omnicare, Inc. v. Laborers District Council Construction Industry Pension Fund*. Relying on *Omnicare*, the Court found that while MetLife’s IBNR reserves were insufficient to meet its life insurance obligations, this fact was not determinative. Instead, the Court held that to survive a motion to dismiss the U.S. Securities and Exchange Commission (SEC) Rule 10b-5 claims regarding the allegedly inadequate IBNR reserves, plaintiffs needed to allege that MetLife knew its reserves were inadequate but told investors that they were adequate. Alternatively, plaintiffs needed to allege that MetLife did not perform an adequate inquiry into whether its reserves were adequate, rendering misleading its representation that they were adequate. Because shareholders did neither, these claims were dismissed. Likewise, the remaining Rule 10b-5 claims were dismissed for failure to allege untrue statements of material fact or omission of a material fact. The Court also dismissed a number of related claims, including failure to disclose the state investigations. Ultimately, the only claims that survived included allegations under Section 11 of the Securities Act that MetLife misrepresented its mortality ratios and the accompanying claim for joint and several liability.

**State Courts**

**California**


(*Cal. Ct. App. 2d 2015*)

This case addresses the issue of whether entities issuing health care service plans (HCSPs) can be taxed as insurers under the California constitution. The plaintiff, a taxpayer, filed a writ of mandamus and a declaratory judgment action to compel state officials to collect a gross premium tax from two entities, Blue Shield and Blue Cross (collectively, the Blues) as insurers, rather than the corporate franchise tax imposed on all other businesses. The taxpayer argues that the PPO products sold by the Blues, which constitute a majority of their business, are indemnity health insurance contracts, making them insurers. The Blues filed a demurrer seeking to dismiss the case, arguing that they were HCSPs under
California’s Knox-Keene Act and not insurers. The trial court agreed, relying on the fact that, as HCSPs, the Blues were not subject to regulation by the DOI.

On appeal, the Court of Appeal reversed that decision, finding that the taxpayer’s complaint contained sufficient facts to support that the Blues were insurers subject to the gross premium tax. Relying on two California Supreme Court cases, the Court held that the trial court should have looked beyond regulatory labels to determine whether a significant proportion of the Blues’ business was based on indemnification.

**Indiana**

*First American Title Ins. Co. v. Robertson, 19 N.E.3d 757 (Ind. 2014), amended on rehearing at 27 N.E.3d 768 (Mem) (March 26, 2015)*

Following a market conduct examination of First American Title Insurance Company, the commissioner of the Indiana DOI forwarded the report to the insurance company. First American submitted a rebuttal to the report’s findings. Under the examination statute, the commissioner had 30 days to enter an order, but instead of issuing an order, the commissioner sought several extensions so that the parties could resolve the issues raised by the report. When First American refused a further request for extension, the commissioner issued an order calling for a hearing before an administrative law judge. Before the hearing date, First American filed an action in the state trial court seeking judicial review of the commissioner’s order, arguing it was void because it had been issued after the 30-day statutory deadline. The commissioner moved to dismiss the suit for failure to submit the agency record as required by the state Administrative Orders and Procedures Act.

The trial court denied the commissioner’s motion to dismiss, but it also denied First American’s petition for judicial review for failure to show prejudice by the untimely order. On appeal, the commissioner asserted for the first time that the petition should be denied for First American’s failure to exhaust administrative remedies. The Court of Appeals held that: 1) the commissioner’s order was void for being untimely and that First American did not need to show it was prejudiced; 2) failure to exhaust administrative remedies is a procedural error that does not rob the court of subject matter jurisdiction and that the commissioner waived this argument by raising it for the first time on appeal; and 3) First American did not need to submit a formal agency record since the documents attached to its petition were sufficient for review. On transfer, the Supreme Court agreed with the Court of Appeals that failure to exhaust administrative remedies does not implicate the trial court’s subject matter jurisdiction and that the commissioner had nonetheless waived this argument. The Court explained that the commissioner could have argued that a finding of waiver was inappropriate, but he had not done so. Ultimately, the Supreme Court dismissed First American’s petition by declaring a
“bright line” rule holding that courts may not review an administrative order when the agency record has not been filed.

**New Jersey**


This case addresses the issue of whether a statement taken by prosecutors during an insurance fraud investigation is discoverable by an insurance company in a civil suit against the affiant and others allegedly involved in the scheme. Allstate filed a civil suit against several defendants for insurance fraud. Defendants were health care providers, including medical doctors and chiropractors, some of whom were unlicensed. Defendants allegedly paid individuals to stage automobile accidents and would then provide unnecessary care, prescribe unnecessary medical equipment, unlawfully split fees and conceal self-referrals. One of the defendants, a chiropractor, entered into an agreement with the New Jersey Office of the Insurance Fraud Prosecutor (OIFP), where he provided a proffer statement describing his participation in the fraud scheme. He later pled guilty to several charges and was sentenced to six years in prison and ordered to pay restitution of more than $600,000.

During discovery in the civil lawsuit, Allstate asked one of the prosecutors for the chiropractor’s proffer statement. The prosecutor sent it to Allstate’s lawyer. Allstate later deposed the chiropractor, who claimed that he had no recollection of the fraud scheme. When Allstate attempted to enter the proffer statement as an exhibit, the chiropractor objected and moved for a protective order. The trial court found that the proffer statement was not confidential. The Appellate Division affirmed the trial court’s decision, finding that the parties placed restrictions on the statement’s use in criminal matters but not in civil litigation. The Court also found that, as part of his plea agreement, the chiropractor agreed to testify truthfully in all proceedings concerning the fraud scheme. Furthermore, the Court held that the chiropractor’s claim of privilege failed because a regulation allows the OIFP to share confidential information with “referring entities on pending cases,” and insurance companies are considered “referring entities.”

**Pennsylvania**

*In Re Penn Treaty Network America Ins. Co., 119 A.3d 313 (Pa. 2015)*

This case addresses the issue of when a Court should defer to an insurance commissioner’s determination to convert the rehabilitation of a troubled insurance company into liquidation proceedings. Penn Treaty Network America Insurance
Company (PTNA) and its subsidiary are life insurers specializing in long-term care (LTC) insurance. PTNA’s financial troubles began in the 1990s, when it sold a large number of underpriced and poorly underwritten policies providing generous benefits. The companies never fully recovered financially and, in 2009, a former Pennsylvania insurance commissioner began rehabilitation proceedings.

Several months after initiating an uncontested rehabilitation, the commissioner filed petitions to convert to liquidation proceedings, citing the companies’ insolvency. The Court below denied the petition, explaining that no deference was owed to the commissioner when there are specific statutory standards governing termination of rehabilitation. In its decision, the Supreme Court cited a number of cases from Pennsylvania and other jurisdictions holding that the commissioner is owed deference in making the determination to convert rehabilitation proceedings to liquidation, reviewable by a court under an abuse-of-discretion standard. Despite this, the Supreme Court found that, in this instance, continued rehabilitation was proper because the former commissioner who had initiated the rehabilitation proceedings had improperly treated the rehabilitation as a conservatorship to give him time to prepare for liquidation.


In this case, policyholders challenged cancellation of their homeowners insurance policy under Pennsylvania’s Unfair Insurance Practices Act (Act). The insurance company issued the policy before inspecting the premises. Upon inspection and after consulting with its underwriter, the company determined that the deck, which was 14 feet above ground, would need a railing. A month later, policyholders were notified that they would need to install a railing within 30 days to avoid cancellation of the policy. Policyholders requested a 30-day extension, which the company granted. After the time lapsed and the rail had not been installed, the company cancelled the policy. When policyholders sought review of the cancellation, the company offered another four-month period to install the railing. But policyholders still never installed the railing.

This appeal follows the insurance commissioner’s finding that the insurer’s cancellation of the policy did not violate the Act. The Act allows an insurer to cancel a policy within 60 days or at any time when “there is a substantial increase in hazards insured against by reason of willful or negligent acts or omissions by the insured.” The Court affirmed the commissioner’s decision because policyholders were notified within 60 days that the railing needed to be installed, and their willful failure to do so constituted a “substantial increase in hazards.”
Tennessee


This case is a consolidated review of claims brought by five workers’ compensation insurers domiciled in Pennsylvania. The insurers argue that they were incorrectly assessed retaliatory taxes by the state of Tennessee due to a misinterpretation of Pennsylvania statutes and regulations. Tennessee law imposes retaliatory taxes upon insurers domiciled in a state with laws imposing higher taxes or other obligations on Tennessee insurers doing business there than those imposed under Tennessee law on the other state’s domiciliaries doing business in Tennessee. The issue addressed on appeal is whether Pennsylvania law imposes taxes or other obligations that exceed those imposed by Tennessee.

The Tennessee Supreme Court determined that the Pennsylvania workers’ compensation fund statutes—interpreted by the state of Tennessee as imposing excess obligations, and, thereby, requiring payment of retaliatory taxes by the insurers—had been repealed by a more recently adopted statute. The new statute, Section 578, specifically reads that the assessments “shall no longer be imposed on insurers, but shall be imposed, collected and remitted through insurers[.]” The Court concluded that the previous statutes had been repealed by this law and that collecting the assessments through insurers placed the burden on insured employers, rather than the insurers themselves. Therefore, the state of Tennessee had no authority to collect the retaliatory taxes.

Texas


An insurance agent, Elias De La Garza, appeals the trial court’s affirmance of a default order entered by the commissioner of the Texas DOI, revoking his occupational licenses. The DOI had sent multiple notices to the agent regarding client complaints and seeking a response. When he never replied, the DOI sent notice of a hearing before an administrative law judge. The insurance agent’s assistant signed the notice and returned the receipt, but the agent never appeared at the hearing, resulting in a default order. The DOI sent the order to the agent’s office. More than a month later, the agent filed several motions with the DOI, including a motion for rehearing, a motion for extension of time and a motion to set aside the order. In an affidavit supporting his motions, the agent claimed that he was unaware of any of the notices sent by the DOI and that he later learned that one of his employees had shredded them without his knowledge. The DOI granted his extension of time, and he filed his motion for rehearing. Before an
administrative decision was made, he filed an action with the trial court, seeking a declaration that the default order was void. The DOI then entered an order denying the agent’s motions. The agent amended his petition to seek judicial review of the default order.

On appeal, the Court found that the insurance agent had exhausted his remedies by filing the motion for rehearing within the extended period of time and by amending his suit to include a petition for judicial review of the default order. The agent raises several arguments that his substantial rights were prejudiced by entry of the order. The Court dismissed the agent’s argument that the order was “made through unlawful procedure” because while the DOI failed to comply with technical language requirements for the notice and affidavit, the agent failed to show he was prejudiced by this. The Court dismissed the argument that the default order was “affected by other error of law” because while his failure to file a written response to the DOI’s notice of hearing may not have been intentional on his part or a result of his own “conscious indifference,” he was ultimately responsible for his employee’s actions. Finally, the Court dismissed his argument that the order violated his right to due process because the DOI afforded him “all of the notice and opportunity to be heard that he was entitled to receive.” The Court of Appeals affirmed the trial court’s judgment affirming the DOI’s default order.

Cases in Which the NAIC Filed as Amicus Curiae


The NAIC submitted an amicus brief in the U.S. District Court for the District of Columbia in the case of MetLife, Inc. v. Financial Stability Oversight Council. The NAIC filed this brief at the request of the California DOI and in support of MetLife’s motion for summary judgment. The case involves MetLife’s challenge to the Financial Stability Oversight Council (FSOC) in its designation of MetLife as a systemically important financial institution. Pursuant to the federal Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank), the FSOC was required to consider the degree to which MetLife is already regulated by one or more primary financial regulatory agencies before making a designation.

The brief asserted that the FSOC largely ignored or discounted the state-based system that regulates MetLife, and therefore acted in an arbitrary and capricious manner in making the designation. Specifically, the brief described the full range of regulatory tools available to state regulators at the individual entity and group level and the failure of the FSOC to assess the risk of asset liquidation against
those tools, which include early warning through risk-based capital requirements and stays on surrender activity. The brief also described the deliberate, incremental process that applies to troubled companies regulated by state insurance commissioners and recounted the FSOC’s failure to assess the risk of a hypothetical MetLife liquidation against this process.


At the request of the Insurance Division of the Vermont Department of Financial Regulation, the NAIC filed an amicus brief on the merits with the U.S. Supreme Court, in support of Alfred Gobeille, chair of the Vermont Green Mountain Care Board, appealing the Second Circuit’s opinion in favor of Liberty Mutual Insurance Company. The Second Circuit determined that ERISA preempted a Vermont state statute and regulation requiring certain insurers and other health care payers to submit health care claims data to an All-Payer Claims Database (APCD), as applied to Liberty Mutual’s self-insured employee benefit plan. The collected data is used to analyze health care utilization, cost, quality and population health, as well as to support health care reform initiatives. The Second Circuit found that the law had an impermissible “connection with” ERISA’s federal reporting requirements.

The NAIC, joined by the National Governors Association (NGA), National Conference of State Legislatures (NCSL), Council of State Governments (CSG), and Association of State and Territorial Health Officials (ASTHO), argued that the Vermont law and the similar APCD laws of 17 other states were not preempted by ERISA. Specifically, amici argued that: 1) APCD laws fill critical information gaps for states; 2) the presumption against ERISA preemption applies because in enacting APCD laws, states are exercising their traditional police powers; 3) the APCD laws do not “relate to” ERISA in an impermissible manner; and 4) finally, APCD laws do not interfere or conflict with requirements imposed by ERISA.


The NAIC filed an amicus brief in support of plaintiff New York Life Insurance Company at the request of the Rhode Island DOI. At issue was the application of the “interest on death benefit proceeds” provision of the uniform standards adopted by the Interstate Insurance Product Regulation Commission (IIPRC), as opposed to Rhode Island’s statutory interest rate, to the proceeds of an individual term life insurance policy approved by the IIPRC for issue in Rhode Island. The issuer of the policy, New York Life Insurance Company, filed an interpleader action in federal district court seeking to apply the rate of interest calculated in accordance with the IIPRC-approved policy provision. Defendant
Massiel Ortiz countered with bad faith claims and prayed for the statutory rate of interest. The Magistrate Judge issued a Report and Recommendation declining to apply the interest provision in the policy, in contravention of the statutory Compact provision stating that the uniform standards requirements shall be the exclusive provisions applicable to the content of policies filed with the IIPRC. Following the IIPRC’s appearance via affidavit supporting the plaintiff’s objections to the Report and Recommendation, the NAIC filed as amicus curiae recommending that the district court reject the Report and Recommendation on the interest payable. The NAIC brief discussed the background of the IIPRC and compacts in general and addressed several related deficiencies in the Report and Recommendation.

In an order dated Sept. 30, 2015, the Court directed New York Life Insurance Company to deposit the principal amount of policy proceeds into the Court’s registry to stop the accrual of interest. The Court then gave the parties and any amici 90 days to provide supplemental briefing on the issue of which interest rate applied.
Journal of Insurance Regulation

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