



National Association of Insurance Commissioners

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# Journal of Insurance Regulation

2016 Issue

## Research Articles

- Cellphone Laws and Rear-End Accidents
- A Review of States' Decisions Regarding Health Insurance Exchanges
- Optimal Cap on Claim Settlements Based on Social Benefit Maximization
- Commercial Insurers' Participation in Public Health Insurance Programs
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- Key Stakeholders' Stock Returns and the Affordable Care Act
- A Post-Mortem of the Life Insurance Industry's Bid for Capital During the Financial Crisis



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# JOURNAL OF INSURANCE REGULATION

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Cassandra Cole and Kathleen McCullough  
Co-Editors

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National Association of  
Insurance Commissioners

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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;
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5. To be an important force for the overall improvement of insurance regulation.

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# Journal of Insurance Regulation

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consistent with numerous studies on the limitations of disclosures, due to cognitive limitations (bounded rationality) and financial literacy. We review the German practices for effectiveness, compare German and U.S. experiences with insurance disclosures, and conclude that disclosures show little impact on consumer decisions. We recommend that disclosures could provide benefit if conveyed in better formats in line with existing research on financial services disclosures. Regulators and consumer advocates should, therefore, be restrained about general proscriptions for disclosures. Greater benefit to consumers may come from improving default coverages and raising the advisory standard for intermediaries.

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In this paper, we show that life insurance companies were under significant capital strain during the recent financial crisis. This was the case not just for the notable case of American International Group (AIG), or for life insurers within the largest life insurance groups that applied for government funds, but for life insurers across the entire industry. The ability to access government funds, the benefit of regulatory actions and the large internal capital transfers received by life insurers from their non-insurance parents during the crisis combined to contribute significant amounts of reported statutory capital to life insurance companies. Moreover, capital contributions to life insurers from their parents are not limited to crisis periods; they also exhibit a business cycle pattern. This study provides evidence suggesting two important policy recommendations and calls for additional research on these issues: 1) insurance supervisors should have the ability to assess capital adequacy and availability beyond the level of the insurance operating company, including the ability to assess the capital adequacy of, and availability of capital from, holding companies not currently supervised by state insurance regulators, and these supervisors should take a consolidated view in monitoring the size, type and direction of internal capital transfers when evaluating the viability of entity-level life insurers; and 2) life insurance supervisors would benefit from staff with expertise in understanding and forecasting the impact of macroeconomic and financial conditions on life insurers' balance sheets.

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## *Editors' Perspective*

The changing regulatory environment has led to a diverse set of articles on a number of topics in 2016. Though varied, all provide important insight into issues of significance to regulators, the insurance industry and consumers. Topics have included continued research on health insurance, as well as emerging risks such as autonomous vehicles.

The articles related to the federal Affordable Care Act (ACA) examine very different issues. The first examines the decisions of states as it relates to the establishment of health insurance exchanges. Specifically, the articles considers whether there are differences in the demographics and political environments between states that established state-maintained exchanges in comparison to federally facilitated exchanges. The second considers the capital market response of affected industries to both the signing into law of the health care bill as well as the U.S. Supreme Court decision to uphold the law. Affected industries included health care providers, health insurance companies, medical device companies and pharmaceutical companies. The final health insurance-related article considers the potential implications of the involvement of private insurers on health insurance exchanges by examining the impact of participation in public health insurance programs on insurer performance.

The 2016 edition of the *Journal* includes two articles that consider the impact of technology on the insurance industry. The first examines laws banning cellphones and rear-end accident frequency. The second explores the issues surrounding the development and potential usage of autonomous vehicles. Two other articles focus on catastrophe and climate risks. These articles evaluate existing state regulation of insurance markets subject to catastrophe risk and consider how existing strategies can be adapted to manage climate change risk. Finally, tort reform, insurance disclosure practices and the financial crisis are other topics covered in this year's *Journal*.

In 2017, implications of the presidential election on insurance regulatory issues likely will generate further research on health insurance reform and other issues. In addition, emerging risks related to the aging population, such as nutraceuticals, and technology, such as data manipulation, likely will lead to research focused on examining and evaluating solutions to manage these risks. The *Journal of Insurance Regulation* will work to continue to publish articles that can serve as resources to those responsible for managing these issues.



# Cellphone Laws and Rear-End Accidents

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Robert Puelz  
Hanna E. Robertson\*

## Abstract

In an attempt to reduce accident frequency caused by distraction involving cellphone use, the state of California enacted two sets of laws banning cellphone use while driving. We examine the relationship between laws to ban cellphone use while driving and rear-end accident frequency in California. Using a panel data set that groups accidents by geographic location, we find evidence that the association between California's handheld cellphone ban and the number of rear-end accidents is negative and statistically significant. In robustness testing, we find this result is unaltered when we use a broader definition of "collision accident." These results have implications for public safety and transportation, automobile insurance markets and insurance regulation.

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## 1. Introduction

Fifteen years ago, driving distracted because of cellphone use was a new risk created through innovation. The risk has matured and today is recognized as broadly impactful. Consequently, the potential for distraction caused by cellphone use is a major concern for legislators, public safety advocates and the insurance industry. The National Highway Traffic Safety Administration (NHTSA) estimates that 17% of accidents with injuries in 2011 were “distraction affected crashes.”<sup>1</sup>

From the point-of-view of insurance regulation, distracted driving touches upon potential product regulation and market regulation.<sup>2</sup> The efficacy of state laws to limit distracted driving while using a cellphone and a better understanding of distraction effects are key, because distracted driving remains a liability for insurers in their contractual obligations to their clients and third-party claimants. If bans on handheld cellphone use prove effective, then risks borne by insurers will be less important. If, on the other hand, bans are ineffective, then insurers’ loss ratios may become higher and/or more variable, which could lead to some insurers pushing for alternative contract designs in their auto insurance policy forms. Thus, regulations focused on safety, and the subsequent outcomes of such regulation, can become informative to insurance regulators who must weigh simultaneous effects on insurance consumers and their insurers.

Using a cellphone while driving introduces an externality: the reduction in safety of innocent third parties. Previous studies have estimated that cellphone use while driving may cause between 10 and 1,000 fatalities per year in the U.S. and many more non-fatal accidents.<sup>3</sup> Klauer et al. (2014) found that among both young and experienced drivers, using a cellphone while driving increased the risk of a crash or near-crash. The heightened risk will eventually trickle through to insurance pricing as long as insurers continue to embrace first-party and third-party coverage for distracted driving incidents.

Concern that cellphone use distracts drivers and increases the probability of accidents has led advocates for traffic safety to demand bans on cellphone use while driving. Regulation of cellphones has become a major policy issue and many states have enacted legislation to address distracted driving due to cellphone use. To date, using a handheld cellphone while driving is banned in 14 states.<sup>4</sup>

In addition, all cellphone use (handheld and hands-free) is restricted for novice drivers in 37 states and the District of Columbia. The definition of “novice driver” varies by state. Most states classify novice drivers as drivers younger than

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1. [www.distraction.gov/download/811737.pdf](http://www.distraction.gov/download/811737.pdf).

2. These are two of the six purposes for insurance regulation articulated by the NAIC, [www.naic.org/documents/consumer\\_state\\_reg\\_brief.pdf](http://www.naic.org/documents/consumer_state_reg_brief.pdf).

3. Hahn, Tetlock, and Burnett (2000) calculated a range of 10 to 10,000 fatalities with a best estimate of 300 deaths per year.

4. As of July 2015. See [www.iihs.org/iihs/topics/laws/cellphonelaws?topicName=distracted-driving](http://www.iihs.org/iihs/topics/laws/cellphonelaws?topicName=distracted-driving).

18, while other states designate novice drivers as learner's permit and intermediate license holders. For example, novice drivers in Alabama are 16-year-old drivers and 17-year-old drivers who have held an intermediate license for fewer than six months, and novice drivers in Illinois are all drivers younger than 19. All cellphone use while driving a school bus is prohibited in 19 states and the District of Columbia.<sup>5</sup> Text messaging while driving is banned in 44 states and the District of Columbia. Novice drivers are prohibited from text messaging in four states (Mississippi, Missouri, Oklahoma and Texas).<sup>6</sup>

Most relevant to this research is the California experience where, on July 1, 2008, a ban on handheld cellphone use while driving (hereinafter referred to as "handheld ban") was put into effect.<sup>7</sup> The handheld ban is made of up two laws: 1) the first law prohibits all drivers from using a handheld cellphone while operating a motor vehicle (California Vehicle Code [VC] §23123); and 2) the second law prohibits drivers under the age of 18 from using a handheld cellphone or a hands-free device while operating a motor vehicle (VC §23124). California also enacted a ban on text messaging (hereinafter referred to as "texting ban") that took effect January 1, 2009, which prohibits all drivers from writing, sending or reading text-based communication on an electronic wireless communications device while driving a motor vehicle (VC §23123.5).<sup>8</sup> The handheld and texting laws are enforced as primary enforcement laws, which allow law enforcement officers to stop drivers solely for talking on a handheld phone or texting. However, the use of hands-free devices by drivers younger than 18 is enforced as secondary enforcement, which requires an officer to have some other reason for making a traffic stop.<sup>9</sup>

Of particular interest to policymakers and economists are the costs and benefits of handheld cellphone bans. As we discuss, there is conflicting evidence about the association between cellphone use, distracted driving and automobile accidents. This paper stems from significant new research by Burger, Kaffine and Yu (BKY, 2014), who find no significant decline in accidents around the time of California's change.<sup>10</sup> We extend BKY's work using California accident data by initially focusing on what we believe to be a better set of accidents to investigate this question. We apply a finding by Neyens and Boyle (2007), who showed that cellphone distractions resulted in a higher likelihood of rear-end accidents, and we are able to expand the state highway accident data used by BKY to include

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5. "Hands-free" refers to a phone that does not require the user to hold it during operation.

6. Insurance Institute for Highway Safety, [www.iihs.org/laws/maphandheldcellbans.aspx](http://www.iihs.org/laws/maphandheldcellbans.aspx).

7. Note that hands-free devices are still allowed.

8. California drivers 18 and older may dictate, send or listen to text-based messages if they are using voice-activated, hands-free devices.

9. California Vehicle Code, [www.dmv.ca.gov/pubs/vctop/d11/vc23123.htm](http://www.dmv.ca.gov/pubs/vctop/d11/vc23123.htm).

10. In a 2012 white paper, the National Safety Council asserts that distraction still exists in hands-free environments because of the inability of the brain to effectively multitask when a driver wishes to simultaneously hold a phone conversation. See [www.nsc.org/DistractedDrivingDocuments/Cognitive-Distraction-White-Paper.pdf](http://www.nsc.org/DistractedDrivingDocuments/Cognitive-Distraction-White-Paper.pdf).

accidents off of state highways. We find and report a strong relationship between the introduction of the handheld ban and a decline in monthly rear-end accidents that is robust across a variety of empirical specifications.

The direction of this paper proceeds as follows. In the next section, we present a review of previous studies related to cellphone use and automobile incidents. Then, the California accident data used in the study and other control variables are introduced and analyzed. We find a negative relationship between the ban on handheld use and accident count, and extend the analysis by three robustness checks. We conclude with a discussion of how the study results may be interpreted by policymakers and we offer thoughts for future research.

## 2. Background

Previous studies that have analyzed data involving cellphone use and accident frequency have produced conflicting results. Many studies conclude that the use of cellphones while driving increases the probability of accidents. Goodman, Tijerina, Bents and Wierwille (1999) conclude that there is sufficient evidence to claim that using a cellphone while driving increases the risk of being involved in an accident. Various factors may contribute to the increased frequency of collisions, including dialing, answering and talking on the phone, along with sending and receiving text messages. These activities divert the driver's attention away from the driving task and reduce the amount of attention capacity available for processing and dealing with potential hazards that may occur; therefore, the likelihood of the driver being involved in an accident increases (Goodman et al., 1999). A driver's cognitive load is increased regardless of whether he or she uses handheld or hands-free equipment.

Strayer and Johnston (2001) supported this notion with their dual-task studies to assess the effects of cellphone conversations on performance of a simulated driving task. Their research suggests that cellphone use disrupts performance by diverting attention to an engaging cognitive context other than the one immediately associated with driving. Their data implies that legislative initiatives that restrict handheld devices but permit hands-free devices are not likely to reduce cognitive interference from the phone conversation, because the interference is due to central attention processes.

Several studies attempt to find a statistical relationship between cellphone use and accidents using individual-level data. Violanti and Marshall (1996), Violanti (1998), Redelmeier and Tibshirani (1997), and Dryer, Loughlin, and Rothman (1999) conclude that using a cellphone while driving increases the risk of being involved in an accident.

Violanti and Marshall (1996) used an epidemiological case-control design and logistic regression techniques to examine the association of cellphone use in motor vehicles and traffic accident risk. Their data were obtained from a case group of 100 randomly selected drivers involved in accidents within the past two years and

a control group of 100 randomly selected licensed drivers not involved in accidents within the past 10 years. Violanti and Marshall examined the amount of time per month spent talking on a cellular phone and 18 other driver inattention factors. They found that increased use of a cellphone while driving was associated with increased risk of being in a traffic accident. Although the study consisted of a small sample size, the results indicated that talking more than 50 minutes per month on a cellphone in a vehicle was associated with a 5.59-fold increased risk of a traffic accident. In addition, Violanti found in 1998 that cellphones increase the risk of certain accident characteristics in fatal collisions more than those same characteristics in non-fatal collisions. A case-control study found an approximate nine-fold increased risk for a fatality given the use of a cellphone while driving. In addition, a two-fold increased risk for a fatality was found given the mere presence of a cellphone in the vehicle.

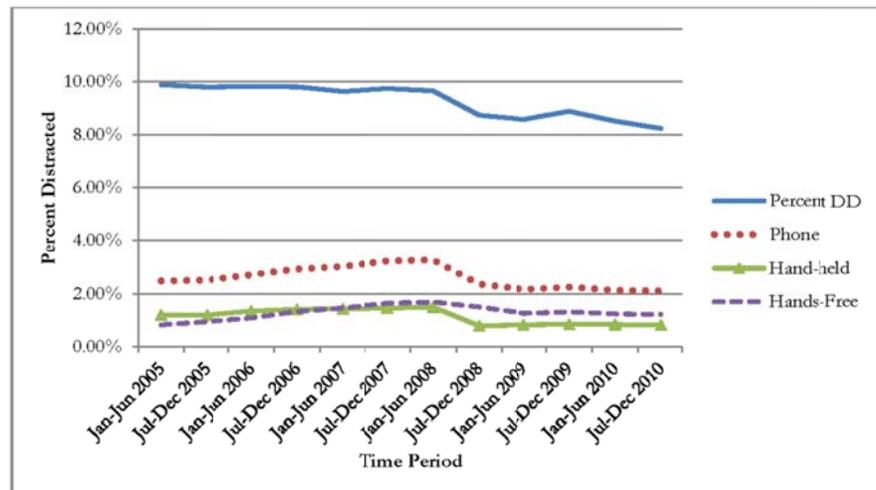
Redelmeier and Tibshirani (1997) further explored these findings by using the case-crossover design to study whether using a cellphone while driving increased the risk of a motor vehicle collision. The case-crossover method is used in medical literature to study determinants of rare events, which are accidents in this case. Redelmeier and Tibshirani found that the risk of a collision when using a cellphone was approximately four times higher than the risk when no cellphone was used. These results are the most highly cited in policy discussions about banning cellphone use while driving.<sup>11</sup> However, the field studies of Redelmeier and Tibshirani do not necessarily imply that the use of cellphones causes an increase in accident rates. People who use their cellphones while driving may be more likely to drive erratically or to engage in risky driving behavior, such as speeding. This increased risk-taking may underlie the correlation, which could be a limitation of this field study. Based on Redelmeier and Tibshirani (1997), Redelmeier and Weinstein (1999) estimated a 2% reduction in accidents from a cellphone ban, and Cohen and Graham (2003) found a 2% to 21% reduction in accidents with a central estimate of a 6% reduction in accidents.

Supporting the association between cellphones and collisions, Dreyer, Loughlin and Rothman (1999) found an association between cellphone use and death from automobile collisions. In their research on the health risks of cellular telephones, Dreyer et al. found evidence that the heaviest users of cellphones had more than double the mortality from collision incidents than the lightest users. Interestingly, the effect of cellphone use on mortality was not as strong for longer-term users, which could suggest a greater degree of caution or perhaps a learning effect.

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11. Hahn and Preiger (2006).

**Figure 1:**  
**Percentage of Injuries by Distracted Driver Category**



In contrast to these studies confirming a relationship between cellphone use and accident frequency, economists Hahn and Prieger (2006, 2007) report no significant effect of handheld or hands-free cellphone use on accidents based on survey data from more than 7,000 individuals. Hahn and Prieger used a large sample of individual-level data and tested for selection effects, such as whether drivers who use cellphones are inherently less safe drivers, even when not talking on the phone. They found that the impact of cellphone use on accidents varies across individuals; therefore, previous studies, based on accident-only samples, may be overstated by 36%. After controlling for selection bias and various risks across drivers, such as the statistically significant difference in cellphone effects between men and women in the sample, they found no significant effect of hands-free or handheld cellphone use on accidents.

Most closely related to the research in this paper is the work of Burger, Kaffine and Yu (2014). Burger et al. found no evidence that the ban on handheld cellphone use in California led to a reduction in traffic accidents. They tested whether the handheld cellphone ban in California reduced the number of accidents generally, but they did not consider accident type. Their analysis was based on daily, high-frequency vehicle accident data around the time the cellphone ban went into effect, making their analysis distinct from other studies. Their data set included more than 500,000 incidents as reported by the California Highway Patrol to the California Department of Transportation (Caltrans) Performance Management System (PeMS). PeMS collects, manages and publishes data on California highway conditions. Using total daily accidents regardless of accident type on major freeways and highways in nine of California's traffic districts, Burger et al. concluded that there is no evidence to support that the handheld

cellphone ban reduced accidents in California. While they provide evidence that the ban failed to reduce accidents, the researchers were unable to discover whether compliance with the law was associated with a reduction in accidents. That is, they were unable to explain the ban's lack of effect on accident frequency by any one of the following possibilities: that cellphone use does not impact accidents; that drivers used other disruptive hands-free or text-based technologies; or that weak compliance failed to reduce cellphone use overall.

By contrast, a University of California, Berkeley study found an overall reduction in percentages of fatalities and non-fatal injuries related to handheld cellphone use after implementation of California's handheld cellphone ban.<sup>12</sup> Using data from the California Statewide Integrated Traffic Records System (SWITRS) from January 2005 to December 2010, the study analyzed the number of fatalities and injuries overall due to distracted driving, cellphone use, handheld cellphone use and hands-free cellphone use. (The percentages of non-fatal injuries due to overall distracted driving, cellphone use, handheld cellphone use and hands-free cellphone use for the period of January 2005 to December 2010 are shown in Figure 1.) Two-year periods before and after the implementation of the handheld cellphone ban were compared to provide before-and-after collision patterns. The results of the analysis show a consistent reduction in fatalities and injuries related to handheld cellphone use after the July 1, 2008, effective date of the handheld cellphone ban in California. While Burger et al. had a rigorous analytical approach, the University of California, Berkeley study conducted a brief descriptive analysis of fatalities and injuries before and after the implementation of the handheld cellphone ban.

Several studies have focused on the relationship between cellphone use and collisions for specific age groups. Using a survey sample of 1,185 college students, Seo and Torabi (2004) examined the association between in-vehicle cellphone use and accidents or near accidents. Seo and Torabi found that the most frequently cited reason for drivers' accidents or near-accidents involving cellphones was actually talking while driving, not dialing or answering the phone. This is consistent with Strayer and Johnson (2001).

Neyens and Boyle (2007) determined how different distraction factors impact the crash types that are common among teenage drivers specifically. They developed a model to predict the likelihood that a driver will be involved in one of three common crash types: an angular collision with a moving vehicle, a rear-end collision with a moving lead vehicle and a collision with a fixed object. Their results showed that cellphone distractions resulted in a higher likelihood of rear-end collision. We utilize this finding in the next section and broaden the analysis to examine the relationship between cellphone use and all rear-end collisions in California.

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12. See Ragland et al. (2012).

### 3. Analysis

The accident data we use to test and evaluate the relationship between handheld and texting bans and the number of rear-end collisions comes from SWITRS. The SWITRS database houses collision scene data collected through the California Highway Patrol. Two separate laws that regulate cellphone use while driving in California are germane to the analysis. The handheld ban (VC §23123) took effect July 1, 2008, and it prohibits all drivers from using a handheld cellphone while operating a motor vehicle, but drivers 18 and older are allowed to use a hands-free device. The separate texting regulation (VC §23123.5) took effect January 1, 2009, and it prohibits all drivers from texting while driving.<sup>13</sup> The dates chosen for this study encompass five years, from January 1, 2006, to December 31, 2010, with two years and six months on either side of the state's handheld cellphone ban. This period was chosen because it is symmetric on either side of the handheld ban (July 1, 2008) while also providing a window on either side of the additional texting ban (January 1, 2009).<sup>14</sup>

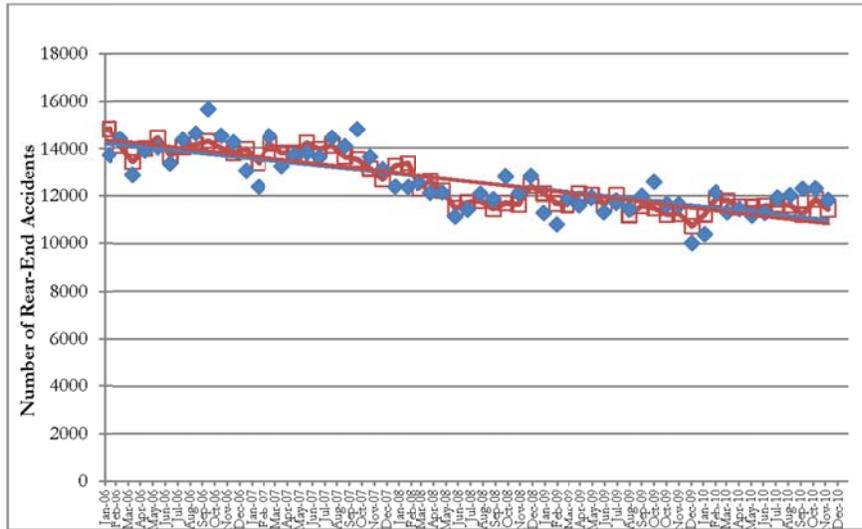
The raw data set for each of the five years contained more than 500,000 collisions. The observations contain detailed information about each collision, including the location of the incident, the date and time the accident occurred, the collision severity and the type of collision. Each collision can be classified into one of the following categories according to type of collision: head-on; sideswipe; rear-end; broadside; hit object; overturned; vehicle/pedestrian; other; or not stated. We segregated the data into 60 months from January 2006 to December 2010 and focused on rear-end accidents, given the Neyens and Boyle evidence on cellphone distractions and rear-end accidents. This permits us to better isolate the efficacy of any legal change to distracted driving.

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13. <http://dmv.ca.gov/cellularphonelaws/>. There were no grace periods for enforcement after the laws went into effect July 1, 2008, and January 1, 2009, respectively.

14. The raw data are available in three separate files: Collision Data File; Party Data File; and Victim Data File. All three files are linked together with the same case identification number of each collision. Victim data are linked to the collision file by the case identification number and to their respective party by the party number.

**Figure 2:  
Number of Rear-End Collisions by Month**



An initial look at statewide data is displayed in Figure 2, with the raw data noted as diamonds and the seasonality considered in the squares connected by a solid line. A general negative trend in accident count over time is apparent in Figure 2. Moreover, if one follows the actual monthly accidents over time, there also appears to be a seasonal effect.<sup>15</sup> Periodically, the months of August through December appear to have a larger than average number of collisions with a peak high in the month of October. The months of January and February have a lower than average number of collisions.<sup>16</sup>

15. We looked at the average number of rear-end collisions from January 2006 through June 2008 (approximately 13,552) and compared them to the average number of rear-end collisions from July 1, 2008, to December 2010 (approximately 11,708). Utilizing a chi-square test, there is sufficient evidence at the  $\alpha = 0.05$  level to infer there has been a change in rear-end collisions in California after the ban on handheld cellphone use became effective July 1, 2008. Of course, the result is also consistent with the general negative trend in rear-end collisions, regardless of changes in the law.

16. The outlier months could be attributable to a possible “tourism effect.” Perhaps there are more visitors to the state and, therefore, more cars on the road during the August through December time frame than during January and February. More cars on the road could be associated with a higher number of rear-end collisions, and a tourism effect would suggest that these drivers may be unfamiliar with the roads and, therefore, more likely to be involved in an accident.

### 3.1 *The Hypotheses and the Empirical Model*

Our primary interest is to document how a change in law has been associated with accidents. The null and alternative hypotheses for the initial test are as follows:

$H_0$ : There has been no change in rear-end collisions in California after the ban on handheld cellphone use became effective July 1, 2008.

$H_1$ : There has been a change in rear-end collisions in California after the ban on handheld cellphone use became effective July 1, 2008.

In building an empirical model, we undertook a series of preliminary steps. First, we began by looking at monthly accident data at the “state level,” which permitted us to utilize more accessible control variables related to information about gas prices, new vehicle registrations and fuel consumption thought to be related to accident frequency. However, observation at the state level has the obvious severe limitation of omitting more specific geographic location, important to accident frequency, which needed to be addressed. Second, we elected to focus only on the handheld ban, because across our overall time interval, there were only six months where the handheld ban was in effect and the texting ban was not. However, we view that of minor consequence because we are most interested in general distracted driving effects.<sup>17</sup> Third, consideration of intra-state accident location and our ultimate treatment of the California data provide an important and direct contrast of our findings to the contribution of Burger et al. These researchers considered accident location when the underlying data recorded the Caltrans district venue of the incident. However, many data points were eliminated from their study, because only accidents that occur on state highways have a recorded and associated Caltrans district in the SWITRS data system. For instance, in 2010, the number of accidents available for analysis would decline by 63% if the data were limited to only those accidents with Caltrans information, and this has the potential of severely biasing any analysis that explores texting behavior and auto accident outcomes when more localized and urban start-and-stop driving behaviors are excluded.

To retain as many accident data points as possible, we constructed a panel data set with the SWITRS information that would account for location by using the county and city information in the accident record or the traffic district information. When an accident had county and city information, we assigned the accident to its specific traffic district in order to merge these accidents with those that had traffic district information. The traffic districts we considered are represented in Table 1, along with the associated major MSA in the district,

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17. Estimations that included a texting ban variable were undertaken with the empirical model offered in the forthcoming section. The texting ban variable was statistically insignificant. Results are available from the authors upon request.

**Table 1**

Major MSA in Caltrans District	Caltrans District
Redding MSA	2
Sacramento-Arden Arcade-Roseville MSA	3
San Francisco-Oakland-Fremont MSA	4
Salinas MSA	5
Fresno MSA	6
Los Angeles-Long Beach-Santa Ana MSA	7
Riverside-San Bernardino-Ontario MSA	8
Stockton MSA	10
San Diego-Carlsbad-San Marcos MSA	11

Among these Caltrans districts, we identified the major metropolitan statistical area (MSA) within each district and used the MSA definition to assist our gathering of values on exogenous factors in our model. While there are 12 Caltrans districts in the California system, we found that District 1 and District 9 had few losses and Caltrans District 12 did not match well to the U.S. Census Bureau’s MSA definition.<sup>18</sup> The resulting data set comprises 60 monthly observations across the remaining 9 geographic locations over the time period January 2006 through December 2010. The handheld ban became effective in July 2008. Therefore, in our initial estimations, we indicate this legal change by giving the handheld ban variable a value of 0 for each month in the time series through June 2008, then a value of 1 for each month from July 2008 through December 2010.

We follow a regression discontinuity design approach of Burger et al. (2014), where a change in the law at a specific point in time can be viewed as a threshold, once crossed, that may impose a discontinuous change on monthly rear-end accidents over the time period of the study.

In our model, the relationship between monthly rear-end collisions is stated in (1) as

$$\ln(\text{rear-end collisions}_{i,t}) = \beta_0 + \beta_1 \cdot \text{handheld ban} + \beta_2 \cdot \ln(\text{gas price index}_{i,t}) + \beta_3 \cdot \text{rainfall}_{i,t} + \beta_4 \cdot \ln(\text{unemprate}_{i,t}) + \beta_5 \cdot \ln(\text{net working days}_{i,t}) + \sum_{j=6}^{16} \beta_j \cdot \text{dvmonth}_j + g(t) + \varepsilon_{i,t} \quad (1)$$

where  $g(t)$  is represented as, in Burger et al., a polynomial trend that “accounts for unobserved factors that evolved smoothly over time.”<sup>19</sup> We include

18. Caltrans District 1 is in far northwest California (Eureka) and District 9 is in east central California (Bishop).

19. For comparison purposes with Burger et al., we adopt the same specification of the polynomial function and report results under linear, quadratic and cubic functional forms. As

$dv_{month_j}$  to represent the first  $j$  months in a calendar year to control for any seasonal effects. When controlling for traffic district fixed effects and other factors, we expect the handheld legal change to be negatively related to monthly rear-end accidents consistent with the expectation that some proportion of drivers will follow the law and be less distracted and, therefore, fewer accidents will occur.<sup>20</sup> A statistically significant negative coefficient on the handheld ban could be revealed by non-reporting if negligent drivers perceive that an additional penalty attributable to the cause of incident will be added to incidents where handheld use was a factor. Yet, any non-reporting would require that the injured party who was rear-ended would be willing to settle a claim without an insurer. That is less a problem for rear-end incidents where the attribution of fault is clear.

We include four additional exogenous factors that are expected to be related to monthly rear-end collisions: a gas price index; rainfall; the unemployment rate; and net working days. We view gas prices as a proxy for exposure to loss via traffic density on California roadways. Changes in gas prices are expected to be negatively related to marginal differences in traffic density and, therefore, in rear-end collisions. To control for gas prices by location, a retail gas price index was created for this study by the California Energy Commission. The gas price index for location  $i$  at time  $t$  is the average price in the MSA  $i$  during month  $t$  divided by the difference between the highest monthly average price observed across all MSAs and months from January 2006 through December 2010 and the lowest average monthly price across all cities and months in the same time frame. The index captures relative differences in gas prices during the time period of the study while being sensitive to geography. The rainfall data are taken from weather stations near each MSA. The data are available on the website of the Western Regional Climate Center.<sup>21</sup> Higher amounts of monthly rainfall are expected to be related to higher counts of rear-end accidents to reflect higher physical hazard risk. The unemployment rate is considered as a reflection of economic activity and, consequently, transportation flows, which we would expect to be negatively related to rear-end accidents. Lower unemployment is expected to be related to a higher count of rear-end accidents because of increased traffic flows, particularly during rush hours. Finally, we create the variable, net working days, which

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discussed by a referee, a regression discontinuity (RD) approach to a problem involving a legal change, such as a handheld ban, is imperfect because before-and-after groupings are likely to be “fuzzy”; i.e., “a flexible enough polynomial could absorb the impact of the ban, leaving little for the discrete jump in the mean accident rate from the ban coefficient to pick up. This is an especially important consideration given that it is questionable how sharp the RD actually is here.” In Section 3.2, we explore different subsets of the data and different definitions for the handheld ban to provide additional perspectives on the initial findings.

20. In preliminary testing, we did not find statistically significant marginal changes attributable to this legal change; therefore, consideration of a texting ban variable was omitted from the final model.

21. Monthly precipitation totals for specific weather stations can be found at <http://wrcc.dri.edu/climatedata/climsum/>. The Riverside, CA, MSA presented us with a problem. We used the Redlands, CA, weather station and found that two data points, March and August 2006, had missing data. We used the historical average for those months as our data points.

captures the number of working days in a month that accounts for recognized U.S. holidays during the time frame of this study. More working days in a month imply higher monthly traffic frequency, which is expected to be positively related to the number of rear-end accidents.<sup>22</sup> For the model estimations, we take natural logs of these variables, except for rainfall, because of a high number of data points (139) with no rainfall.<sup>23</sup> Table 2 reports sample statistics of the variables by Caltrans district considering the entire time period of the study.

We approach equation (1) following Burger, Kaffine and Yu (2011) and estimate the model by treating the time trend as linear, quadratic or cubic, accounting for “unobserved factors that evolved smoothly over time and are unrelated” to a handheld ban.<sup>24</sup> The three estimations are reported in Table 3. For each estimation, the parameter estimates with standard errors in parentheses are reported controlling for traffic district fixed effects.

The results in Table 3 support the hypothesis that a handheld ban has been associated with a reduction in rear-end accidents for the initial estimation where the ban is interpreted strictly as July 2008. Using the cubic model, the coefficient value indicates that the handheld ban is associated with a 4.75% reduction in rear-end accidents, while the linear model estimates an associated reduction in rear-end accidents of 7.09%. While we have attempted to take a similar tack to Burger et al., this finding, while controlling for traffic district fixed effects and other factors, could be different from Burger et al. because of our assertion that changes in rear-end accidents better measure initiatives to reduce distracted driving and/or our efforts to include data points associated with non-highway incidents. (This is a proposition we test and report on later in the paper.)

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22. Recognized U.S. holidays were obtained from the public archive files of the U.S. Office of Personal Management ([www.opm.gov](http://www.opm.gov)). We first were made aware of this variable in a traffic estimation problem in Jeffrey Woolridge’s “Introductory Econometrics” text.

23. At the suggestion of a referee, we ran the model using the cube root of Rainfall to address potential skewness issues and found the results were not fundamentally different from those reported in Table 3.

24. We, following Burger et al., did not normalize the monthly accident count in a traffic district by measures that more directly reflect accident frequency such as vehicles miles traveled (VMT). Burger et al. motivated their use of a regression discontinuity design by stating that certain unobservable variables such as VMT could alter accident count and, as in their case, “countervailing the policy effect.” At the end of this research, we did attempt to gather VMT data from Caltrans to normalize monthly accidents by traffic district as an additional robustness check, but were unable to obtain the information.

**Table 2:  
Descriptive Statistics**

Cal Trans District	rear-end collisions	handheld ban	gas price index	rainfall	unemprate (%)	net working days
<b>2</b>						
mean	89417	0.5	1.07076	2.403	10.898	21.633
std	15522	0.5042	0.18412	2.851	3.812	1.207
min	59.00	0	0.639	0	5.30	19.00
max	129.00	1	1.60	9.98	17.50	24.00
<b>3</b>						
mean	946217	0.5	1.05680	1.4087	8.1233	21.6333
std	108834	0.5042	0.18047	1.7148	3.1839	1.2069
min	727.00	0	0.624	0	4.30	19
max	1,183.00	1	1.581	6.67	12.90	24.00
<b>4</b>						
mean	2356000	0.5	1.08284	1.459	6.812	21.633
std	258017	0.5042	0.18550	1.944	2.674	1.207
min	1,796.00	0	0.648	0	3.70	19.00
max	2,929.00	1	1.583	7.830	10.70	24
<b>5</b>						
mean	508067	0.5	1.08368	1.054	9.455	21.633
std	67240	0.5042	0.18040	1.309	3.530	1.207
min	329.00	0	0.658	0	4.50	19
max	666.00	1	1.599	5.02	17.70	24
<b>6</b>						
mean	600700	0.5	1.07667	0.917	11.775	21.633
std	78452	0.5042	0.18211	1.302	3.696	1.207
min	419.00	0	0.655	0	6.30	19
max	780.00	1	1.605	5.920	18.60	24
<b>7</b>						
mean	4159633	0.5	1.06515	0.877	7.778	21.633
std	317350	0.5042	0.18121	1.531	3.165	1.207
min	3,411.00	0	0.628	0	4.00	19
max	4,933.00	1	1.588	8.83	12.50	24
<b>8</b>						
mean	1407133	0.5	1.06263	1.033	9.300	21.633
std	236612	0.5042	0.18163	2.023	3.918	1.207
min	1,042.00	0	0.621	0	4.50	19
max	1,891.00	1	1.586	12.60	15.00	24
<b>10</b>						
mean	511167	0.5	1.05079	1.025	11.683	21.633
std	75178	0.5042	0.18165	1.261	4.022	1.207
min	310.00	0	0.605	0	6.30	19
max	683.00	1	1.579	5.25	18.30	24
<b>11</b>						
mean	751033	0.5	1.06925	0.723	6.928	21.633
std	98189	0.5042	0.18003	1.098	2.730	1.207
min	584.00	0	0.628	0	3.70	19
max	943.00	1	1.592	5.00	10.90	24

Moreover, care needs to be taken in interpreting the magnitudes of the handheld ban coefficients, because it is more likely that driving behavior may have been modified more continuously over time than at the specific effective date initially modeled. It is plausible that the time polynomial captures some of the influence of handheld ban in its association with rear-end accidents.<sup>25</sup>

25. As noted by one referee, "There is more continuity in the effect of the ban than the authors expect and it would be absorbed into the continuous time trend." We appreciate the

**Table 3: Estimates**  
(n = 540; 9 traffic districts over 60 months)

Variable	Dependent Variable: ln(rear-end collisions)		
intercept	6.11*** (0.336)	6.189*** (0.0374)	6.163*** (0.3894)
handheld ban	-0.07094*** (0.01509)	-0.06669*** (0.01498)	-0.04753* (0.0213)
ln(gas price index)	-0.22251*** (0.2420)	-0.21552*** (0.02582)	-0.21351*** (0.0256)
rainfall	0.00873** (0.00285)	0.00727* (0.00321)	0.00704* (0.00326)
ln(unemprate)	-0.17551** (0.54512)	-0.18313** (0.05437)	-0.164406** (0.05847)
ln(net working days)	0.33908** (0.11717)	0.323488** (0.1244)	0.315072** (0.12241)
month <sub>5</sub>	-0.1061*** (0.02133)	-0.10223*** (0.02305)	-0.09833*** (0.022601)
month <sub>7</sub>	-0.0114 (0.0176)	-0.010206 (0.01786)	-0.010314 (0.01818)
month <sub>8</sub>	-0.05744** (0.01927)	-0.05098 (0.02342)	-0.052216* (0.02427)
month <sub>9</sub>	-0.11761*** (0.02667)	-0.11211*** (0.02701)	-0.110268*** (0.02717)
month <sub>10</sub>	-0.15931*** (0.02387)	-0.15273*** (0.02652)	-0.150311*** (0.02685)
month <sub>11</sub>	-0.06113 (0.03323)	-0.06043 (0.03313)	-0.061724 (0.034229)
month <sub>12</sub>	-0.08811*** (0.01992)	-0.08660*** (0.02027)	-0.083159*** (0.019722)
month <sub>13</sub>	-0.07975 (0.04022)	-0.07421 (0.04315)	-0.071519 (0.04316)
month <sub>14</sub>	-0.05938** (0.02371)	-0.05783** (0.02423)	-0.053641* (0.0236)
month <sub>15</sub>	-0.00496 (0.0176)	-0.00333 (0.01843)	-0.004633 (0.01891)
month <sub>16</sub>	0.020802 (0.01721)	0.022694 (0.01792)	0.022984 (0.01780)
time	-0.00028 (0.0007)	-0.0017919 (0.00148)	0.00222 (0.0025)
time <sup>2</sup>	-	0.000025 (0.00002)	-0.00016 (0.00011)
time <sup>3</sup>	-	-	2.12e-06 (1.12e-06)
adj. R <sup>2</sup>			
within	0.6884	0.6907	0.6923
between	0.3424	0.3570	0.3530
overall	0.0778	0.0840	0.0740

Clustered standard errors via *Stata* are reported in parentheses. Statistical significance at the  $\alpha = 0.01$ , 0.05 and 0.10 levels are denoted by \*\*\*, \*\*, \*, respectively. The unit of clustering is the traffic district. F-statistics for each estimated equation are strongly statistically significant.

remarks of anonymous referees who emphasized caution about the estimation approach being a true RD design.

Other estimated parameters line up with our expectations. Higher levels of rear-end accidents are associated with lower fuel prices, perhaps reflecting fewer cars on roadways in response to marginal changes in the demand for fuel. A 1% change in the gas price index is associated with about a 0.215% reduction in rear-accidents. Higher levels of rainfall lead to less safe driving conditions and are associated with higher levels of rear-end accidents. More specifically, the rate of increase in rear-end accidents is 0.873% for a 1% change in rainfall under the model with linear time. More working days in a month are related to a higher number of rear-end accidents in a month: a 1% change in working days is associated with about a 0.33% increase in rear-end accidents depending on how time is included. Lower rates of unemployment are assumed to be aligned with higher rates of economic activity, which should impact transportation. We found a statistically significant negative relationship between monthly rear-end accidents and unemployment rates consistent with this premise. The range of reduction in rear-end accidents associated with a 1% increase in the unemployment rate is between 0.164% and 0.183%.<sup>26</sup>

### 3.2 Robustness Checks

To further explore the strength of the results reported in Table 3, we estimated the model with different time dependent subsets of the data. In Table 4, we report only the estimated coefficient on handheld ban for estimations in which various time windows before and after the legal change was implemented.<sup>27</sup> For ease of comparison purposes, we repeat the reported estimated value from our benchmark case from Table 3, noting it as Benchmark. In Scenario 2, we omitted from our 60-month sample the 12-month time period surrounding July 1, 2008, including only pre-handheld months up to six months before the ban and delaying the inclusion of post-handheld months until six months after the ban. As can be seen by Table 4, estimates of the handheld parameter remain consistent with the baseline model while controlling for other factors. For Scenario 2, we find that rear-end accidents are associated with a reduction of between 11.7% and 13.6% when the handheld ban is in place, *ceteris paribus*. In Scenario 3, we expand that omission window to 24 months and our estimation is undertaken including the pre-handheld ban months from January 1, 2006, through July 2007 and the post-handheld ban months from July 1, 2009, through December 2010. Negative and statistically significant parameter estimates of the handheld ban remain evident.

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26. A reminder of interpretations of the parameters in a log-linear model may be found at [http://dss.princeton.edu/online\\_help/stats\\_packages/stata/log.html](http://dss.princeton.edu/online_help/stats_packages/stata/log.html) and [www.ats.ucla.edu/stat/sas/faq/sas\\_interpret\\_log.htm](http://www.ats.ucla.edu/stat/sas/faq/sas_interpret_log.htm).

27. Estimates of the entire model are available from the authors upon request.

**Table 4:**  
**Robustness Tests I**

		Coefficients on handheld ban for estimation of equation (1) by time trend type			
		Time Trend	Linear	Quadratic	Cubic
Scenario		Time Interval			
<b>Benchmark</b>	No Handheld Ban	Jan-06 thru June-08	-0.07094*** (0.01509)	-0.06669*** (0.01498)	-0.04753* (0.0213)
	Handheld Ban	July-08 thru Dec-10			
<b>2</b>	No Handheld Ban	Jan-06 thru Dec-07	-0.11703** (0.03701)	-0.11964** (0.03619)	-0.13668** (0.04271)
	Handheld Ban	Dec-08 thru Dec-10			
<b>3</b>	No Handheld Ban	Jan-06 thru July-07	-0.13085** (0.0497)	-0.12935** (0.04843)	-0.4825** (0.1578)
	Handheld Ban	July-09 thru Dec-10			
<b>4</b>	No Handheld Ban	Jan-06 thru June-08	-0.08378*** (0.0195)	-0.0878*** (0.0184)	-0.0666** (0.0235)
	Handheld Ban	Nov-08 thru Dec-10			
<b>5</b>	No Handheld Ban	Jan-06 thru June-08	-0.08616** (0.03804)	-0.09975** (0.03304)	-0.06999* (0.0354)
	Handheld Ban	Jan-09 thru Dec-10			

In Scenario 2 and Scenario 3, data are removed from around the key legislative date in July 2008 in two widening, symmetric intervals. By contrast, in Scenario 4 and Scenario 5, we remove months subsequent to July 1, 2008, because we expect there could be some response lag to the legal change. In Scenario 4, we omit months from July 1, 2008, through October 2008, a four-month time period, and, in Scenario 5, we omit months from July 1, 2008, through December 2008. The contrast between handheld and no handheld regions should be more evident and the relative magnitudes of the negative coefficients on the handheld variable support this presumption. In Scenario 4 and Scenario 5, data are omitted post-legal change in three-month windows beyond July 2008. Both model estimations yield statistically significant negative coefficients on the handheld ban variable.

The second set of robustness checks is motivated by the potential for distracted driving behavior to be altered prior to the effective date of the law. While it is reasonable to expect that the transmission of information around the change in handheld law was most frequent at the effective date, it is equally plausible that information and public awareness about the potential of the

handheld law would be expected to occur over a time range.<sup>28</sup> Indeed, the law in question was enacted in September 2006, with information in the public domain prior to that date.<sup>29</sup> Thus, utilizing the entire 60-month period, we report in Table 5 the estimated coefficients of a handheld ban during the estimation of the entire model in (1) across four additional scenarios where we change how we treat the handheld ban. We include the benchmark Scenario 1 for comparison purposes.

Scenario 7 through Scenario 10 report the coefficient estimates with different *assumed* dates of the handheld ban being the distinguishing attribute. Scenario 7 considers an effective handheld ban beginning in August 2006, and Scenario 8, Scenario 9 and Scenario 10 move the “effective” handheld ban out in six-month increments. Scenario 10 assumes the ban is effective as of January 2008, six months before the actual effective date of the law. Contrast the results in Scenario 10 versus the original estimations; they are notably similar. The assumption that the prospective ban would have penetrated some of the public’s awareness six months prior to the actual effective date leads to the expectation that such an awareness is related to fewer rear-end driving accidents. Indeed, the negative coefficient estimates largely follow this expected outcome. Moreover, as one moves upward in Table 5 from Scenario 10 to Scenario 9, Scenario 8 and Scenario 7, in which different effective dates have been created farther away from the actual effective date, the coefficient estimates on the effective handheld variable become inconclusive. More often than not, there is no evidence of a significant relationship between the created handheld ban variable and rear-end accidents and, in three instances, there is a positive relationship.<sup>30</sup>

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28. We are grateful to one reader who suggested that dates prior to July 1, 2008, could serve as a “placebo” test for comparisons to the initial estimation results reported in Table 3 to accommodate differences in driving behavior away from the effective date of the law.

29. See “Schwarzenegger Calls for Banning Hand-Held Cellphone Use While Driving,” *Los Angeles Times*, July 13, 2006 and Kolko (2008).

30. As noted by a reader, there are instances in Table 5 in which the coefficient on handheld ban is positive. However, these positive estimates correspond with dates that were at least a year before the actual handheld ban going into effect. It is reasonable to suspect that “noise” in such estimates would be prevalent.

**Table 5:  
Robustness Tests II**

			Coefficients on handheld ban for estimation of equation (1) by time trend type		
			Linear	Quadratic	Cubic
Scenario		Time Trend Interval			
<b>Benchmark</b>	No Handheld Ban	Jan-06 thru June-08	-0.07094*** (0.01509)	-0.06669*** (0.01498)	-0.04753* (0.0213)
	Handheld Ban	July-08 thru Dec-10			
<b>7</b>	No Handheld Ban	Jan-06 thru Jul-06	-0.00221 (0.02378)	0.03537** (0.01291)	-0.01516 (0.02366)
	Handheld Ban	Aug-06 thru Dec-10			
<b>8</b>	No Handheld Ban	Jan-06 thru Dec-06	0.01813 (0.0252)	0.0952*** (0.01470)	0.0803*** (0.01604)
	Handheld Ban	Jan-07 thru Dec-10			
<b>9</b>	No Handheld Ban	Jan-06 thru June-07	-0.02654 (0.0164)	-0.00976 (0.01236)	0.00765 (0.01478)
	Handheld Ban	Jul-07 thru Dec-10			
<b>10</b>	No Handheld Ban	Jan-06 thru Dec-07	-0.07480*** (0.01852)	-0.07450*** (0.01904)	-0.06175** (0.0261)
	Handheld Ban	Jan-08 thru Dec-10			

The third set of robustness checks entails: 1) analyzing the assumption that focusing on rear-end accidents only is important to testing whether the handheld policy change is associated with a declining accident frequency; and 2) determining whether considering only collisions in which the incident took place on a state highway would lead to a different inference.<sup>31</sup> We expanded the data points in the model to include a definition of “collision accident” that included rear-end accidents *and* all other collision accident descriptors including “not stated” in the SWITRS data, while maintaining in the data both accidents that occurred on roadways other than state highways and accidents that occurred on state highways. The results are reported in Table 6. The coefficient and statistical significance of the handheld ban is consistent with the results in Table 3, revealing that focusing only on rear-end accidents is inconsequential to the implications from this empirical analysis. Other model variables are largely consistent with the findings reported in Table 3.

31. We appreciate the comments of an anonymous referee who directed us to explore these issues.

**Table 6: Estimates**  
**Robustness Checks IIIa**  
**(n = 540; 9 traffic districts over 60 months)**

Variable	Dependent Variable: ln(collisions)		
intercept	7.95*** (0.146)	7.989*** (0.1676)	7.9742*** (0.17454)
handheld ban	-0.05746*** (0.0055)	-0.055341*** (0.0049)	-0.043489*** (0.010147)
ln(gas price index)	-0.15747*** (0.02105)	-0.15397*** (0.02162)	-0.152734*** (0.021301)
rainfall	0.014056*** (0.00342)	0.01332* (0.00411)	0.013182** (0.004158)
ln(unemprate)	-0.151568*** (0.0382)	-0.155404** (0.03859)	-0.143788** (0.04203)
ln(net working days)	0.11192** (0.0493)	0.104119** (0.05238)	0.098912* (0.05226)
month <sub>6</sub>	-0.0637*** (0.013905)	-0.06185*** (0.01507)	-0.05943*** (0.01527)
month <sub>7</sub>	0.018356 (0.13023)	0.018954 (0.01245)	0.0188873 (0.012563)
month <sub>8</sub>	0.002784 (0.014173)	0.00602 (0.01361)	0.005256 (0.013935)
month <sub>9</sub>	-0.102742*** (0.019823)	-0.09998*** (0.021061)	-0.098846*** (0.02125)
month <sub>10</sub>	-0.082796*** (0.018287)	-0.0795*** (0.01866)	-0.078002*** (0.018644)
month <sub>11</sub>	-0.008114 (0.0124)	-0.007765 (0.012101)	-0.008561 (0.012745)
month <sub>12</sub>	-0.03467*** (0.01992)	-0.033915*** (0.009593)	-0.031781*** (0.00915)
month <sub>13</sub>	-0.02104 (0.01833)	-0.018269 (0.01987)	-0.016604 (0.020127)
month <sub>14</sub>	-0.003802 (0.00782)	-0.003107 (0.007825)	-0.0005107 (0.00774)
month <sub>15</sub>	-0.00311 (0.00945)	-0.002301 (0.00927)	-0.003101 (0.00972)
month <sub>16</sub>	0.03618*** (0.01015)	0.03713*** (0.010609)	0.037313*** (0.010603)
time	-0.001047* (0.00054)	-0.01803 (0.00102)	0.0006795 (0.001768)
time <sup>2</sup>	-	0.000012 (0.000016)	-0.000107 (0.00008)
time <sup>3</sup>	-	-	1.31e-06 (9.06-07)
adj. R <sup>2</sup>			
within	0.8097	0.8105	0.8113
between	0.2208	0.2299	0.2223
overall	0.0592	0.0620	0.0566

Clustered standard errors via *Stata* are reported in parentheses. Statistical significance at the  $\alpha = 0.01$ , 0.05 and 0.10 levels are denoted by \*\*\*, \*\*, \*, respectively. F-statistics for each estimated equation are strongly statistically significant.

Lastly, we kept the broader definition of “collision accident” and eliminated observations when the raw data did not report an associated traffic district; e.g., the accident did not occur on a state highway. In essence, the estimations are exploring whether analyzing all reported collision incidents, but limiting them to

only state highways, would change the original findings. In Table 7, the estimate of the handheld ban coefficient is negative and statistically significant across all model specifications, and other model variables are largely consistent with previous findings.

**Table 7: Estimates  
Robustness Checks IIIb  
(n = 540; 9 traffic districts over 60 months)**

Variable	Dependent Variable: ln(collisions)		
intercept	6.804*** (0.16115)	7.0027*** (0.19407)	6.9922*** (0.19274)
handheld ban	-0.089734*** (0.010562)	-0.078443*** (0.00954)	-0.07048*** (0.01354)
ln(gas price index)	-0.205005*** (0.021588)	-0.186409*** (0.02032)	-0.18557*** (0.02027)
rainfall	0.02625*** (0.005697)	0.0223792* (0.00658)	0.022282** (0.00707)
ln(unemp rate)	-0.13827** (0.042188)	-0.15865** (0.04016)	-0.150853*** (0.04376)
ln(net working days)	0.145626** (0.057399)	0.104175** (0.061304)	0.10068 (0.06301)
month <sub>6</sub>	-0.072436*** (0.02109)	-0.062134** (0.022209)	-0.060515** (0.023035)
month <sub>7</sub>	0.054817*** (0.01461)	0.057991*** (0.013488)	0.057946*** (0.013598)
month <sub>8</sub>	-0.004116 (0.020422)	0.013065 (0.01845)	0.012553 (0.01865)
month <sub>9</sub>	-0.1219571*** (0.032432)	-0.10733** (0.03358)	-0.106569** (0.03396)
month <sub>10</sub>	-0.114709*** (0.02461)	-0.097206*** (0.024819)	-0.0962*** (0.02512)
month <sub>11</sub>	0.048098** (0.0166257)	0.049955** (0.015659)	0.04942** (0.016148)
month <sub>12</sub>	-0.027649** (0.012018)	-0.023642* (0.01143)	-0.022209* (0.011939)
month <sub>13</sub>	-0.04523* (0.02377)	-0.030505 (0.024944)	-0.029388 (0.02545)
month <sub>14</sub>	-0.023233 (0.01442)	-0.019129 (0.01417)	-0.017386 (0.01472)
month <sub>15</sub>	0.030803 (0.017176)	0.035111* (0.01663)	0.034574* (0.016933)
month <sub>16</sub>	0.0311508 (0.019435)	0.036178 (0.01956)	0.036299* (0.02004)
time	-0.00028 (0.00068)	-0.00429** (0.001469)	-0.00262 (0.002513)
time <sup>2</sup>	-	0.000063** (0.00002)	-0.000012 (0.00012)
time <sup>3</sup>	-	-	8.81e-07 (1.35e-06)
adj. R <sup>2</sup>			
within	0.6544	0.623	0.6726
between	0.168	0.231	0.2221
overall	0.0517	0.0674	0.0632

Clustered standard errors via *Stata* are reported in parentheses. Statistical significance at the  $\alpha = 0.01$ , 0.05 and 0.10 levels are denoted by \*\*\*, \*\*, \*, respectively. F-statistics for each estimated equation are strongly statistically significant.

In summary, the first set of robustness checks shows a reduction in accidents post-ban relative to pre-ban for various snapshots of the data around its effective date. The subsequent set of robustness checks relaxes the formal definition of “effective date,” and the estimations are consistent with an inability to reject the null hypothesis except for the scenario that assumes that behavior in response to the handheld ban occurred six months prior to its effective date. The third set of robustness checks shows the handheld ban is associated with a reduction in a broader categorization of collisions and that isolating only on state highways, thereby altering the definition of an “observation,” does not change the findings of the original benchmark estimation. For the model specification employed in this paper across different sets of data, lower collision accident frequency is associated with the enactment of California’s handheld ban.

## 4. Conclusion

The developing literature on cellphone use, driving and safety has yielded conflicting conclusions about whether such a distraction while driving is associated with higher odds of an accident. The results in this paper indicate that the presence of California’s handheld cellphone ban has been associated with a reduction in the number of accidents generally consistent with our expectations and contrary to Burger et al. (2014). While our approach had a somewhat different definition of “accident” and different controls than Burger, our findings considered monthly data over a five-year time period centered about the handheld ban, rather than daily data up to a one-year time period around the handheld ban.

While this primary finding is limited to the state of California, there are broader implications for policymakers in other jurisdictions who are charged with evaluating the efficacy of enacting legislation that limits the use mobile communication devices. Our findings can contribute to any discussion of technological innovation within a vehicle that may deviate driver attention. Indeed, technological innovation around any element of vehicle operation has the potential of altering the auto insurance landscape and the subsequent regulation of this market. Due to the high costs imposed on society by accidents, it is important for public policies to exist that are effective in reducing accident frequency, regardless of the reason users become distracted.

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# A Review of States' Decisions Regarding Health Insurance Exchanges

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## Abstract

Health insurance exchanges play a principal role in the structure of the Patient Protection and Affordable Care Act's (ACA) goal of providing access to affordable, quality health insurance, and reducing the growth in health care spending in the U.S. Exchanges are proposed to simplify and streamline the health insurance choices and benefits for individuals and small businesses. The ACA and the Exchange Final Rule stipulate states are required to have an approved state-based exchange or participate in the federally facilitate marketplace. This paper examines the variety of decisions made by states, including the type of exchange established, the structure of the exchange and various other relevant characteristics. Additionally, we examine whether any significant differences exist between state-level population demographics and political factors by exchange type. Our discussion highlights the heterogeneity in states' decisions regarding health insurance exchange and provides a valuable source of intuitional information that helps to inform regulators, policymakers and other health insurance market participants. Our paper also helps identify future research topics related to health insurance markets and exchanges.

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states that do not successfully propose or establish their own exchanges (CMS, 2013). The extent of the state's involvement in the exchange varies by exchange type. As such, the choice of exchange type could result in different costs and benefits for the state. Additionally, the demographics of the state may be associated with the state's decision regarding the type of exchange it elected to establish, as well as the utilization of the exchange by eligible individuals. This study explores both of these issues.

Given the social, political and economic implications surrounding the ACA, it is not surprising that the existing literature considers various topics related to the characteristics of health insurance exchanges. Some studies suggest that the exchange should include characteristics that support consumers by, for example, providing means to help consumers navigate through the plans offered on exchanges (e.g., Day and Nadash, 2012; Sinaiko, Ross-Degnan, Soumerai, Lieu, and Galbraith, 2013). Other studies focus on characteristics, such as enrollment levels and pricing in the marketplaces, in the context of topics such as Medicaid eligibility (e.g., Sommers and Rosenbaum, 2011), the cost of employer-sponsored health insurance (e.g., Austin, Luan, Wang, and Bhattacharya, 2013), and the health insurance-related decisions of small employers (e.g., Eibner Price, Vardavas, Cordova, and Girosi, 2012).<sup>4</sup>

Additional studies, such as Jost (2010) and Kingsdale and Bertko (2010), specifically address various operational and structural characteristics of exchanges. Jost (2010) considers problems in previous health insurance exchanges and identifies key issues that should be addressed in marketplace creation, including regulatory constraints imposed by the exchanges, the adoption of state-based or federal exchanges, and the structure of the marketplace. Kingsdale and Bertko (2010) identify the six most important design issues for states creating health insurance exchanges: 1) organization and governance; 2) insurer rating rules; 3) premium adjustment criteria; 4) benefit options; 5) the nature of plan contracting; and 6) protection of the public. However, to the best of our knowledge, the literature provides little insight into all of the states' ultimate decisions regarding the establishment, organization and operation of health insurance exchanges mandated by the ACA.

The first open enrollment period began on Oct. 1, 2013, and ended on March 31, 2014 (HealthCare.gov, 2014), indicating that states have already made key decisions regarding exchange characteristics. By the end of 2014, information was available on exchange participation across states. Given the degree of discretion allotted to states by the ACA, it is important to examine each state's ultimate decision in determining the nature and characteristics of health insurance

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4. Other relevant studies include Blavin et al. (2012) and Gardiner (2012). Blavin et al. (2012) suggests that states have the ability to make decisions regarding various design features of exchanges without substantial ramifications for costs and coverage levels. Gardiner (2012) suggests that the use of brokers, an effective navigator program, the nature of essential services and availability of wellness programs are all features that may draw small business customers to exchanges.

exchanges, as the decisions are likely to have a variety of academic and public policy implications.

In the remainder of the paper, we closely review and discuss states' decisions surrounding the creation of health insurance exchanges. Specifically, we briefly summarize information regarding the states' options and decisions regarding exchange types, with a focus on the costs and benefits of the options. We also provide a discussion and comparison of the decisions made by states that elected to establish a state-based exchange. Finally, by examining some basic demographic factors, health factors, political factors and initial take-up rates, we consider if there are observable differences across states by exchange type. We then provide concluding remarks.

## Creating and Structuring the Exchanges

### *State-Maintained Exchanges vs. Federally Facilitated Exchanges*

Per the ACA, health insurance exchanges are intended to provide one-stop shopping for individuals and small businesses seeking to obtain coverage from private health insurance plans. Most individuals are eligible for coverage through the exchange.<sup>5</sup> However, only those with financial need<sup>6</sup> are eligible for the subsidized coverage or coverage through Medicaid.<sup>7</sup> Health insurance exchanges facilitate the goal of providing affordable health insurance coverage to all Americans and help to ensure the feasibility of the individual purchase and guaranteed issue mandates.

When deciding the type of exchange to establish, states had three options: 1) a state-based marketplace (SBM); 2) a state-partnership marketplace (SPM); or 3) a federally facilitated marketplace (FFM). With the first option, the SBM, states could establish and operate the health insurance exchange at the state-level.<sup>8</sup> With

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5. The exchange is available to all U.S. citizens or nationals that are living in the U.S., with the exception of those that are incarcerated. U.S. citizens living outside of the U.S. for a minimum of 330 days do not have to purchase health insurance coverage as required by the ACA for that period and are not subject to the penalty of the greater of 1% of income or \$95 per person (\$47.50 for children) for noncompliance.

6. Financial need is determined based on household income and the number of people in the household. For subsidized coverage, income must be between \$11,490–\$45,960 for single-person households and between \$31,590–\$126,360 for six-person households. A chart showing income ranges per household size is available on the [www.healthcare.gov](http://www.healthcare.gov/how-can-i-save-money-on-marketplace-coverage/) website at <https://www.healthcare.gov/how-can-i-save-money-on-marketplace-coverage/>.

7. Income requirements for Medicaid eligibility depend on whether the state expanded its Medicaid program but tend to be on the low end of the ranges.

8. Note that in 2015, three states (Nevada, New Mexico and Oregon) transitioned to a federally supported SBM (FSSBM). An FSSBM is an SBM that elected to use the FFM website in its exchange. The decision to use the FFM website appears to be driven by technical failures

the second, the SPM<sup>9</sup>, states would share the responsibilities of running the exchange with the federal government. A notable feature of these state-maintained exchanges is that many policy and procedural decisions regarding the exchanges are made by the state (Public Consulting Group, 2012). This autonomy in decision making allows states to design exchanges that fit the needs of state residents and the health insurance market. For example, SBMs are permitted to select the governing agency, method of determining policies sold on exchanges and method of consumer assistance. These features made SBMs and SPMs potentially appealing to some states.

Should a state prefer the autonomy in governance afforded by state-maintained exchanges, it would be the state's duty to create an exchange that is in compliance with the guidelines set forth in the ACA. For example, these exchanges would be involved in the process of designating "qualified" plans, enrolling participants and/or assisting customers (Illinois Legislative Health Insurance Exchange Study Committee, 2012 (henceforth, Illinois Study)). In addition, states electing not to utilize the federal government's online marketplace interface would be required to develop their own IT infrastructure. States would also be obligated to consult with stakeholders such as legislators, state regulatory offices, insurers or providers (Illinois Study, 2012). As such, while the latitude in fulfilling these duties potentially allows states to tailor exchange operations in ways that best serve the needs of the population, adequately fulfilling these duties would require increased investment of state resources (Public Consulting Group, 2012).

While initial implementation costs to the state were an important consideration in evaluating the costs of SBMs or SPMs, the requirement that these exchanges be self-sustaining meant that states were also forced to consider the ongoing operational costs for the life of the exchange. Several of the states considering SBMs or SPMs commissioned reports on their costs, and estimates varied among states. For example, an analysis conducted for Ohio estimated the implementation cost of an SBM at \$63 million,<sup>10</sup> while Illinois estimated the start-up costs of its exchange at \$92.3 million<sup>11</sup> (KPMG, 2011; Illinois Study, 2012). In

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with state-based websites (e.g., the failure of the Cover Oregon website). All other operations remain at the state level, and these states are, therefore, still considered to have SBMs.

9. According to the HHS (2013), SPMs allow the states to "continue to serve as the primary points of contact for issuers and consumers, and will work with the HHS to establish an Exchange that best meets the needs of state residents." Thus, with this model of exchanges, states have latitude in various aspects of operations of the exchange, including plan management functions or consumer assistance and outreach (HHS, 2013).

10. This includes software costs of \$5 million and hardware costs of \$1.4 million. The majority of the remaining amount, approximately \$44 million, is allocated to external resource costs. To review a detailed breakdown of all operating costs, see KPMG (2011).

11. The Illinois study (2012) decomposes the cost of this figure as follows: \$45.4 million for determining eligibility and enrollment; \$15.8 million for the website; \$9.6 million for a call center; \$4.1 million for premium billing systems; \$0.8 million for facility costs; \$8.4 million for salaries and benefits; \$7 million for consulting and professional support; and the remaining balance to other program operation costs.

California, one of the largest state with an SBM, ongoing costs have been estimated at nearly \$400 million per year (California Health and Human Services, 2014), while in less populated states like Hawaii and Vermont, operating budgets were \$15 million and approximately \$18 million, respectively (Consillio, 2014; Health Management Associates, 2013).

Another challenge faced by states in evaluating state-maintained marketplaces is that cost estimates are sensitive to expected enrollment levels, meaning that unexpected changes in enrollment or lower than expected enrollment could lead to ongoing budgetary concerns. This is particularly concerning when assessments on policies sold on the exchange are a significant portion of the revenue needed to maintain the exchange (Illinois Study, 2012; Consillio, 2014). For example, because Hawaii's exchange had the lowest initial enrollment of any state and has continued to be plagued by low participation by residents (Reston, 2014), the long-term sustainability of its exchange is a major concern.<sup>12</sup>

In order to offset some of the initial costs associated with establishing state-level exchanges, the federal government provided grants to states interested in establishing an exchange.<sup>13</sup> An Early Innovator grant was a two-year award for states to design and implement the IT infrastructure required to operate an exchange. Planning grants, each of up to \$1 million, funded research into the viability of an exchange and its methods of operation and governance. States were also permitted to apply for multiple Level One Establishment grants, which provided a year of funding for the development and implementation of exchanges. Finally, Level Two Establishment grants provided a maximum of three years of funding for states establishing an exchange. In total, approximately \$4.9 billion in grants were awarded to states (Mach and Redhead, 2014), though not all states elected to apply for or accept all grants.<sup>14</sup>

While federal grants helped offset some of the costs associated with SBMs or SPMs, states were forced to consider cost control measures and various revenue sources that would fund the exchange's operations.<sup>15</sup> One-way exchanges could help control costs related to how it managed premium-assistance credits, subsidies or Medicaid/Children's Health Insurance Plans (CHIP) eligibility. Centralization of this process could allow states to share some of the exchange costs with other programs such as Medicaid. States also explored a variety of revenue options,

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12. As noted in the conclusion of its 2014 annual report, "Enrollment, while growing, is unlikely to produce sufficient revenue to cover costs unless operations are curtailed to the point where growth is in jeopardy" (Hawaii Health Connector, 2014).

13. All of the descriptive information in this paragraph pertaining to grants is obtained from the Kaiser Family Foundation (2015).

14. For example, Florida and Louisiana returned the Planning Grant money (Mach and Redhead, 2014). Other states, such as Georgia, Kansas, and Montana, only received the Planning Grant (Mach and Redhead, 2014). Still other states, such as Maryland, New York and Oregon, accepted all four grant types (Mach and Redhead, 2014).

15. Information regarding potential sources of state funding is obtained from Public Consulting Group (2012), Illinois Study (2012) and a report conducted by Wakely Consulting Group for the state of Maryland (2012).

including assessments levied against qualified health plans (QHPs), health insurers, other stakeholders in the health care industry and on individual consumers. Other options considered included taxing cigarettes or alcohol, selling advertising on the exchange's website, instituting licensing fees for navigators and using funds from general revenues. As noted by the Illinois Study (2012), each of these options had "various positive and negative factors which would have to be considered in order to finance the Exchange in the most effective way."

If, after evaluating the costs and benefits, a state did not elect to establish an SBM or SPM, it would by default implement the third option, an FFM, whereby the federal government would perform all of the marketplace functions for the state. More specifically, in FFM states, the U.S. Department of Health and Human Services (HHS) would carry out all exchange functions required by the ACA, including: 1) consulting with stakeholders, certifying, recertifying and decertifying QHPs; 2) determining individuals' eligibility for enrollment in a QHP through the exchange and for insurance affordability programs; and 3) supporting consumers, issuers, and other stakeholders through technical assistance and enrollment facilitation resources (Jost, 2013). However, outside of the operations of the exchange, a state's insurance regulatory roles would remain intact if an FFM were established.

The primary benefit of the FFM is that it does not require the state to develop, operate and maintain an exchange and instead shifts many of the insurance responsibilities to the federal government (Public Consulting Group, 2012).<sup>16</sup> As a result, an FFM allows a state to be in compliance with the ACA's regulations while incurring less exchange-related costs when compared to SBMs and SPMs. For example, as noted earlier, Ohio estimated the implementation cost of an SBM at \$63 million, but costs of an FFM were estimated at \$20 million. Additionally, average ongoing costs of an FFM were estimated at about 33% of the cost of an SBM (KPMG, 2011). States defaulting to FFMs would also encounter fewer regulatory and administrative burdens associated with factors such as enacting legislation to authorize funding sources or governing the exchange.

However, by shifting the responsibilities of marketplace operations to the federal government, states defaulting to the FFM type would also forfeit a degree of autonomy in designing features of the marketplace. As a result, these states would have less ability to tailor the operations of the exchanges in ways that benefit the health insurance market and the specific needs of the population. Additionally, health risks would not be combined across all FFM states and, therefore, would not drastically improve the risk pool of individual states, especially the smaller states (Public Consulting Group, 2012). States defaulting to FFMs would also retain control of the insurance market outside the exchange, meaning that FFM states would have to coordinate with the federal government to avoid risk selection problems (Public Consulting Group, 2012).

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16. While states can choose to facilitate or allow the federal government to facilitate the reinsurance program, the federal government can direct the risk-adjustment program in states that do not operate their own exchange, including partnership states.

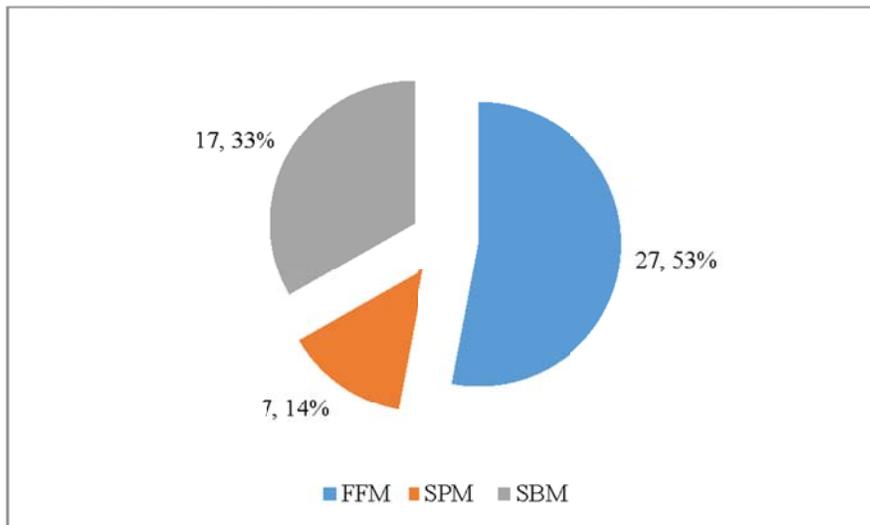
**Table 1:**  
**List of States by Exchange Type**

<b>FFM</b>	<b>SBM</b>	<b>SPM</b>
Alabama	California	Arkansas
Alaska	Colorado	Delaware
Arizona	Connecticut	Illinois
Florida	District of Columbia	Iowa
Georgia	Hawaii	Michigan
Indiana	Idaho	New Hampshire
Kansas	Kentucky	West Virginia
Louisiana	Maryland	
Maine	Massachusetts	
Mississippi	Minnesota	
Missouri	Nevada	
Montana	New Mexico	
Nebraska	New York	
New Jersey	Oregon	
North Carolina	Rhode Island	
North Dakota	Vermont	
Ohio	Washington	
Oklahoma		
Pennsylvania		
South Carolina		
South Dakota		
Tennessee		
Texas		
Utah		
Virginia		
Wisconsin		
Wyoming		

Note: “FFM” is defined as federally facilitated marketplace, “SBM” is state-based marketplace, and “SPM” is state-partnership marketplace.

At the commencement of the application and approval process, 19 states received approval to establish an SBM.<sup>17</sup> Of the 19 that received approval to establish an SBM, 16 states and the District of Columbia elected to do so.<sup>18</sup> Additionally, seven states created SPMs, while the remaining 27 states allowed the federal government to establish an FFM. Table 1 provides a list of the states by exchange type, and Figure 1 provides a summary of this information.

**Figure 1:  
Exchange Types**



This figure reports the number (percentage) of states that established a given exchange type. “FFM” refers to a federally facilitate marketplace, “SPM” is a state-partnership marketplace, and “SBM” is a state-based marketplace. Source: Commonwealth Fund. Available at: [www.commonwealthfund.org/interactives-and-data/maps-and-data/state-exchange-map](http://www.commonwealthfund.org/interactives-and-data/maps-and-data/state-exchange-map).

### *Important Decisions Specific to State-Based Marketplaces<sup>19</sup>*

As noted earlier, 16 states and the District of Columbia received approval and made the final decision to establish SBMs. Relative to SPMs and FFMs, SBMs states had much more discretion over the structure and design of their exchange.

17. The CMS provides a list of the states receiving conditional approval to operate a marketplace at [www.cms.gov/CCIIO/Resources/Fact-Sheets-and-FAQs/state-marketplaces.html](http://www.cms.gov/CCIIO/Resources/Fact-Sheets-and-FAQs/state-marketplaces.html).

18. Mississippi and Utah were the two states that received approval to establish an SBM but elected another option.

19. Much of the information provided in this section was obtained from The Commonwealth Fund (see [www.commonwealthfund.org/interactives-and-data/maps-and-data/state-exchange-map](http://www.commonwealthfund.org/interactives-and-data/maps-and-data/state-exchange-map)) and verified with the information provided on the SBM websites. The SBM websites are listed in Table 2.

As such, the operations and governance features of SBM states represent important decisions regarding the health insurance exchange creation process. In this subsection, we discuss several of these key features of SBMs, a summary of which is presented in Table 2.

**Table 2:**  
**State-Based Exchanges**  
**Summary of Key Features of State-Based Exchanges**

State	Governing Agency	Board Size	Selection Method	Insurer Part.	Coverage Levels	Consumer Assist
California	California Department of Healthcare Services	5	Selective contractor	No	5	Navigator/in person assistance
Colorado	Colorado Department of Healthcare Policy and Financing, Colorado Division of Insurance	12	Clearinghouse	Encouraged	2	Navigator/in person assistance
Connecticut	Department of Health and Human Services	14	Market organizer	Encouraged	3	Navigator/in person assistance
DC	DC Health Benefit Exchange Authority	11	Clearinghouse	Yes	3	Navigator/in person assistance
Hawaii	Hawaii Health Connector	15	Clearinghouse	No	2	Navigator/in person assistance
Idaho	Department of Health and Welfare	19	Clearinghouse	No	2	In person assistance
Kentucky	Center for Consumer Information and Insurance Oversight under the direction of Center for Medicare/Medicaid	11	Market organizer	No	3	In person assistance
Maryland	Department of Health and Mental Hygiene, Maryland Insurance Administration and Department of Human Resources	9	Market organizer	Yes	3	Navigator/in person assistance
Massachusetts	Commonwealth Health Insurance Connector Authority	11	Selective contractor	Yes	5	Navigator program
Minnesota	Minnesota Management and Budget	7	Clearinghouse	No	2	Navigator/in person assistance
Nevada	Silver State Health Insurance Exchange	10	Market organizer	No	2	Navigator/in person assistance
New Mexico	NM Human Services Department	13	Clearinghouse	Encouraged	2	Navigator/in person assistance
New York	New York State Department of Health	**	Market organizer	Encouraged	5	Navigator/in person assistance
Oregon	Department of Consumer and Business Services	9	Market organizer	Encouraged	3	Navigator/in person assistance
Rhode Island	Executive Office of Health and Human Services	13	Selective contractor	No	2	Navigator/in person assistance
Utah	Department of Health, Department of Insurance	25	Clearinghouse	No	2	Navigator program
Vermont	Department of Vermont Health Access	29	Selective contractor	Yes	4	Navigator/in person assistance
Washington	Washington Health Benefit Exchange with Washington State Health Care Authority	11	Clearinghouse	No	2	Navigator/in person assistance

This table provides summary information regarding key features of the state-based exchanges. “Governing Agency” refers to the agency responsible for governing the exchange in a given state. “Board Size” is the number of board members for a given exchange. “Selection Method” refers to the method a given state uses to determine the plans sold on the exchange. “Insurer Part.” indicates whether states require inventive insurers to participate in the health insurance exchange. “Coverage Levels” indicates the number of coverages (e.g., silver, gold, etc.) that insurers participating in the exchange are required to sell. “Consumer Assist” denotes the type of assistance a given state affords to insurance exchange purchasers. “Year Est.” is the establishment year of the exchange, and “Website” is the link to the exchange’s website.

\*\* New York created five Regional Advisory Committees for the purpose of managing the exchange. The regions are: 1) Western NY; 2) Central NY/Finger Lakes; 3) Capital District/Mid-Hudson/Northern NY; 4) New York City/Metro; and 5) Long Island.

**Table 2 (Continued):  
State-Based Exchanges  
Year Established and Website Information**

State	Year Est.	Website
California	2010	<a href="http://www.coveredca.com">http://www.coveredca.com</a>
Colorado	2011	<a href="http://connectforhealthco.com">http://connectforhealthco.com</a>
Connecticut	2011	<a href="https://www.accesshealthct.com/AHCT/LandingPageCTHIX">https://www.accesshealthct.com/AHCT/LandingPageCTHIX</a>
District of Columbia	2012	<a href="https://dchealthlink.com">https://dchealthlink.com</a>
Hawaii	2011	<a href="http://www.hawaihealthconnector.com">http://www.hawaihealthconnector.com</a>
Idaho	2013	<a href="http://www.yourhealthidaho.org">http://www.yourhealthidaho.org</a>
Kentucky	2012	<a href="https://kyenroll.ky.gov">https://kyenroll.ky.gov</a>
Maryland	2011	<a href="http://www.marylandhealthconnection.gov">http://www.marylandhealthconnection.gov</a>
Massachusetts	2006	<a href="https://www.mahealthconnector.org">https://www.mahealthconnector.org</a>
Minnesota	2013	<a href="https://www.mnsure.org">https://www.mnsure.org</a>
Nevada	2011	<a href="https://www.nevadahealthlink.com">https://www.nevadahealthlink.com</a>
New Mexico	2013	<a href="http://bewellnm.com">http://bewellnm.com</a>
New York	2012	<a href="https://nystateofhealth.ny.gov">https://nystateofhealth.ny.gov</a>
Oregon	2011	<a href="https://www.coveroregon.com">https://www.coveroregon.com</a>
Rhode Island	2011	<a href="http://www.healthsourceri.com">http://www.healthsourceri.com</a>
Utah	2008	<a href="http://www.avenueh.com">http://www.avenueh.com</a>
Vermont	2011	<a href="https://portal.healthconnect.vermont.gov/VTHBELnd/welcome.action">https://portal.healthconnect.vermont.gov/VTHBELnd/welcome.action</a>
Washington	2011	<a href="https://www.vahealthplanfinder.org">https://www.vahealthplanfinder.org</a>

States establishing state-maintained exchanges were required to identify the exchange board and governance structure, and confirm that it had adopted a charter or bylaws.<sup>20</sup> In general, states chose board compositions that were comprised of a mix of legislators, regulators and industry professionals. While the average number of board members is approximately 11, the size and composition of the boards varies significantly. For example, California chose a relatively small board consisting of five members. Board members include a medical doctor who was the director of the HHS Agency for San Diego County and the executive director of a child advocacy group. Idaho chose the largest board, consisting of 18 members representing a number of interests including consumers, health carriers/health care providers, producers and small businesses. The board also

20. Additionally, the board was required to have a minimum of one consumer representative who is a voting member.

includes three legislative members, two representatives and one senator, as well as two directors of other agencies (Idaho Department of Health and Welfare and Idaho Department of Insurance). Both of the members that are directors of the other agencies are non-voting members. Table 2 discusses several of these key features of SBMs.

While states were required by the ACA to establish a governing agency, they had a degree of latitude in the decision. Some states established the exchange within an existing or newly created state agency. For example, Colorado established its exchange's governance within the Colorado Division of Insurance (DOI). Other states, such as Hawaii, elected to designate a nonprofit entity to run the exchange, thereby creating the greatest separation from state government (Public Consulting Group, 2012).

SBMs were also required to create criteria for certifying plans that would be sold on exchanges and develop a process to ensure that the plans are in ongoing compliance with the standards established.<sup>21</sup> Only plans that meet specific requirements can be sold on exchanges. In determining allowable participation for plans meeting the criteria will be sold on exchanges, states had three choices: 1) allow all plans meeting the criteria to participate, called the Clearinghouse Method; 2) allow all plans meeting the criteria to participate but limit the number/types of plans that an insurer can offer, the Market Organizer Method; or 3) only allow plans to be sold on the exchange with insurers with which it has contracts, the Selective Contractor Method. Almost all states used the first or second approach, with only California, Massachusetts, Rhode Island and Vermont selectively contracting with insurers. As a result, the percentage of insurers participating in the exchanges varies significantly from state to state.<sup>22</sup> For example, Colorado is a selective contractor SBM. There are 10 insurers participating in its exchange, or 55% of the insurers licensed to sell health insurance coverage in the state.<sup>23</sup> In Minnesota, which uses the clearinghouse method, there are five insurers participating in the exchange, or 12% of the licensed health insurers.<sup>24</sup> Finally, in Maryland, which uses the market organizer approach, there are four insurers, or 5% of the licensed insurers, that are providing plans on the exchange.<sup>25</sup>

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21. It should be noted that exchanges must also have procedures in place to monitor the performance of plans and resolve any consumer complaints.

22. It should be noted that in this section, we report the percentages of licensed insurers that participate on exchanges. However, these numbers do not reflect the percentage of business, or state health insurance premiums, written on exchanges.

23. For the list of insurers participating in the exchange, see <http://connectforhealthco.com/coverage-basics/>. According to the NAIC Health Insurance database, 18 health insurers were licensed or chartered in Colorado in 2013.

24. For list of insurers participating in the exchange, see <https://www.mnsure.org/individual-family/networks/providernet-individual.jsp>. According to the NAIC Health Insurance database, 43 health insurers were licensed or chartered in California in 2013.

25. For a list of insurers participating in the exchange, see <http://marylandhealthconnection.gov/health-coverage-resources/participating-insurance->

Another important component of the SBMs is the extent to which insurers are required to participate in the marketplace. Some states require that certain insurers offering individual or group coverage outside the SBM must also participate (or at least submit a bid to participate) in the exchange. Other states, such as Oregon, encourage insurers to participate in the exchange by imposing restrictions on operating in the exchange in future years should the insurer not elect not to participate, or withdraw from participation, in the exchange in the current year. Finally, some states do not impose any regulatory constraints regarding health insurer participation in the exchange. Table 2 lists each SBM's insurer participation requirement.

The ACA requires that an insurer participating in an exchange offer at least two coverage levels—silver and gold. While approximately 47% of SBMs also use this requirement, some require greater participation. The average is three plans; however, as shown in Table 2, California, Massachusetts and New York require the maximum of five coverage levels (catastrophic, bronze, silver, gold and platinum). In examining some of the insurers' offerings through the SBMs, insurers commonly offer a variety of options within the categories, with plans differing based on factors such as deductible levels and maximum out-of-pocket expenses.<sup>26</sup>

In the "Consumer and Stakeholder Engagement and Support" portion of the application, the exchange is required to maintain both a call center (toll free) and a website that provides information about available plans and has to establish a Navigator program.<sup>27</sup> However, almost every state also has an in-person assistance program. For example, on Colorado's website, a link to its Assistance Network Directory is provided where individuals can enter their ZIP codes and locate persons near them. Similar systems are used by other SBMs and help to provide customers with sources of information for assistance.<sup>28</sup> Table 2 also provides more information regarding each state's consumer assistance program.

The decisions made by states as it relates to the structure of the exchange are likely to have a significant impact on the success of the SBM. For example, the

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*companies/insurance-plans/*. According to the NAIC Health Insurance database, 74 health insurers were licensed or chartered in California in 2013.

26. For a list of plans offered by each approved insurer, see <http://marylandhealthconnection.gov/health-coverage-resources/participating-insurance-companies/insurance-plans/>.

27. The law also requires that an exchange must have a consultation plan in place that has been created with the input of "consumers, small businesses, State Medicaid and CHIP agencies, agents/brokers, employer organizations, and other relevant stakeholders" and must continue to receive input from these stakeholders on an ongoing basis. The SBM must also develop and provide "culturally and linguistically appropriate" general educational materials about information about the exchange available in formats that can be used by people with disabilities, as well as develop outreach materials.

28. For example, New Mexico's website boasts, "We're close by" and "To help with any questions or concerns, hundreds of Health Care Guides will be available to you throughout the state. They are located in community venues such as hospitals, clinics, and schools. Use the map tool to find a Health Care Guide near you and make an appointment."

sophistication of the IT system on which the exchange operates and the amount of money spent on items like outreach and education can result in high costs. However, these can also result in greater participation. For example, software problems delayed access to the Hawaii Health Connector for two weeks (Consillio, 2014), and other states, such as Oregon, have had well-documented problems with their exchanges' websites. Additionally, the certification process could affect the number of insurers operating on exchanges. Also, the variety of plan options available could affect how many eligible individuals purchase plans on exchanges. Lower levels of participation by insurers and lower take-up rates by eligible individuals could result in fewer individuals over which to spread costs and potentially lower revenue if the exchange is financed by assessments on insurers or fees on premiums paid by participants.

## Demographic and Political Climate Comparisons by Exchange Type

Our review of states' decisions regarding health insurance exchanges suggests considerable heterogeneity in the type of exchange established. In this section, we explore whether the differences in decisions are correlated with various state-level demographic and political factors.<sup>29</sup> More specifically, we note that each exchange type is associated with costs and benefits to a state, such as the ability to serve the population's health insurance needs, expenditures of state resources and regulating the health insurance markets. As such, we would expect that various state-specific demographic features had a significant influence on each state's evaluation of the feasibility of each exchange type. In addition, there has been much discussion in the popular press regarding the political divide as it relates to the ACA. As a result, we may see differences in decisions depending on the political climate of states.

Our strategy is to examine several state-level demographic and wellness measures from 2002—2010, as well as two 2008 political variables, to determine if there are any observable differences in the characteristics of the states based on the type of exchange they established.<sup>30</sup> We focus our analysis on differences between SBMs, SPMs and FFMs, as these were the three broad categories of exchange types initially available to states under the ACA. Our analysis involves

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29. We examine the correlations of the variables included in the study. We find negative and significant correlations between income and two of the health factors (percentage obese and percentage smokers). We also find significant and negative correlations between percentage obese and percentage heavy drinkers, as well as percentage obese and percentage of popular vote for President Obama. These results are available from the authors upon request.

30. The value and results reported are based on a given state's demographic characteristic over the entire sample period. Appendix A provides a list of definitions and sources for the demographic variables considered in our analysis.

conducting multiple means comparison tests among the states electing each of the options to determine if the observable differences are statistically significant.<sup>31</sup>

To begin, we consider demographic factors, including unemployment rates, uninsured rates, median income and population density. States with higher uninsured rates and unemployment rates may be more likely to have a greater percentage of their population participating on exchanges. This could lead to higher claims if the unemployed and uninsured participants have greater utilization of services (even if for just some initial period) and/or tend to be less healthy than those that are employed and that are currently insured. As such, we expect states with higher unemployment rates and higher uninsured rates to be more likely to select an FFM than an SBM or SPM.

Additionally, though evidence has been mixed, some prior research has found a positive relation between wages and fringe benefits, including health insurance (e.g., Monheit, Hagan, Berk, and Farley, 1985; Simon, 2001).<sup>32</sup> As such, we would expect that states with higher median income levels are likely to have a greater percentage of the population with employer-sponsored health insurance and, consequently, a lower uninsured rate. Given that early research suggests employers will not drop coverage and force employees into exchanges (e.g., Eibner, Hussey, and Girosi, 2010; and Blumberg, Buettgens, Feder and Holahan, 2012), we would expect states with SBMs and SPMs to have a higher median income than those with FFMs. Further, we would also expect that states with higher income levels have better opportunity for securing and maintaining funding sources for the exchange, such as through assessments on individuals or using general state revenue. This also would suggest a positive relation between the creation of SBMs and SPMs and income levels.

We additionally consider whether differences in population density are associated with differences in exchange type, as states with more dense populations may have comparative advantages in operating an exchange.<sup>33</sup> For

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31. In comparing the groups, we use the PRCOMP command in STATA. This command conducts pairwise comparisons of the means of identified variable by the group where health insurance exchange type is the identified group. For each characteristic examined, we first use the ROBFVAR command to test for equality of variances. Where tests indicate heteroskedasticity across the states, we use the UNEQUAL command to control for inequality of variances.

32. Theory suggests that to compete for workers within the labor market, employers will offer a compensation package that would attract and retain employees. However, given the limitations on how much the firm has available to spend, wages will be reduced as money spent on benefits increases. This would suggest a negative relation between wages and health insurance expenditures as those companies not providing benefits would need to pay higher wages to compensate both for the lack of coverage and also for the additional costs employees will incur in searching and securing their own coverage. At the same time, those that are higher wage earners tend to be more expensive to replace and can be highly valued by companies. Additionally, the opportunity costs for higher wage earners can be greater. This may explain the positive relation between wages and fringe benefits.

33. Since a larger number of participants within the marketplace would allow the state to spread fixed costs across a larger number of insureds, we alternately examine state population. We do not find any significant differences among the state populations by exchange type.

example, more densely populated states may have more and/or larger metropolitan areas that may yield more potential sources of funding for SBMs and SPMs. Additionally, it may be easier to enroll individuals in health plans or establish managed care networks in states with higher population densities.

We also examine a variety of factors that provide information about the overall health of the population of the states. The health of the population is important given that post-ACA, plans can only utilize four rating factors (age, family size, geographic region and tobacco use) in establishing premiums, and premiums can vary only within specific ratios across these factors. As such, premiums may not adequately reflect the risk of the individuals insured.<sup>34</sup> We posit that states that select an FFM generally will have less healthy populations given the potentially higher medical costs or variability in medical costs the population may incur. Since the operating costs associated with maintaining an FFM are less, this may make it a more feasible option for these states. It may also allow premiums to remain at lower levels, potentially increasing the number of lower risks that purchase, or take-up coverage, through the exchange. This could serve to increase revenue and lower the overall riskiness of the exchange. Health variables considered include variables measuring the percentage of the population that is obese, that are smokers and that are heavy drinkers.

We also consider the number of deaths (scaled by 1,000) within the state. If the population is generally unhealthy, it is possible that this would result in a greater number of deaths than in states with healthier populations. However, states with a greater percentage of the population with chronic health problems may incur high ongoing medical expenses but not necessarily high death rates. Given that deaths can also result from accidents that may be more immediate and not result in prolonged medical treatment, we are unsure whether the number of deaths will vary across the health care exchanges.

Finally, we consider two political measures: 1) the percentage of the population that voted for President Obama in 2008; and 2) a variable indicating whether the governor of the state in 2008 was a Democrat. Given that the ACA has been viewed as a Democratic bill and the president at the time the bill was passed was a Democrat, it may be that strongly Republican states would want to have as much control as possible over the creation and management of their health care exchanges. This would suggest that states that elect SBMs would have a lower percentage of popular vote for President Obama and a Republican governor. Alternatively, the creation of an SBM marks a considerable effort on the part of the state, ingrain a law that was not truly supported and possibly work counter to efforts to challenge the legality of the ACA. If this is the case, we would expect to

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34. For specifics on the variation in allowable premiums across the rating factors, see <https://www.cms.gov/CCIIO/Resources/Files/Downloads/market-rules-technical-summary-2-27-2013.pdf>. Also, see Weiner, Trish, Abrams, and Lemke (2012) for a discussion of the heterogeneity of risk and tools insurers can use to attempt to manage this risk.

see states that elect SBMs would have a higher percentage of popular vote for President Obama and a Republican governor.<sup>35</sup>

Table 3 displays the results of our analysis. Our univariate results suggest that there are statistically significant differences in the demographic characteristics of the states selecting different exchange types. Specifically, as expected, states that elected to create SBMs are wealthier and more densely populated than those creating SPMs or FFMs. The states that established SBMs also have lower uninsured rates than those states that established FFMs. Additionally, states establishing SPMs have lower uninsured rates than those establishing FFMs. Thus, the difference in population demographics among states, as it relates to the choice of exchange type, appears to be significant.

When we examine health-related factors, we also find evidence of differences across the states based on exchange type. We find that the three health measures are all significantly different in the comparison of the SBM states and FFM states. Specifically, the results indicate that a greater percent of the population of FFM states is obese and are smokers in comparison to the population of SBM states. However, we find that SBMs have a higher percentage of heavy drinkers. The results are generally consistent with expectations.

In the comparison of the SPM states and the FFM states, we also find statistically significant differences in terms of the populations' tobacco and alcohol use. Contrary to our expectations, in both cases, the results suggest that the population of states electing FFMs are healthier than those electing SPMs. Finally, two of the measures (percent obese and percent smokers) are significant in the comparison of the SBM and SPM states. Thus, there appear to be significant differences in the health of the populations electing the various types of exchanges.

Finally, when we consider the political variables, we find that more of the "Democratic" states elected to have some control over the marketplace (SBM or SPM). Specifically, we find significant differences in the comparison of SPMs and FFMs as they relate to the political party of the governor, as well as significant differences in the comparison of both SBMs and SPMs to FFMs when considering the percentage of the population that supported President Obama in the 2008 election.

Considered in their entirety, our results suggest that while population demographics may have been an important factor in states' decisions to establish a particular type of exchange, political ideology also was an important factor. Further, while the dynamic effects of various political and demographic factors likely make it difficult for this or other more detailed analyses to identify causality, the correlations we document help shed light onto the complex decisions states faced surrounding exchanges. As a result, it appears that states' demographic characteristics are likely important considerations for regulators and

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35. For a detailed discussion and analysis of the political implications and decisions related to the type of exchange, see Jones, Bradley, and Oberlander (2014).

policymakers attempting to evaluate options and make decisions as they relate to federal health care reform.

**Table 3:  
Comparison of States by Health Insurance Exchange Type**

<b>Means</b>						
Variable	(1)	(2)	(3)	Means Comparisons		
	State	Partnership	FFM	(1) vs (2)	(1) vs (3)	(2) vs (3)
<b>Demographic Factors</b>						
Median Income	51234.51	46867.10	44838.06	*	*	
Population Density	781.35	167.31	147.48	*	*	
Unemployment Rate	5.58	5.86	5.70			
Uninsured Rate	13.09	12.32	14.26		*	*
<b>Health-Related Factors</b>						
Deaths per 1000	43.73	40.57	52.67			
Percent Obese	22.64	26.55	26.22	*	*	
Percent Smokers	18.37	21.86	21.04	*	*	
Percent Heavy Drinkers	5.47	5.27	4.96		*	
<b>Political Factors</b>						
Democratic Governor	0.50	1.00	0.48	*		*
Percent Obama	0.58	0.53	0.46		*	*
<b>Minimum and Maximums</b>						
Variable	State		Partnership		FFM	
	Min	Max	Min	Max	Min	Max
<b>Demographic Factors</b>						
Median Income	35105.00	66452.00	29359.00	67576.00	30882.00	68059.00
Population Density	15.29	9868.85	52.05	459.57	1.13	1185.39
Unemployment Rate	2.50	14.90	3.40	13.30	3.00	11.50
Uninsured Rate	4.38	22.51	7.92	18.71	7.83	25.35
<b>Health-Related Factors</b>						
Deaths per 1000	4.67	239.37	6.86	106.67	3.00	173.76
Percent Obese	16.00	32.40			18.70	35.40
Percent Smokers	9.10	32.60	15.80	28.40	5.80	29.30
Percent Heavy Drinkers	2.00	8.30	2.70	7.90	1.90	8.70
<b>Political Factors</b>						
Democratic Governor	0.00	1.00	1.00	1.00	0.00	1.00
Percent Obama	0.36	0.72	0.39	0.62	0.33	0.58

Note: An asterisk indicates statistically significant differences, at conventional levels, of the means of the variables for the two exchange types indicated.

Source: Centers for Disease Control (CDC), the U.S. Department of Labor (DOL), the U.S. Census Bureau, the National Governors Association (NGA) and the Federal Election Commission (FEC).

## Eligibility, Enrollment and Take-Up Rates

Ultimately, states were required to make decisions regarding exchanges because their residents were required to enroll in a health insurance plan by the deadline imposed by the ACA. As a result, it is also important to examine whether enrollment levels varied among states with different exchange types. While at the time of this writing data are relatively limited, we are able to consider the number of persons eligible for coverage on the exchange, the number of persons eligible for tax credits on the exchange, and the number of persons electing to enroll in an exchange plan by health exchange type for the first enrollment period (including the extended special enrollment period, which ended April 19, 2014).<sup>36</sup> As shown in Table 4, more than 13.5 million people were determined eligible for coverage through exchanges in 2014, with nearly 65% being eligible for the tax credit. (This also includes those eligible for subsidized insurance or a cost-sharing reduction.) Of the 13.5 million eligible, more than 8 million have enrolled in plans through the exchanges.

As shown in the final column, approximately 59% of those eligible for coverage through the exchanges elected to obtain coverage, with the greatest take-up percent occurring in states with SBMs (60%) and the lowest occurring in states with SPMs (56%). This suggests that, overall, there appear to be little differences in the take-up rates among the different types of exchanges. In unreported univariate analysis, we find no evidence of statistical differences in take-up rates among different types of exchanges. As a result, it appears that in the aggregate, states' decisions regarding the type of exchange to establish did not have much influence on average enrollment levels across exchange types.

However, an examination of the range of take-up rates within each exchange type suggests that there is much greater variability in the take-up rates of SBMs. For example, excluding Massachusetts given its existing health care legislation prior to the ACA, the range in take-up rates was 40%, with a low of 34% in Nevada to a high of 74% in California. Alternately, the range in take-up rates in SPMs and FFMs was 11% and 21%, respectively. In fact, we find the standard deviation in take-up rates for SBMs to be approximately 17%, while that same figure is approximately 4% and 5% for SPMs and FFMs, respectively.

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36. Most people are eligible to purchase coverage in the marketplace. For those living in the U.S., the requirement is that you are a U.S. citizen or national and not currently incarcerated. The plans sold on the exchanges generally only cover services provided within the U.S. Those living outside of the U.S. (defined as residing in a foreign country for 330 or more days in a 12-month period) are not subject to the requirement of health insurance coverage set forth in the ACA and, therefore, would likely not benefit from the purchase of coverage. For more details, see <https://www.healthcare.gov/am-i-eligible-for-coverage-in-the-marketplace/>.

**Table 4:  
Health Exchange Enrollments by Exchange Type**

State	Total Eligible	Total Eligible for Tax Credit	Percent	Total Selecting a Plan	Percent
<i>State-Based Marketplaces</i>					
California	1,886,867	1,458,433	77%	1,405,102	74%
Colorado	205,910	88,208	43%	125,402	61%
Connecticut	113,390	80,354	71%	79,192	70%
District of Columbia	15,437	4,033	26%	10,714	69%
Hawaii	15,694	4,549	29%	8,592	55%
Kentucky	201,593	91,092	45%	82,747	41%
Maryland	99,298	84,015	85%	67,757	68%
Massachusetts	31,695	N/A		31,695	100%
Minnesota	101,645	36,217	36%	48,495	48%
Nevada	134,942	89,683	66%	45,390	34%
New York	707,638	369,380	52%	370,451	52%
Oregon	124,840	99,902	80%	68,308	55%
Rhode Island	43,295	32,471	75%	28,485	66%
Vermont	95,203	28,797	30%	38,048	40%
Washington	240,880	151,441	63%	163,207	68%
<b>SUB-TOTAL/AVERAGE</b>	<b>4,018,327</b>	<b>2,618,575</b>	<b>56%</b>	<b>2,573,585</b>	<b>60%</b>
<i>State-Partnership Marketplaces</i>					
Arkansas	80,709	53,958	67%	43,446	54%
Delaware	24,721	16,170	65%	14,087	57%
Illinois	369,696	242,255	66%	217,492	59%
Iowa	57,184	37,328	65%	29,163	51%
Michigan	467,878	297,742	64%	272,539	58%
New Hampshire	64,901	39,818	61%	40,262	62%
West Virginia	36,749	24,634	67%	19,856	54%
<b>SUB-TOTAL/AVERAGE</b>	<b>1,101,838</b>	<b>711,905</b>	<b>65%</b>	<b>636,845</b>	<b>56%</b>

\* Though both Idaho and New Mexico elected to establish state-based exchanges, per the report, “they are using the FFM platform for 2014.”

Source: This information was obtained from the Health Insurance Marketplace: Summary Enrollment for the Initial Annual Open Enrollment Period, data May 1, 2014. The report is available at: [http://aspe.hhs.gov/health/reports/2014/marketplaceenrollment/apr2014/ib\\_2014apr\\_enrollment.pdf](http://aspe.hhs.gov/health/reports/2014/marketplaceenrollment/apr2014/ib_2014apr_enrollment.pdf).

**Table 4 (Continued):  
Health Exchange Enrollments by Exchange Type**

*Federally-Facilitated Marketplaces*

State	Total Eligible	Total Eligible for Tax Credit	Percent	Total Selecting a Plan	Percent
Alabama	195,779	105,059	54%	97,870	50%
Alaska	21,915	14,898	68%	12,890	59%
Arizona	216,951	144,376	67%	120,071	55%
Florida	1,603,575	1,114,877	70%	983,775	61%
Georgia	572,025	343,925	60%	316,543	55%
Idaho*	107,849	83,662	78%	76,061	71%
Indiana	229,815	155,961	68%	132,423	58%
Kansas	99,380	59,601	60%	57,013	57%
Louisiana	184,041	113,337	62%	101,778	55%
Maine	68,541	48,531	71%	44,258	65%
Mississippi	117,518	72,219	61%	61,494	52%
Missouri	268,764	166,440	62%	152,335	57%
Montana	55,675	39,572	71%	36,584	66%
Nebraska	74,606	50,382	68%	42,975	58%
New Jersey	301,965	193,286	64%	161,775	54%
North Carolina	581,173	396,212	68%	357,584	62%
North Dakota	16,627	11,974	72%	10,597	64%
New Mexico*	58,628	39,543	67%	32,062	55%
Ohio	285,967	185,780	65%	154,668	54%
Oklahoma	127,915	76,301	60%	69,221	54%
Pennsylvania	549,205	332,915	61%	318,077	58%
South Carolina	213,974	134,969	63%	118,324	55%
South Dakota	24,147	16,243	67%	13,104	54%
Tennessee	305,628	169,470	55%	151,352	50%
Texas	1,371,157	835,519	61%	733,757	54%
Utah	130,945	97,621	75%	84,601	65%
Virginia	392,340	231,534	59%	216,356	55%
Wisconsin	230,516	168,721	73%	139,815	61%
Wyoming	20,806	14,629	70%	11,970	58%
<b>SUB-TOTAL/AVERAGE</b>	<b>8,427,427</b>	<b>5,417,557</b>	<b>65%</b>	<b>4,809,333</b>	<b>58%</b>
<b>GRAND TOTAL/AVERAGE</b>	<b>13,547,592</b>	<b>8,748,037</b>	<b>65%</b>	<b>8,019,763</b>	<b>59%</b>

While the evidence presented in this analysis is inherently limited by data availability, it does highlight some initial conclusions that could be further explored by future researchers. In particular, while there appear to be no discernable differences in aggregate take-up rates across exchange type, the large variation among SBM states suggests that some of the decisions pertaining specifically to an SBM may have had a significant influence on exchanges' enrollment levels. For example, SBM states were required to develop and put in place the IT infrastructure required to operate exchanges, and the reliability of the IT system chosen by a state may have had significant consequences for enrollment levels in a given SBM. Other decisions, such as the nature of the marketing efforts or consumer assistance infrastructure, may have had similar effects on enrollment levels that led some SBMs to high levels of enrollment and others to lower levels. While outside the scope of this paper, further analysis of how the SBM-specific decisions made by a state influenced enrollment levels will likely be a fruitful area of future research.

## Conclusion

The ACA afforded states the opportunity to make a variety of decisions regarding the creation of health insurance exchanges. States could elect to participate in an exchange administered by the federal government, and 27 states elected to do so. An additional seven states chose to partner with the federal government and be involved in the management of the federal exchange, while the remaining states and the District of Columbia elected to create and run their own marketplaces. Those states partnering with the federal government, or SPMs, had to determine the extent of involvement in the management of the exchange, while states electing to create an SBM faced a number of additional decisions regarding features such as governance, plan contracting characteristics and organizational structure.

Our paper reviews the decisions made by states regarding the characteristics of the chosen exchange type and, in the process, provides institutional background regarding the nature of SBMs, SPMs and FFMs. Our research highlights the heterogeneity that exists among states based on exchange type. We also provide some insight into the variation among SBMs in terms of organizational structure, governance and plan contracting, which vary considerably among states. Finally, we examine various demographic and health-related factors of states and find evidence of statistically significant differences between states choosing SBMs, SPMs and FFMs.

Specifically, states that elected to create SBMs are wealthier and more densely populated than those creating SPMs or FFMs. Additionally, states that established SBMs have lower uninsured rates than those states that established FFMs, while states establishing SPMs have lower uninsured rates than those establishing FFMs. In terms of health-related factors, we find that states with

SBMs generally tend to have fewer obese persons and fewer smokers relative to states with either SPMs or FFMs. We also find evidence that states with SBMs or SPMs have stronger Democratic influence than those that allow the federal government to provide the exchange.

From a broad perspective, the results related to demographic and enrollment differences yield some interesting comparisons. First, the results of the demographic factors suggest that wealthier states and more densely populated states elected an exchange type under which the state had greater control. Second, the results of the wellness measures suggest that the health status of the states' populations may have played a role in establishing SBMs. These findings indicate there are significant differences in the populations of states insured under FFMs and those insured under other exchange types. This is an important finding given that this could lead to differences in health care enrollment, and potentially future health care and operating costs, among states by exchange type. Additionally, this could result in variation in health care outcomes among these states.<sup>37</sup> Finally, the results for the political variables provide some evidence that exchange decisions may have been influenced by political forces.

Further, while we find evidence of considerable heterogeneity among states in terms of eligibility criteria and plan selection, we find little evidence of large differences in relative enrollment among exchange types. This suggests that the type of exchange established by a given state may have had less influence on the enrollment decisions of states' populations. However, there is evidence that there is greater variation in the take-up rates among states with SBMs when compared to states with SPMs and FFMs. As a result, SMB-specific decisions pertaining to the operation and governance of the exchange may have had a significant influence on enrollment levels.

Though previous studies have considered a variety of topics relating to the ACA, the literature provides little insight into states' ultimate decisions regarding health insurance exchanges. The research presented here helps to fill this void and, in the process, provides a valuable source of regulatory and institutional background regarding health insurance exchanges. Our finding of differences in exchange characteristics—as well as population demographics, health status and take-up rates—also highlights potential areas of future research. For example, researchers could consider the extent to which state-based characteristics influence the performance of insurers operating in a given exchange type and take-up rates. Researchers could also consider whether the characteristics of insurance exchanges have any influence on patients in terms of health outcomes, access to care or patient satisfaction. Future research may also examine the extent to which the population demographics of a given state influenced the decision of specific exchange characteristics.

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37. We leave it to future researchers to more closely examine the economic implications and consequences of heterogeneity in population demographics among states as it relates to health care exchanges, as a more detailed analysis of this topic is outside the scope of our research.

## Appendix A

Variable	Definition	Source
<i>Demographic Factors</i>		
Median Income	Median household income	U.S. Census
Population Density	Population divided by land mass	U.S. Census
Unemployment Rate	Percentage of labor force that is unemployed	U.S. Department of Labor
Uninsured Rate	Percentage of the population not covered by any public or private insurance program	U.S. Census/Current Population Survey
<i>Health-Related Factors</i>		
Deaths	Number of deaths scaled by 1,000	CDC National Center for Health Statistics
Percent Obese	Percent obese based on BMI (between 30 and 99.8 considered obese)	CDC Behavioral Risk Factor Surveillance System
Percent Smokers	Adults who are current smokers	CDC Behavioral Risk Factor Surveillance System
Percent Heavy Drinkers	Percentage of adult men having more than two drinks per day and adult women having more than one drink per day	CDC Behavioral Risk Factor Surveillance System
<i>Political Factors</i>		
Democratic Governor	Equal to 1 if had democratic governor in 2008 and 0 otherwise	National Governors Association
Percent Obama	Percent of popular vote cast for Obama in 2008	Federal Election Commission

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# Optimal Cap on Claim Settlements Based on Social Benefit Maximization

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## Abstract

Caps on damages constitute one of the proposed reforms of the tort system, especially in the U.S. In this paper, we establish models to capture both the claimant's and the insurer's behaviors under a system whereby damages are capped. We also establish an objective function of maximizing the social benefit, expressed as the sum of claimant and insurer benefits. We examine the optimal upper limit that balances both claimant and insurer benefits. Our model implies that the optimal value of the upper limit should be the expected value of the random claim payment independent of the type of probability distribution the claim payment follows. Finally, we apply empirical data to our theory and arrive at an estimate of the optimal damage cap.

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## Introduction

In the ongoing debate concerning tort reform, caps on damages have been proposed as a possible solution to address the problem of increasing claims costs. One of the key purposes of such caps is to control insured losses, making insurance more available and affordable (Feldman, 2003; Gfell, 2003; and Liang, 2004). Supporters assert that caps would inhibit fraudulent claims and eventually help to reduce insurance premiums. Many states in the U.S. are considering passing, or have passed, legislation creating caps on damages, especially for non-economic damages. As an example, the crisis in medical malpractice insurance markets can be especially pronounced, and caps have been proposed as a method to help militate against such crises.

There are different views about the efficacy of caps. On one hand, many believe that caps reduce losses for insurers, pointing out reductions in losses in jurisdictions that enacted a cap, when compared with those states that did not. For example, Sloan, Mergenhagen and Bovbjerg (1989) found that, based on closed claim data for 1975 through 1978 (and through 1984), insurers paid 31% less in states with caps on non-economic damages, and 38% less in states with caps on total damages. Kessler and McClellan (1997) found that premiums were reduced by 8.4% in the first three years after a tort reform. Tort reform also reduced the likelihood that a physician would be sued. The U.S. Congressional Budget Office (1998) summarized that caps on non-economic damages “have been found extremely effective in reducing the amount of claims paid and medical liability premiums.” Viscusi and Born (2005) used NAIC data for the period 1984 to 1991 to show that caps on non-economic damages reduced losses by 17% and premiums by 6%. Encinosa and Hellinger (2005) found evidence that states with caps on non-economic damages increased the supply of physicians by 2.2% per capita, as compared to states without caps, after observing the impact of non-economic damage caps from 1985 to 2000.

On the other hand, critics contend that an arbitrary cap amount cannot work for every case. For small damages, the award may still be excessive. For greater damages, the compensation may not be equitable. Also, caps may not necessarily lead to reduction of insurance premium rates, as relatively high insurance premiums on medical malpractice insurance may be caused by other factors such as insurance cycles, weak competition or declines in investment returns earned by insurers (Zuckerman et al., 1990; Richard, 2012; and Paik et al., 2012).

Critics of tort reform often cite the case of California to argue that the non-economic caps do not work to reduce premium rates. When California passed the legislation on caps on non-economic damages at \$250,000 in 1975, premium rates were reduced only for a short time and then continued to rise. By 1988, premiums on medical malpractice were up 450% in comparison with 1975. California then enacted California Insurance Code 1861.01, Proposition 103, which required every insurer to reduce its rate by at least 20%. Subsequently, malpractice rates decreased quickly and premium rates decreased by 30% or more within three years

(Glassman, 2004).

Many states have passed legislation to impose caps on claim payments. At the national level, the Help Efficient, Accessible, Low-Cost, Timely Healthcare (HEALTH) Act of 2003, which would have capped non-economic damage awards in medical malpractice actions at \$250,000, was passed by the U.S. House of Representatives in May 2004 but was not passed in the Senate (Govtrack, 2004).

The literature on caps on claims and/or damages is dominated by legal analysis. Crocker and Morgan (1998) and Crocker and Tennyson (2002) were unique contributions by the virtue of creating a quantitative model. They study optimal insurance contracts and indemnification profile, when controlling for fraudulent claims for both first-party and third-party claim settlements from the insurer's perspective. They optimize the insurer's response to a potentially exaggerated or fraudulent claim. However, determining an optimal cap should also consider the benefit to consumers. Regulators, of course, should attempt to balance both claimants' and insurers' benefits, and consider all relevant risks. Shoben (2005) proposes a societal (and by implication, regulatory) perspective on the issue of caps on claims and/or damages by proposing the following three elements of a tort reform to address the issues of measured degree of wrongfulness, measured severity of harm and connectedness between the defendant's wrong and the plaintiff's injury. Shoben (2005) also proposes replacement of contingent attorney's fee by an hourly rate for work done.

In our opinion, whether the cap on damages helps to decrease the insolvency probability of insurers, protect consumers, promote the demand and supply of liability insurance, and improve the social fairness depends on how to rationally determine the cap on damages by scientific methods and from the perspective of maximizing the social benefit. Caps that are too high, as well as caps that are too low, are not optimally beneficial to the realization of maximizing social welfare.<sup>1</sup>

In our paper, we quantitatively study the optimal cap on claims and/or damages by analyzing both the behavior of claimants and insurers under tort reform law that puts caps on claims and/or damages paid by insurance. We analyze the problem from the regulators' perspective. We study the following problem: How do we set up an optimal upper limit on claim damages if we want to balance benefits between insurers and claimants? Consumer protection regulators aim for damage awards large enough to properly compensate victims of negligence or of malfeasance. However, insurance regulators also have genuine interest in limiting the awards to levels that would not endanger insurer solvency. Hence, the issue at hand must be cognizant of consumer protection and the prudential regulatory perspectives.

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1. In the notes from Gfell (2004), he points out that while a national cap on non-economic damages in medical malpractice actions may pass constitutional muster, Congress would be wise to attempt less invasive limitations first. That is, Gfell suggests that Congress should seek better economic data upon which to base its decisions, and thus help to assure the crisis would be covered with minimal negative consequences.

As a preview to our results, we get the intuitive theoretical result that the optimal cap on damages is the expected value of random loss. It implies that a cap on damages is not exogenous to the distribution of random loss. The frequency and severity distribution of liability injuries does affect the caps on damages.<sup>2</sup> Therefore, the injured claimant can obtain fair claim payment. Based on our empirical data, our analysis indicates that the optimal cap on damages is far less than caps found in reality, such as caps for damages related to general liability insurance. For some other types of liability insurance (e.g., medical malpractice liability insurance), our analysis suggests that the insurer's total claim payment without caps is much greater than that with caps. As more than one-half of U.S. states did not have caps on damages, the absence of caps may be one reason for the medical malpractice insurance crisis (besides long-tail liability and exaggerated losses to obtain higher judgment awards).

Our study is organized as follows: In the next section, we establish models used for the third-party claimant. Then, in the third section, we discuss the determination of optimal caps, based on the criterion of maximizing the social benefit. In the fourth section, we provide two important examples to illustrate the application of our models to the problem. We then present sensitivity analysis, and in the final section, we provide our conclusions.

## Models of Third-Party Claims Settlements

We consider third-party liability insurance in which we assume the claimant and insurer to be risk-neutral. The claimant has a real loss of  $X$ , which is only fully known to the claimant. However, the claimant files a claim of  $s$  ( $\geq X$ ). The jurisdiction of the claim has an upper limit of claim damage of  $\theta$ . The claim amount of  $s$  may still exceed the amount of  $\theta$ , but the indemnification amount of  $I(s)$  paid by insurer must be less than or equal to  $\theta$ . If insurer can identify the real amount of damage, then  $I(s) = X$  when  $X \leq \theta$ . When the indemnification amount is greater than the real amount of loss,  $I(s) - X$  is the realized exaggerated claim amount for claimant. When the real loss is greater than  $\theta$ , the highest claim possible is the amount of  $\theta$ , and  $X - \theta$  is the loss for claimant after compensation. Let  $E(Y_1(\theta))$  be the expected terminal wealth of the claimant, and  $E(Y_2(\theta))$  be the expected terminal wealth of the insurer.<sup>3</sup> Using that notation, we can write:

2. Gfell (2004) points out (in the notes to the article) that reforms that protect the public are what are needed, not reforms that blame the injured, the disabled, and victims of medical ineptitude and neglect. It is in this light that caps, based on the expected loss incurred to the injured, may help maximize social benefit.

3. When claimant and insurer are risk-neutral, their expected benefit functions are exactly the same as their utility functions. In the context of the theory of the firm, a risk-neutral firm facing risk about the market price of its product, and caring only about profit, would maximize

$$\begin{aligned}
E(Y_1(\theta)) &= \\
&= \int_0^{\theta} (W_{Y_1} - C_1(\xi_1, x, \theta) + I(s) - x) f(x) dx + \\
&\quad \int_{\theta}^{+\infty} (W_{Y_1} - C_1(\xi_1, x, \theta) + \theta - x) f(x) dx
\end{aligned} \tag{1}$$

and

$$\begin{aligned}
E(Y_2(\theta)) &= \\
&= \int_0^{\theta} (W_{Y_2} - C_2(\xi_2, x, \theta) - I(s) + x) f(x) dx \\
&\quad + \int_{\theta}^{+\infty} (W_{Y_2} - C_2(\xi_2, x, \theta) - \theta + x) f(x) dx
\end{aligned} \tag{2}$$

Where  $W_{Y_1}$  is the claimant's initial wealth, and  $W_{Y_2}$  is the insurer's initial wealth. Also,  $C_1(\xi_1, x, \theta)$  represents the costs that the claimant incurs for the direct and indirect expenditures to set up claims. We model those costs as a function of  $\theta$ ,  $x$ , and  $\xi_1$ , with  $\xi_1 \geq 0$ , where  $\xi_1$  is the cost parameter for the claimant. We assume that the claim costs for claimant under a regime of a cap on damages of  $\theta$  are strictly increasing with the deviation of real loss away from  $\theta$ , and represent these costs with the following specific function:

$$C_1(\xi_1, \theta, x) = \begin{cases} \xi_1 (\theta - x)^2 & \text{when } x < \theta \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

While this may seem like a simplification of the reality of costs (all economic costs, not necessarily just accounting costs) incurred by the claimant, we suggest that it is a reasonably good model of economic reality. On one hand, it intends to create a situation where as the real loss gets closer to the upper limit, or  $\theta - x$  is close to zero, the claimant is less likely to increase the costs through some form of exaggeration or misinformation since the exaggeration of claim loss above the upper limit  $\theta$  cannot be compensated by the insurer; and, on the contrary, the expenditures of setting up claims will increase. On the other hand, the smaller the real loss (the real loss being far below the damage cap), the more willing is the

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the expected value of its profit (with respect to its choices of labor input usage, output produced, etc.).

claimant to exaggerate the claim loss, even at the expense of increasing the cost of setting up claim. Therefore, it is necessary to impose a measure of control on the claim cost using the quadratic function of the difference between the cap on damages and real loss.

Similarly,  $C_2(\xi_2, x, \theta)$  is the insurer's costs to investigate possible falsification of the claim by the claimant, set up a function of  $\theta$ ,  $x$ , and  $\xi_2$ , with  $\xi_2 \geq 0$ . We also assume that the associated cost to the insurer is increasing with the deviation of the real loss away from  $\theta$ . When the loss approaches the cap imposed on the policy payout, the falsification cost is reduced along with the reduced investigation cost of insurer. Cost parameters are different for the two parties. As we stated above,  $\xi_1$  is the cost parameter for the claimant, and now we introduce a similar parameter:  $\xi_2$  to capture the insurer's effects. The insurer's cost function under a regime of a cap on claims and/or damages payout is expressed as:

$$C_2(\xi_2, \theta, x) = \begin{cases} \xi_2(\theta - x)^2 & \text{when } x < \theta \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

The key idea of this simplified costs model is that both the consumer and the insurer cost functions are designed so that large departures from the level of the cap result in costs increasing at an increasing rate.

## **Determination of Optimal Cap by Maximizing Social Benefit Under Third-Party Claims**

The values of the cap on claim payments affect the benefits of both claimant and insurer. On one hand, when real damage  $X$  is less than the cap of claim payment, the claimant may tend to claim more payment than real damage, and the insurer will lose money (pay a larger claim) because of exaggerated claim payment. On the other hand, when real damage is larger than the cap of claim payment, the claim payment obtained by the claimant will be reduced in relation to the real loss, but the insurer will benefit because of less money paid than real damages. From the perspective of the insurer, its benefits are maximized via the following optimization problem:

$$\begin{aligned}
 E(Y_1(\theta)) &= \\
 \max \quad &= \int_0^\theta (W_{Y_1} - C_1(\xi_1, x, \theta) + I(x) - x) f(x) dx + \\
 &\quad \int_\theta^{+\infty} (W_{Y_1} - C_1(\xi_1, x, \theta) + \theta - x) f(x) dx
 \end{aligned} \tag{5}$$

The optimization problem of the claimant is maximizing his (her) claim benefit. That is,

$$\begin{aligned}
 E(Y_2(\theta)) &= \\
 \max \quad &= \int_0^\theta (W_{Y_2} - C_2(\xi_2, x, \theta) - I(x) + x) f(x) dx \\
 &\quad + \int_\theta^{+\infty} (W_{Y_2} - C_2(\xi_2, x, \theta) - \theta + x) f(x) dx
 \end{aligned} \tag{6}$$

Generally, these two objectives cannot be realized simultaneously since the benefits of insurers and the claimants are in conflict. A regulator must consider social fairness, balancing the benefits of both insurer and claimant, and decreasing social costs in determining the cap of the claim. What is optimal for regulators is to determine optimal cap based on the objective of maximizing the social benefit, expressed as the sum of the benefit of the insurers and the claimants<sup>4</sup>—that is, maximizing

$$\begin{aligned}
 E(Y) &= E(Y_1(\theta)) + E(Y_2(\theta)) = \int_0^{+\infty} (W_{Y_1} + W_{Y_2} - C_1(\xi_1, x, \theta) - C_2(\xi_2, x, \theta)) f(x) dx = \\
 &= \int_0^{+\infty} (W_{Y_1} + W_{Y_2}) f(x) dx - \int_0^\theta (\xi_1 (x - \theta)^2 + \xi_2 (x - \theta)^2) f(x) dx
 \end{aligned} \tag{7}$$

We find from objective function (7) that if we determine the optimal cap on damages according to the objective function of  $\max E(Y)$ , we can maximize the wealth of both insurer and the claimant (the first term of the right side of objective function (7)), and at the same time, minimize the cost of both insurer and the claimant (the second term of the right side of objective function (7)).

This optimization problem is solved in the Technical Appendix, where it is shown that the solution is surprisingly simple:

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4. The Nash (1950) solution maximizes the value of the product of the two utilities. The Thomson (1981) solution maximizes the sum of the two utilities. Mao and Ostaszewski (2007) determine the optimal participating rate by maximizing the sum of the benefit of the insurer and the insured.

The optimal level of a cap on damages is the expected value of real economic loss:

$$\theta^* = E(X). \quad (8)$$

It is also important to note the following two points. One, the optimal cap can easily be dynamic, if the type of distribution of loss remains the same. That is,  $\theta^*(t) = E(X_t)$ . For example, if the loss follows lognormal distribution with parameters of  $\mu_t$  and  $\sigma_t$ , then the optimal cap is:

$$\theta^*(t) = e^{\frac{1}{2}\sigma^2(t) + \mu(t)} \quad (9)$$

Therefore, we can dynamically change the optimal cap when the parameters of loss distribution change. Two, the optimal cap is endogenous to the distribution of random loss to the injured and the frequency and severity do affect the value of optimal cap. Therefore, the injured claimant can obtain the fair claim payment. Based on the analysis above, our theoretical model appears to produce a reasonable and intuitively appealing result.

Further, the optimal level of terminal social benefit is:

$$E(Y^*) = W_{\frac{1}{2}} + W_{\frac{1}{2}} - (\xi_1 + \xi_2) \text{Var}(X), \quad (10)$$

It is the sum of initial wealth from which we subtract the sum of the cost parameters multiplied by the variance of the real loss. This means that both the riskiness of the real economic loss, represented by its variance, and costs to the claimants and the insurance companies, affect the optimal terminal wealth. Notably, the costs to the claimants and to the insurance company have equally negative effect on the final social outcome (although, of course, the cost parameters may vary between the two, but the key point is that if we increase one of them at the expense of the other, the net effect on the society is zero).

Let us note that the key parameter estimated for the practical application of the model is the expected value of the real economic losses to the claimant. This is, of course, a key parameter sought in actuarial analysis by insurance firms in setting premiums and is likely to be studied by both insurance companies and regulators. Furthermore, it is a relatively simple concept that can be presented to the public in general, and to juries in particular, to justify the existence of a cap on payments.

Finally, there exist many statistical procedures for estimating it, even in the situation when data are limited. If data are perfectly available, a method of moments or a maximum likelihood estimator can be easily applied. But even if data are censored or grouped, certain statistical methodologies can be applied. If

only data for cases with caps already applied are available, the data are *right-censored*. Datta (2005) shows a possible statistical methodology to be applied in such a situation. Below we give an example of estimation of the expected value parameter for grouped data, when only ranges of data are available, and not all individual cases. (This situation may be encountered in practice by both insurance actuaries and insurance regulators.)

## Examples to Illustrate Our Results on Optimal Caps

### *Example 1: General Liability Insurance*

Table 1 lists the average claim payment of 217 general liability insurance policies. The claim payment is divided into several intervals (the first column) within the minimum value zero and the maximum value \$300,000, which is the policy upper limit. The second and third column, respectively, list the number of claims and the average claim payment in which the claim payment for each time falling in each interval (the data are used by Xiao, 2008, and originates from Klugman et al., 1998).<sup>5</sup>

We will now illustrate our result by calculating an estimate of the parameter of the mean economic loss, which in the model proposed here is equal to the optimal level of damages cap. We could estimate it from the sample mean, but given that the data are grouped, it is more reasonable to attempt to fit a probability distribution and then use an estimation of that distribution's mean. By examining the data, we hypothesize that the lognormal distribution is a good fit. In the Appendix, we perform a test of this hypothesis (the chi-square goodness of fit test) and find that the distribution can be used to model this data. We also find (in the technical calculation) the estimates of the distribution's parameters, and we use them in the analysis that follows.

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5. We use general liability insurance as an example since firms generally purchase this coverage as one of the first steps to protect their assets. This safety net is critical in a society in which the number of lawsuits and the value of judgment awards have increased over time (Howell, Commercial General Liability Insurance Definition |: [www.ehow.com/about\\_5184654\\_commercial-general-liability-insurance-definition.html](http://www.ehow.com/about_5184654_commercial-general-liability-insurance-definition.html)).

**Table 1:**  
**Average Claim Payment in Dollars**

Claim payment	Number of claims	Average claim payment in dollars
\$0–\$2,500	41	\$1,389
\$2,500–\$7,500	48	\$4,661
\$7,500–\$12,500	24	\$9,991
\$12,500–\$17,500	18	\$15,482
\$17,500–\$22,500	16	\$20,232
\$22,500–\$32,500	14	\$26,616
\$32,500–\$47,500	16	\$40,278
\$47,500–\$67,500	12	\$56,414
\$67,500–\$87,500	6	\$74,985
\$87,500–\$125,000	11	\$106,851
\$125,000–\$225,000	5	\$184,735
\$225,000–\$300,000	4	\$264,025
\$300,000*	3	\$300,000

\* Here the claimants with real loss in excess of \$300,000 can only obtain the claim payment of \$300,000 from the insurer due to that being the upper limit set by the insurer.

Therefore, the estimated optimal value of the cap on the damages award is the expected value of that lognormal distribution:

$$\theta^* = E(X) = e^{\frac{\sigma^2}{2} + \mu} \quad (11)$$

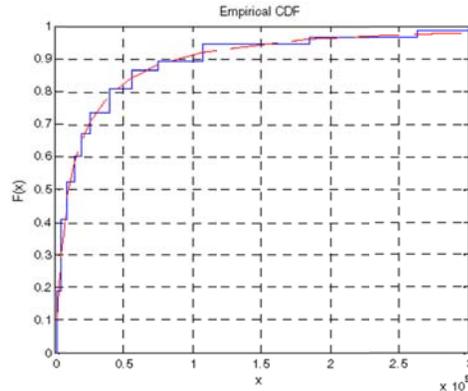
and the optimal expected value of social benefit is:

$$E(Y^*) = W_{\xi_1} + W_{\xi_2} - (\xi_1 + \xi_2) e^{2\mu + \sigma^2} (e^{\sigma^2} - 1) \quad (12)$$

Substituting the estimates of the parameters  $\hat{\mu} = 9.29376$ ,  $\hat{\sigma} = 1.62713$  into equation (11), we obtain an estimate of the optimal damages cap  $\theta^* = 40844.85$ . Figure 1 is the empirical function of cumulative probability distribution fitted using the data in Table 1. It should be noted that while we do not know the exact number of policies/claims affected by the cap, the number represents only approximately 25% of all claims; this does not appear to be an overwhelming restriction, but assessment of how significant the restriction is depends on one's perspective on the effect of the cap on consumers' rights, insurance companies' solvency and overall societal welfare. The optimal social benefit is, of course, dependent on the wealth levels and risk parameters. (But, let us note, the optimization process itself is independent of those quantities, as the optimal cap is

set without reference to them; it is derived only as the mean of the economic loss random variable.)

**Figure 1:**  
**Empirical Function of Cumulative Probability Distribution of**  
**Claim Payment Fitted Using the Data in Table 1**



It is important to note the contrast between the cap determined here based on the expected value of insured loss and caps in reality. The example discussed by us shows that the cap in the real world (\$300,000) is much greater than the cap determined by us (about \$41,000). In fact, Table 1 shows that only three claims appear in which the real loss is greater than \$300,000, while the total number of claims is as large as 217. Thus, only 1.4% of claims exceed the \$300,000 limit. Therefore, high values of caps play little role in decreasing claim payment by insurers. On the contrary, high caps will encourage claimants to take risks without experiencing the true costs associated with these risks, thus inviting moral hazard.<sup>6</sup>

### *Example 2: Medical Malpractice Insurance*

The professional liability insurance (PLI) system is the primary funding mechanism for defending medical malpractice claims and indemnifying successful

6. Eling (2012) used the indemnity loss data of general liability from Free and Valdez (1998) (which was randomly chosen from late settlement lags and were provided by the Insurance Services Office) to fit the empirical distribution of the indemnity loss using the goodness-fit-test. Those results show that the log-normal distribution is one of best distributions to fit the indemnity loss. The expected indemnity loss they estimate is \$41,210, and the average upper limit of policies is \$509,598. Comparing the result from Eling (2012) to our result, we find that the two estimates of the expected indemnity loss for general liability insurance are quite similar. However, the average upper limit of policies for Eling is even larger than that for our example, which further illustrates that the upper limits for general liability insurance in U.S. are relatively high.

negligence lawsuits (Amon and Winn, 2004). Thus, large claim payments on medical liability insurance by insurers may be one important reason for liability insurance crisis. Several empirical papers study medical malpractice insurance markets (e.g., Karl and Nyce, 2014; Born et al., 2009; Lei and Schimit, 2006; and Kane and Emmons, 2006). In this second example, we study medical malpractice insurance from a different perspective. We use our theoretical model to determine the optimal cap with the empirical data from the “real world.” Table 2 shows the number of claims by size of indemnity payment of medical malpractice insurance in Connecticut from the 4th quarter of 2005 through 2007.

**Table 2:**  
**Size of Indemnity Payments (2005 4<sup>th</sup> Q–2007)**

<i>Indemnity Payment</i>	<i>Number (%) of Claims with Indemnity Payments</i>	<i>Total (%) Indemnity Payments</i>	<i>Average Indemnity Payment</i>
\$1–\$9,999	281 (41.1%)	\$10,922,842 (2.4%)	\$38,871
\$100,000–\$199,999	70 (10.2%)	\$10,704,918 (2.3%)	\$152,927
\$200,000–\$299,999	45 (6.6%)	\$11,463,291 (2.5%)	\$254,740
\$300,000–\$399,999	46 (6.7%)	\$16,310,001 (3.6%)	\$354,565
\$400,000–\$499,999	36 (5.3%)	\$16,780,917 (3.7%)	\$466,137
\$500,000–\$599,999	13 (1.9%)	\$7,160,000 (1.6%)	\$550,769
\$600,000–\$699,999	17 (2.5%)	\$11,059,923 (2.4%)	\$650,584
\$700,000–\$799,999	31 (4.5%)	\$23,600,718 (5.1%)	\$761,313
\$800,000–\$899,999	19 (2.8%)	\$16,197,500 (3.5%)	\$852,500
\$900,000–\$999,999	26 (3.8%)	\$25,599,184 (5.6%)	\$984,584
\$1,000,000 and over*	100 (14.6%)	\$308,792,097 (67.3%)	\$3,087,921
<b>Total</b>	<b>684 (100%)</b>	<b>\$458,591,391</b>	<b>\$670,455</b>

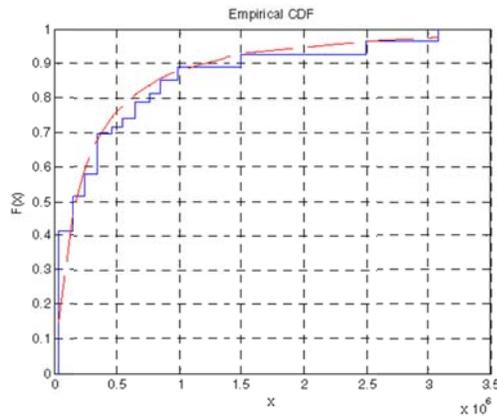
\* Since the range of \$1 million and over in the last line of Table 2 is so large, it results in a very large number and percentages of claims falling in this interval. We address this aspect of the data by dividing this portion of the data into four intervals and assume the number of claims uniformly falls in these four intervals.

Source: Connecticut Insurance Department, Connecticut Medical Malpractice Annual Report, March 2008

Figure 1 describes the empirical function of cumulative probability distribution (CDF) using the data in Table 2. The data clearly fit the lognormal distribution quite well. We calculate the values of parameters of lognormal distribution by maximum likelihood estimation and obtain  $\hat{\mu} = 12.1015$ ,  $\hat{\sigma} = 1.4577$ . We use the Kolmogorov-Smirnov test and obtain the value of the test statistic  $STAT = 0.2682$ . Since the critical value for determining whether to reject

the null hypothesis is 0.3912, which is greater than the value of the test statistic, we do not reject the null hypothesis.

**Figure 2:**  
**Empirical Probability Distribution of Claim Payment Fitted**  
**Using the Data in Table 2**



Thus, our theoretical model calculates that, based on the data, the optimal damages cap should equal:

$$\theta^* = e^{\frac{1}{\sigma^2} + \hat{\mu}} = e^{\frac{1}{\sigma^2} \times 1.4577^2 + 12.1015} = \$521,230 \text{ (dollars)}.$$

We know from Avraham (2014) that the state of Connecticut has not set a cap on damage for medical malpractice insurance. Thus, the total claim payments here are relatively large. Setting the damage cap at the amount suggested by our model, \$521,230, would reduce the total claim loss paid by insurers. The total claim payment with this cap is about 24% of that without the cap.

In Appendix Table A2, we list the caps of 20 states set by state legislation from 2005 to 2007. Comparing the data in Table A2, the cap of \$521,230 from our analysis here is close to those set by five states: Florida, Illinois, Mississippi, North Dakota and Utah. The cap we calculate is lower than that set by Maryland, and it is higher than caps set by the states of Alaska, California, Colorado, Georgia, Idaho, Kansas, Missouri, Nevada, Oklahoma, South Carolina and West Virginia. We note that more than one-half of the U.S. states did not set caps, and this may be one of the important reasons related to the medical malpractice crisis in the U.S., along with other reasons such as long-tail liability and exaggerated losses to obtain higher judgment awards.

## Sensitivity Analysis in the Lognormal Model of Claims Distribution

Taking the partial derivative of equation (11) with respect to the parameters  $\mu$  and  $\sigma$  of the lognormal distribution used in that model, we obtain:

$$\frac{\partial \theta^*}{\partial \mu} = e^{\frac{\sigma^2}{2} + \mu} > 0 \quad (12)$$

$$\frac{\partial \theta^*}{\partial \sigma} = e^{\frac{\sigma^2}{2} + \mu} \sigma > 0 \quad (13)$$

From equations of (12) and (13), we see that the optimal value of the cap is an increasing function of both  $\mu$  and  $\sigma$  parameters of the loss distribution under the assumption that the claim loss follows the lognormal distribution. By dividing equation (12) by equation (13), we also obtain:

$$\frac{\frac{\partial \theta^*}{\partial \mu}}{\frac{\partial \theta^*}{\partial \sigma}} = \frac{1}{\sigma} \quad (14)$$

Equation (14) shows that when  $\sigma > 1$ , the sensitivity of the cap on payments to the parameter  $\mu$  is smaller than its sensitivity to the parameter  $\sigma$ , and the opposite is true when  $\sigma < 1$ . In fact, the ratio of sensitivity to  $\sigma$  to sensitivity to  $\mu$  equals exactly  $\sigma$ , which is, let us recall, the standard deviation of the normal distribution obtained by taking the natural logarithm of the lognormal random variable. Since lognormal distribution is a reasonable model for many realistic models of claims distributions,<sup>7</sup> our work suggests that for more volatile claims distributions, caps on claims will be more sensitive to the volatility parameter of the claim distribution, while for more stable claims distributions, sensitivity to the parameter  $\mu$  will dominate.

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7. The distributions of loss often used in actuarial science generally have the characteristics of asymmetric, non-negative and with fat tail, etc. Based on these characteristics, we usually select models with two parameters, such as: lognormal distribution, Weibull distribution, Gamma distribution (Xiao, 2008). We have tested that we can use lognormal distribution to describe the individual claim distribution in our example.

## Implications and Conclusion

This paper develops models to analyze both claimant and insurer behaviors with caps on claim damage for third-party insurance. We establish the optimal strategy for regulators to set the cap to balance both the claimant and insurer's benefits, considering different risks, based on the criterion of maximizing social benefit. The cap and the cost parameter can be used to control the claimant's claim inflation. As there is information asymmetry for the amount of damage, the regulator and insurer hardly capture the actual loss amount, especially for the non-economic loss. Our analysis suggests that the optimal value of the cap, considering the maximization of social benefit, should be the expected value of random loss amount independent of the kind of probability distribution it follows.

For losses that are relatively easy to evaluate in terms of their real amount (e.g., economic losses), regulators may consider capping the damage awards on a case-by-case basis, following the principles of equitable justice. But the principle developed here is a simple and practical guide even for such case-by-case evaluations. We acknowledge that our paper utilizes a static equilibrium model, and this is undoubtedly its limitation. There are significant dynamic processes involved in consideration of incentives of all parties involved in legal damages caps. But, such dynamic processes require a more complex multi-period model, and must include incentives faced by the injured party, insurance company and political decision-makers. We consider our work to be a first step toward such a complex model, and creation of such a model is reserved for a far larger and longer-term research project.

Our calculation with empirical data indicates that the cap determined by us in general liability policies is much less than caps observed in the real world. Our other example for medical malpractice insurance indicates that the insurer's total claim payment is much higher without caps than that with caps determining based on the expected loss. The fact that many states have not set caps on damage might be one of the main reasons for the crisis of medical practice insurance in the U.S. We believe that our work may be a valuable contribution in the ongoing debate on managing the cost of claims and the issue of imposing a legal cap on them.

Because insurance regulators are focused on the solvency of insurers, regulators may tend to favor damage award caps in order to reduce the likelihood of insurer insolvency. Similarly, insurance regulators are concerned with insurance pricing, and regulators also may tend to favor caps on damage awards as a way to reduce the expected costs of insurance. Our analysis on optimal damage caps provides insurance regulators with results that shed light on optimum cap levels. The analysis, thus, can help insurance regulators to better achieve the goals of insurer solvency and consumer protection. Of course, others may also need to consider factors such as trying to limit frivolous litigation, decreasing moral hazard and holding parties responsible for their behavior, which might suggest increases in the level of caps or even the removal of caps on damage awards.

In future work, we hope to focus on the reasons that for some liability

insurance (e.g., general liability insurance) the value of optimal cap observed in reality, while for other types of liability insurance (e.g., medical malpractice), the value of the optimal cap is close to that observed in reality. Another further study may focus on determining optimal cap on damages and corresponding premium considering dynamic incentives of the potential injurers and corresponding injury phase of the environment.<sup>8</sup>

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8. We thank an anonymous reviewer for this suggestion.

## Technical Appendix

### 1. Derivation of the Optimal Solution to the Problem Stated in Equation (7)

In order to maximize the quantity in equation (7), we use the Leibniz formula with equation (7) and obtain the following equation:

$$\begin{aligned} \frac{dE(Y)}{d\theta} &= \int_0^{\theta} -\frac{d}{d\theta}(\xi_1 + \xi_2)(\theta - x)^2 f(x) dx - (\xi_1 + \xi_2)(\theta - \theta)^2 f(\theta) \\ &= \int_0^{\theta} (\xi_1 + \xi_2)(\theta - x) f(x) dx \end{aligned} \quad (\text{A1})$$

Setting equation (A1) equal to zero, we obtain:

$$\frac{dE(Y)}{d\theta} = \int_0^{\theta} (\xi_1 + \xi_2)(\theta - x) f(x) dx = 0 \quad (\text{A2})$$

Note that since

$$\frac{\partial^2 E(Y)}{\partial \theta^2} = -\int_0^{\theta} 2(\xi_1 + \xi_2) f(x) dx < 0,$$

i.e., when the first derivative is zero, the second derivative is negative, the optimal value obtained by solving the equation (A2) will yield a maximum. By solving the equation (A2), we can obtain the optimal cap of claim  $\theta^*$  maximizing the social benefit. From equation (A2), we see that the optimal solution  $\theta^*$  satisfies the condition  $E(X - \theta^*) = 0$  so that

$$\theta^* = E(X) = e^{\frac{\sigma^2}{2} + \mu} \quad (\text{A3})$$

From the equation (A3), we see that the cap of claim is unrelated to the parameters of claim cost and settlement cost  $\xi_1$  and  $\xi_2$ , while it is only dependent on the expected value of the loss distribution. Substituting equation (A3) into equation (7), we obtain the optimal social benefit:

$$\begin{aligned}
 E(Y^*) &= \int_0^{+\infty} (W_{Y_1} + W_{Y_2}) f(x) dx + \int_0^{\theta} \left( -\xi_1 (x - E(x))^2 - \xi_2 (x - E(x))^2 \right) f(x) dx \\
 &= W_{Y_1} + W_{Y_2} - (\xi_1 + \xi_2) \text{Var}(X).
 \end{aligned}$$

(A4)

## 2. Chi-Square Goodness of Fit Test for the Lognormal Distribution (For this appendix, we refer to Xiao, 2008.)

(1) Use  $\chi^2$  goodness of fit test and based on its outcome assuming that claim payment can be taken to originate from a lognormal distribution. Its density function is:

$$f(x) = \begin{cases} \frac{1}{\sigma\sqrt{2\pi x}} e^{-\frac{1(\ln x - \mu)^2}{2\sigma^2}} & x \geq 0, \\ 0 & x < 0, \end{cases} \quad (\text{A5})$$

(2) Perform a hypothesis test with the null hypothesis  $H_0: F(x) = F_0(x, \mu, \sigma)$  and  $H_1: F(x) \neq F_0(x, \mu, \sigma)$ , where  $F(x)$  is the cumulative distribution function of the lognormal distribution, and  $\mu, \sigma$  are its parameters. (They are not the mean and variance of the lognormal distribution, but of the normal distribution equal to the natural logarithm of the lognormal variable.)

(3) Use the distribution function chosen to calculate the expected values:

$$E_0 = nF_0(c_0, \hat{\mu}, \hat{\sigma}), \quad (\text{A6})$$

$$E_j = n(F_0(c_j, \hat{\mu}, \hat{\sigma}) - F_0(c_{j-1}, \hat{\mu}, \hat{\sigma})), j = 1, \dots, r-1, \quad (\text{A7})$$

$$E_r = n(1 - F_0(c_r, \hat{\mu}, \hat{\sigma})), \quad (\text{A8})$$

Where  $n$  is sample size, and  $\hat{\mu}, \hat{\sigma}$  are values obtained from maximum likelihood estimation and consider the following statistic:

$$Q = \sum_{j=1}^r \frac{(n_j - E_j)^2}{E_j}, \quad (\text{A9})$$

where  $Q \sim \chi^2(r - k - 1)$  and  $k$  is the number of unknown parameters. If

$$Q > \chi^2_{\alpha}(r - k - 1),$$

reject the hypothesis of  $H_0$  and the distribution assumed is not a suitable distribution for the data.

(4) Calculate the values of parameters by maximum likelihood estimation and obtain:  $\hat{\mu} = 9.29376$ ,  $\hat{\sigma} = 1.62713$ . Using the equations (A6), (A7) and (A8), the following results are obtained:

$$E_0 = 217\Phi\left(\frac{\ln(2500) - 9.29376}{1.62713}\right) = 39.75,$$

and similarly  $E_1 = 49.17$ ,  $E_2 = 27.00$ , ..., etc. can also be obtained. The results are listed below in Table A1.

**Table A1:**  
The Calculation Results of  $\chi^2$  Goodness of Fit Test

Claim Payment	Number	$E_j$	$Q_j = \frac{(n_j - E_j)^2}{E_j}$
0–\$2500	41	39.75	0.04
\$2500–\$7500	48	49.17	0.03
\$7500–\$12,500	24	27.00	0.33
\$12,500–\$17,500	18	17.55	0.01
\$17,500–\$22,500	16	12.48	0.51
\$22,500–\$32,500	14	16.70	0.44
\$32,500–\$47,500	16	14.77	0.10
\$47,500–\$67,500	12	11.18	0.06
\$67,500–\$87,500	6	6.71	0.07
\$87,500–\$125,000	11	7.22	1.98
\$125,000–\$225,000	5	7.68	0.94
\$225,000–	7	6.79	0.01
		Sum	4.51

Since

$$Q = 4.51 < \chi_{0.05}^2(12 - 2 - 1) = 16.92,$$

it is failed to reject the hypothesis  $H_0$ , and thus we proceed with the model that takes the lognormal distribution as a suitable one for representing the amounts of claims in this context.

**Table A2:**  
**The Values of Caps of Medical Malpractice Insurance for 20 States in the U.S. in 2005 4th Q to 2007<sup>9</sup>(Thousand Dollars)**

Name of State	Cap in 2005	Cap in 2006	Cap in 2007
Alaska		250	250
California	250	250	250
Colorado	300	300	300
Florida	500	500	500
Georgia	350	350	350
Hawaii	375	375	375
Idaho	260	270	280
Illinois		500	500
Kansas	250	250	250
Maryland	645	660	675
Mississippi	500	500	500
Missouri	580	350	350
Nevada	350	350	350
North Dakota	500	500	500
Oklahoma	300	300	300
South Carolina		350	350
South Dakota	500	500	500
Texas	250	250	250
Utah	430	430	430
West Virginia	250	250	250

9. The data in this table is selected from the database (in the clever file) of Avraham, Ronen (May 2014). The states that are not listed in the table have not set caps during these three years.

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# Commercial Insurers' Participation in Public Health Insurance Programs

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## Abstract

For many years, commercial insurers have opted in and out of the provision of health care services to persons enrolled in public programs, such as Medicare and Medicaid. By mandating the creation of health insurance exchanges, the federal Patient Protection and Affordable Care Act of 2010 (ACA) offers a new way for commercial insurers to participate in public health programs. Participation is not mandatory, and thus will require that participating insurers be allowed to establish adequate premiums to ensure solvency. Our analysis sheds light on the potential benefit of participating in a health insurance exchange by analyzing the relative performance of commercial health insurers across varying degrees of participation in public health insurance programs. In particular, we consider how the level of participation in Medicare, Medicaid and the Federal Employee Health Benefits Program relate to commercial health insurers' overall financial performance. Our results show that insurers' underwriting performance is weakly related to the degree to which they concentrate in various lines of public insurance. While performance is not significantly enhanced, it is also not significantly worsened by participating in public health insurance programs. This information may be especially useful to state insurance regulators as they evaluate the performance of the private insurance market and participation in health insurance exchanges across rating areas in their states.

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## 1. Introduction

The enactment of the federal Patient Protection and Affordable Care Act of 2010 (ACA) initiated unprecedented changes in the U.S. health insurance market. Among the most relevant changes are subsidies to small groups for the purchase of health insurance, an individual mandate to purchase coverage, mandated benefits, the creation of health insurance exchanges and expanded Medicaid eligibility. While potentially costly to U.S. taxpayers, the reform measures could significantly affect the availability and affordability of health care services and ultimately “transform U.S. health insurance.”<sup>1</sup> However, there is little empirical information predicting the potential long-term effects of this new federal regulation, especially as it relates to the operations of health insurers.

One of the many consequences of the regulations imposed by the ACA is that it will alter the nature of private insurers’ participation in public health insurance programs, which will ultimately have consequences for the nature of regulatory constraints on health insurers. As mandated by the ACA, public health insurance exchanges create a new market in which “Americans can one-stop shop for a health care plan, compare benefits and prices, and choose the plan that’s best for them”<sup>2</sup> and policies sold on the exchanges are subject to different types of federal and state regulatory constraints when compared to policies sold on the market before the enactment of the ACA. Similarly, health insurers commencing or increasing participation in the Medicaid program, due to the Medicaid expansion provisions of the ACA, are faced with new regulatory constraints relative to pre-ACA levels. As insurers are faced with new costs of participation, it is important for state insurance regulators and other market participants in the post-ACA era to understand how participation in public programs influences the performance of health insurers, because successful performance (i.e., profitability) will drive participation.

Our research examines how participation in public health insurance programs is related to health insurer performance in the period before the enactment of the ACA. Relative to other lines of health insurance business, participation in the public health insurance programs—Medicare, Medicaid and the Federal Employee Health Benefits Program (FEHBP)—imposed unique regulatory constraints on private health insurers in the pre-ACA era. While the regulations associated with Medicare, Medicaid and the FEHBP do not perfectly reflect those that will be encountered by health insurers in the post-ACA era, examining insurers’ success within the regulatory confines of these public programs may shed light on insurers’ financial performance as they adapt to the regulatory confines of the ACA. If the health insurers that choose to participate have (or have not) found

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1. Harrington (2010), p. 34.

2. Statement made by President Barak Obama in the post titled, “President Obama Reiterates Support for Public Option and Health Insurance Exchange” and found at: <http://my.barackobama.com/page/community/post/obamaforamerica/gGGGpK>. Last accessed May 7, 2012.

ways to be operationally successful in the pre-ACA era while participating in public health insurance programs, this would provide some evidence that health insurers will (or will not) be able to overcome the unique regulatory constraints they encounter when participating in health insurance exchange business and Medicaid business in the post-ACA era.

Our results indicate that a non-trivial relationship exists between the financial performance of commercial health insurers and their level of involvement in public health insurance programs. We provide evidence that the cross-sectional relationship between participation in public health insurance programs and several measures of operational performance varies depending on the type of program and the measure of operating performance.

The remainder of our paper is organized as follows. In Section 2, we examine the relevant literature addressing the performance of commercial health insurers, factors related to their participation in public health insurance programs, and the financial performance in these public programs. In Section 3, we discuss our data and develop testable hypotheses regarding the relationship between insurer performance and participation in private and public health insurance programs. Section 4 provides an overview of our data and methodology. We then present and discuss our results in Section 5, and we provide our conclusion in Section 6.

## 2. Background

Our research draws from multiple streams of literature. We refer, specifically, to a wide range of health economics and health policy literature that addresses the financial performance of managed care plans and a number of studies that address the financial performance of insurers more generally.<sup>3</sup> To a great extent, the former body of research was motivated initially by the transition in the U.S. from indemnity coverage to primarily managed care, and has been largely concerned with availability of health care services, health outcomes and/or quality of care. These studies draw primarily on data from the health care industry (e.g., hospitals) and consumer surveys. An overarching objective for much of this literature has been to gain a better understanding of factors driving the cost of health care. In the 1980s and 1990s, newly formed managed care plans were scrutinized for their ability to contain costs without impacting the quality of care provided. One early focus of research on commercial health insurers' financial performance was driven by concerns that the incentives associated with operating a "for profit" managed care plan would result in the coverage of fewer services or lower quality care.<sup>4</sup> As the managed care market continued to grow, research addressing their financial performance expanded to other topics, including the costs and benefits of

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3. We refer to the organizations providing health insurance as health insurers, which include managed care organizations (e.g., HMOs, PPOs) as a common form.

4. See, for example, Schlesinger et al. (1986) and Bryce (1994).

consolidation,<sup>5</sup> competition<sup>6</sup> and the role of medical technology.<sup>7</sup> Many of these studies relied on state aggregate data because a central depository for insurer-level data did not exist.<sup>8</sup>

### *Public and Private Health Insurance Business*

Commercial health insurers' private lines of insurance business include comprehensive hospital and medical services, vision, dental, long-term care and disability income. These insurers also have a long history of involvement in public programs; for decades, they have served as risk-bearing entities in the FEHBP, and more recently as capitated, risk-bearing entities in Medicare Choice (now Medicare Advantage) and Medicaid. Table 1 shows a summary of the three main public programs in which commercial health insurers, now predominantly managed care plans, currently report their participation.<sup>9</sup> We also include, in Table 1, Medicare supplement plans, which are heavily regulated and inherently linked to the Medicare program, but provided solely through a competitive market of commercial insurers, who bear all of the risk associated with the coverage. To our knowledge, no study has evaluated the financial performance of commercial health insurers that participate to varying degrees in these programs simultaneously. Nevertheless, the research addressing commercial health insurers' performance in public programs is broad and considers, among other things, their decisions to participate,<sup>10</sup> capture and spillover of enrollees,<sup>11</sup> uncompensated care,<sup>12</sup> outcomes and financial performance.

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5. Robinson (2004) finds a weak correlation between the structure of the industry and its long-term profitability.

6. For example, studies such as Dafny (2010), Dafny et al. (2012) and Scanlon et al. (2006) consider the relationship between health insurance market structure and performance.

7. Advances in medical technology have been linked to premium increases in several studies. While these advances are considered beneficial for the improvement in health outcomes, these advances come at a cost (Cutler and McClellan (2001); Newhouse (1992); Bunker et al. (1994)). To remain financially viable, health insurers must pass these costs through to consumers, resulting in higher health insurance premiums, which lead to a reduction in coverage rates (Chernew et al. (2005)).

8. Plan-level financial data were available from a variety of sources, such as the National Committee on Quality Assurance (NCQA) and state insurance or health departments, but is only recently available on a more comprehensive plan-level basis, across all plans and all states.

9. We focus on this categorization of these programs to be consistent with the data reported to the state insurance departments, which we use in our analysis. Financial performance of the programs within these categories; e.g., those enrolled in Medicare via TRICARE, is not available.

10. See, for example, Robinson (2006).

11. For example, Cutler and Gruber (1996) analyze the effects the expansions of Medicaid to pregnant women and children between 1987 and 1992. The authors estimate the decline in private coverage as a result of the expansion was roughly 50%. In the following decade, Gruber and Simon (2008) estimate an even larger crowd-out rate of about 60%.

**Table 1:  
U.S. Commercial Health Insurers' Participation in  
Public Health Insurance Programs**

<b>Program</b>	<b>Role of Commercial Insurers</b>
Medicare (Title XVIII) Established 1965	<ul style="list-style-type: none"> <li>• In the traditional program, commercial insurers contract with the federal government to handle claims, administration, etc.</li> <li>• Commercial insurers bear risk in Medicare Choice implemented in 1997; now known as Medicare Advantage</li> </ul>
Medicaid (Title XIX) Established 1965	<ul style="list-style-type: none"> <li>• Depends on state. Some states subcontract to commercial insurers, other states pay providers directly.</li> <li>• Offered through managed care plans since the 1990s, via waivers from the federal government. Commercial insurers handle claims, administration, etc.</li> </ul>
Federal Employee Health Benefits Program (FEHBP) Established 1959 [Includes TRICARE (formerly CHAMPUS), established 1966]	<ul style="list-style-type: none"> <li>• Commercial insurers compete with government plans.</li> <li>• Original legislation required the program to offer HMOs.</li> </ul>
Medicare Supplement First plan appeared 1971 Standardized in 1991	<ul style="list-style-type: none"> <li>• Commercial insurers provide several different standardized coverage options. Reduced to 12 plans in 1992.</li> <li>• Three states (Massachusetts, Minnesota and Wisconsin) offer nonstandard plans.</li> <li>• Commercial insurers offer managed care coverage via Medicare Select; piloted in 15 states, expanded to all 50 states in 1995.</li> </ul>

The participation of commercial plans in the public programs has important implications for public policy, including the establishment of program parameters that allow plans to achieve cost savings and minimize the potential disruption to enrollees due to the entry and exit of plans. Empirical research supports economic theories that suggest insurers enter markets in which they expect positive profits and exit when this goal is not achieved. But expected profitability, which requires adequate reimbursement rates, is not the sole driving factor. In a study of participation in Medicaid managed care, Coughlin et al. (2001) find that rate adequacy is a central factor; however, some noneconomic factors, such as a sense of social obligation or brand image, are also relevant to an insurer's decision to participate. In an analysis of trends from 1993 to 1995, Felt-Lisk and Yang (1997) note that "plans serving Medicaid tended to be either Medicaid-dominated or low-Medicaid." Using data from InterStudy, Long and Yemane (2005) evaluate the factors associated with commercial insurers' decisions to exit the Medicaid managed care market. Their findings suggest that the states wishing to maintain participation by commercial insurers must pay sound capitation rates and consider their mandatory enrollment rules.

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12. See Stoll (2005), Dobson et al. (2006) and Hadley et al. (2008). Stoll (2005) estimates that the impact of uncompensated care through cost shifting adds \$922 to the annual premium charged for family health insurance coverage.

Before the Medicare program was established, commercial insurers had little opportunity to earn profits in the older population (age 65 and older). Jones (1996) examines the commercial insurance market opportunities created by the Medicare program. While few insurers chose to market to the elderly before Medicare, they did find it profitable to write Medicare supplement policies, which represented much less risk (Jones (1996)). The Medicare program administration was authorized to contract with health maintenance organizations (HMOs) on a capitated basis under the 1972 Social Security amendments, but by 1979, only one plan had contracted with Medicare on a risk basis (Oberlander (1997)). Demonstration projects and other provisions, including the federal Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) promoted the involvement of commercial insurers by offering favorable prospective, monthly capitated payments. The 1980s and 1990s included multiple attempts to move enrollees into managed care, under the assumption that managed care could provide medical care at a substantially lower cost than the traditional indemnity plans.<sup>13</sup>

Ellis and Gurol (2004) evaluate health plan entry and exit from the Medicare managed care market over the period 1997–2001. They find that Medicare prices are important, but regulations and other non-price factors also help to explain trends in participation during this time period. Most important, this study disentangles the entry and exit of plans from the Medicare program from the entry and exit of plans from the commercial market.

The FEHBP offers a wide range of coverage options to federal employees and retirees. The number of plans in the program varies from year to year, but has historically included traditional indemnity plans and managed care plans.<sup>14</sup> When the program began operation in 1960, it offered 28 plans. There are currently 230 different plan choices, including 14 nationwide fee-for-service plans, but more than half the enrollees are enrolled in Blue Cross and Blue Shield and another 25% are in one of the other national preferred provider organization (PPO)/fee-for-service plans.<sup>15</sup> Much of the research on the FEHBP has utilized enrollment information to evaluate health insurance consumer behavior; e.g., response to copayments, tendency to switch plans, effect of report cards, etc.<sup>16</sup> Research addressing the financial performance of the insurers participating in the FEHBP is limited.

The U.S. Office of Personnel Management (OPM), which administers the FEHBP, negotiates directly with commercial plan carriers to establish rates and benefits. Over its history, plans have left the program due to inadequate rates and

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13. See Miller and Luft (1994) for arguments supporting this view.

14. Enthoven (1989) provides a discussion of biased selection and lack of efficiency in the FEHBP. He concludes with a number of recommendations “from the point of view of a rational economic design to achieve the efficient and equitable program that taxpayers and federal employees are paying for,” including standardizing benefit packages and integrating the program with Medicare.

15. See Mach (2012).

16. See, for example, Wedig and Tai-Seale (2002) and Atherly et al. (2005).

adverse selection problems that arise from the wide range of plans offered.<sup>17</sup> The OPM is currently looking to expand nationwide the number of HMOs available in the program. According to its announcement, the OPM is hoping that health insurance carriers will be interested in either applying or reapplying for participation under the new pricing method dictated by the introduction of the medical loss ratio (MLR) regulations in the ACA. The previous method was based on similarly sized subscriber groups. Further, the announcement indicates a priority for adding plans in the states that have been determined to be medically underserved.<sup>18</sup>

Insurers that sell Medicare supplement coverage can offer up to 10 model policies. The core benefits included in all policies include coverage for: 1) copayments for Part A hospital stays for days 61 through 150; 2) the 20% coinsurance for Part B physician charges; 3) the first three pints of blood received each year; and 4) an additional 365 days of hospital care. Because the coverage effectively removes the cost-sharing mechanisms from the traditional Medicare program, much research has emphasized how supplemental coverage induces a moral hazard problem, effectively creating first-dollar coverage and thereby increasing utilization in the Medicare program.<sup>19</sup>

### *Participation Decisions*

The existing literature considers our assumption that commercial insurers that participate in the public health insurance programs maintain their participation if they are financially viable and exit if their profitability is threatened. We do not seek here to evaluate the reasons for entry and exit into these markets; instead, we assume that entry is likely driven by an assumption of positive financial opportunities. Similarly, exit may be desirable when the line of business is unprofitable. However, we do not assume that participation is necessarily a profitable move when evaluated solely on the performance in that new line. Specifically, entering one or more public lines of insurance may yield benefits that spill over to the private lines of coverage through, for example, increased negotiating power over provider organizations. Thus, we focus our analysis on how participation in one or more of these public lines of insurance are related to the performance of the insurer as a whole.

Despite the large number of commercial insurers that operate exclusively, or almost exclusively, within these government programs, we consider the primary function of commercial plans to be that of providing private health insurance

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17. Aetna withdrew in 1990 because adverse selection threatened its financial performance (National Health Policy Forum (1998)).

18. The U.S. Department of Health and Human Services lists the following medically underserved states: Alabama; Arizona; Idaho; Illinois; Louisiana; Mississippi; Missouri; Montana; New Mexico; North Dakota; Oklahoma; South Carolina; South Dakota; and Wyoming.

19. For studies of the effect of Medicare supplement policies on the Medicare program see McCall et al. (1991), Marquis (1992) and Atherly (2002).

coverage. This coverage is primarily comprehensive medical insurance, but commercial insurers also offer dental, disability, vision and long-term care insurance in the private market.

The commercial health insurance industry is threatened by several trends, including, most important, the decline in the employment-based provision of health insurance (Robinson (2006)). This decline has encouraged commercial insurers to diversify into public programs, thereby allowing for further growth and serving to limit their exposure to risk in any one particular program. Robinson (2006) notes, for example, “the ‘single-payer’ structure of state Medicaid programs no longer constitutes an insurmountable barrier to investor-owned insurers, as they can enter and exit particular states based on changes in payment rates and medical costs.” While he addresses the important factors driving commercial insurers into participation in the public programs, he does not test whether participation in these programs has yielded a positive financial benefit to commercial insurers.

Few papers to date have assessed whether diversification benefits exist for health insurers that operate in different lines. One exception is a recent paper by McCue and Bailit (2011), in which the authors explore the financial performance and quality differences for three types of plans: 1) “pure-play,” publicly traded plans that focus almost exclusively on the Medicaid business; 2) multiproduct, publicly traded plans; and 3) provider-sponsored plans. They find, among other things, that pure-play, publicly traded plans had lower medical costs associated with serving the Medicaid population when compared to non-publicly traded plans. While the multiproduct plans did not report significantly different financial performance from the other types of plans, they were found to report higher administrative costs.

While it may be early to assess whether insurer participation in the exchanges is rewarding, several empirical studies yield some early insight into the participation decision. For example, insurers’ decisions to participate in an exchange depend on their ability to attract an adequate pool of insureds within a given rating area. Dickstein et al. (2015) suggest that more insurers will enter rating areas if rural areas are combined with neighboring urban markets. McGuire et al. (2014) apply a model of plan profit maximization, recognizing the potential for adverse selection, and conclude that plans have incentives to skimp on care for certain diagnoses. Dafny et al. (2014) evaluate the initial (2011) plan participation across rating areas in the states with federally funded exchanges and conclude that more plans equates to lower premiums in the exchange. They further conclude that the new exchange markets exhibit the same competitive dynamics of existing, mature health insurance markets where neither is perfectly competitive.

### *Other Factors Affecting Performance*

In the analysis that follows, our comprehensive data set provides us with a unique opportunity to examine insurers’ participation in multiple lines of business, while controlling for other insurer characteristics and a variety of intervening

factors. Variation in the profitability of commercial insurers reflects not only their choice to participate in various public and private lines of business, but also their success in the design of contracts, charging appropriate premiums and, subsequently, managing the services provided. Therefore, to the extent that similarities exist between participation in public programs and participation in exchanges, this paper endeavors to provide insight into the influence of the ACA on health insurers' financial operations.

One exogenous factor affecting this success is the demographic characteristics of the population served. While there is an extensive literature that links disparities in insurance coverage to demographic characteristics,<sup>20</sup> only a few papers have tied health insurer operations and performance to characteristics of the population served. For example, Bundorf (2002) examines the relationship between employee preference for health insurance and the health plans offered by employers and finds that employee characteristics affect the generosity of health plans offered by employers. Bundorf, Herring and Pauly (2010) find that adverse selection in the group insurance market is affected by the socio-economic status of the insureds. More recently, several studies have analyzed state-specific factors that will likely influence the operation of health insurance exchanges, or have affected their development thus far. For example, a recent report from the Urban Institute notes how the presence of either a dominant insurer, or a dominant hospital system, will affect the nature of competition in the market (Holahan (2012)). Graves and Swartz (2013) suggest that enrollment in health insurance exchanges and Medicaid expansion programs will depend, in part, on statewide factors that cause people to become uninsured. The authors conclude that the states will need to tailor their outreach and retention efforts toward specific populations. Some studies have looked to the Massachusetts exchange (Health Connector) for guidance on likely consumer responses (Starc and Kolstad (2012); Ericson and Starc (2012)). Based on a survey of enrollees in the Massachusetts Health Connector, Sinaiko et al. (2013) conclude that exchanges will need to provide adequate resources and decision support tools to enable enrollees to optimize their health plan choices. These latter findings have important implications for ensuring the viability of exchanges and encouraging the involvement of insurers who may fear adverse selection.

Additional studies help identify other exogenous factors that may play an important role in insurer profitability more generally. Such studies generally concur that certain economic factors are related to insurer performance. For example, Browne, Carson and Hoyt (1999) identify factors that are exogenous to individual life/health insurers and related to insurer insolvency. Their results indicate that long-term interest rates, personal income, unemployment, the stock market, number of insurers and real estate returns are all related to the solvency of life and health insurers.

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20. See, for example, Gresenz et al. (2009), Alegria et al. (2006), and Monheit and Vistnes (2000).

Prior research indicates that some additional insurer-specific characteristics are commonly related to their financial performance.<sup>21</sup> Specifically, the prior literature on P/C and life insurer performance may offer important insight into insurer-specific factors that are likely to be associated with health insurer performance, as well. For example, among P/C and life insurers, stock and mutual companies are often found to differ in many ways, including their operating efficiency and performance.<sup>22</sup> Roughly 25% of health insurers are classified as “nonprofit” or “mutual.” The prior literature also suggests that capacity (e.g., the premium-to-surplus ratio), age and size are also significant determinants of performance.<sup>23</sup>

Health insurers’ operations extend beyond the traditional insurance functions of P/C and life insurers to the extent that they are also involved directly in the provision of health care services. Thus, additional insurer characteristics—i.e., those pertaining to the health care delivery aspect of the insurer—are included in our analysis as controls for performance. For example, while not synonymous with the design of distribution systems, we note several parallels between P/C insurers’ distribution systems and health insurers’ delivery systems.<sup>24</sup> First, both systems rely on negotiated financial arrangements; i.e., P/C insurers negotiate independent or exclusive arrangements with agents and brokers, while health insurers establish networks of providers. P/C insurance agents are given varying degrees of underwriting authority. Health insurance delivery systems vary in the types of mechanisms used to manage costs. For example, the HMO form is typically characterized by the use of gatekeepers, primary care physicians who control insureds’ access to more specialized providers. A majority of coverage is now written through PPOs.

P/C insurers can operate in a wide variety of lines. This feature has motivated several studies of the benefits of diversification, with somewhat different findings. For example, Liebenberg and Sommer (2008), and Berger, Cummins, Weiss and Zi (2000) examine the *strategic focus hypothesis* and the *conglomeration*

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21. See Browne and Hoyt (1995); Grace and Hotchkiss (1995).

22. There is a vast literature documenting the relationship between insurer ownership structure and performance. For example, Mayers and Smith (1988) examine the impact of ownership structure on differences across the insurance industry in lines of business finding differences in ownerships structure and line of business concentration. Lamn-Tennant and Starks (1993) document the relationship between ownership structure and the risk of an insurer’s activities. In general, the persistence of competing organizational forms in the P/C insurance market is attributed to particularities in the lines of business in which the insurer operates. See also McNamara (1991) and Ho et al. (2012).

23. See, for example, Born (2001), Shim (2010), Kraus and Ross (2012), and Doumpos et al. (2012). Many studies of the determinants of insurer financial performance also include consideration of the insurance cycle (e.g., Grace and Hotchkiss (1995)) or predicting insolvency (e.g., Cheng and Weiss (2012)). Size and age are also significant determinants of insurer growth (Choi (2010)).

24. Here, “delivery system” is used to identify the specific managed care mechanism by which a health insurer provides health care services to enrollees; e.g., through a health maintenance organization (HMO).

*hypothesis*. The *strategic focus hypothesis* states that diversification may be detrimental to insurer performance due to exacerbated agency costs and inefficient cross-subsidization of other internal projects, while the *conglomeration hypothesis* asserts that diversification may enhance insurer performance via scope economies, larger internal capital markets and risk reduction. Liebenberg and Sommer (2008) find support for the *strategic focus hypothesis*, which asserts that the market penalizes diversified P/C insurers due to the fact that the costs of line of business diversification are greater than the benefits of line of business diversification. Berger et al. (2000) note that many insurers offer P/C insurance products only, others offer life insurance/health insurance products only, and still other insurers offer both P/C and life/health products. The results of Berger et al. (2000) indicate that *strategic focus* dominates in some circumstances, while *conglomeration* dominates in other circumstances. To the extent that the participation in both public and private lines of health insurance business is indicative of diversification, we rely on these works to better understand the potential relationship between participation in public and private health insurance programs and health insurer performance.

### 3. Development of Hypotheses

Participation in government programs is voluntary and commercial health insurers are also free to determine their level of participation in a given program. As noted in many studies (e.g., Coughlin et al. (2001); Long and Yemane (2005)) participation in these, and similar government-related programs, has real economic implications. Assuming that commercial health insurers are profit-maximizing entities, we expect that participation does not result in a decrease in profitability and may, in fact, improve the overall profitability of the insurer. On a case-by-case basis, a non-zero number of commercial insurers will not experience positive operating performance due to idiosyncratic company and market factors<sup>25</sup> (e.g., incorrect revenue projections, inadequate administrative infrastructure, unexpected changes in reimbursement schedules, etc.). However, due to the fact that a large number of commercial insurers elect to participate in government insuring programs for extended periods of time, we suspect that, in the aggregate, operating performance is not adversely affected by the level of commercial insurers' participation in government health insurance programs.

The first measure of operating performance that we consider, the MLR, has been considered by other studies of health insurance markets (e.g., Karaca-Mandic et al. (2015)). In our analysis, the variable is defined as the dollar amount of health insurance losses incurred by the commercial insurer scaled by the dollar amount of premiums earned. All else equal, a lower MLR indicates superior operating

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25. For example, some studies (e.g., Ellis and Gurol (2004)) suggest that non-price factors may be a relevant factor in explaining trends in government program participation.

performance in terms of the risk-selection process (i.e., underwriting performance). We acknowledge that, for example, certain companies may err in the underwriting process, and premiums are not very flexible in government insuring programs, so we would therefore not expect that every commercial insurer participating in government insuring programs would have lower MLRs. However, to the extent there are certain features of government insuring programs that provide commercial health insurers the opportunity to improve underwriting performance, we expect to observe, in the aggregate, a negative relation between level of involvement in government insuring programs and MLRs.<sup>26</sup> Formally, we hypothesize that:

*H1: Participation in government health insurance programs is associated with a lower overall medical loss ratio.*

Next, we consider the relationship between participation in government insuring programs and the expense ratio (ER) of commercial insurers. The expense ratio—calculated as the ratio of dollar expenditures on administrative expense scaled by the dollar amount of net premiums written—quantifies an insurer’s cost of acquiring and administering business. The nature of government insuring programs may provide health insurers participating in government programs the opportunity to improve performance via reduced expenses. Compared to government insuring programs, private insuring programs may have higher administrative expenses due to such factors as interacting with a wider range of providers, non-standard policy coverages or agent/broker fees. The relatively standardized nature of government insuring programs, in terms of policy forms and reimbursement schedules, might further reduce the relative amount of administrative expenditures of commercial insurers participating in government insuring programs, but bureaucratic issues, such as determining eligibility for the public program, may increase these expenses.<sup>27</sup> Also, some commercial insurers may not have the administrative infrastructure and expertise to be successful in a

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26. We acknowledge that program-specific factors, such as rate regulations or reimbursement rates, differ across insuring programs. However we believe that operating within the confines of program-specific factors does not preclude the potential for different underwriting advantages among participation in the various insuring programs. Further, since the government insuring programs examined in our analysis insure specific subsets of the population, there may be more certainty in underwriting a government program than in underwriting a random population. For example, all else equal, the error in estimating the medical losses of a group of persons 65 years and older in a Medicare program is likely to be smaller than the error in estimating medical losses of a group of persons of any age range in a group comprehensive health insurance setting. As such, commercial insurers participating in government insurance programs may exhibit a lower variation in losses relative to premiums, than those commercial insurers not participating in public programs.

27. Other studies (e.g., McCue and Bailit (2011)) have noted that multiproduct plans are potentially associated with higher administrative costs.

government insuring programs, which could result in higher expenses. The effect of participation in government programs on the insurer's overall expenses is an empirical question, but we presume that insurers would be unlikely to participate in public programs if such participation represented a significant increase in administrative costs. Therefore, we posit:

*H2: Participation in government health insurance programs is associated with a lower expense ratio.*

We also consider the overall effect of participation in government programs on operating performance by examining the combined ratio (CR), which is an important financial ratio considered in the insurance literature (e.g., Browne and Hoyt (1995)). The CR is the sum of the MLR and the ER and provides an aggregate indication of an insurer's operating performance. It is possible that participation in government programs has a differential influence on one subcomponent of performance than it has on another subcomponent (i.e., MLR or ER). For example, if participation in Medicaid is associated with a slight improvement in the MLR and a corresponding increase in the ER, then evaluating the CR provides insight into the net effect that participation in Medicaid has on operational performance. Given our expectations for H1 and H2, we anticipate a negative relation between the level of involvement in government insuring programs and an insurer's overall CR. Formally, we hypothesize that:

*H3: Participation in government health insurance programs is associated with a lower overall combined ratio.*

Finally, we evaluate insurers' return on assets (ROA)—defined as net income scaled by total admitted assets—to quantify the relation between participation in government health insurance programs and a broad measure of health insurer financial performance. While the aggregated nature of ROA may distort certain dynamics of the direct relation between operational performance and participation in government insuring programs (e.g., by including investment income in net income), it provides important and robust perspective when considered with the other three measures of operational performance in our analysis. In addition, ROA is frequently examined by many studies (e.g., Liebenberg and Sommer (2008)) pertaining to the financial performance of insurance firms. For example, participation in a given government program may be associated with higher administrative expenses but also simultaneously create opportunities that lead to higher revenues (e.g., increased market power is

associated with more favorable provider contracting schemes for the health insurer). We therefore hypothesize that:

*H4: Participation in government health insurance programs is associated with a higher return on assets.*

## 4. Data and Methodology

We examine data from the NAIC annual financial statements of all insurers engaged in providing health insurance coverage for the years 2002 through 2009 in all 50 states and the District of Columbia.<sup>28,29</sup> All commercial insurers required to file a health annual financial statement are included in the NAIC health insurance database, and the data contain detailed information about health insurer operations and data include information regarding premiums, losses, enrollment, managed care arrangements, expenses, etc. The subset of NAIC data we analyze are at the insurer level (i.e., not aggregated to the group level) and pertain to overall insurer performance, line of business operations and insurer operating characteristics. After the application of appropriate filters, our final panel data set contains 4,829 insurer-year observations; summary statistics are found in Table 2.<sup>30</sup>

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28. Our sample is the most recent possible for this analysis; our demographic and health care variables are not available past 2009.

29. The NAIC database provides the most comprehensive source of commercial insurer financial information available. However, the data available is somewhat limited in a few respects. First, until recently California required managed care organizations to file operating and financial data with the Department of Health and not necessarily with the NAIC and California is, therefore, excluded from our sample. This is consistent with other health insurance research (see, for example, Cole, He and Karl (2015)). Further, a number of persons receive health insurance through self-insured employees. Since we do not have financial data regarding self-insured plans, and our sample does not include all persons with health insurance. We checked the total enrollment counts for insurers in our sample versus the U.S. Census Bureau, Current Population Survey and we checked the total enrollees in Medicaid against data from the federal Centers for Medicare & Medicaid Services (CMS). We find that the NAIC data contain roughly 70% of privately insured persons in the U.S. We therefore believe that, despite a few limitations, our sample is representative of the population of commercial insurers operating in the U.S.

30. Consistent with prior insurance studies, we institute several filters to ensure that our sample contains viable firms actively operating as commercial insurers. In particular, we restrict our sample to include only firms with at least \$1,000 in total premiums, losses, surplus and assets.

**Table 2:**  
**Summary Statistics (N = 4,829)**

Variable	Mean	Std. Dev.	Min.	Max.
MLR	0.83	0.10	0.460	1.606
ER	0.12	0.08	0.005	0.602
CR	0.95	0.09	0.659	2.065
ROA	0.07	0.14	-0.446	0.689
Medicare Share	0.12	0.26	0	1
Medicaid Share	0.14	0.31	0	1
FEHBP Share	0.03	0.09	0	1
Medicare Supplement Share	0.01	0.06	0	1
Individual Comprehensive Share	0.03	0.11	0	1
Dental and Vision Share	0.21	0.40	0	1
Other Business Share	0.03	0.14	0	1
Line of Business HHI	0.81	0.23	0.208	1
Share of Business in States that Run Medicaid Programs	0.13	0.33	0	1
Size	17.50	1.97	10.980	23.155
Premium to Surplus Ratio	7.94	29.32	0.036	1835.044
HMO Enrollment Share	0.57	0.46	0	1
PPO Enrollment Share	0.14	0.30	0	1
POS Enrollment Share	0.08	0.20	0	1
Age	23.04	16.09	1	102
Mutual Indicator	0.03	0.16	0	1
Nonprofit Indicator	0.27	0.44	0	1
Group Indicator	0.74	0.44	0	1
Females Per Capita Weighted by DPW Share	0.51	0.01	0.476	0.522
Persons Over 65 Per Capita Weighted by DPW Share	0.12	0.02	0.056	0.172
Median Income Per Capita Weighted by DPW Share	47613.70	6853.78	29359.000	68059.000
Uninsured Persons Per Capita Weighted by DPW Share	0.14	0.04	0.043	0.254
Hospital Admissions Per Capita Weighted by DPW Share	0.03	0.03	0.004	0.235
Total Hospital Spending Per Capita Weighted by DPW Share	0.01	0.00	0.004	0.009

In Table 3, we report more detailed summary statistics for firms operating in Medicare, Medicaid and FEHBP business.<sup>31</sup> More specifically, we compute the proportion of a firm's total business that is derived from each of these three lines of business, and, for firms with a non-zero share of participation in these lines, we display several operating performance measures by quartile. As shown in the table, many firms do not elect to participate in a given line but, for those that do, we find summary evidence of differences in performance among participation quartile. For example, firms at the highest quartile of Medicare share have, on average, lower

31. Note that, in the columns of the table, Qne denotes the quantile based on the share of business in a given line of business (e.g., Q1 is the first quantile, Q2 is the second quantile, etc.). The number of observations for a given quantile in each line of business is given in parentheses in each column. Note also that the summary information pertains only to firms in our sample with positive premiums in a given line of business.

MLRs and average ROA declines among each Medicaid share quartile. The econometric analysis below will help to explore the summary information present in Table 3 in more detail.

**Table 3:**  
**Performance Measures by Quartile of Business Share**

Panel A: Firms With Medicare Business				
	Q1 (N = 423)	Q2 (N = 422)	Q3 (N = 422)	Q4 (N = 422)
MLR	0.8458	0.8619	0.8609	0.8362
ER	0.0975	0.0907	0.0926	0.1165
CR	0.9433	0.9526	0.9536	0.9527
ROA	0.0806	0.0841	0.0889	0.0762

Panel B: Firms With Medicaid Business				
	Q1 (N = 313)	Q2 (N = 312)	Q3 (N = 312)	Q4 (N = 312)
MLR	0.8712	0.8613	0.8483	0.8689
ER	0.0875	0.0955	0.1019	0.1044
CR	0.9587	0.9569	0.9502	0.9733
ROA	0.0831	0.0828	0.0678	0.0517

Panel C: Firms With FEHBP Business				
	Q1 (N = 303)	Q2 (N = 303)	Q3 (N = 303)	Q4 (N = 302)
MLR	0.8558	0.8668	0.8637	0.8488
ER	0.0992	0.0903	0.0911	0.08847
CR	0.9551	0.9571	0.9548	0.9335
ROA	0.0826	0.0891	0.0855	0.0852

Our data set also contains state-level demographic information from various sources, such as the U.S. Census Bureau and the Kaiser Family Foundation.<sup>32</sup> While many commercial insurers in our sample restrict operations to a single state, some commercial health insurers report operations for multiple states. When insurers operate in multiple states, we assign these companies a weighted value of

32. State per capita measures of females, persons over 65 per capita, median income and uninsured were obtained from the U.S. Census Bureau. Total health care expenditures per capita, and the variable to indicate state-run Medicaid programs were obtained from CMS. Hospital admissions per capita was obtained from the American Hospital Association.

the state-level demographic variables, where the weights are based on the proportion of the insurers' total premiums in each state.<sup>33</sup>

We then use these data to test our hypotheses relating to the commercial insurer's operating performance and their participation into government health insurance programs. Our strategy is to develop an empirical model that allows us to examine the cross-sectional relationship between a given level of involvement in a government insuring program and operational performance while simultaneously considering the effects of insurer-level and state-level factors that could influence operational performance.<sup>34</sup> As such, we estimate the following OLS model:

$  \begin{aligned}  Performance_{it} = & \alpha + \beta_1 MedicareShare_{it} + \beta_2 MedicaidShare_{it} \\  & + \beta_3 FEHBPSHare_{it} + \beta_4 MedicareSuppShare_{it} \\  & + \beta_5 IndivCompShare_{it} + \beta_6 Dental\&VisionShare_{it} \\  & + \beta_7 OtherBusShare_{it} + \beta_8 LOBHHI_{it} \\  & + \beta_9 SRMedicare_{it} + \beta_{10} Size_{it} + \beta_{11} PremSurp_{it} \\  & + \beta_{12} HMOShare_{it} + \beta_{13} PPOShare_{it} + \beta_{14} POSShare_{it} \\  & + \beta_{15} Age_{it} + \beta_{16} Mutual_{it} + \beta_{17} NonProfit_{it} \\  & + \beta_{18} Group_{it} + \beta_{19} Females_{it} + \beta_{20} Over65_{it} \\  & + \beta_{21} PerCapInc_{it} + \beta_{22} Uninsured_{it} \\  & + \beta_{23} HospAdmits_{it} + \beta_{24} HospSpend_{it} \\  & + \sum_{j=1}^{49} StateShare_{ijt} + \sum_{k=1}^8 \gamma_k Year_k + \varepsilon_{it}  \end{aligned}  $	(1)
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33. To elaborate on the state-level demographics weighting method, consider the following example: In 2009, a given insurer has \$1 million in total premiums; \$.75 million from State A and \$.25 million from State B. Median income in State A is \$50,000 and Median Income in State B is \$30,000. In our sample, this insurer would be assigned a median income value of \$45,000 for the year 2009.

34. To the extent that operational performance measures and the level of participation in government insuring programs are determined in equilibrium, we acknowledge the potential for endogeneity. However, our analysis seeks only to observe and document the cross-sectional relationship between the level of commercial insurers' participation in government insuring programs and commercial insurers' operational performance. We leave the analysis of the factors surrounding the decision to enter government programs and its effects on operational performance as an area of future research.

Where:

$MedicareShare_{it}$  = the share of business insurer  $i$  has in Medicare during year  $t$ .

$MedicaidShare_{it}$  = the share of business insurer  $i$  has in Medicaid during year  $t$ .

$FEHBPSHare_{it}$  = the share of business insurer  $i$  has in the FEHBP during year  $t$ .

$MedicareSuppShare_{it}$  = the share of business insurer  $i$  has in Medicare Supplement Plans during year  $t$ .

$IndivCompShare_{it}$  = the share of business insurer  $i$  has in individual comprehensive health insurance during year  $t$ .

$Dental&VisionShare_{it}$  = the share of business insurer  $i$  has in Dental and Vision Insurance during year  $t$ .

$OtherBusShare_{it}$  = the share of business insurer  $i$  has in Other Business Lines during year  $t$ .

$LOBHHI_{it}$  = the share of business insurer  $i$  has in Medicare during year  $t$ .

$SRMedicare_{it}$  = the share of business insurer  $i$  has in states with state-run Medicaid programs in year  $t$ .

$Size_{it}$  = is Total Assets for insurer  $i$  in year  $t$ .

$PremSurp_{it}$  = the ratio of premiums written to policyholder surplus for insurer  $i$  in year  $t$ .

$HMOShare_{it}$  = the share of business insurer  $i$  has in HMO plans during year  $t$ .

$PPOShare_{it}$  = the share of business insurer  $i$  has in PPO plans during year  $t$ .

$POSShare_{it}$  = the share of business insurer  $i$  has in POS plans during year  $t$ .

$Age_{it}$  = the number of years that insurer  $i$  has been in operation as of year  $t$ .

$Mutual_{it}$  = one if insurer  $i$  is a mutual company in year  $t$ , 0 otherwise.

$NonProfit_{it}$  = one if insurer  $i$  is a nonprofit company in year  $t$ , 0 otherwise.

$Group_{it}$  = one if insurer  $i$  is a member of a group in year  $t$ , 0 otherwise.

$Females_{it}$  = the weighted state-level proportion of females for insurer  $i$  in year  $t$ .

$Over65_{it}$  = the weighted state-level proportion of citizens over 65 for insurer  $i$  in year  $t$ .

$PerCapInc_{it}$  = the weighted state-level per capita income for insurer  $i$  in year  $t$ .

$Uninsured_{it}$  = the weighted state-level proportion of uninsured for insurer  $i$  in year  $t$ .

$HospAdmits_{it}$  = the weighted state-level per capita hospital admissions for insurer  $i$  in year  $t$ .

$StateShare_{ijt}$  = the share of business written in state  $j$  by insurer  $i$  during year  $t$ .

$Year_{it}$  = year dummy variables

As noted previously, we use four measures of *Performance* in our analysis: 1) the MLR, defined as medical losses incurred divided by net premiums earned for insurer  $i$  in year  $t$ ; 2) the ER, defined as administrative expenses scaled by net premiums written for insurer  $i$  during year  $t$ ; 3) the CR, which is the sum of the MLR and the ER; and 4) ROA. We estimate four separate regression models, each with the same set of regressors, but with a different measure of *Performance* as the dependent variable.

During the entirety of our sample period, health insurers report operations to the NAIC in nine lines of business: 1) group comprehensive; 2) individual comprehensive; 3) dental; 4) vision; 5) Medicare; 6) Medicaid; 7) FEHBP; 8) Medicare supplement; and 9) other. We compute the ratio of premiums written in each line of business to total premiums written for insurer  $i$  in year  $t$  and include all but one of these shares in our regression.<sup>35</sup> The share of business in group comprehensive is our omitted, comparison group. We combine shares in dental and vision business to form a single variable due to the operational similarities between dental and vision insuring arrangements, but we do not aggregate the remaining lines, because they represent exposure to different populations and there may be operational differences.<sup>36</sup>

The coefficients on the line of business share variables serve to test our four hypotheses. In particular, as discussed in Section 2, commercial insurers can elect to participate in the government health insurance programs of Medicare, Medicaid, FEHBP and Medicare supplement. A statistically significant coefficient on these variables would provide evidence on  $H1$ ,  $H2$ ,  $H3$  or  $H4$ , depending on the equation.

Next, we include insurer characteristics to control for insurer-specific factors that may influence a given measure of operating performance.<sup>37</sup> First, we include several measures that capture the insurer's focus and financial capacity. These include a line of business Herfindahl-Hirschman Index; the share of business in the states that operate a state-run Medicaid program; overall size, measured by total assets; and the premium-to-surplus ratio. Next, we characterize insurers further by the degree of control over utilization by including measures of the share of enrollment in HMOs, PPOs and point-of-service (POS) plans, respectively. Finally, we include the age of the insurer to control for experience, and three indicator measures to capture differences in organizational structure: 1) whether the insurer is incorporated as a mutual organization; 2) whether the insurer is incorporated as a nonprofit organization; and 3) whether an insurer is a member of an insurer group.

We include in our analysis other insurer-specific measures that are derived from state population demographic variables to control for the influence of population demographic factors for insurer  $i$  with a given level of business in state  $j$  during year  $t$ . As described previously, these state-level demographic factors are weighted by the proportion of total premiums a given insurer receives as a result of operating in a given state during a given year. The specific demographic variables included in our analysis are as follows: 1) females per capita; 2) persons

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35. We omit from this vector the share of group comprehensive benefits for a given firm in a given year in order to avoid econometric problems arising from singularity.

36. The number of insurers with positive premiums in each line is as follows: Medicare (361); Medicaid (252); FEHBP (221); Medicare Supplement (128); Individual Comprehensive (334); Dental and Vision (287); and Other (196).

37. Note that several firm-specific controls are time invariant indicator variables, which therefore preclude the inclusion of firm fixed effects in our model. However, we do cluster standard errors by firm.

age 65 and older per capita; 3) median income per capita; 4) uninsured persons per capita; 5) hospital admissions per capita; and 6) total hospital spending per capita.

Also included are state-specific shares of overall business, and indicator variables for each year. The state-specific share of business is defined as direct premiums written in state  $j$  scaled by total direct premiums written for insurer  $i$  in year  $t$ . These variables control for omitted regulatory, economic, demographic and similar state-specific factors that may influence the performance of commercial insurers operating in a given state.<sup>38</sup> Dummy variables for each year are included to control for year-specific effects, such as variations in claims levels, market factors and similar macroeconomic conditions that could influence commercial insurers' operating performance. Our equations are estimated with Huber-White estimators of variance to control for heteroskedasticity.

## 5. Results

Table 4 presents the results of estimating equation 1. From a broad context, the results provide varying evidence related to  $H1$ ,  $H2$ ,  $H3$  and  $H4$ , depending on the operational performance measure employed in the model. Our overall results suggest a weak relationship between the level of participation in public health insurance programs and the operational performance of health insurers. Joint F-tests indicate that, for the MLR and ER model specifications, the coefficients of the Medicare, Medicaid and FEHBP Share variables are not equal to zero and are not equal to the other line of business share variables in all but two instances. Examining the coefficients of the Medicare, Medicaid and FEHBP Share variables among all four model specifications indicates three statistically significant coefficients that support our hypotheses, one statistically significant coefficient that refutes our hypotheses and eight statistically insignificant coefficients.

Examining the results in more detail, we first note that the estimated coefficient on the Medicare Share variable is negative and statistically significant at the 10% level when MLR is the dependent variable. In support of  $H1$ , this result suggests that, relative to the omitted category of group comprehensive health benefits, commercial health insurers with higher levels of participation in Medicare programs experience superior underwriting performance. However, we find no evidence which supports  $H2$ ,  $H3$ , or  $H4$  when evaluating the Medicare Share variable. We note that, while the lack of a statistically significant coefficient on the Medicare Share variable in the ER, CR, or ROA regressions does not suggest many operational benefits to participation in Medicare business, it also does not suggest many operational costs associated with Medicare.

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38. Note that Iowa is the omitted category and we were forced to exclude California from our analysis due to data inconsistencies discussed in footnote 29.

**Table 4:**  
**Regression Results (N=4,829)**

Variable	MLR	ER	CR	ROA
Medicare Share	-0.016*** [0.006]	0.007 [0.004]	-0.010* [0.006]	0.013 [0.010]
Medicaid Share	-0.007 [0.005]	0.008*** [0.003]	0.001 [0.005]	-0.005 [0.007]
FEHBP Share	0.039*** [0.013]	-0.040*** [0.010]	-0.001 [0.015]	0.075*** [0.026]
Medicare Supplement Share	-0.102*** [0.032]	0.103*** [0.022]	0.001 [0.034]	-0.093** [0.040]
Individual Comprehensive Share	-0.068*** [0.013]	0.033*** [0.012]	-0.036*** [0.012]	0.031 [0.022]
Dental and Vision Share	-0.100*** [0.007]	0.043*** [0.005]	-0.058*** [0.006]	0.107*** [0.009]
Other Business Share	-0.030** [0.014]	0.019* [0.010]	-0.011 [0.013]	-0.001 [0.017]
Line of Business HHI	0.010 [0.007]	-0.022*** [0.006]	-0.012* [0.007]	-0.015 [0.011]
Share of Business in States that Run Medicaid Programs	0.011 [0.011]	0.013* [0.007]	0.023** [0.010]	0.011 [0.013]
Size	0.005*** [0.001]	-0.017*** [0.001]	-0.013*** [0.001]	0.017*** [0.002]
Premium to Surplus Ratio	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]	-0.000** [0.000]
HMO Enrollment Share	0.002 [0.007]	0.002 [0.005]	0.005 [0.006]	0.031*** [0.008]
PPO Enrollment Share	0.002 [0.007]	0.016*** [0.005]	0.018*** [0.006]	-0.044*** [0.009]
POS Enrollment Share	-0.034*** [0.009]	0.018*** [0.007]	-0.016* [0.008]	0.032*** [0.012]
Age	-0.000 [0.000]	0.000*** [0.000]	0.000* [0.000]	-0.000 [0.000]
Mutual Indicator	-0.006 [0.007]	-0.003 [0.006]	-0.009 [0.006]	-0.019** [0.009]
Non-Profit Indicator	0.036*** [0.003]	-0.018*** [0.002]	0.018*** [0.003]	-0.033*** [0.005]
Group Indicator	-0.003 [0.004]	-0.001 [0.003]	-0.004 [0.003]	-0.008 [0.005]
Females Per Capita Weighted by DPW Share	-0.051 [0.648]	0.064 [0.391]	0.012 [0.599]	0.317 [0.819]
Persons Over 65 Per Capita Weighted by DPW Share	0.088 [1.083]	0.852 [0.668]	0.940 [1.024]	-2.408* [1.420]
Median Income Per Capita Weighted by DPW Share	-0.000 [0.000]	-0.000 [0.000]	-0.000** [0.000]	0.000** [0.000]
Uninsured Persons Per Capita Weighted by DPW Share	-0.045 [0.141]	0.012 [0.103]	-0.033 [0.147]	0.242 [0.189]
Hospital Admissions Per Capita Weighted by DPW Share	-0.262 [0.863]	0.484 [0.596]	0.223 [0.979]	1.357 [1.005]
Total Hospital Spending Per Capita Weighted by DPW Share	11.941 [12.166]	-4.058 [7.422]	7.883 [11.945]	-8.673 [16.560]
Constant	0.740** [0.313]	0.324 [0.201]	1.065*** [0.288]	-0.297 [0.417]
R-squared	0.265	0.368	0.112	0.135

Robust standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

When we examine the estimated coefficients on the Medicaid Share variable, we find that the variable is not significant in any of the four regression equations. This result does not support any of the four hypotheses with respect to Medicaid participation. While the combined ratio is positively related to the insurer's share of business in with a state-run Medicaid program, our results suggest that participation in Medicaid programs does little to help or hurt the operational performance of health insurers.

Evaluating the results of the FEHBP Share variable provides further insight into the relation between participation in public programs and health insurer operating performance. The estimated coefficient is positive and statistically significant at the 10% level in the MLR regression, which indicates that, relative to the level of participation in group comprehensive health insurance benefits, higher levels of participation in FEHBP is associated with inferior underwriting performance. This result refutes *H1*. However, the sign and statistical significance of the FEHBP variable in the ER and ROA regressions provide support for *H2* and *H4*, respectively. In particular, the negative and statistically significant coefficient when ER is the dependent variable indicates that, relative to the omitted category, higher levels of participation in FEHBP are associated with higher levels of operating performance, in terms of ER. Also, the positive and statistically significant coefficient on the ROA regression indicates that higher levels of participation in FEHBP are associated with higher levels of ROA. We find no evidence for or against *H3* when specifically considering FEHBP, suggesting any potential benefits in reducing expenses are likely washed out by higher loss ratios.

While not a specific focus of our analysis, we find several significant relationships between performance and participation in other programs. For example, participation in the Medicare supplement program is associated with superior underwriting performance. However, we also find that participation in the Medicare supplement program is associated with higher ERs and lower ROAs. Overall, these results suggest that there may be operational benefits and drawbacks for insurers that provide Medicare supplement policies. Participation in the remaining non-public health insurance programs is also related to health insurer operational performance. In particular, we find that, relative to the share of group comprehensive health benefits, higher levels of involvement in individual comprehensive health benefits are associated with lower MLRs and CRs, but higher ERs. We find similar results regarding participation in dental and vision private insuring programs except that insurers participating in dental and vision programs also have higher ROAs.

Our results also indicate that a variety of additional insurer-specific and state-market factors are related to health insurer operational performance. Line of business diversification, operating in states with state-run Medicaid programs, size, premium-to-surplus ratio, managed care type and ownership structure are all associated with different measures of operational performance in varying manners. We further find that the relationship between state-market characteristics and health insurer operational performance is relatively weaker than that of the other variable categories included in our analysis. In particular, we find statistically

significant coefficients only on median income per capita. However, we note that the inclusion of the state share variables in our regression (given as  $Z_{i,t}$  in equation 1) likely accounts for the majority of state-level variation in our model and may dampen the explanatory power of the state-specific variables.

When considered in their entirety, our results suggest that, in many instances, a positive relationship exists between health insurer operating performance and participation in government health insurance programs. While we do not attempt to capture the self-selection that occurs when insurers either opt in or out, our evidence shows that commercial insurers can participate in public programs and maintain overall profitability. Further, the fact that several of our measures of participation in public programs are not statistically related to operating performance suggests that participation in government insuring programs may not be detrimental to the performance of health insurers.

While we cannot directly estimate if these insurers maintain profitability through strategic subsidization across public and private programs, we suspect the opportunities for such subsidization are limited due to the design of public programs and the competitive environment in which these insurers operate to provide private coverage. To the extent that similarities exist between participation in the ACA's health insurance exchanges and participation in current government health insurance, our results indicate that participation in health insurance exchanges may be associated with superior operating performance. However, we acknowledge that our analysis provides weak support for the supposition that participation in government programs is negatively related to health insurer performance, suggesting that there remains the potential for participation in health insurance exchanges to be associated with inferior operational performance.

## 6. Conclusion

The ACA has brought about unprecedented changes in the U.S. health insurance market and may fundamentally change the degree to which commercial health insurance companies interact with government health insurance programs. As such, it is important to understand and document the relationship between participation in government health insurance programs and the operating performance of health insurers. Interestingly, many commercial health insurers today choose to participate in public health insurance programs, which suggests that participation is associated with some operational benefit. Our results generally support this assumption. Using data from the NAIC health insurance database, we examine the extent to which private health insurers' participation in the government insuring programs of Medicare, Medicaid and the FEHBP is associated with operational performance. We note that the goal of our analysis is not to determine causality, but rather to examine the cross-sectional relationship that exists between health insurer performance and participation in government health insurance programs in the years prior to enactment of the ACA.

Participation by private insurers in the health insurance exchanges varies across the states and has been volatile in the first three years of operation. While the specific requirements for participation (e.g., the types of plans they are allowed to offer) are beyond the scope of this study, we note that these requirements are likely to cause some growing pains for private insurers as they consider the adequacy of their prices, the requisite size of their provider networks and other strategies in the ACA regime. Our results here suggest that private insurers have developed the necessary expertise for participating in public health insurance programs and they will similarly prosper in the health insurance exchange arena.

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# Catastrophe Risk and the Regulation of Property Insurance Markets

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## Abstract

In this paper, we evaluate state regulation of insurance markets subject to catastrophe risk and, more specifically, homeowners insurance and commercial property insurance. When insurers suffer substantial losses following a catastrophic event, pressures on property insurance markets can increase as insurers attempt to raise their prices and reduce their exposures. This can bring insurers into conflict with regulators who seek to maintain the affordability and availability of insurance. Some states may also use their residual market mechanisms (RMMs) as a means to provide subsidized coverage for high-risk properties. While these regulatory actions may seem well-intended, the concern is that they can interfere with market adjustments and undermine the supply of private insurance. To gain some insight on these issues, we examine how state rate regulation and the relative size of state RMMs affect various outcomes in homeowners and commercial property insurance markets generally and specifically following a large catastrophe in a state. Our findings indicate that regulatory attempts to constrain rates and larger residual markets tend to have negative effects on certain outcomes in homeowners insurance markets, all other things equal. However, we do not find that these effects become more pronounced following a catastrophic event except for market concentration. Further work is needed to develop better ways of measuring how changes in catastrophe risk and rate regulation affect property insurance markets.

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## 1. Introduction

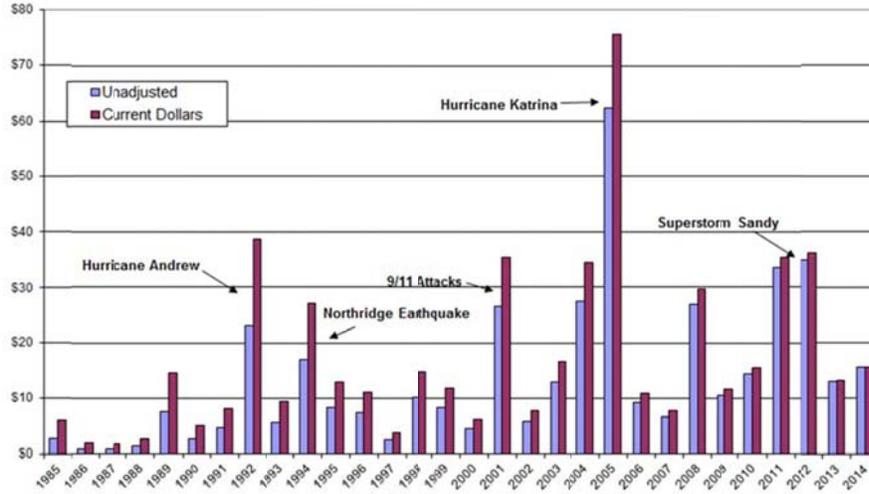
There is a long line of academic literature on the effects of regulation on property/casualty (P/C) insurance markets. Most of this research has focused on how different rate regulatory systems and residual market mechanisms (RMMs) affect personal auto and workers' compensation insurance markets. There has been some research on the effects of regulation in property insurance markets (primarily homeowners insurance), but with one exception (Born and Klimaszewski-Blettner, 2013), this research has focused on only one state or a just a few states. An important factor involved with the regulation of property insurance markets is the dramatic rise in catastrophe risk and the occurrence of natural disasters (e.g., Hurricane Andrew, the Northridge Earthquake and Hurricane Katrina) as depicted in Figure 1. Regulatory policies in areas prone to natural disasters have important implications for the cost and availability of property insurance and the management of catastrophe risk. There is particular interest in homeowners insurance where market changes following a catastrophe can be a matter of considerable public concern, and regulatory responses to such changes can be contentious. Hence, there is a strong need to gain a better understanding of how regulatory practices affect outcomes in property insurance markets subject to catastrophe risk, particularly homeowners insurance.

The topic of best regulatory practices in insurance was generally addressed in the Federal Insurance Office's (FIO) report on *How to Modernize and Improve the System of Insurance Regulation in the United States* (FIO, 2013). Several parts of this report bear directly or indirectly on how state regulators can continue to ensure a viable private market for insurance against natural catastrophic events. Specifically, the report includes recommendations that urge state regulators to identify "best practices" with regard to both rate regulation and natural catastrophe loss mitigation. With respect to the former, the explicit objective is to identify rate-related regulation that fosters competitive markets for personal lines insurance consumers and, consequently, increases market capacity. Regarding natural catastrophes, the objective is less clear but might include identifying regulations that encourage loss mitigation (e.g., allowing premiums to reflect mitigation activities) or establish/define mitigation measures (e.g., building codes). The FIO issued a subsequent report in 2015 entitled *Report Providing an Assessment of the Current State of the Market for Natural Catastrophe Insurance in the United States* (FIO, 2015). This report did not discuss state rate regulation or mitigation but did review state RMMs for property insurance without offering any opinions on how these mechanisms should be structured or administered.<sup>1</sup>

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1. The report discussed important developments concerning the Texas Windstorm Underwriting Association (TWIA), the Florida Citizens Property Insurance Corporation (FCPIC) and the Louisiana Citizens Property Insurance Corporation (LCPIC), including their depopulation efforts.

**Figure 1:**  
**Insured Property Losses for U.S. Catastrophes (\$B)**  
**1985–2014**



Note: Excludes losses insured by the National Flood Insurance Program (NFIP)  
 Source: Insurance Information Institute

Natural disasters can have substantially adverse effects on homeowners and commercial property insurers. These effects include large underwriting losses and the depletion of capital that can compel an insurer to make significant changes in its operations. According to the Insurance Research Council (IRC), the average claim payment for all homeowners insurance claims countrywide rose 228% between 1997 and 2013 (IRC, 2015). Several factors could account for this trend, including the increasing severity of natural disasters and higher replacement costs for homes. Additionally, population growth in coastal areas subject to tropical storms and hurricanes has contributed to higher catastrophe losses, and projections by the National Oceanic and Atmospheric Administration (NOAA) indicate that the number of people living in coastal areas will continue to grow for the foreseeable future (NOAA, 2013).<sup>2</sup> Hazard mitigation efforts are viewed by experts as insufficient in many areas, and evidence of the effectiveness of incentives to undertake mitigation activities is mixed (FIO, 2013).

To maintain their profitability, insurers adapt to catastrophic events and increased estimates of catastrophe risk by reducing coverage, raising rates, and changing their underwriting and investment strategies. Homeowners respond to these events and the consequent actions of insurers in a variety of ways as well. For example, those with insufficient coverage may seek additional insurance,

2. NOAA projects that, between 2013 and 2020, the number of people living in coastal areas will grow by 11 million to a total of 134 million (NOAA, 2013).

while others may choose to reduce or drop coverage (if they have this option) as the cost of coverage becomes more difficult for them to afford.<sup>3</sup> Such responses suggest that, for a period following a catastrophic event, the supply of and demand for coverage will be in flux.

Using a large dataset on homeowners and commercial property insurance coverage by state, by firm and by year for the period 1984–2013, this study assesses changes in the structure and performance of U.S. homeowners and commercial property insurance markets generally and specifically following natural catastrophic events. This long period, characterized by an increasing number of natural disasters, facilitates exploration of how rate regulation and residual market administration affect various dimensions of homeowners and commercial property insurance markets. We analyze both homeowners and commercial property insurance markets to compare the effects of regulation between these lines of business. As we discuss further below, commercial insurance markets are subject to less intensive regulation than personal lines insurance markets. Hence, we would expect regulation to affect commercial property insurance markets to a lesser degree than homeowners insurance markets (Born and Klimaszewski-Blettner, 2013).

Our objective is to contribute to the discussion of what would constitute “best regulatory practices” that help to promote the availability of coverage, insurers’ capacity to bear catastrophic risks and risk-based rates. Some might contend that a regulatory best practice is one that ensures that coverage is “affordable” for all consumers.<sup>4</sup> In general, rates are not likely to be excessive if the market for coverage is workably competitive, but this may or may not be the case for homeowners insurance in areas subject to very high levels of catastrophe risk.<sup>5</sup> Moreover, regulatory policies that seek to artificially suppress rates conflict with the goal to ensure that insurers are financially solvent. While it is understandable that regulators will seek to keep the cost of insurance within the bounds of what they consider to be affordable, they also are faced with the challenge of ensuring that insurance coverage is available. Insurers will be more reluctant to provide coverage if they are not allowed to charge rates that are commensurate with the risks they bear and fully cover their costs of providing coverage, at least over the

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3. Buying or maintaining homeowners insurance is generally a condition for acquiring or maintaining a mortgage on a home. Homeowners without a mortgage are not subject to this requirement and could choose to go without insurance.

4. The term “affordable” is often used in reference to the cost of insurance without a clear, commonly-understood definition of what this term means. Our impression is that the regulators in a given state may have at least an implicit standard in mind in determining what they believe should be considered an affordable premium for a given type of insurance and insured. In practice, such a standard may be reflected in regulatory policies that seek to constrain insurers from charging premiums higher than what regulators believe consumers should be expected to pay for a specific type of insurance.

5. We discuss the issue of whether homeowners insurance markets subject to a high level of catastrophe risk can be competitive below.

long term. Hence, there can be a tension between the objectives of promoting affordability and availability.

The paper proceeds as follows. The next section reviews the discussion in the two FIO reports concerning catastrophic risks. This is followed by a discussion of the anticipated effects of catastrophic events on the structure and performance of insurance markets. This discussion emphasizes that catastrophic events have differential effects on insurers and proposes that the effectiveness of state regulatory practices should be evaluated based on how they affect a market as a whole, not how they influence any particular insurer(s). This is followed by a review and empirical analysis of the relationship between two more easily identified state regulatory practices—rate regulation and the relative size of RMMs—and changes in five measures of market structure and performance. The paper concludes with a summary and review of our findings and suggestions for further research.

## **2. The FIO Report: A Challenge to Regulators**

The FIO 2013 report considers a wide range of insurance regulatory issues with primary emphasis on the extent of federal government involvement that is desirable and/or necessary for improving the current state-based regulatory system. While the report recommends direct federal involvement in only a few areas (e.g., federal standards and oversight for mortgage insurers), the bulk of the report suggests ways in which the state systems could be reformed. It recognizes that the states continue to serve local needs and that their unique regulatory experiences can provide lessons for others. However, it notes there is room for improvement and calls on regulators to develop “best practices” in several areas, particularly rate regulation and natural catastrophe loss mitigation. With regard to rate regulation, the report states that, generally, the objective should be to foster competition in the personal insurance lines, thereby increasing the availability of coverage. Best practices in catastrophe loss mitigation could include encouraging the adoption of specific mitigation measures (e.g., strong building codes).

Interestingly, the report does not explicitly acknowledge that best practices concerning rate regulation could also be among the best practices for promoting optimal managing of and insuring against natural catastrophe risk. Rather, the section on catastrophes focuses mainly on residual markets and mitigation.<sup>6</sup> The

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6. The report briefly addresses risk classification, though not in a broad sense. In particular, the emphasis in the report is on the use of credit scoring and, to a lesser extent, the use of personal information for insurance pricing. The FIO recommends in this section that “states should develop standards for the appropriate use of data for the pricing of personal lines insurance.” As it pertains to the pricing of catastrophe insurance, variation across markets may

report recognizes that the variation across affected states in building codes and other post-event activities have consequences for smoothly functioning property insurance markets. Hence, it recommends that states “should identify, adopt, and implement best practices for construction standards, including effective building codes, to mitigate losses from natural catastrophes” (p. 61).

The report also addresses controversies surrounding government-run insurance and reinsurance programs. Premium increases following catastrophic events affect the affordability and accessibility of coverage and often have led to government intervention (e.g., the establishment or expansion of RMMs). Interestingly, the report stops short of suggesting that best practices for managing catastrophe risk might include reforms to downsize or scale back these mechanisms. The 2015 FIO report discusses RMMs in detail but also does not make any recommendations or offer any opinions as to what would constitute best practices in their design and administration. That said, it should be noted that the FIO attributed decreases in the relative size of RMMs to more competitive insurance markets.

### **3. The Effects of Catastrophic Events on Property Insurance Markets**

The effect of catastrophes on insurers’ underwriting performance can be measured by an insurer’s loss ratio, calculated by dividing the insurer’s total losses incurred by its premiums earned for a specified line of insurance. This commonly used measure captures the extent to which the premiums collected are sufficient for paying incurred claims.<sup>7</sup> The total losses incurred for a state, relative to the premiums that were earned for that year, provide a good indication of the average weighted effect of a catastrophic event on the state market, as all insurers are not equally affected. Variation in loss ratios across insurers suggests that some may have had more stringent underwriting standards or had few or no exposures in the area where a catastrophe struck and others had less stringent underwriting standards.<sup>8</sup> As we look at some of the major events in the past 30 years, it is clear that there is great variation in the performance of firms operating in a catastrophe-affected state.

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yield important insights into the relationship between underwriting criteria and market structure and performance measures.

7. A loss ratio greater than one indicates an underwriting loss, although underwriting profitability, more generally, would also account for an insurer’s loss adjustment expenses, its other administrative expenses, and the investment income it earns on reserves for unearned premiums and unpaid losses.

8. Generally, insurers that manage their catastrophe risk will avoid having large concentrations of exposures in any geographic area that could be struck by a natural disaster. Insurers that are less cautious in this regard run the risk of incurring large losses in areas where they have high concentrations of exposures.

**Table 1:**  
**Sample of Catastrophic Events and Their Impact on the**  
**State Homeowners Insurance Market**

State	Year	Property Losses Per Capita(\$)	State Loss Ratio (Weighted Avg.)	State Median Loss Ratio	90 <sup>th</sup> Percentile Loss Ratio
Alabama	2011	881.78	1.811	1.389	3.305
California	1994	934.48	0.746	0.625	1.671
Colorado	1990	255.58	1.921	1.383	2.503
Florida	1992	59.38	3.127	1.956	4.982
Florida	2004	12,910.25	2.861	2.472	4.908
Iowa	2001	32.47	1.603	1.456	3.005
Kansas	1992	69.35	2.561	2.181	3.983
Louisiana	2005	12,806.97	4.421	3.156	5.667
Minnesota	1998	226.50	2.888	2.370	3.849
Missouri	2001	236.48	1.801	1.394	2.711
Mississippi	2005	9,500.72	4.292	3.213	4.908
North Dakota	2001	622.78	2.931	2.111	4.154
Oklahoma	1999	438.62	1.834	1.001	1.926
South Carolina	1989	1,748.55	4.251	3.033	5.306
Tennessee	2011	312.84	2.134	1.750	3.341

Table 1 presents a sample of state-year observations in which the value of total per capita insured homeowners property damages due to catastrophes was significantly higher than in previous years.<sup>9</sup> As the table shows, loss ratios corresponding to these events indicate a significant aggregate underwriting loss. However, it is clear that these events do not affect insurers equally. The median performance is always better than the state-weighted average, while the 10% of insurers with the worst underwriting performance (the 90<sup>th</sup> percentile of the loss ratio distribution) report loss ratios as high as 1.5 to 2 times the state average.

Table 2 provides comparable data for the commercial property insurance market for the same sample of events.

Following all but three of the events in this sample, the state aggregate loss ratio for commercial property insurance is lower than the state aggregate loss ratio for homeowners insurance. The median and 90<sup>th</sup> percentile performance figures indicate that, in most cases, insurers writing commercial property coverage fare better following catastrophic events than their counterparts in homeowners insurance. According to Born and Klimaszewski-Blettner (2013), there are several reasons to expect this. First, insurers have more flexibility in designing coverage

9. By "significantly higher," we mean that reported damages were higher in the identified state-year by at least a factor of 10 compared to the average for that state during the previous three years. The core database used for the empirical analysis consists of the state-level homeowners and commercial property insurance operations for all U.S. insurers from 1984 to 2013. Data on the direct premiums earned, losses incurred, capital and reinsurance amounts are compiled from insurer's annual statutory accounting statements filed with the National Association of Insurance Commissioners (NAIC). Data on catastrophic events and the associated damages were obtained from Sheldus.

for commercial properties, which are also more likely to have certain mitigation features.<sup>10</sup> More importantly, these insurers are less likely than homeowners insurers to be constrained by strict rate regulation, such that the rates charged may be more commensurate with the risks that are borne by a commercial property insurer. Underwriting, policy forms and contract terms also are more intensely regulated for homeowners insurance than for commercial property insurance.<sup>11</sup>

**Table 2:**  
**Sample of Catastrophic Events and Their Impact on the State Commercial Insurance Market**

State	Year	Property Losses Per Capita(\$)	State Loss Ratio (Weighted Avg.)	State Median Loss Ratio	90 <sup>th</sup> Percentile Loss Ratio
Alabama	2011	881.78	2.520	0.967	2.098
California	1994	934.48	0.850	0.543	0.906
Colorado	1990	255.58	0.936	0.581	1.045
Florida	1992	59.38	2.946	1.617	3.510
Florida	2004	1,291.25	2.221	1.521	2.975
Iowa	2001	32.47	1.129	0.749	1.330
Kansas	1992	69.35	1.334	0.876	1.749
Louisiana	2005	12,806.97	5.451	2.649	5.849
Minnesota	1998	226.50	1.497	0.878	1.497
Missouri	2001	236.48	0.888	0.707	1.134
Mississippi	2005	9,500.72	4.269	2.267	4.506
North Dakota	2001	622.78	1.370	0.811	1.568
Oklahoma	1999	438.62	1.306	0.711	1.243
South Carolina	1989	1,748.55	4.088	2.850	4.711
Tennessee	2011	312.84	1.451	0.824	1.643

When states are affected by catastrophes to the degree shown by the examples in Table 1 and Table 2, we would expect that insurers operating in a state are likely to reconsider their decision to participate in its market. Their re-evaluation may result in raising their rates, changing the nature and extent of their exposure in the state, exiting the market, or making no changes. The reaction of a given insurer presumably depends on whether: 1) the insurer perceives that the catastrophic event warrants any changes because it indicates a significant change in risk or

10. Regulators give insurers greater leeway in the insurance contracts purchased by commercial insurance buyers that cover property exposures (Klein, 2014). These contracts are designed in such a way as to give the buyers a number of options with respect to the causes of loss forms used, exclusions, endorsements and optional coverages (Flitner, 2011).

11. Since the mid-1990s, the NAIC and a number of states have undertaken concerted efforts to “deregulate” commercial insurance (Cook and Flitner, 2011). Regulators assert this is justified because individuals and households are less sophisticated in purchasing insurance than commercial insurance buyers, who may work with an experienced broker and are, therefore, more “professional” insurance consumers. However, rate regulation that constrains insurers from setting adequate rates may actually exacerbate losses, as consumers have less incentive to manage risk when rates are suppressed—i.e., the penalty for not mitigating is diminished (Harrington and Danzon, 2001; Derrig and Tennyson, 2011).

other factors affecting its operations; 2) the event substantially reduced its capacity to bear risk (i.e., decreasing its capital or increasing the cost or reducing the availability of reinsurance); and 3) the insurer is not constrained in some way (e.g., by regulation) from responding.<sup>12</sup> Additionally, an insurer may consider how its responses with respect to homeowners insurance in a particular state affect its ability to sell other personal lines of insurance (e.g., personal auto and umbrella insurance) in that state.<sup>13</sup> Further, an insurer's ability to pool exposures across multiple states may affect how it responds to a catastrophic event in a particular state, noting that insurers are not in a position to perpetually subsidize losses from their operations in one state with revenues they earn from operations in other states and lines of insurance.<sup>14</sup>

The data shown in Table 1 and Table 2 suggest alternative ways to determine whether a catastrophe disrupts or destabilizes a state insurance market. A measure that captures the aggregate effect on a state would reflect the impairment of the state's economy. However, because we are concerned with the subsequent responses by homeowners and commercial property insurers, this type of measure would be less informative than a measure that captures the distribution of the catastrophic losses across insurers in the market. Thus, our analysis of insurer responses defines an "economically" catastrophic year as one in which one-half of the homeowners insurers operating in the state report a loss ratio of 1.25 or greater, or 25% of the insurers in the state report a loss ratio of 1.5 or greater. Under this definition, there are 51 state-year observations involving economically catastrophic events over the period 1984–2013.<sup>15</sup> These are shown in Table A-1 in the Appendix A.

While other state-year observations exhibit extreme amounts of insured property losses, these 51 events *should* correspond to a destabilized state market for property insurance. Some outcomes of this instability could include reduced availability of coverage, search costs for consumers who need to find a new source

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12. Examples of previous treatments of the insurance of catastrophic risks include special issues of the *Journal of Risk and Insurance* (December 1996) and the Geneva Papers on Risk and Insurance (April 1997). See, e.g., Grace et al, (2004), Angbazo and Narayanan (1996), Gollier (1997), and Kleffner and Doherty, (1996).

13. Typically, many insurers will seek to market multiple products to the same consumer because of the economies of scope associated with this strategy. If an insurer stops offering homeowners insurance, this likely will compromise its ability to sell other types of insurance to consumers who had been purchasing their homeowners coverage from the insurer.

14. Some critics of how insurers have responded to catastrophic risk seem to confuse the pooling of exposures across states with their cross-subsidization. Efficient and economically sustainable pooling requires that each member of the pool pay a premium commensurate with his or her level of risk. An insurer cannot charge higher than actuarially-indicated rates to some insureds to compensate for its charging lower than actuarially-indicated rates to other insureds as this would expose it to adverse selection (Grace and Klein, 2009).

15. Other possible candidates for defining an economically significant catastrophe include the state aggregate loss ratio (total losses incurred divided by total premiums earned) or the ratio of insured property losses to total state income. The measure used here is somewhat arbitrary but captures the essence of an underwriting year in which a majority of insurers are adversely affected. In such a year, heightened media attention and regulatory scrutiny would be expected.

of coverage and the inability of insurers to obtain adequate reinsurance for subsequent years. In addition, as noted above, an evaluation of regulatory practices should generally focus on how such practices affect the market as a whole rather than specific insurers.

## 4. Discussion of Regulatory Practices

As discussed above, a bad underwriting year, especially resulting from a catastrophic event or a series of catastrophic events, would be expected to motivate insurers to re-evaluate their participation in a market. For example, insurers may seek to implement relatively large rate increases (i.e., rate increases in excess of 10%) and/or significantly reduce the number of policies they write. The more substantial and widespread the changes that insurers seek to make, the more likely regulators may attempt to prevent or limit such changes. Indeed, anticipating sharp market reactions to catastrophic losses may prompt regulators to take pre-emptive actions to limit rate increases and/or the nonrenewal of insurance policies. Some regulatory responses to such economically catastrophic years may be immediate and short-term in nature, such as a freezing of rates or imposing moratoriums on policy cancellations and non-renewals. Other actions can change the state regulatory environment for the longer term (e.g., modifying the process for approving rate changes, establishing a state reinsurance pool, or creating or modifying an RMM).<sup>16</sup>

To judge whether a particular regulatory response is positive, neutral or negative, one has to consider what would likely occur in the absence of the regulatory response or other changes in regulatory policies. Following a “large” catastrophic event, absent any regulatory reaction, insurers may raise their rates, reduce the number of policies they write and/or make other changes to reduce their future exposure to catastrophic losses.<sup>17</sup> Regulatory responses to an economically catastrophic event could be viewed as positive if they minimize the adverse effects of such an event on consumers. On the other hand, regulatory responses that exacerbate market changes that are adverse to consumers (e.g., prompting more insurers to exit a market, further reducing the availability of coverage, etc.) are, arguably, counterproductive over the long term.<sup>18</sup> In this paper, we focus on two of

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16. Modifications to an existing RMM could include easing its eligibility requirements or broadening the types of coverages offered.

17. Insurers are more likely to make such changes if a specific event or series of events alters their assessment of the risk of catastrophic losses in a given area.

18. We recognize that regulators can be placed in a difficult position when insurers seek to implement substantial rate hikes to cover what they perceive to be a significantly higher risk of catastrophe losses. Homeowners in the highest-risk areas can be especially hard hit by large premium increases. Regulators may be concerned that some homeowners will be unable to afford the premiums that insurers believe are required. On the other hand, if regulators constrain the rates that insurers are allowed to charge, this can induce insurers to reduce the supply of insurance and decrease its availability. Also, if rates are held below the cost of providing

the most critical areas of regulation—rate regulation and residual market administration—which lend themselves to empirical analysis using econometric methods.<sup>19</sup>

#### *4.1 Regulation of Rates and Underwriting*

It is generally presumed that states with prior approval systems (i.e., “non-competitive rating systems”) are more likely to constrain insurers’ rates.<sup>20</sup> It is important to note, however, that a state’s rate regulatory system does not indicate everything that is relevant to how rates are actually regulated in that state. For example, a state that requires prior approval of insurers’ rates before they can be implemented may or may not impose binding constraints on those rates. Further, the severity of the constraints imposed, if any, can vary among states with prior approval systems. We also observe that states with “competitive rating systems” (states that employ a system other than prior approval, such as file and use, use and file, etc.) may or may not seek to constrain insurers’ rates. Additionally, we note that regulators are more likely to disapprove or temper insurers’ filings for rate increases when a market is subject to considerable upward cost pressure and insurers are seeking to substantially raise their rates.

A state’s attempt to constrain or interfere with the prices that insurers would otherwise set can be manifested in two ways that are not mutually exclusive. One of these ways is to impose a ceiling on insurers’ overall rate levels (i.e., a uniform “haircut” is imposed on the rates [or rate increases]) for all risk classifications; we refer to this practice as “rate suppression.” Alternatively, or in conjunction with

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coverage, homeowners’ incentives to invest in mitigation will be diminished. Consequently, regulators must consider these competing concerns in determining how they will respond to insurers’ filings for rate increases.

19. It should be understood that other regulatory policies concerning such areas as solvency, underwriting, policy provisions and claims settlement also are important but are not things for which metrics can be readily developed that can be employed in a regression analysis. Hence, while we offer some observations on how the regulation of insurers’ underwriting decisions may affect market outcomes (as insurers’ underwriting is closely tied to their pricing), we are not in a position to evaluate regulatory policies governing underwriting or these other areas based on our empirical analysis. We do offer our opinions on those policies and practices in the areas of rate regulation and RMM administration that are likely to result in more favorable market outcomes and those that are likely to result in less favorable outcomes. Our opinions are informed primarily by economic principles and the results of our empirical analysis, as well as prior research, including state case studies and anecdotal observations.

20. The NAIC places state rate regulatory systems into the following categories: prior approval, modified prior approval, flex rating, file and use, use and file, and no file (Klein, 2014). Prior research on auto insurance and workers’ compensation insurance and anecdotal observation indicate that states with prior approval systems are more likely to impose constraints on insurers’ rates than states employing the other types of systems. Hence, we use prior approval regulation as a proxy for “strict regulation.” The presumption has been that states with the other types of systems tend not to impose constraints on insurers’ rates (these systems are generally characterized as “competitive rating”), but observers familiar with states’ actual practices know that this is not always the case.

rate suppression, a state may seek to cap the differences between the rates that can be charged for different classifications or impose tighter constraints on the rates for high-risk classifications than low-risk classifications; we refer to this practice as “rate compression.”<sup>21</sup>

When regulators cause rates to be inadequate, this would be expected to reduce the supply of insurance, all other things equal. We expect that insurers will be more reluctant to voluntarily provide insurance for homes for which they are not allowed to charge an adequate premium. Insurers may tolerate a small degree of rate inadequacy, but severe regulatory constraints on prices would be expected to result in significant distortions in the supply of insurance (Grace and Klein, 2009). This can force a substantial number of homes into RMMs. It also contributes to moral hazard in that inadequate rates reduce insureds’ incentives to reduce their exposure to losses (e.g., invest in hazard mitigation), which results in higher risk and losses, all other things equal.

Excessive delays in getting rate changes approved can also contribute to market inefficiency. Under a prior approval system, regulators are typically subject to a “deemer provision,” (i.e., rate changes filed by insurers are deemed approved if they are not disapproved within a 30- to 60-day period). Under a competitive rating system, regulators typically have a limited amount of time (e.g., 30 days) to inform an insurer that the rates that it filed are disapproved.<sup>22</sup> However, under both systems, regulators can delay an insurer’s implementation of a rate change by informing it that its filing is incomplete, lacks adequate support, etc. Regulators sometimes use this tactic rather than disapproving a rate filing, which requires them to state the grounds for disapproval. Even if a rate increase filed by an insurer ultimately is approved, the delay in receiving approval can lead to inadequate rates until the new rates can be implemented. Also, it is not uncommon for an insurer and regulators to engage in a protracted bargaining process over a rate filing, which results in a considerable delay, as well as approved rates that are significantly below what the insurer initially filed.

Insurers’ underwriting practices are closely tied to their pricing structures. (See, for example, Grace and Klein, 2009.) Regulation of insurers’ pricing can affect their underwriting decisions, and regulation of their underwriting practices can affect their pricing. All other things equal, tighter regulatory constraints on

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21. A good illustration of this practice is the imposition of regulatory caps on the rates that insurers are allowed to charge homeowners in coastal areas that are exposed to significant hurricane risk. Rate compression typically results in overall rate inadequacy as it is difficult for insurers to offset inadequate rates for high-risk insureds by charging excessive rates for low-risk insureds.

22. Under a file and use system, regulators may allow an insurer’s filed rates to go into effect and then retroactively determine that the rates were excessive. If this occurs, based on the rates that the regulators will permit the insurer to implement, the insurer will be required to issue refunds to policyholders for the difference in the premiums they paid and what were ultimately approved. Generally, if an insurer believes that the rate changes it has filed may be subject to such retroactive disapproval, it will defer implementing the rate changes until a final determination is made to avoid having to issue refunds.

insurers' rates would be expected to induce insurers to tighten their underwriting standards and reduce their exposures. In turn, greater regulatory restrictions on insurers' underwriting would be expected to result in higher rates.

#### *4.2. Residual Market Mechanisms*

There are three principle types of property insurance RMMs. Fair Access to Insurance Requirements (FAIR) plans provide full coverage in some or all areas of a state. The original purpose of FAIR plans was to provide property coverage to urban areas where voluntary market coverage was less available due to the high risks associated with fire and theft. Over time, FAIR plans have been increasingly servicing properties exposed to various weather-related perils as insurers seek to limit their exposure to these perils. Currently, there are 33 FAIR plans in operation in the U.S.

Beach/Windstorm Plans (also called Wind Pools), a second type of mechanism, generally provide windstorm and hail coverage to properties in designated coastal areas that are subject to a high risk of windstorm damage. These plans are designed to address the particular property insurance availability problems in certain coastal areas, although some may also cover other perils, such as fire. Currently, there are five Beach/Windstorm Plans ; the plans in Mississippi, South Carolina and Texas offer wind/hail coverage only, and the plans in Alabama and North Carolina also offer coverage for fire.

A third type of mechanism combines the first two types of plans and essentially functions as a state-run insurance company. There are only two such mechanisms in the U.S.: 1) the Florida Citizens Property Insurance Corporation (FCPIC); and 2) the Louisiana Citizens Property Insurance Corporation (LCPIC). Each comprises something equivalent to a FAIR Plan and a Coastal Plan (Louisiana) or a Beach/Wind Plan (Florida). The FCPIC provides full coverage and wind/hail coverage. Both plans in the LCPIC provide full coverage.

In many states, the three types of property RMMs are targeted toward residential properties, but some also provide also coverage for commercial properties. The availability of residential property insurance coverage is generally the greatest problem and concern, but the supply of insurance coverage for certain commercial properties may also be constrained in some areas.

While these mechanisms may serve as short-term safety valves in the event of disruptions in the supply of private insurance, they are generally not intended to serve as long-term sources of coverage for a substantial portion of a state's property exposures.<sup>23</sup> For this reason, most states seek to properly structure and manage these mechanisms, as well as minimize their size, i.e., retaining or moving as many exposures in or to voluntary markets as possible. Beyond efforts to

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23. Even in times when there is an ample supply of insurance in the voluntary market, there may be some properties that meet minimum insurability conditions but are unable to secure voluntary market coverage. Hence, it is common for these mechanisms to insure a relatively small number of exposures for extended periods.

maximize the supply of voluntary insurance, measures aimed at keeping policies out of the residual market include maintaining residual market rates above voluntary market rates and imposing stringent rules with respect to who is allowed to obtain insurance from the residual market.<sup>24</sup> Efforts to move policies out of the residual market include “take-out” incentives for private insurers and programs designed to match residual market policyholders with private insurers that are willing to cover them.

Proper administration of an RMM also is important. To that end, a well-managed RMM will charge adequate rates to cover the loss exposures that it insures and also will purchase adequate reinsurance to diversify its exposure to catastrophic losses. Historically, some RMMs failed to employ such measures and, consequently, incurred substantial deficits when they incurred high hurricane losses (Klein, 2009c; FIO, 2015). In such instances, insurers are charged assessments to pay for the deficits, most of which they are allowed to pass on to their policyholders. At the very least, these assessments constitute a cross subsidy between voluntary market insureds and RMM insureds. The amount of assessments that insurers are not allowed to pass on to their policyholders must necessarily be funded out of their premiums and surplus. This can further chill insurers’ willingness to write business on a voluntary basis and increase the size of the residual market, all other things equal.<sup>25</sup>

## 5. Empirical Analysis of Rate Regulation and Residual Markets

In our empirical analysis, the two regulatory practices that are the focus of this paper—rate regulation and residual markets—are assessed in relation to five market measures: 1) the number of private insurers operating in a market; 2) the structural competitiveness of the market; 3) the amount of capital supporting the insurance written in the market; 4) the amount of reinsurance that insurers’ purchase to diversify their underwriting risk; and 5) the median loss ratio of insurers operating in the market (a measure of underwriting profitability). In our regression analysis, each of these market dimensions is measured as a net change variable  $CY_i$  using the following formula where  $Y_i$  is the value of the underlying variable  $i$ .

$$CY_{i,t} = (Y_{i,t} - Y_{i,t-2})/Y_{i,t-2}$$

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24. An example of such a rule is the requirement that a homeowner applying for insurance coverage from an RMM must provide one or more declinations from voluntary market insurers.

25. Florida and Louisiana offer interesting and contrasting case studies of alternative regulatory approaches with respect to voluntary markets vis-à-vis RMMs (Born and Klein, 2015).

By comparing the supply decisions that insurers make in personal lines and commercial lines following major natural disasters, Born and Klimaszewski-Blettner (2013) demonstrate empirically that “certain regulatory responses may unintentionally impede insurers’ willingness to provide coverage against natural disasters,” especially in the more heavily-regulated personal lines. “Prior approval of rates and regulatory rules like policy cancellation bans discourage insurers from offering insurance in certain lines of business and deter them from developing effective strategies for dealing with changing risk exposures,” they write, adding that there is “statistically significant proof for the expected ‘crowding out’ of private insurers by residual markets.” Born and Klimaszewski-Blettner suggest that regulation should place “more emphasis on the [solvency] monitoring function than on rate approvals and post-disaster regulatory responses that can have unintended consequences of reducing the availability of coverage.”

Whereas Born and Klimaszewski-Blettner focus on how catastrophes and regulation affect individual homeowners and commercial property insurers’ decisions on how much insurance to supply (including fully exiting a market), our analysis examines how catastrophes, rate regulation, and residual markets affect the various dimensions of homeowners and commercial property insurance markets identified above. Variation across states in the rate regulatory systems they employ and the relative size of their residual markets, especially as they follow catastrophic events, may help to yield insights into the best practices for regulation. While the analysis here considers changes in each of the five measures individually following a catastrophic event, the results should not be considered separately. Rather, the results should be considered in concert to identify consistencies and inconsistencies with respect to the estimated effects of catastrophe risk, rate regulation and residual markets on different market dimensions.

### *5.1 Analytical Approach and Sample*

Changes to state homeowners and commercial property insurance markets are analyzed using 30 years of data on homeowners and commercial property insurers reporting data to the National Association of Insurance Commissioners (NAIC). The key measures evaluated below are the relative changes over a two-year period<sup>26</sup> in each state-market for each of the following variables: the number of firms; the Herfindahl-Hirschman index of market concentration (HHI); the amount of capital (i.e., surplus as regards policyholders) held by insurers; the reinsurance ratio<sup>27</sup>; and the median loss ratio.<sup>28</sup> The analysis considers three primary factors

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26. This two-year period should be long enough to allow affected insurers time to evaluate their operations, but also short enough to avoid the need to control for subsequent catastrophic events or changes in regulations.

27. The reinsurance ratio is defined as the ratio of reinsurance ceded divided by the sum of reinsurance assumed and direct premiums written for all insurers writing business in a given state-market.

that affect these market outcome measures: catastrophic events, prior approval rate regulation and the relative size of the state residual market.

**Table 3:  
Variable Descriptions**

Variable	Description
Change in Number of Firms	Net change in the number of homeowners and commercial property insurers
Change in HHI	Net change in the HHI for homeowners and commercial property insurance markets
Change in Surplus	Net change in the total amount of surplus held by insurers
Change in Reinsurance Ratio	Net change in the aggregate reinsurance ratio of insurers
Change in Loss Ratio	Net change in the median loss ratio for insurers
Cat	Dummy variable for natural catastrophe in a state, lagged two years
HO	Dummy variable for homeowners insurance, lagged two years
Prior Approval Regulation	Dummy variable for prior approval rate regulatory system, lagged two years
Residual Market	Residual market share, lagged two years
Change Population	Change in state population from previous year (%)
Housing Starts	Number of new housing starts per capita

Because markets also evolve for reasons other than catastrophic events and regulatory changes, the analysis includes changes in state demographics—population and housing starts—and controls for macroeconomic effects through the use of a time trend variable and other state-specific factors through the inclusion of a state fixed-effects variable. Definitions of the dependent and explanatory variables used in the regression analysis are provided in Table 3. Descriptive statistics for each variable are provided in Table 4, and a summary of the regression results are provided in Table 5.

**Table 4:  
Descriptive Statistics**

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Change in No. of Firms	2,646	-0.00541	0.09651	-1.5405	0.5542
Change in HHI	2,646	-0.00442	0.38534	-18.5417	0.9648
Change in Surplus	2,646	0.05879	0.16240	-2.3410	0.7773
Change in Reinsurance Ratio	1,666	0.22158	0.44735	-2.1199	1.0000
Change in Loss Ratio	2,548	-0.12413	0.59081	-7.6335	0.8727
Cat	2,646	0.03477	0.18323	0.0000	1.0000
HO	2,646	0.50000	0.50009	0.0000	1.0000
Prior Approval Regulation	2,646	0.23621	0.42483	0.0000	1.0000
Residual Market Share	2,646	0.44254	0.50113	0.0000	1.2925
Change in Population	2,646	0.00958	0.00941	-0.0637	0.0683
Housing Starts	2,646	0.00505	0.00320	0.0007	0.0286

28. The analysis also was conducted on a sample that excluded Florida. The results were consistent with those reported here.

**Table 5:  
Summary of Regression Results**

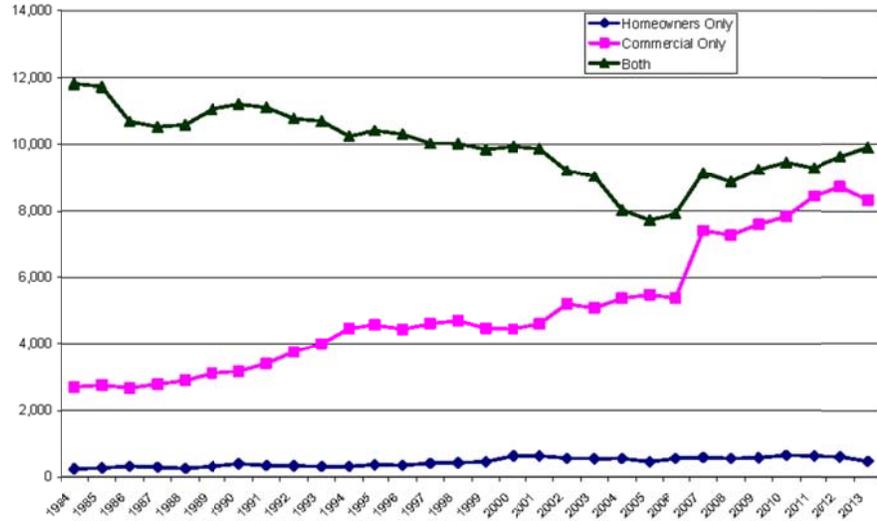
Explanatory Variables	Dependent Variables				
	Change in No. of Firms	Change in HHI	Change in Surplus	Change in Reinsurance Ratio	Change in Loss Ratio
Cat	0.000	0.002	0.020	-0.016	-0.069
	-0.011	-0.029	-0.020	-0.038	-0.064
Cat * HO	-0.007	0.024	-0.001	-0.152	-0.134
	-0.032	-0.036	-0.044	-0.137	-0.907
Prior Approval Regulation	0.006	-0.018	0.004	0.035***	-0.099
	-0.006	-0.015	-0.007	-0.011	-0.070
Prior Approval Reg. * HO	-0.036***	0.029*	-0.032***	-0.053***	0.065
	-0.008	-0.016	-0.011	-0.014	-0.076
Prior Approval Reg. * Cat	0.006	-0.178***	0.006	0.054	-0.057
	-0.017	-0.065	-0.026	-0.049	-0.148
Prior Approval Reg. * Cat * HO	0.040	0.074	0.054	0.065	0.020
	-0.056	-0.100	-0.077	-0.143	-0.170
Residual Market	0.019***	-0.035	0.016***	0.032**	0.073***
	-0.004	-0.028	-0.005	-0.012	-0.028
Residual Mkt. * Cat	-0.014	0.098**	-0.023	0.024	0.196*
	-0.015	-0.046	-0.026	-0.056	-0.109
Residual Mkt. * HO	-0.031***	0.049*	-0.022***	-0.064***	0.032
	-0.003	-0.026	-0.004	-0.011	-0.021
Residual Mkt. * HO * Cat	-0.028	-0.123**	-0.037	0.055	-0.115
	-0.038	-0.057	-0.053	-0.147	-0.274
Change Population	0.724	-1.832*	0.713	1.415	1.419
	-0.663	-1.110	-0.811	-1.161	-2.644
Housing Starts	0.382	0.034	-0.082	-7.497**	-2.238
	-1.555	-2.447	-1.968	-3.358	-7.921
Constant	0.043***	-0.054***	-0.016**	0.034***	-0.014
	-0.003	-0.021	-0.006	-0.012	-0.041
R-squared	0.483	0.023	0.540	0.832	0.128
N	2,646	2,646	2,646	1,665	2,548

Notes: Standard errors terms reported below each coefficient. Results for year dummy variables omitted. \*, \*\* and \*\*\* denote significance at the 90%, 95% and 99% confidence levels, two-tailed tests.

The sample includes all homeowners and commercial property insurers operating in the U.S. over a 30-year period. The number of insurers offering homeowners and commercial property insurance coverage varies significantly over time. Figure 2 shows the total number of insurers that reported direct premiums earned in the homeowners insurance market, the commercial property insurance market or both, for the sample period of 1984–2013.<sup>29</sup> The figure shows a dramatic increase in the number of firms operating in the commercial market, but a decline in the number of insurers that also write homeowners insurance. The number of insurers that reported writing only homeowners insurance coverage increased from 246 in 1984 to 458 in 2013.

29. The insurers included in our analysis wrote at least \$1 million in premiums in a given year. The commercial property insurers included in our analysis were all insurers with direct written premiums in fire, allied lines and/or commercial multiple peril insurance.

**Figure 2:**  
**Number of Insurers Operating in U.S. Property Insurance Markets: 1984–2013**



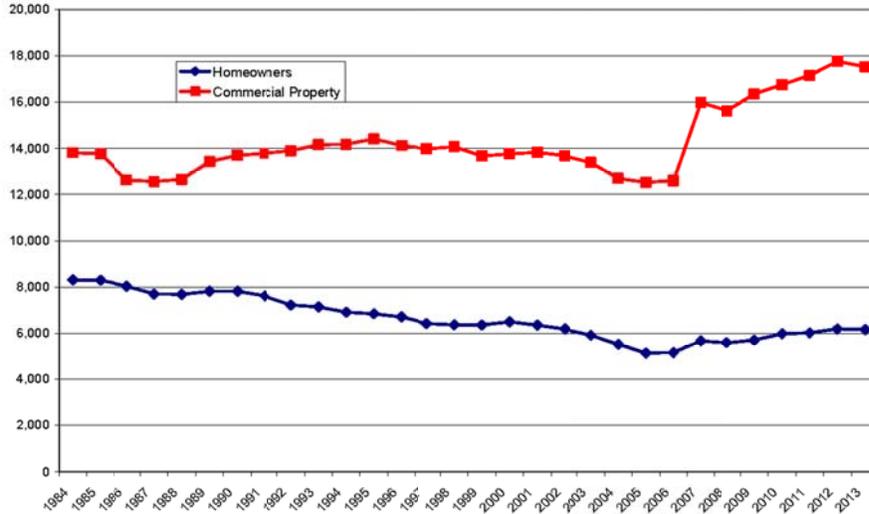
Source: NAIC financial data; authors' calculations

In our analysis, insurer participation and performance are captured at the state level in what is hereafter referred to as an “insurer unit,” i.e., an insurer that operates in 20 states is captured in the analysis as 20 different units. Figure 3 shows the total number of insurer units that reported participating in writing homeowners or commercial property insurance in the U.S. over the period 1984–2013. The data indicate that, over the sample period, the number of homeowners units has declined by about 2,000, while the number of commercial property units has increased by roughly 4,000. The average number of states in which homeowners insurers reported business declined from nearly 7.94 states per insurer in 1984 to 3.43 in 2013. The number of single-state carriers increased from 452 in 1984 to 509 in 1990, but subsequently decreased to 406 in 2013.

## 5.2 Estimation

The markets for property insurance are affected by a state’s regulatory environment in several ways. While many states have adopted similar approaches to regulating forms and the licensing of agents, rate filing requirements and their application, in particular, can have a significant impact on the ability of an insurer to adjust rates, either by restricting the size of such adjustments or delaying their approval and implementation. Also, as discussed above, regulators may seek to constrain the rate differentials between different risk classifications, e.g., placing a cap on the rate factors an insurer uses for different rate territories.

**Figure 3:**  
**Aggregate Number of Property Insurer Units: 1984–2013**



Source: NAIC financial data; authors' calculations

Insurers operating in a true competitive rating environment would be expected to have more flexibility in setting their rates than those that must file and wait for approval. Arguments for strict rate regulation are often motivated by a desire to provide “affordable” insurance, while supporters of competitive rating systems suggest that regulators in a prior approval system are more likely to be influenced by political considerations and argue that rate regulation “artificially depresses prices, forcing insurers out of otherwise important markets and distorts the real cost of insurance” (FIO, 2013, p. 55).

After experiencing natural disasters, some states established or expanded existing state-sponsored RMMs. These mechanisms, in theory, are designed to provide coverage for high-risk property owners who cannot obtain insurance from the private (also known as the “voluntary”) insurance market.<sup>30</sup> Since private insurers are generally required to participate to some extent in state RMMs, these mechanisms can influence an insurer’s decision on how much business it writes in a state. If an insurer does write business in the voluntary market, it typically will

30. In theory, an RMM should serve as a “market of last resort,” i.e., no other source of coverage is available to its insureds. In practice, under certain conditions, some RMMs may be structured and managed in such a way that they provide an alternative source of coverage even to consumers who could buy insurance in the voluntary market.

be assessed to cover the residual market's deficits based on its relative share of the voluntary market.<sup>31</sup>

Several states have imposed exit restrictions and long-term policy cancellation and non-renewal bans following a catastrophe (Klein, 2016). By design, these measures are intended to force insurers to maintain their participation in the state market even if they would otherwise prefer to reduce their exposures or exit altogether. The use of these measures, and the perception that they could be used again in the aftermath of future catastrophes, must be considered when assessing the role of rate regulation and RMMs, as they may exacerbate the potential negative consequences of regulatory practices on insurers' post-catastrophe decisions.<sup>32</sup>

The effects of rate regulation and RMMs on market structure and performance are assessed through the analysis of the five market measures described above. This assessment considers how prior approval regulation and the relative size of RMMs affect market outcomes, generally over time, as well as specifically following an economically catastrophic event. As such, the analysis yields insights on the market dimensions (e.g., structural competitiveness, capacity) for which these regulatory responses are most influential and whether the influence is positive or negative for each dimension. The results of the analysis are reported in Table 5 and discussed in the following sections, with each market dimension analyzed separately.

Some explanation of the exact specification of our explanatory variables is warranted. "Cat" is a dummy variable equal to one when there has been a "catastrophic" event in a state two years earlier. As noted above, we determine that a catastrophic event has occurred when at least one-half of the homeowners insurers operating in the state report a loss ratio of 1.25 and/or greater or 25% of the insurers in the state report a loss ratio of 1.5 or greater.<sup>33</sup>

"Prior approval regulation" is a dummy variable equal to one for states/markets with a prior approval regulatory system in effect for the relevant line of business.<sup>34</sup> We are using a prior approval regulation as a proxy for "strict regulation" with the understanding that it is an imperfect proxy with no better

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31. RMMs are rarely self-sufficient. Where the rates charged to high-risk policyholders are too low to support the program's operation, insurers are generally assessed to make up the difference (Klein, 2009c).

32. In an evaluation of the Florida property insurance market, Medders, et. al. (2014) note that "a focus on price-reducing legislation and regulation has led to increased solvency constraints and negative first-order effects on private industry capacity. Such legislation and regulatory actions impacting Florida's property insurance market create significant uncertainty for private insurers and add to the cost of doing business in Florida" (p. 199).

33. A catastrophic event is determined to have occurred when either or both of these conditions have been met. We also tested the use of an alternative specification of this variable using a three-year lag, but it did not have a material effect on our estimation results.

34. States with a prior approval system for homeowners insurance do not necessarily have a prior approval system for the commercial property lines. In our analysis, the prior approval regulation dummy variable is different for homeowners insurance and commercial property insurance.

alternatives readily available. Some (perhaps many) states with prior approval systems do not attempt to impose significant constraints on insurers' rates at any given point in time. Similarly, some states with "competitive rating systems" (i.e., something other than prior approval) may seek to impose constraints on insurers' rates at different points in time.<sup>35</sup>

"Residual market" is specified by the amount of direct premiums earned in a state's RMM(s) divided by the amount of direct premiums earned in both the voluntary and residual market. We anticipate that there is some "noise" associated with this variable as the size of state's residual market may be affected by many factors beyond how it is structured and administered, including how rates are regulated in a given state and market.

Our dataset combines separate observations for insurers' homeowners operations and their commercial operations. In the results presented below, the estimated coefficients on our key explanatory variables—catastrophes, prior approval regulation and residual markets—describe the relationships between these explanatory variables and our dependent variables for commercial property insurers and homeowners insurers. We include interactions of these three explanatory variables with a dummy variable, "HO," which equals one if the observation is for homeowners insurance, to further capture the unique relationships for homeowners insurance relative to commercial property insurance. We employ several additional interaction terms to measure the effects of these explanatory variables for other subsets of insurers in our sample—i.e., those affected by a catastrophe and those in a prior approval rate filing regime. As an example, in our first regression reported in Table 5, the coefficient on our variable "Residual Market \* HO Insurer \* Cat" captures the relationship between the size of the residual market and the change in the number of firms following a catastrophic event for the homeowners insurers in a state affected by a catastrophic event *relative to* the change in the number of commercial or homeowners insurers in states without a catastrophic event *and* the change in the number of commercial insurers in states with a catastrophic event.

Our model includes two control variables (in addition to year dummy variables and state fixed effects): 1) the change in state population from the previous year ("change population") and the number of housing starts per capita ("housing starts").<sup>36</sup> All other things equal, we would expect that both of these variables would increase the demand for homeowners and commercial property insurance, which could have effects on all of our dependent variables.

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35. Researchers have struggled with developing better measures of regulatory stringency with some success, but the measures of regulatory stringency that have been employed were not available for homeowners or commercial property insurance over the time period used in our analysis. For example, Klein, et. al. (2002) developed rate regulatory stringency measures based on the disposition of advisory rate/loss cost filings in auto and workers' compensation insurance for the period 1986–1997.

36. "Change Population" is equal to a state's population in the previous year minus a state's population in the current year divided by a state's population in the previous year. This is calculated as a percentage and not as a strict ratio.

### 5.2.1 Number of Insurers in a Market

One easily determined measure of the supply of insurance is the number of firms operating in a market. All other things equal, it would seem preferable to have more insurers offering coverage in a market rather than fewer insurers, with the understanding that the overall size of a market will affect how many insurers can operate and earn what they consider to be an adequate profit. More insurers in a market offer consumers more choices and should also promote greater competition. That said, not all insurers are created equal, and it would be in the best interest of consumers to have insurers in a market that were financially sound and would not be at significant risk of becoming insolvent.<sup>37</sup> With these caveats in mind, a net relative increase in the numbers of insurers is viewed as a positive development. Conversely, a persistent decrease in the number of homeowners insurers is cause for concern, as it would have a negative effect on consumers' access to coverage. In our analysis, we employ the net relative change in the number of insurers over a two-year period.

The impact of a catastrophe on the number of insurers is a matter of particular interest. If the likelihood of a catastrophe were fully anticipated by insurers in a competitive and unregulated market, they would not necessarily be prompted to revise their assessments of the risk of writing future homeowners insurance coverage in the state, and we would not expect there to be a significant effect on exit or entry. The losses from the catastrophic event would be viewed as a sunk cost, so that if it was profitable to write insurance coverage in the state prior to the event, then it should continue to be profitable to do so. Because the risks were fully anticipated, insurers would have their premiums in a manner so that, in the long run, they would expect to earn a sufficient profit to make writing coverage desirable. On the other hand, if an insurer perceived that a catastrophe reflected a significant increase in risk, this could prompt it to make various changes in its operations, including withdrawing from the market.

For these reasons and others, it is difficult to predict how a catastrophe will affect the number of insurers in a market. While many catastrophic events may not cause insurers to change their estimates of catastrophe risk, some events may cause insurers to believe that catastrophic risk has increased and that their best course of action is to exit the market to avoid further catastrophe losses. That said, there might be other insurers who view a catastrophe as an opportunity to enter a market to absorb policies shed by insurers that have exited the market or reduced their exposures.

We do expect prior approval regulation to be associated with a decrease in the number of insurers that might be exacerbated after a catastrophe, all else equal. Our reasoning here is that regulators in prior approval states are presumed to be more likely to constrain insurers' rates, which, in turn, would be expected to cause some insurers to exit the market and discourage other insurers from entering the market. We also expect that a larger residual market should be associated with

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37. Taking this point a bit further, all other things equal, it would be desirable to have firms that are well capitalized and geographically diversified.

fewer insurers in the voluntary market for at least two reasons. One, a larger residual market may induce insurers to leave a market because of their concerns about their assessments for residual market deficits. Two, we expect that as a residual market increases, the voluntary market would shrink and, hence, would support fewer insurers in that market.<sup>38</sup>

The results of our analysis of the relative change in the number of insurers operating in a state-market reported in Table 5 indicate the following. While the number of insurers varies substantially over time, changes in the number of insurers in a state are not significantly related to catastrophic events. Prior approval rate regulation is associated with a reduction in the number of homeowners insurers, relative to the number of commercial property insurers operating in a state. However, we do not find a statistically significant relationship between prior approval regulation and the number of homeowners insurers nor commercial property insurers following a catastrophic event.

Our failure to find a statistically significant relationship between catastrophic events and the number of insurers operating in a market is noteworthy. We know that from anecdotal observations that, in at least few cases, a catastrophic event does create a certain amount of turmoil in a market and has led to insurer exits. Further research and testing of different model specifications are needed to determine the circumstances, if any, that could prompt insurers' exit from a market following a catastrophe. It may be the case that only very large catastrophes that cause a significant reassessment of insurers' risk result in a material and measurable reaction in terms of insurers' decisions to stay in or leave a market. It also may be the case that, after a catastrophe, some insurers leave a market while other insurers enter it, seeking opportunities to capture the business of exiting insurers. Another possibility is that insurers' reactions to catastrophes play out over a longer time period than two years.

The number of commercial property insurers in the state increases with the size of the residual market, while the number of homeowners insurers decreases with the size of the residual market. The effect of residual market size on homeowners insurers is actually slightly smaller in years following catastrophes but is not statistically significant. The negative relationship between the size of a state's residual market and the relative change in the number of homeowners insurers is consistent with what we would expect. It is less clear why the size of the residual market would have a positive effect on the number of commercial property insurers. It is possible that the size of the residual market reflects more general perceptions of increased risk in the state that might create new opportunities for commercial insurers to enter the market for property insurance and attract commercial buyers that were previously self-insured.

### **5.2.2 Market Concentration**

Changes in the number of insurers operating in a market, among other factors, would be expected to affect its structural competitiveness. Throughout the sample

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38. Born and Klimaszewski-Blettner (2013) refer to this as the "crowding-out effect."

period, no states had fewer than 27 insurers participating in the homeowners market or 97 insurers participating in the commercial property market in any given year. Average insurer market shares were 0.8% and 0.4% for the homeowners and commercial property markets, respectively. The HHI, a measure of market concentration, averaged 880 for homeowners markets and 240 for commercial property markets. A relatively low value of the HHI, which ranges from 0 to 10,000, indicates a competitive market.<sup>39</sup> By these indicators, both markets are very structurally competitive across all states. In only one state, Delaware, did any one insurer write more than 50% of the commercial property business.

Compared to changes in the number of insurers, analysis of changes in market concentration not only reflects changes in the number of insurers in the market, but also changes in the distribution of the business across insurers operating in the market. Thus, if one large insurer exits, the effect on the number of insurers is negligible, but the effect on market concentration can be substantial. The occurrence of a catastrophe could be associated with an increase or a decrease in market concentration. If a specific event has particularly adverse effects on smaller companies prompting them to exit the market or reduce their exposures, this could cause market concentration to increase. On the other hand, a catastrophe could cause larger insurers to reduce their exposures (or exit the market), which would lead to decreased market concentration. Indeed, both effects may occur, which would work in opposite directions, so we cannot predict a priori as to whether the occurrence of a catastrophe will increase or decrease market concentration.

As with the number of insurers, we do not find a statistically significant association between catastrophic events and changes in the HHI for either homeowners or commercial insurance markets. Prior approval regulation is associated with an increase in market concentration for homeowners insurance, all else equal. It is, however, negatively related to market concentration following a catastrophe for commercial insurers and homeowners insurers combined. One possible explanation for these results is that for commercial property insurers, catastrophes tend to cause some large insurers to exit the market (or reduce the amount of the business they write), and this tendency is more dominant in relation to catastrophes prompting smaller insurers to exit the market.

The relative size of the residual market is positively related to the concentration of the homeowners market, in general. However, this relationship becomes negative following a catastrophe. It may be the case that, absent a catastrophe, a larger residual market is associated with the exit of smaller insurers from the voluntary market who are unable to compete with the residual market. On the other hand, following a catastrophe, large insurers may become more concerned about the size of the residual market and what this portends in terms of their future assessments for residual market deficits, which could be substantial if

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39. According to horizontal merger guidelines promulgated by the U.S. Department of Justice and the Federal Trade Commission, markets with HHI values under 1,500 are considered to be "un-concentrated"; a merger that would not cause a market's HHI to exceed 1,500 would generally not raise any concerns from an antitrust perspective.

there are more catastrophes. Such concerns may prompt some large insurers to exit from or reduce their presence in the homeowners market.

### **5.2.3 Market Capacity**

Another important market dimension is insurers' capacity for bearing risk. One measure of this is the total capital (surplus) of the insurers operating in a market. More capital indicates a greater ability to accommodate larger than expected losses, but there are costs to holding capital. These costs include taxes that must be paid on undistributed reserves, the opportunity cost of not putting the capital to use (investing it) elsewhere and the possibility of becoming a takeover target.<sup>40</sup>

Cummins, et. al. (2002) evaluate the capacity of the U.S. market for bearing risk and suggest a natural definition of industry capacity is “the amount of industry resources that are deliverable conditional on an industry loss of a given size” (p.557). Thus, an evaluation of changes in market capacity following catastrophic events should also consider insurers' use of reinsurance, which allows insurers to increase their capacity for bearing risk. While we would expect insurers to reevaluate their reinsurance arrangements following a catastrophe, Froot and O'Connell (1999) find that supply shocks are more important than demand shocks in explaining the effects of catastrophe losses on reinsurance prices and the amount of reinsurance coverage purchased. Consequently, while holding more capital and securing more reinsurance may be considered substitute approaches to increasing an insurer's capacity, capital reductions, along with a reduction in the availability of reinsurance, can have adverse effects on the availability of property insurance.

Additionally, the amount of capital that is backing the amount of insurance coverage that is being provided in a market has implications for the “quality” of that coverage, with the understanding that the capital is divided among the various insurers. All other things equal, it is desirable to have insurers with adequate capital and reinsurance providing coverage in a market (Grace, et. al., 2004). Concerns arise when insurers with inadequate capital and reinsurance insure large amounts of exposures subject to catastrophe losses. Such insurers are more likely to default on their obligations to policyholders when a catastrophe strikes.<sup>41</sup>

Since insurers report capital (i.e., surplus as regards policyholders) at the company level, one can only estimate the amount of capital that is available to cover catastrophic losses in any given state. For many insurers, the reported amounts support their operations in all lines and states in which they do business. For example, if an insurer incurs catastrophe losses in more than one state, its capital will be allocated across all affected states to absorb its losses. Some

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40. For further discussion of the costs of holding capital, see Korczyk (2005).

41. The insolvency of the Poe companies in Florida following the 2005 storm season is an example of what can go wrong when insurers with insufficient capacity underwrite large amounts of high-risk exposures (Grace and Klein, 2009). The insolvency of the three Poe companies resulted in approximately \$800 million in unpaid claims that were assumed by Florida's guaranty association.

companies, on the other hand, have created separate “pups” that operate as legally separate entities in a state. When the pup is affected by a catastrophe, only the capital within the pup is at risk.<sup>42</sup>

The amount of capital held by the property insurers operating in a state varies significantly over time. Over the entire sample period, some states saw an increase of more than 200% while others experienced much smaller increases, and no states saw a reduction. If insurers had not changed their risk exposures over this period, then this would constitute a positive development in that there would be more capital supporting a given amount of exposures. However, risk exposures change, and this capital is supporting other lines of business and exposures in other states. Nonetheless, a significant reduction in the capital available to support the property risks in a state might indicate further instability of the state market and associated availability problems.

Consider a change in capital that occurs in the years following an economically catastrophic event. In the short term, a significant reduction could reflect the higher-than-expected losses due to the catastrophic event. A reduction in total capital that persists over a longer period of time might indicate that larger, well-capitalized insurers have chosen to exit the market.

Our analysis of the state total capital, as reported in Table 5, indicates the following. All else equal, changes in state total capital over time are not significantly related to catastrophic events. This holds across the different types of insurers and states with different regulatory systems. One possible explanation for this is that a catastrophe can have different effects on the amount of capital backing the coverage provided in a market that work in opposite directions. On the one hand, the exit of one or more well-capitalized insurers would have a negative effect on the total amount of capital. Also, some insurers that remain in the market may suffer a reduction in capital due to catastrophe losses. On the other hand, other insurers that continue to write business in the market may choose to maintain or even increase the amount of capital they hold to increase their capacity to cover future catastrophe losses.

In prior approval states, homeowners insurance markets exhibit a significant 3.2% average decline in capital over a two-year period relative to commercial property insurers. This suggests that, all other things equal, stricter rate regulation leads to the exit of highly-capitalized homeowners insurers and/or prompts homeowners insurers remaining in the market to reduce the amount of capital they

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42. It should be noted that some of the larger insurer groups have employed the strategy of establishing “pup” companies in high-risk states for at least two reasons. One reason is that the effect of regulation and market conditions in a state are more evident in the financial data of the pup than in the financial data of a company with operations in multiple states. A second reason is that, under extreme conditions and the incurrence of severe catastrophe losses by the pup, its parent company is not obligated to bail out the pup. That said, the parent company may still choose to provide a capital infusion to the pup. Our point here is that the use of pup companies affiliated with large, national insurers is preferable to either the complete withdrawal of large, national insurers (i.e., they have no affiliated insurers in a state) or their replacement by small, regional or single-state insurers with much less capacity and geographic diversification.

hold. What we see here is consistent with the findings of Klein, et. al. (2002), who provide evidence that prior approval regulation has a negative effect on the amount of capital insurers hold. A larger residual market also is associated with a significant reduction in capital among homeowners insurers.

As with the amount of capital, one can only estimate the amount of reinsurance coverage that is available to support catastrophic losses in a state because reported reinsurance amounts support insurers' operations in all states in which they do business. Insurers' reported reinsurance assumed and reinsurance ceded amounts are used to create a state-level reinsurance measure, defined as the ratio of reinsurance ceded divided by the sum of reinsurance assumed and direct premiums written. From 1996 to 2013, the average state reinsurance ratio for all property insurers (commercial and homeowners) increased from about 1% to more than 8%. The state average reinsurance ratio for commercial insurers is roughly four times higher than that for homeowners insurers (12% and 3%, respectively, in 2013).

Our analysis of the state reinsurance ratio reported in Table 5 indicates the following. All else equal, changes in state reinsurance ratios are not significantly related to catastrophic events. This is the case across the different types of insurers and states with different regulatory systems. As with amount of capital, it is possible that a catastrophe can have different effects on the amount of reinsurance purchased that work in opposing directions. On the one hand, a catastrophe could prompt some insurers that purchase large amounts of reinsurance to exit the market. On the other hand, other insurers that continue to write business in the market may choose to maintain or even increase the amount of reinsurance they purchase to increase their capacity to cover future catastrophe losses.

The state reinsurance ratio is generally higher in states with prior approval rate regulation. However, the state reinsurance ratio for homeowners insurers subject to prior approval regulation is significantly lower than the ratio for commercial property insurers. There are at least two possible explanations for these results that are not mutually exclusive. One explanation is that stricter rate regulation, by constraining the rates that homeowners insurers charge, also constrains the amount of reinsurance they can purchase. A second explanation is that stricter rate regulation prompts the exit of homeowners insurers that have higher amounts of reinsurance.

The residual market share, on average, is positively related to the state reinsurance ratio. However, the effect of the residual market share on the reinsurance ratio is negative for the homeowners insurance market. One possible interpretation of this result is that a larger residual market prompts homeowners insurers to purchase less reinsurance as more of their high-risk exposures have moved to the residual market. It also may be the case that the residual market variable is capturing the effect of other regulatory practices or market conditions that induce homeowners insurers to purchase less reinsurance. Additionally, a larger residual market may encourage the exit of homeowners insurers that purchase larger amounts of reinsurance.

When these results are considered in conjunction with those regarding changes in capital, homeowners markets in states with prior rate regulation and/or a relatively large residual market have experienced a significant reduction in the amount of insurance industry resources available to cover catastrophic losses. Regulators need to consider how their policies affect market capacity when contemplating measures aimed at preserving the affordability of coverage and/or expanding the use of residual markets as an alternative source of coverage. More specifically, other considerations aside, regulators should employ practices that encourage insurers to increase the amount of capital and reinsurance that supports the coverage they write in a given market, e.g., allowing them to charge risk-based rates.

#### **5.2.4 Underwriting Performance**

Insurers underwriting performance for property insurance is variable by nature, but significant catastrophic events may have substantial effects on insurers' post-catastrophe operations. The loss ratio (losses incurred divided by premium earned) is a commonly used measure of insurers' underwriting performance. State median loss ratios are used here to evaluate how the rate regulatory system in a state, along with other factors, affects insurers' underwriting performance. If a catastrophe prompts insurers to increase their prices, then we would expect the median loss ratio to fall following a catastrophic event. On the other hand, if regulators in prior approval states tend to constrain insurers' rates, this should tend to increase insurers' loss ratios, all other things equal.

In our analysis of state median loss ratios reported in Table 5, we did not find a statistically significant relationship between the median loss ratio and catastrophic events or prior approval regulation. As discussed earlier, it may be the case that only some catastrophes prompt insurers to reassess their estimates of the risk they face and raise their prices. Further, catastrophe-induced price increases may be implemented over a longer time period than two years. Our results also suggest that prior approval regulation per se does not have a material effect on insurers' rates, all other things equal. This could reflect the limitations of using a prior approval system as a proxy for strict regulation of insurers' rates.

Our analysis of loss ratios reveals only one significant finding: The share of premiums in the residual market share is positively related to commercial and homeowners insurers' loss ratios, and this effect is greater following a catastrophe. Larger residual markets could be having a negative effect on market profitability for at least two reasons. One is that if an insurer is charging inadequate rates and accounts for a significant share of the total market, this in itself could increase insurers' loss ratios. We would expect that this would be case in states where the residual market mechanism uses an assigned risk approach and its rates are inadequate. Where this approach is used, the loss ratios of voluntary market insurers would reflect the inadequate rates they would be forced to charge for residual market insureds. A second reason is that inadequate rates in an RMM could undermine insurers' efforts to charge adequate rates for

voluntary market insureds.<sup>43</sup> This supports the view that regulators should seek ways to reduce the size of the residual market through the measures we have discussed earlier, including setting residual market rates that do not compete with rates in the voluntary market and imposing strict eligibility requirements for residual market coverage.

## 6. Summary and Review

Recognizing that insurers react to catastrophic events in a variety of ways, this paper evaluates two important aspects of regulatory policies that can significantly influence homeowners insurance markets. Individual firm experiences and characteristics are not explored. Instead, we examine the features of state regulatory environments that mitigate or exacerbate the adverse economic consequences of natural disasters as they affect the functioning of homeowners and commercial property insurance markets. Two specific areas of regulation are considered: 1) rate regulation; and 2) residual market mechanisms. We conduct an empirical analysis of how the existence of a prior approval rate regulatory system and the relative size of a state's RMM affect five measures of market structure and performance: 1) changes in the number of property insurers; 2) the HHI of structural competition; 3) total insurer financial capital; 4) the reinsurance ratio; 5) and the state median loss ratio.

Our empirical analysis indicates that a prior approval regulation regime is generally associated with less desirable outcomes in homeowners insurance markets. More specifically, for homeowners insurance, prior approval rate regulation is associated with a decrease in the number of insurers, an increase in market concentration and a reduction in capacity (i.e., a decrease in surplus and less reinsurance purchased).

It is important to note, however, that a state's rate regulatory system does not fully reflect how rates are actually regulated in that state at any given point in time. In particular, there may be substantial variation across states in the specific manner in which a "prior approval system" is implemented. Further, regulators in some states with "competitive rating systems" (e.g., file-and-use) may seek to constrain rates as a general policy or at certain times. Hence, we are not in a position to conduct a more precise analysis of how actual rate regulatory practices affect property insurance markets. This specification issue is a matter for further research.<sup>44</sup> Consequently, while we can surmise when regulators attempt to solve

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43. We would expect that this effect would be more pronounced in states where the RMM does not enforce strict eligibility requirements.

44. We have given this matter considerable thought. We identified several possible ways in which actual rate regulatory practices in a given state could be determined. One way would be to examine the rate filings of insurers and the disposition of these filings by a state's regulators. We have explored the feasibility of this approach and determined that it would involve an enormous amount of work and appears to be impractical for developing reliable metrics of regulatory

post-catastrophe availability and affordability issues by suppressing rates that they may exacerbate these problems in the long run, more work is needed to provide stronger empirical support for this thesis.

We also find some evidence that larger residual markets are associated with poorer outcomes in homeowners insurance markets. As with prior approval regulation, a larger residual market is associated with a decrease in the number of insurers, higher market concentration, reductions in market capacity and higher median loss ratios. The existing beach plans and wind pools that were established in the wake of catastrophic events deserve further scrutiny, especially those that retain a large market share in the state, as they seem to be driving some homeowners insurers out of states. The expansion of FAIR plans to properties subject to significant catastrophe risk and the creation of state residual market insurers (i.e., the FCPIC and the LCPIC) also create the potential for adverse effects on homeowners insurance markets.

In essence, when these mechanisms are designed and administered properly as true markets of last resort, they are likely to have only minor adverse effects, if any, on homeowners insurance markets. It is when these mechanisms are designed and administered to achieve questionable objectives (e.g., the supply of “inexpensive” insurance coverage) that more significant problems can occur. Best practices with respect to the design and management of RMMs could include: 1) setting adequate residual market rates that are not competitive with the voluntary market; 2) imposing strict requirements for properties that are eligible for residual market coverage; 3) purchasing adequate reinsurance coverage; and 4) administering “keep-out” and “take-out” programs that reduce the number of residual market policies. Further, measures that maximize the availability of voluntary market coverage (e.g., allowing insurers to charge risk-based rates), should also help to decrease the size of RMMs.

Finally, the different effects of prior approval regulation and RMMs on the homeowners and commercial property insurance markets provide some evidence of the consequences of efforts to ensure affordability at the cost of rate adequacy. Compared to the homeowners insurance market, the commercial market does not appear to experience adverse disruptions due to prior approval regulation and residual market size. This brings us back to the dilemma faced by regulators: how to keep homeowners insurance “affordable” without unduly undermining market stability and efficiency. It may be possible to develop programs that would help homeowners in high-risk areas who can neither afford the full price of coverage nor be expected to move or invest in loss mitigation. Such programs could be preferable to attempts to enforce artificially low and thus indirectly subsidized

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stringency across all states for an extended period of time (e.g., 10 years). A second approach would be to compare the loss costs filed by advisory organizations with the loss costs approved by regulators. This approach could be more feasible if the necessary cooperation of advisory organizations could be obtained. A third approach would be to survey insurance companies on their characterization of each state’s rate regulatory environment over time.

premiums for all homeowners in high-risk areas, as it would allow market forces to continue to work.<sup>45</sup> However, it is important that a subsidization program include appropriate incentives for mitigating against future losses.

We must also acknowledge that our empirical analysis did not reveal a statistically significant relationship between catastrophic events and market outcomes with the exception of market concentration, contrary to what we expected. We know from studies that have examined the effects of specific events or a series of events (e.g., Hurricane Andrew, the 2004–2005 storm seasons) that there were significant disruptions in a number of state homeowners insurance markets along the southeast and Gulf Coasts (Grace and Klein, 2009; Klein, 2009a). Consequently, in conducting a broader empirical analysis across a larger number of states for an extended period of time as we have done here, further work is needed to develop a better approach to estimating how specific events and/or changes in insurers' assessment of catastrophic risk affect state homeowners insurance markets.

Assessing the effects of other regulatory policies with respect to insurers' underwriting and policy provisions would also be desirable but highly challenging. It would be necessary to develop specific metrics for such policies, which would require detailed research on state regulations and rules in these areas. In summary, while the analysis reflected in this paper provides some insights on how regulatory practices can affect market outcomes, further research on various dimensions of the regulation of insurance markets subject to catastrophic risks would provide the basis for more specific recommendations on regulatory practices that best serve the public interest.

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45. NRC (2015) provides a thoughtful examination of how flood insurance could be made more affordable for some property owners.

## Appendix A

**Table A-1:  
Events Corresponding to Economically Catastrophic Years**

State	Year	Event(s)
AL	2004	Hurricane Ivan
AL	2011	Alabama tornado outbreak
AR	1996	Wind, tornadoes, wildfire
AR	2008	Tropical storm Ike, Hurricane Gustav
AZ	2010	Flooding, severe storms, wind, hail and tornado
CO	1990	Severe storms
CO	1991	Winter weather
CO	2009	Lightning/avalanche
FL	1992	Hurricane Andrew
FL	2004	Hurricane Charley
FL	2005	Hurricane Katrina and Hurricane Wilma
GA	2009	Hail and flooding
HI	1992	Hurricane Iniki
IA	2001	Upper Mississippi River spring flood
IA	2011	Tornado/Mississippi River flooding
IN	1996	Blizzard and flooding
IN	2006	Severe storms and flooding
KS	1991	Severe storms and tornado
KS	1992	Wichita hail storm
KS	2011	Severe storms, tornado, hail and flooding
KY	1996	Winter weather
LA	1992	Hurricane Andrew
LA	2005	Hurricane Katrina/Hurricane Rita
LA	2008	Tropical storms
MN	1998	Tornado/flooding
MN	1999	Tornado/flooding
MN	2001	Wind
MN	2008	Flooding
MO	2001	Hail/tornado
MO	2006	Tornadoes
MO	2011	Severe storms, tornadoes and flooding
MS	1985	Winter weather
MS	2005	Hurricanes Katrina, Dennis and Ivan
MT	1991	Winter weather and wind
MT	2010	Flooding
NC	1989	Hurricane Hugo
NC	1996	Hurricane Fran

**Table A-1 (Cont'd):  
Events Corresponding to Economically Catastrophic Years**

<b>State</b>	<b>Year</b>	<b>Event(s)</b>
ND	1995	Hail and severe weather
ND	1997	Flooding
ND	2001	Winter weather
NE	1996	Tornado
NE	2001	Flooding and tornado
NJ	2012	Hurricane Sandy
OK	2010	Flooding
SC	1989	Hurricane Hugo
SD	1993	Great Flood of 1993
SD	2001	Flooding and tornadoes
TN	2011	Tornadoes, winds and flooding
TX	2008	Hurricane Ike
VA	2003	Severe winter storm

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# How Does Natural Hazard Insurance Literature Discuss the Risks of Climate Change?

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## Abstract

Natural hazard insurance has been increasingly considered in the literature of climate change. Based on a comprehensive literature review, this paper reviews how peer-reviewed literature on natural hazard insurance discusses the risks of climate change. The study highlights the increasing role of natural hazard insurance as a business opportunity contributing to adaptation and working in cooperation with governmental sectors. In response to these challenges, the insurance industry has started to develop adaptation strategies and measures to adjust data collection, catastrophe modelling and risk analysis despite the limitations of these strategies and difficulties arising from the requirement of considering a significant number of partners and systems.

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## **1. Introduction and Aim: Climate Change Affecting Insurance**

The Intergovernmental Panel for Climate Change (IPCC) confirmed that global warming increases the frequency of extreme weather events (IPCC, 2007). The result of this increased frequency is a heightened vulnerability of communities to weather events caused by a combination of natural and man-made factors (Blazey and Govind, 2007; Charpentier, 2008). This threatening combination is leading to a growing number of extreme weather events, whose impacts are becoming increasingly more costly (Charpentier, 2008; Mishra, 2010). The damage caused by Hurricane Katrina in 2005, for instance, was more than \$135 billion, and it greatly affected the insurance industry (Swiss Re, 2006). However, Blazey and Govind (2007) and Charpentier (2008) point out that increased losses from extreme weather events are not only due to climate changes, but also because of individuals' decisions that end up increasing their exposure to risks. Glade et al. (2008) add that an increase in exposure led to an increase of insured losses in the last decades. Most insurers, however, seem to be primarily adapting their business practices to the growing impacts of climate risks (Kunreuther and Michel-Kerjan, 2009), such as climate variability rather than implementing long-term adaptation and mitigation strategies based on potential losses to climate change and its related uncertainties.

Climate risks are thus becoming increasingly important to the insurance sector (Born and Viscusi, 2006; Charpentier, 2008). Changes in weather events may have been responsible for a growth in insured losses by about 2% a year since the 1970s (Muir-Wood et al., 2006; Ward et al., 2008). Climate change may have led to unprecedented losses in the 1980s and the 1990s (Muir-Wood et al., 2006). Swiss Re cautioned in November 1990 that insured losses from natural catastrophes were not a random occurrence (Dlugolecki and Keykhah, 2002). These occurrences are linear and bound to increase, and so is the exposure of populations at risk (Freedman, 1997). Thus, climate change is a risk management issue on a global scale, and the consequences of inaction, due to high costs, can result in potential larger losses for many countries (Charpentier, 2008; Robson, 2007).

## **2. Methodology**

This study is a meta-synthesis of the literature reviewed, a technique used to integrate, evaluate and interpret the findings of multiple qualitative research studies (Cronin et al., 2008). The aim of meta-syntheses is to transform individual findings into new conceptualizations and interpretations (Polit and Beck, 2006). Comprehensiveness, through the inclusion of a large number of databases (Jesson

et al., 2011)<sup>1</sup>, and relevance were the primary indicators considered in the review process (Newell and Burnard, 2006). Terms searched in databases were: “insurance,” “climate change” and “natural hazard.” This search was conducted on Oct. 21, 2013, and its categories of limitation were: 2000–2014, articles, English, peer reviewed and full text. The search yielded 195 papers from which the studies considered for this project were the ones making direct references and connections between the searched terms while answering the following question: “How does natural hazard insurance literature discuss climate change-related risks?” By “making direct references and connections,” this study took into account only those papers making explicit reference to the searched terms while discussing and answering the research question. As a result, the total number of relevant primary articles selected out of 195 papers resulting from the search terms was 33, with a lower number effectively cited in this review. From these primary references, a total of 420 secondary references were selected. Based on the selection criteria above, the number of secondary references was reduced to 54 articles, yielding a total of 87 articles for this review. In addition, studies on catastrophe risk and regulation that were not identified through the search mechanisms were later included in this review in order to extend the discussion on this area. In total, 10 additional references were included in this respect, yielding a total of 97 articles.

The great amount of information selected from these studies demanded the establishment of a set of criteria to identify which information would be the most relevant to this review. These criteria were: 1) a preference for statements rather than descriptions or examples; 2) inclusion of passages that highlighted comments and observations made by insurers; 3) a focus on climate change as a phenomenon instead of related hazards; 4) most updated information; and 5) discussions on the relationships between climate change and the insurance industry. While studies not falling into these categories were not immediately disregarded, they were given less focus as the scope of the review had to be narrowed down to accommodate general points, main arguments and debates in relation to the research question.

The categorization of the selected information was organized under the following sections. “Climate Change Affecting Insurance” provides an overview of the impacts of climate change on the insurance industry. “Insurers’ Views on Climate Change” describes the main viewpoints insurers share on the risks of climate change. “Challenges to Insurance Caused by Climate Change” covers the major problems faced by insurers as a result of climate change. “Insurance Addressing Climate Change” highlights insurers’ adaptation strategies and measures to reduce the risks of climate change. “The Role of Government:

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1. ACM digital library, AIP Journals, American Chemical Society, Annual Review, Anthrosource, ASM, BioMed Central, BMJ, Brill, Cambridge Journals, De Gruyter, DOAJ, Duke University Press, Econpapers, Elsevier, Emerald Journals, Encyclopedia Britannica, Idunn, IEEE, Informa Healthcare, IOP, IOS Press, Journal of Bone and Joint Surgery, Jstor, Karger, Lippincott Total Access, Literature Resource Center, Mary Ann Liebert, Nature, New England Journal of Medicine, Ovid, Oxford Journals, Oxford Arts Online, Palgrave, Project Muse, Psycarticles, Pubmed, Royal Society of Chemistry, Sage Journals, Science Direct, Scopus, Springer, SwePub, Taylor and Francis, Web of Science 1989 and Wiley.

Regional and National Variation” describes the role of public policies and regulations in relation to insurance and climate change.

### **3. Results**

#### *3.1 Insurers' Views on Climate Change*

The reviewed literature highlighted the growing concern among insurers about the impacts of climate change. The World Meteorological Organization (WMO) reported in July 2014 that weather, climate and water-related disasters are on the rise worldwide (WMO, 2014). From 1970 to 2012, \$2.4 trillion of economic losses were reported globally as a result of weather-related events and health epidemics (WMO, 2014). In two recent years, the worldwide economic losses from weather-related disasters were about \$130 billion in 2008 (\$44 billion insured) (Swiss Re, 2009) and \$190 billion (\$45 billion insured) in 2013 (AON, 2013). Mills informs that these losses have been rising more quickly than population or inflation (2005). Nonetheless, Neumayer and Barthel argue that “... there is no evidence so far that climate change has increased the normalized economic loss from natural disasters” (2011:23). Nonetheless, Neumayer and Barthel state that this lack of evidence does not omit policymakers from preventing “the further accumulation of wealth in disaster-prone areas” (2011:24) and designing policies that reduce greenhouse gas emissions. In 2009, analysts rated climate change as the greatest risk facing the insurance industry (Mills, 2009:324), and this growing risk raises serious questions about the future of insurance firms (Hecht, 2008). In Europe, climate change stands to increase losses from extreme events by 37% within a decade, while losses in a bad year could top \$400 billion (MacDonald-Smith, 2007).

Insurers believe that climate change can lead to the development of business opportunities (Mills, 2007; Botzen et al., 2009). Insurers can be a major partner in promoting climate change adaptation (Hecht, 2008; Mills, 2007) as they can “provide the means to restore things to their previous condition and to insulate vulnerable groups from external risks” (Blazey and Govind, 2007:19). Insurers can also provide signals of climate risks through pricing, terms and conditions while helping society spread financial risks (Charpentier and Maux, 2014; Ibragimov et al., 2009; Mills, 2009). Moreover, insurers can help mainstream climate change as long as policies remain affordable and accessible (Blazey and Govind, 2007). Blazey and Govind noted that climate change and insurance are dependent of each other: insurers can play a major role in adaptation, while adaptation ensures that “the insurance industry remains viable” (2007:29). As a result of this dependency, many insurers are adapting their business model to the realities of climate change (Charpentier, 2008; Mills, 2009). Insurers, however, “are still catching up ... to mainstream science and to their customers” (Mills, 2009:323). Insurance customers have changed the way they build, transport, design and produce (Mills, 2009:323). Insurers struggle to adapt as fast as their clients because of insufficient

data, the need of safeguarding customers, and regulations limiting coverage and the exit of markets (Born and Klimaszewski-Blettner, 2013; Grace and Klein, 2009; Klein, 1996; Mills, 2009).

As far as governance and public policies are concerned, it was noted that insurers require “an effective government strategy in order to remain solvent” (Blazey and Govind, 2007:17). This strategy is about the insurance industry actively engaging in policy making in order to help governments “deal with future financial consequences” resulting from climate change (Blazey and Govind, 2007:17). Governments, however, need to ensure that insurers have the necessary resources to provide climate change modelling services (Blazey and Govind, 2007; Ishihara, 2010). Gathering reliable information at the local level is one instance of the intersection between public policy and the insurance industry; another one is the capacity of the government and insurers to promote behavior modification (Blazey and Govind, 2007).

The issues of availability and affordability of insurance policies are also important intersections between the government and insurers (GAO, 2007; Klein, 1996). An often-raised question when it comes to climate change is who should pay for the elevated risks (Kunreuther et al., 2008). Insurers argue that they not only compensate damages, but also they contribute to the adaptation of societies to increasing risk and enhance economic resilience to disasters (Botzen and van den Bergh, 2008; Mills and Lecomte, 2006). However, the insurance sector faces problems with insuring low-probability, high consequence and correlated risks (Botzen and van den Bergh, 2009). As a result of these difficulties, insurers have tried to limit their exposure to losses by limiting availability, tightening terms and raising prices (Born and Viscusi, 2006; Mills et al., 2006).

When the private sector recedes, insurers expect that the government takes some responsibility for reducing climate risks and helps compensate damages (Mills, 2009). Blazey and Govind (2007) suggest that financial preparedness to climate change should become part of policies and strategies of all nations. These policies and strategies, however, must “be tailored to meet certain dangers and [are] conditioned by different budget levels and political concerns” (Blazey and Govind, 2007:18). However, this challenge of addressing climate change-related risks worldwide is hindered by the perspective that some insurers have that “the time pattern of losses due to socioeconomic developments is likely to cause fewer problems than the effects of climate change on disaster damage” (Botzen and van den Bergh, 2009:218). This happens because insurers argue that growing wealth, which increases the monetary value insured, results in increased premium revenues that balance expected insurance payouts and premium revenues (Botzen and van den Bergh, 2009; Charpentier, 2008).

### *3.2 Challenges to Insurance Caused by Climate Change*

Increased climate uncertainties force insurers to come up with strategies to reduce their exposure to risks. Insurers reduce their exposure to risks by raising their rates, not accepting new risks, and reinsuring (Born and Viscusi, 2006;

Dlugolecki and Keykhah, 2002). Climate uncertainty also makes insurers face the possibility of having their ratings downgraded by rating agencies or collapse under the claims made by policyholders (Mills et al., 2005). Another risk is that a changing climate moves premiums “beyond less affordable to incalculable” (Phelan, 2011:227). In this process of increasing premium prices, insurers criticize regulatory policies on natural catastrophe because low-risk and high-risk individuals cannot be distinguished (Blazey and Govind, 2007; Picard, 2008). One effect of regulators constraining rate differentials between low- and high-risk insureds is market distortions. Another effect of this regulatory constrain is a situation where low-risk policyholders subsidize “those who are at higher risk and suffer risk on a more regular basis” (Blazey and Govind, 2007:33). In order to address this mismatch, premium rates should be calculated based on risks that most accurately reflect the exposure levels of those householders living in high-risk areas (Blazey and Govind, 2007:33). Conversely, policyholders considered as lower risk should be offered premiums at a reduced rate to avoid the risk of adverse selection (Freeman and Scott, 2005).

Uncertainty is not the only challenge faced by insurers while dealing with the risk of climate change. Density is another one because insurance for natural hazard is still rare in developed economies (Dlugolecki and Hoekstra, 2006), but this rarity is expected to fade away as the privatization of utilities and transport companies lead to more demand for insurance solutions since privatized entities “cannot carry uninsured risk exposures to natural disasters” (Dlugolecki and Hoekstra, 2006:651). As far as developing countries are concerned, most of the infrastructure is still government-owned, as well as the risks involved in these ownerships, forcing these governments to “resort to multilateral financial institutions and donors for disaster risk funding” (Dlugolecki and Hoekstra, 2006:651). Thus, urban infrastructure requires new investments in developed and developing nations.

Less developed countries also lack a preparatory phase, which consists of information-gathering and buildup towards a more formal property-owning system (Litan, 2000). As a result, developing nations face “major problems with covariate risks” (Dlugolecki and Keykhah, 2002:93). In Bangladesh, the 1998 flood affected little more than half of 2.3 million members of the Grameen Bank, resulting in difficulties in servicing loans (ISDR, 2002). Other issues faced by entities providing micro-credit are that premiums may be low and administration costs high (Dlugolecki and Keykhah, 2002). As a result, Hoogeveen (2000) argues that for a covariate risk such as catastrophe weather—where many losses can occur simultaneously—formal insurance is the most efficient approach as long as the pool of risks is broad, and there is sufficient capital. While Vatsa and Krimgold (2000) agree with this statement, they also point out the need for physical risk control. The main problem while addressing covariate risks, Dlugolecki and Keykhah observe, is that many of these risks are not financially addressed and when so, “the poor are excluded” (2002:93).

Socioeconomic issues, like disregarding the poor, have been considered “the main cause behind the rapid increase in damage” and exposure resulting from

climate change (Botzen and van den Bergh, 2009:220). In reviewing lessons from Hurricane Katrina in the U.S., Tierney states that “social class position is perhaps the most obvious contributor to disaster vulnerability and resilience” (2006:113). This is also particularly the case in developing countries, which also suffer from “poor control of land use and weak enforcement of building codes” (Dlugolecki and Hoekstra, 2006:650). Also, “trends such as growing populations in hazardous geographic zones and poor maintenance of infrastructure tend to be overlooked” (Blazey and Govind 2007:23).

Still in the context of urban infrastructure, insurance is considered a “low regret” activity. Enabling the environment for adaptation and implementing specific measures to manage flood risk includes: routine monitoring, flood forecasting, data exchange, institutional reform, bridging organizations, contingency planning for disasters, insurance and legal incentives to reduce vulnerability (Wilby and Keenan 2012:1). All such activities are seen as “low regret” in that they yield benefits regardless of the climate scenario (Wilby and Keenan 2012). Implementing these “low regret” activities, however, involves expenses on “safety factors for new buildings, upgrading resistance and resilience of existing infrastructure, modifying operating rules, development control, flood forecasting, temporary and permanent retreat from hazardous areas, periodic review, and adaptive management” (Wilby and Keenan, 2012:1).

Climate change-related challenges are heightened because risk management systems are still based on historical assessments. Underwriters have been using historic loss data as a guide to future losses (Crichton, 2002), but past experience may cease to provide a reliable guide to future experience as climate changes (Phelan, 2011). Catastrophe software, for instance, have struggled to “generate consistent future scenarios based on past experiences” (Charpentier, 2008:104). It is worth noting that climate change and climate variability are not strictly the same, but in practice it may be impossible to differentiate them (van Aalst and Burton, 2000). Therefore, whether it is climate change or climate variability, if insurers are to remain solvent or even to expand into underwriting risks in new territories, historic loss data in itself is no longer a reliable guide to the future (Crichton, 2002).

The IPCC Working Group confirmed that insurance companies agree that the challenge of climate change requires “forward looking” policies not only in terms of cover, but also to ensure that the insurance companies themselves remain viable (Climate Change, 2007). Progress in the field of climatology has helped the insurance industry “increase the predictability in assessing climate change-related risks” (Ishihara, 2010:99) and “catastrophe models may aid rate setting” (Botzen and van den Bergh, 2009:220). Insurers’ main criticisms over the work of the IPCC, despite the panel being the most trusted source of climate information among insurers (Dlugolecki and Keykhah, 2002), are that the IPCC often changes the forecasts of hazards linked to climate change (Henderson-Sellers et al., 1998) and lack details in its climate models both spatially and temporally (Keykhah, 2000). Insurers argue that the IPCC’s forecasts should be complemented by regional assessments (Botzen and van den Bergh 2009). Regional projections

inform adaptation and risk management strategies because they include the understanding of households' perceptions, which may deviate from expert assessments (Botzen and van den Bergh, 2009; Ishihara, 2010).

"Forward looking" policies, however, have implications on pricing. Insurance pricing is a serious matter and one that insurers largely ignore (Booth, 2004). Booth (2004) argues that prices are lagging the real risk and that we cannot see these real risks because disasters do not happen every year. However, Booth (2004) notes that the real risk is going up by between 2% and 4% a year. Because insurers are using historical statistics, prices for weather risks are lagging by between 15% and 30% all the time (Booth, 2004). Also, Booth (2004) warns that additionally, it seems that most classes of insurance are affected by climate change: property and business interruption lines are the most at risk, and there are less obvious exposures that have implications for commercial lines coverages (Booth, 2004). Employers' liability programs could also be hit as temperatures rise and working conditions become unsafe (Booth, 2004). A UNEP Finance Initiative (UNEPFI) study lists perceived threats across sectors including: property/casualty (P/C) insurance; life and health insurance; banking and project finance; and asset management (Booth, 2004).

"The ability to appreciate risk is the first step when considering whether the insurance industry can withstand a natural catastrophe onslaught" (Blazey and Govind 2007:23). Risk appreciation also depends on consumers' willingness to pay (WTP). WTP is expected to increase if climate change increases the frequency or severity of natural hazards (Botzen and van den Bergh, 2009). However, premium changes may have little impact on insurance penetration if changes in WTP are in line with expected losses from climate change (Botzen and van den Bergh, 2009). In other words, customers are expected to continue taking out and accepting paying more for insurance as they become aware of the risks involved with climate change-related hazards (Botzen and van den Bergh, 2009).

Another challenge for insurers is market penetration. Mills (2009) affirms that efforts in this regard have improved, but the amount of information in this regard is still insufficient. Even though the full scale of market penetration is not known, Mills (2009) argues that the current market penetration of natural hazard insurance is "a tiny fraction of global policies." Thus, Mills concludes that the overall insurance market is still "considerably undeveloped" (2009:337). Also, insurers' traditional modelling techniques are still ill-suited for understanding the implications of climate change (Charpentier, 2008) and detailed loss data are "incomplete and under-utilized in understanding the trends" (Mills, 2009:338). This is the reason why the insurance industry needs to work with "local weather information in the underwriting process" (Ishihara 2010:98). Data quality defines underwriting performance (Ishihara, 2010).

Public insurance is also presented as a challenge. Crichton (2002) argues that government compensation schemes can be a severe burden on the taxpayer and generally do not provide similar levels of protection to private insurance. Crichton (2002) believes that public money should be spent on alleviation projects to prevent or reduce flood impacts. Even insurance technologies such as the

Caribbean Catastrophic Risk Insurance Facility (CCRIF) are not fully addressing the risks of climate change as “there is an unacknowledged politics at play” (Grove, 2010:538). In addition, Mills et al. (2005) and Klein (1996) posit that the government’s main role in the insurance and climate change debate is maintaining availability and affordability of insurance. King (2005) states that failure by governments to act in this area results in a failure or refusal to offer adequate coverage to populations at risk. Some authors defend that some mechanisms that could be used to achieve a broad participation in public insurance are discounted or subsidized premiums, making additional funds available during high loss years (Born and Klimaszewski-Blettner, 2013; Medders et al., 2011; USGAO, 2007).

### *3.3 Insurance Addressing Climate Change*

In response to these challenges, the insurance industry has started to apply its expertise in data collection, catastrophe modelling and risk analysis “to better track trends and define the problems posed by climate change and point towards solutions for both the industry and society” (Mills, 2009:338). Kunreuther, for instance, advocates a “comprehensive disaster insurance program whereby all natural hazards are required to be part of a standard homeowner policy” (2006b:176). A number of property/casualty (P/C) insurance companies also have been underwriting environmental technologies, such as carbon capture and sequestration facilities or wind-power generators, while personal lines insurers are seeing an increasingly desire to rebuild a home or office using green materials after an insured loss (Ishihara 2010). Insurance adaptation mechanisms offer the prospect of “a positive payout if adverse circumstances occur” (Robson, 2007:23).

Most adaptation policies are addressed at the national level (Warner et al., 2007). Effective adaptation, however, occurs at the local level, which requires the reinforcement of community policy and action targeted at disaster risk reduction (Helmer and Hilhorst, 2006; Picard, 2008). These local measures are essential because “climate change impacts are already manifest” (Phelan, 2011:229). Thus local “adaptation must be proactive rather than reactive” so that the benefits of insurance can be realized (Blazey and Govind, 2007:29). The promotion of local proactive adaptation happens by attaching conditions to policies that ensure “the survival and viability” of insurers (Blazey and Govind, 2007:29). This is consistent with the purpose of trying “to minimise risk ... on a long term basis” (Blazey and Govind, 2007:29) in communities at risk. Local adaptation is also a race against time as the measures required to adapt to climate change depend on the rate of changes: “If climate change occurs at a more rapid rate, investments in infrastructure will need to occur rapidly” (Blazey and Govind, 2007:30).

Mills (2009) states that insurers have been proactive in designing climate change adaptation strategies. These strategies promote loss prevention, align terms and conditions with risk-reducing behavior, finance customer improvement, and build awareness and participation in policy making (Mills, 2009). As for reducing greenhouse gas emissions, Blazey and Govind (2007) defend that insurers should couple insurance to strategies that help reduce the risk of power outages and

business interruption. Moreover, deductibles should be higher “to policies where homes or businesses are located close to coastlines or other vulnerable areas” (Blazey and Govind, 2007:32). These conventional forms of insurance are recognized as insurers’ attempts to rationalize their role in relation to climate change (Blazey and Govind 2007). However, a difficulty that insurers face while creating new products and reviewing their policies is that regulators have resisted premium adjustments (Born and Klimaszewski-Blettner, 2013; Grace and Klein, 2009), arguing that rates should be based only on historical losses and not reflect predictions (Kunreuther et al., 2008).

Insurers also argue that collecting premium from many individuals helps pay for damages that are very large for individual households and companies (Botzen and van der Bergh, 2009). Insurers do so “to reduce individual loss exposures and ... spread risks” (Botzen and van den Bergh, 2009:219). Primary insurers also spread risks by buying reinsurance coverage that spreads risk on large geographical markets or hedge risk on capital markets using weather derivatives, such as catastrophe bonds (Charpentier, 2008; Michel-Kerjan and Morlaye, 2008). This risk-spreading function of insurance improves financial security of insurers and policyholders (Botzen and van den Bergh, 2009a). In the case of Hurricane Katrina, more than 50% of the financial damage was ceded to reinsurance companies (Carpenter, 2006). Catastrophe insurance, for its part, has gained attention as an adaptation strategy in small island developing states (SIDS) and other regions exposed to the threat of hurricanes (Grove, 2010). Insurance enables SIDS “to transfer disaster risk to global financial markets, reducing states’ financial vulnerability and allowing an influx of capital after a disaster” (Grove, 2010:538). Catastrophe insurance and reinsurance are, however, expensive, and climate change exacerbates these costs—“potentially to uncontrollable levels” (Blazey and Govind, 2007:38).

Insurers tap into risk segregation to reduce moral hazard (Blazey and Govind, 2007). However, the insurance industry’s ability to segregate risk is reduced (Freeman and Scott, 2005; Medders et al., 2011) because “climate change intersects across a wide variety of different insurance lines, and extreme weather events present a number of contemporaneous or co-variant risks” (Blazey and Govind, 2007:33). Catastrophes generally mean that segregation of risk is difficult because large numbers of people are simultaneously exposed to the same peril (Freeman and Scott, 2005). Insuring agriculture illustrates moral hazard since it has many exposures to climate change (Dlugolecki and Hoekstra, 2006). Climate change alters agricultural risks through a slow-change process, with positive and negative effects for agricultural productivity, and through an increasing number of extreme weather events (Dlugolecki and Hoekstra, 2006).

Governments have supported agricultural insurance systems because of the high risk of moral hazard (“when farmers exploit their insurance cover rather than making an effort to reduce their losses”) and an adverse selection (“when only farmers with substandard risks take out insurance”) (Dlugolecki and Hoekstra, 2006:650). A case study by Giné et al. (2008) showed that less than 5% of the eligible farmers in a drought-prone region of India bought rainfall index-insurance.

Also, weather-index insurance failed to attract the target group of farmers as it was purchased mainly by those farmers who needed it the least (Akter, 2012). Charpentier and Maux, however, argue that adverse selection theory “may not be suited to the analysis of natural-catastrophe insurance” because of information asymmetry; that is, “insurers are better informed about catastrophe risks than are individuals” (2014:3). As far as moral hazard is concerned, government programs may cause significant moral-hazard problems because public programs discourage individuals and local governments to take protective measures and encourage construction in hazard-prone areas (Charpentier and Maux, 2014; Medders et al., 2011).

Another problem is that loss potential from catastrophes “often exceeds the capacity that the private insurance sector is willing to offer” (Dlugolecki and Hoekstra, 2006:650). Moreover, state-subsidized insurance schemes serve as “financial safety nets for farmers but make it less likely that farmers will insure non-catastrophic losses privately” (Dlugolecki and Hoekstra, 2006:650). Another issue with regard to public insurance programs is that farmers are not only influenced by premium prices, but also by broad economic changes in conjunction with climate change (Belliveau et al., 2006). To address these challenges, Smit and Skinner (2002) developed an adaptation framework that includes technological developments, government programs and insurance, farm production practices, and farm financial management (Bonsal et al., 2011). Wheaton and MacIver (1999) also developed a framework to improve the understanding of the adaptation cycle by asking questions about who is adapting, to what, why, how, with what effectiveness and with what residual effects. As for forest insurance, Blennow and Sallnäs (2002) found out that a small percentage of non-industrial private forest owners take action to remedy the effects of climate, but many of them did not know whether they take risk-reducing measures in relation to which specific climate change-related hazard.

Insurance limits damage by acting as a price signal for risk and encouraging the undertaking mitigation measures (Botzen and van den Bergh, 2008; Kunreuther, 1996; Medders et al., 2011). A necessary condition to limit damages is that insurance premiums reflect the risk faced by the insured property (Kunreuther et al., 2008). Premiums can stimulate development in less risky areas and restrain development in hazard-prone areas (Born and Klimaszewski-Blettner, 2013; Botzen and van den Bergh, 2009). Moreover, insurance can provide incentives to homeowners “to invest in measures that mitigate damage” (Botzen and van den Bergh 2009:220). This is relevant because mitigation measures are useful to manage risks despite individuals rarely undertaking them (Kunreuther, 2006a). Studies found out that homeowners do not undertake mitigation measures through insurance because: 1) they cannot see the tradeoff between spending money now and the future benefits; 2) they have little knowledge about financial adaptation; 3) they believe that government relief efforts provide a financial safety net; and 4) they have no resources to buy insurance premiums (Kleindorfer and Kunreuther, 2000; Medders et al., 2011). Private and public sectors financing

disaster risk, therefore, feature advantages and limitations (Dlugolecki and Hoekstra, 2006).

In addition to helping diversify risks, the private sector tends to be more effective and innovative than the public sector because of the private sector emphasis on increasing its profits through the controlling of administrative costs and fraud (Dlugolecki and Hoekstra, 2006). However, there has been little evidence that new risk management tools such as weather derivatives, catastrophe bonds and micro-insurance “will become a significant part of the standard repertoire of underwriting products” (Dlugolecki and Keykhah, 2002:95). Insurers are actually struggling to increase the popularity of catastrophe bonds beyond reinsurers’ circles (Salmon and West, 2007; Blazey and Govind, 2007). As far as micro-insurance is concerned, Mills (2009) states that this type of insurance is reaching a greater number of policyholders than most climate-related products in the traditional market and that micro-insurance products respond to vulnerabilities such as food and water shortages in rural areas of South America, Africa and Asia.

Insurance can modify behavior to reduce risk exposure (Freeman and Kunreuther, 2002). Insurance terms and policies designed to “instill behaviors that reduce greenhouse gas emissions as well as appropriate efforts to prepare for the impacts are beginning to emerge” (Mills, 2009:339). Pay-as-you-drive, for instance, has been offered with discounts in recognition of “the link between accident risk, energy use and distance driven,” and “potential liability of corporate directors and officers for their actions regarding climate change risks” is now reflected in insurance policies (Mills, 2009:339). As a result of these policies, customers with a tendency to reduce vulnerabilities are increasingly seen as “good risks” and “are being rewarded with ... lower premiums” (Mills, 2009:339). The promotion of behavior change puts insurance “in the vanguard of the environmental movement” (Mills, 2009:344). Challenges and opportunities in this area include “bringing promising products and services to scale, continuing to identify and fill coverage gaps, and becoming more sophisticated in identifying and confirming the performance benefits of green improvements” (Mills, 2009:355). However, it has “not yet been demonstrated how some insurance lines might respond to climate change” and, if insurers do not meet environmental expectations and are not subject to more scrutiny, they can be “pointed out as an industry only interest in ‘greenwashing’” (Mills, 2009:355).

Pricing climate change-related risks more highly can be seen as an “adaptive insurance response to an increase in the probability of extreme events” (Phelan, 2011). The problem is that “private insurance against natural catastrophes can be prohibitively costly” (Medders et al., 2011:191), and it raises significant social equity issues with regard to economic access to insurance (Phelan, 2011; Picard, 2008). As a response to this equity issue, in the U.S., the Florida Commission on Hurricane Loss Projection Methodology was created in 1995 to evaluate computer models that ensure reliable projections of hurricane losses so that rates for residential property insurance are neither excessive nor inadequate (FCHLPM, 2009). This type of initiative reveals necessary because inaction by the

government or communities will have a negative impact on the availability and affordability of insurance (Blazey and Govind, 2007).

Insurers, however, still claim that premium income will lag behind payouts of claims unless premiums are adjusted (Grace and Klein, 2009; Mills et al., 2002). Born et al. explain that premium income lags behind payout of claims because “residual markets should focus on addressing the availability of coverage and less on the affordability of coverage” (2011:295). The best strategy for insurers would be to incorporate expected changes in probabilities of weather extremes in assessing exposure to, and pricing and management of, risk (Botzen et al., 2009). Grace and Klein (2009) noted that the supply of insurance policies after Hurricane Andrew in 1992 decreased because Florida regulators resisted rate increases. The supply of insurance policies only started to increase in 2004 when insurers viewed their rates “as being close to adequate except in the high-risk areas” (Grace and Klein, 2009:17).

At the regional level, some catastrophe reinsurance companies established themselves on Bermuda, an Atlantic island that has developed a financial service infrastructure after Hurricane Andrew (1992) “precipitated the collapse of a number of insurance and reinsurance companies ... [and because of] its attractive tax status” (Dlugolecki and Keykhah, 2002:92). These companies, funded mostly by American and British capital, formed an international reinsurance hub committed to catastrophe reinsurance (Dlugolecki and Keykhah, 2002). In addition to operating independently, several of them decided to form the Risk Prediction Initiative (RPI)—an industry-academic research consortium—with the Bermuda Biological Station for Research (BBSR) as the scientific partner (Dlugolecki and Keykhah, 2002). The RPI framed its approach as “the open alternative to catastrophe models” and does not engage in climate science research per se or use general circulation models as its focus has been on “the development of historical records of tropical windstorm landfall in the U.S. Gulf Coast, the modeling of tropical windstorm formation and propagation in the Atlantic Ocean, and the proposal of seasonal forecasts of tropical windstorm activity” (Malmquist, 1997 and 1998).

Insurers have also been collaborating with non-insurance groups (Mills, 2009). Research centers are working with reinsurers “to implement satellite-based remote sensing in support of micro-insurance for small farmers in Africa and on a joint project ... to refine the understanding of the economics of climate change” (Mills, 2009:335). Other partnerships have been initiated with regional development banks and financial corporations (Mills, 2009). P/C insurance companies are the ones driving “the majority of the activity with life-health companies lagging far behind” (Mills, 2009:336). In addition, well-designed financial compensation arrangements based on strategic networks can speed up recovery processes and contribute to overall economic resilience (Botzen and van den Bergh, 2009). A combination of this financial expertise with investments in damage mitigation measures by households (e.g., retrofitting and structural designs and materials) and prevention undertaken by the public sector (e.g., infrastructure and long-term mitigation loan programs) is likely to result in

well-diversified risk management strategies that enhance economic resilience to natural hazards (Born et al., 2011; Botzen and van den Bergh, 2009; Charpentier and Maux, 2014).

To enhance economic resilience, Ibragimov et al. (2009) suggest a centralized agency at the national level to coordinate risk distribution and to ensure that risk sharing takes place. This coordination role is especially important because “catastrophe insurance markets have failed worldwide,” and “government interventions are generally considered to be quite inefficient” (Ibragimov et al., 2009:960). The national model that Ibragimov et al. suggest sets conditions for a “functioning reinsurance industry” by aiming a “global diversification outcome” through a “coordinated reinsurance/diversification equilibrium” (2009:961).

Finally, insurance strategies addressing climate change and driving product innovation has also been collaborating with mitigation efforts (Ishihara, 2010). The expectation is that the insurance industry will “meet the growing need to manage risks” through adaptation even though some insurance products function as “mitigation tools by facilitating the production and distribution of green technologies or low emission appliances” (Ishihara, 2010:96). Mitigation, or the reduction of greenhouse gas emissions, should be undertaken given the potential for significant costs arising from climate change (Robson, 2007). Booth (2004) argues that industrial corporations will eventually have to deal with regulatory constraints on the amount of greenhouse gases they can emit by investing in new technology and trading in emissions permits. Booth (2004) notes that this is an area where the insurance industry can play an important role and benefit by offering risk management services and more traditional insurance products. Climate change mitigation, however, is characterized by complexity and interdependencies as it requires behavioral change (Phelan, 2011:229). The responsiveness of the insurance industry in this area is tested in two key areas: “protections provided to policyholders and indemnifying clients who face litigation in connection with GHG [greenhouse gas] policies” (Blazey and Govind, 2007:35). In relation to indemnifying liability of GHG producing companies, the main source of litigation will be “negligence and litigation can also be utilized by policyholders where there is a lack of loss prevention efforts”; as a result, insurance companies need regulations that “force companies to internalize the costs of carbon” (Blazey and Govind, 2007:35). These regulations will act as “financial incentives to companies to reduce pollution and ... the exposure of insurance companies to liability” (Blazey and Govind, 2007:35). However, there remains “the problem of causation and attribution of fault and responsibility... [as] it is not ... clear who is responsible for greenhouse gas emissions in terms of time, place, and composition of gases” (Blazey and Govind, 2007:35).

### *3.4 The Role of Government: Regional and National Variation*

The design of public policies limiting exposure to and reducing the impacts of natural disasters is necessary (Born and Klimaszewski-Blettner, 2013; Botzen and van den Bergh, 2009). Compensation to risk at large in a society is regularly a

result of state-private interplay, where in some countries public insurance is more prominent and in others private is more prominent. The state, however, regularly provides the “insurance of last resort”—i.e. is the party that is required to provide fundamental services and compensation in the case of large events or very large losses (Botzen and van den Bergh et al., 2009).

In relation to climate change, policies need to provide “a number of incentives in order to be effective” (Blazey and Govind, 2007:21) and to ensure that the insurance industry “can adequately fulfill its function without collapsing under the weight of demand” (Blazey and Govind, 2007:41). These regulatory incentives are usually about keeping rates adequate; companies solvent; and state insurance pools having the capacity to pay losses in the event of large risks (Blazey and Govind, 2007; Born and Klimaszewski-Blettner, 2013). Insurers, for their part, need to demonstrate that “there will be an offsetting reduction in losses” in relation to this policy-making process (Mills, 2009a:349). Governments may also be supportive of policies that incentivize a proactive insurance role against climate change-related risks. Blazey and Govind (2007) argue that the insurance industry can manage risk on a long-term basis given its expertise in translating information into risk evaluation. Blazey and Govind add that having insurers dealing with the risk of climate change rather than government disaster relief programs is preferred because it increases “business confidence in relation to given risks whilst government continues with post event relief payments,” encourages adaptation, and avoids that governments costs “for post disaster repair ... spiral to the point where budgetary resources are outstripped by the needs for assistance” (2007:20). Medders et al., however, highlight the importance of government intervention strategies to reduce hazard risks and support the creation of a “hybrid system,” in partnership with the private market, to mitigate natural catastrophes more effectively (2011:192).

Insurance solutions may thus often be described as “the fruit of partnership between the public sector and private companies, under which the insurance industry typically offers the expertise needed to cope with the risk, while the public sector offers financial capacity to support the program” (Ishihara, 2010:99). A result of this partnership is the establishment of private-public partnerships (PPPs) to prevent insurance companies from “being dragged into insolvency in the event of a climate disaster” (Blazey and Govind, 2007:16). PPPs constitute a relief effort when post disaster payouts are no longer viable (Blazey and Govind, 2007), helping governments cover extreme losses resulting from the extreme tail of the loss distribution of natural disasters (Botzen and van den Bergh, 2008; Kunreuther, 2006b; Michel-Kerjan and de Marcellis-Warin, 2006). However, in designing PPPs, governments should keep the characteristics of the insurance industry in managing disaster risks (Born and Klimaszewski-Blettner, 2013; Botzen and Van Den Bergh, 2009) while making available the protection of affordable and accessible policies (Blazey and Govind, 2007). In establishing PPPs, regulators can harness the power of institutional investors through a framework that determines the provision of basic data and ensures that the basic information is

available so that they can rely on competitive forces to exploit it for the common good (Dlugolecki and Keykhah, 2002).

In developing countries, PPPs seem to be the appropriate model for insuring climate risk because “public resources are limited” (Dlugolecki and Hoekstra, 2006:655). Governments need to link financial incentives with environmental planning so that the effect of disaster insurance becomes “a powerful leveraging tool” (Blazey and Govind, 2007:21). Disclosure of greenhouse gas emissions and climate change-related risks is another major regulatory requirement (Blazey and Govind, 2007:41) because of the potential magnitude of climate change impacts on insurers’ solvency, as well as availability and affordability across all major categories of insurance (Mills, 2009a:326). The information usually required to be disclosed relates to a company’s discounted premiums and “evidence detailing an offsetting reduction in losses” (Blazey and Govind, 2007:41). Such disclosure would allow regulators to follow up with questions as they emerge and “investors and consumers to incorporate additional information into their investment and purchasing decisions” (Mills, 2009a:345). Disclosure would also help regulators to monitor insurers’ “financial conditions and the progress they are making towards managing climate change risks” (Mills, 2009a:346).

Governments also can “devolve some responsibility to individuals or communities,” but this can only occur when “the information regarding the risk is very clear and the adaptive operations are relatively simple” (Blazey and Govind, 2007:30). The most problematic barrier to this “dispersal of responsibility” is whether individuals can be relied upon to take consistent and coherent action to “adequately share the risk of a common problem” (Blazey and Govind, 2007:30). Also, communities display limited understanding of how financial services could contribute to risk reduction, and few tools are available for them to address such actions (Warner et al., 2007). Moral hazard and adverse selection are issues that illustrate “the individual failure to bear the responsibility for risk” (Blazey and Govind, 2007:30). In the U.S., a report found that residents in hurricane-prone areas were reluctant to invest in protection measures because they did not see the benefit in paying for risk prevention (Kleindorfer and Kunreuther, 2000) despite information or education campaigns to motivate people to take responsible measures to reduce risk (Blazey and Govind, 2007).

The designation of risk zones by governments also helps insurers. Risk zones are important for the development and implementation of drought and hurricane insurance policies, and long-term land use planning for adaptation to climate change (Smith and Lenhart, 1996; Adger et al., 2005; Botzen et al., 2009). Climate change-related regulations are, therefore, related to: 1) the reduction of greenhouse gases; 2) policies that move people out of disaster prone locations; and 3) minimizing potential future damage (Blazey and Govind, 2007).

International frameworks also guide discussions on climate change and insurance. The United Nations Environment Programme (UNEP) Insurance Industry Initiative came into being in 1995. Its activities on climate change are channeled through the Climate Change Working Group of the UNEP Finance Initiatives, which allows “banks and other institutions to collaborate” (Dlugolecki

and Keykhah, 2002:86). The strategy outlined by the UNEP is the establishment of a relationship between insurance “facilitating sustainable business practices” (Blazey and Govind, 2007:29). In addition, the United Nations Framework Convention on Climate Change (UNFCCC) released its “Bali Action Plan” in 2007, recognizing the importance of insurance mechanisms for climate risk management (Ishihara, 2010). The UNFCCC’s statement helped drive an industry-wide debate on the role insurance is expected to play (Ishihara, 2010). The World Bank has also sponsored considerable research into the question of how the risk of climate change can be managed. One issue that the World Bank is especially concerned about is the vulnerability of the Caribbean region to natural catastrophes with the possibility of deterioration due to climate change (CGCED, 2002). As far as developing nations are concerned, the Conference of the Parties in Marrakech 2001 decided to proceed with the issue of vulnerability in developing nations. Workshops were proposed on “insurance and risk assessment in the context of weather extremes, and on what specific insurance-related actions could be taken to address the concerns of developing countries” (Dlugolecki and Keykhah, 2002:91).

The literature also evidences significant variation in the work of insurance between different world regions. Western European insurers have the deepest history with climate change insurance initiatives, and “some of the more comprehensive strategies can be found there” (Mills, 2009:336). However, “considerable creativity and innovation has emerged from the United States” (Mills 2009:336). In Asia, “insurers have been first movers in many areas,” and in Australia, “insurers are quite active on a variety of fronts” (Mills, 2009:337).

The UK insurance industry, for instance, has been “much more proactive on climate change than other nations” (Dlugolecki and Keykhah, 2002:86). British insurers often had “international interests through subsidiaries and global reinsurance,” and British insurance coverage usually “includes flood and storm as well as subsidence and uplift of the ground” (Dlugolecki and Keykhah, 2002:87). “Communication with the scientific community on climate change has been strong since 1988” (Dlugolecki and Keykhah, 2002:87). The first time insurance was considered in a national climate change review was in the UK (CCIRG, 1991) and in 1994, an insurance institute commissioned a report on climate change from its fellowship members (CII, 1994) and repeated it in 2001 (CII, 2001). The governments in England and Wales, however, have failed to address the issues of hazards, vulnerability and exposure from an insurance standpoint (Crichton, 2002a). The impacts of flooding have grown as defenses have been allowed to deteriorate (Crichton, 2002a). Vulnerability has increased because new lightweight building techniques have been adopted without any corresponding strengthening of building codes (Crichton, 2002a). Exposure has increased as well because the government has permitted developments in flood hazard areas, even when their own environmental agencies advised against it (Crichton, 2002a). As a result of these failures, insurers have been lobbying government to seek changes in policy (Crichton, 2002a).

At the regional level, the European Union (EU) Commission states that climate change demands insurance solutions, the integration of these solutions into a financial framework, and a review of existing public and private disaster funds (Commission of the EU, 2007). As a result of this political priority, the reform of natural hazard insurance has become a cornerstone of the EU's strategy for climate change adaptation (Schwarze et al., 2011). The debate over this strategy has been on whether certain lines of insurance covering natural hazards should be left to private markets or assumed by government, and whether it is preferable to have one entity or multiple entities insure natural hazards. The EU had previously changed its indemnity insurance landscape because of pressure from forces within the Union in favor of increased competition; however, a public monopoly insurance program for natural hazards can prove to be more efficient as insurance systems in Europe "have developed over long periods of time ... and are adapted to the natural and socio-historical conditions of the regions they cover" (Schwarze et al., 2011:28). Also, insurances are deeply rooted in the different cultures of the societies in combating natural hazards, the collective ego and a specific framework of political institutions (Medders et al., 2011; Schwarze et al., 2011).

In the U.S., the insurance industry is heavily regulated at state level (Dlugolecki and Keykhah, 2002; Ibragimov et al., 2009). As a result, there is "not a single domestic market to serve as a base for overseas expansion, which may also lead to an inward-looking nature of the U.S. insurance community" (Dlugolecki and Keykhah, 2002:88). Also, there are "very few U.S. insurers" considered international, which isolate them from concerns over global issues (Dlugolecki and Keykhah, 2002:88). Therefore, there are "relatively few catastrophe insurance firms [operating] in each state for each catastrophe line" (Ibragimov et al., 2009:961) and the traditional insurance strategies of dealing with disasters in the U.S. have been through raising premiums, relying on investment returns or withdrawing from certain insurance markets (Keykhah 2002). The problem of these strategies is that insurers in the U.S. focus only on consequences—not causes—of disaster losses (Keykhah, 2002) and insurance executives are "tied down to their own firm" (Ibragimov et al., 2009:961). In Europe, in contrast, insurers' strategies have embraced both the causes and effects of hazards' related losses (Mills et al., 2001). The most important difference, however, "between the European and the American insurance communities is their time frames and priorities" (Dlugolecki and Keykhah, 2002:88). American insurers are concerned with short-term impacts (Packard and Reinhardt, 2000) whereas European reinsurers "are not bound by quarterly indices" and so can envision a longer time frame "in which issues such as viability, sustainability, and partnerships can evolve" (Dlugolecki and Keykhah, 2002:88).

Mills (2009) presents a different perspective on the status of the insurance and climate change debate in the U.S. The topic of climate change in the U.S. went from "one that was rarely ... addressed in the trade press ... to a regular news item" (Mills, 2009:330). In more recent years, insurance regulators, under the National Association of Insurance Commissioners (NAIC) Property and Casualty Insurance (C) Committee's Climate Change and Global Warming (C) Working

Group, have met to discuss climate change and, in 2008, issued “a paper whose subject was among the top agenda items at the 2007 meeting of the International Association of Insurance Supervisors (IAIS)” (Mills, 2009:330). This paper eventually led to the creation of “Insurer Climate Risk Disclosure Survey” (Ishihara, 2010:97). Insurers and reinsurers in the U.S., therefore, “are increasingly seeing their industry as part of the solution through the creation of innovative products and services to promote emerging technologies and practices” (Mills, 2009:330). Their main concern is that climate change can affect “insurer solvency, as well as availability and affordability across all major categories of insurance” (Ishihara 2010:97).

Finally, some scholars criticize the use of insurance as an environmental security mechanism led by European and U.S. insurers. Insurance is believed to be a governmental mechanism that regulates, produces life, and operates through commodifying and managing contingency (Dillon, 2007). Also, the emergence of insurance as a security mechanism reflects “rearticulations of environmental security discourses” through security rationalities (Grove, 2010:538). Rather than offering security through geopolitical strategies that identify and exclude sources of danger, insurance maximizes the potentials of emergent life (Dillon, 2008). There are two assumptions behind insurance discourses on dangerous climate changes (Grove, 2010). First, “risk management and insurance sustain the forms of social and political order that Western-led ‘development’ has produced” through the institutional discourses of the World Bank and United Nations (UN) (Grove, 2010:538). Second, this Western type of development expects to transform an unruly world of difference into techno-managerial spaces of control and domination (Ferguson, 1990).

## 4. Conclusion

This review demonstrated that insurers are increasingly concerned about climate risks, whether these risks arise from climate change or climate variability. Increased frequency and severity of damaging weather events resulted in growing insured losses. In the case of property/C insurance, for instance, increased exposure and losses to climate risks require immediate actions on a global scale.

Insurers view climate risks as business opportunities. Insurers argue that their policies can help individuals and groups reduce the levels of exposure, risks and costs to the effects of damaging weather hazards. Insurance firms, however, require the support of public authorities to make their policies available and affordable for those people living in hazard-prone areas.

Insurers face more challenges as a result of climate risks. Natural hazard insurance is still rare, particularly in developing and poor countries. Socioeconomic issues affect the degree of exposure of householders to weather hazards. As far as risk management practices are concerned, modelling techniques are still based on historical data rather than on future risks. And government

intervention, such as public insurance, may lead to increased exposure levels and place a burden on taxpayers. Information on market penetration of natural hazard insurance is still limited.

Climate uncertainties pose significant challenges to insurers. If insurers' income is lowered beyond payouts, the industry could stand the risk to collapse after a catastrophic event. Rating agencies can also downgrade ratings of insurers because of growing risks. Under a significant risk increase, premium prices may grow exponentially until they become prohibitive. Regulators may also prevent insurers from increasing the prices of their policies. Natural hazard insurers thus need to deal with the issues of moral hazard and adverse selection at the individual level.

So far, insurers have been addressing climate risks in a variety of ways. Insurers have been underwriting environmental technologies that reduce the emission of GHG. Insurers also have requested public authorities the design of regulations that ensure the viability and survival of the sector in face of growing risks. Up-to-date scientific information has also been requested to improve insurers' rate setting. Reinsurance and the financial market are mechanisms that insurers can use to spread risks. Insurers have also been rewarding decisions and behavior that reduce risk exposure and promote mitigation. Insurers have withdrawn from markets that feature high risks and advocated flexibility to increase policy prices, in spite of equity discussions that premium adjustments unfold.

Finally, insurers rely on the government as an insurer last resort, and to keep insurance viable. Public policies can reduce the exposure and reduce the impacts of natural hazards, and help maintain risk levels insurable to amongst other avoid risks of collapse. Public-private partnerships, for instance, protect the government and business interests by preventing both from becoming insolvent or being the only part responsible for mitigating and adapting to climate risks, in addition to dealing with the costs of recovery after a disaster. The degree of these partnerships and the structure of the insurance market varies in each country and region, as does the perception and critique over insurance practices addressing climate change-related risks.

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# Regulatory Issues Related to Autonomous Vehicles

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## Abstract

Self-driving cars mean revolution and evolution. The revolution: Humans will leave the traditional rules of the road behind as they turn over the driving to a machine. The evolution: States will not be defining who a driver is but what a driver is, as the term will gradually change from a person steering the vehicle to a product doing so. Along the way, changes are inevitable to the traditional model of auto insurance. The National Highway Traffic Safety Administration (NHTSA) is working to create a national policy on automated vehicles, and the NHTSA is encouraging states to develop best practices while focusing on consistent regulatory objectives. This article looks at where the states are now in the regulatory process and presents the issues surrounding the expected shift in liability.

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## Introduction

Americans are united by at least one characteristic: They all consider themselves to be above-average drivers. While that notion belies the definition of average, the fact is that human error is the root cause for about 94% of all traffic crashes (NHTSA, 2015). Most of the driving errors are due to inattentiveness or distractions. People drive too fast for conditions or fail to keep proper distance from the vehicle ahead. Drivers focused on an impending hazard become reflexive, causing them to overcorrect and lose control of their vehicles. Drivers also tend to misjudge what other drivers are doing or should be doing, and even those assumptions often prove wrong. This makes U.S. roadways dangerous. About 38,000 people were killed in traffic crashes in 2015, and more than 4 million are injured (National Safety Council, 2016). Taking humans out of this equation, by way of self-driving technology advances, should result in a reduction in accidents, leading to fewer automobile-related fatalities and injuries.

In early 2016, self-driving automotive technology got a boost when President Barack Obama proposed providing nearly \$4 billion over 10 years for pilot programs to test connected vehicle systems in certain designated areas of the U.S. (Solomon, 2016). In addition, the U.S. Department of Transportation's (DOT) Smart City Challenge pledged up to \$40 million to the one city that fully integrated innovative technologies into its transportation network, which includes self-driving cars, connected vehicles and smart sensors. The idea was to gain early adopters and role models. The seven finalist cities were Austin, TX; Columbus, OH; Denver, CO; Kansas City, MO; Pittsburg, PA; Portland, OR; and San Francisco, CA. Columbus was announced as the winner of the challenge in June 2016. It will use a combination of the challenge winnings, an additional \$10 million provided by Paul G. Allen's Vulcan, Inc. and private funds of \$90 million to "deploy three electric self-driving shuttles to link a new bus rapid transit center to a retail district, connecting more residents to jobs." The city also expects to develop better transportation options to improve access to health care for its residences (DOT, 2016).

These financial incentives and general increased interest in self-driving cars has led some to believe the innovation will become mainstream very soon. However, this is a common misconception, brought on by increasingly sophisticated computer power and futuristic safety features being engineered into some new car models (Driverless Car Watch, 2015). Today's technology is dominated by driver assistance devices, which operate in limited settings and for very limited times. For example, emergency braking systems are a last-second savior when a crash appears imminent. Auto-parking only lasts for a few seconds, with the driver required to pay close attention to the process. Lane warning devices, for when a car veers across highway lines, also lasts for a blink of the eye. While today's auto assistance systems are currently driver supervised, they cannot evolve into continuous driving without technological advances that are now mainly on the drawing board. As a result, a decade or more may pass before we

have a mass-produced, fully autonomous vehicle (FAV). A realistic prediction for a time frame when FAVs on the highway are the norm is around 2035, according to a survey of autonomous vehicle experts by the Institute of Electrical and Electronics Engineers (IEEE), a technical professional organization. That is the year experts expect that steering wheels, gas pedals and brakes will be removed from mass-produced cars (IEEE, 2014).

In this article, we discuss the advances in autonomous vehicle (AV) technology that have been made to date. We also provide information on some of the setbacks faced by companies and technology developers. Next, we review existing regulation as it relates to autonomous vehicles and outline some of the challenges faced by developers and manufacturers as it relates to liability. Finally, we provide some concluding statements.

## **The Transportation Revolution**

There has been quite a bit of “hype” generated by the advances in AV technology. Developers, however, are generally taking a cautious approach and are moving slowly with getting these vehicles on the road. As a result, this provides time for other developers to enter the marketplace.

To date, Google has been one of the frontrunners in developing AVs. As the public face of self-driving cars in the U.S., Google has a prototype with a top speed of 25 mph. Google cars are already on the streets in Austin, TX, and Mountain View, CA, with test drivers on board ready to assume control. The company has said it wants to build a fleet of vehicles without a role for the driver, meaning without steering wheels, because its current technology cannot easily switch control from automated driving back to the driver (Markoff, 2014).

No developer of AVs is declaring that its vehicles are ready for the open highway, and some companies have experienced delays and/or setbacks. For example, General Motors (GM) announced in September 2014 that it would offer a Super Cruise system on its large sedans by 2016 to enable hands-free driving on freeways that had proper lane markings. That rollout has been delayed until 2017. In an article in early 2016, GM global product chief was quoted as saying: “Getting the technology right and doing it safely is most important” and “It will come out when it is ready” (Colias, 2016).

While Tesla’s Autopilot system has a number of autonomous features, it is not a self-driving car, as the company stressed when it released the system in “public beta” form in October 2015 (Tesla, 2016). Tesla owners were reminded to keep their hands on the wheel and to remain alert at all times. The press kit on the Tesla software upgrade begins by noting that the model “is designed to keep getting better over time.” That is the general theme for those whose focus is on deploying and adapting to the technology, not developing it, such as insurers, regulators and state transportation departments.

In May 2016, a fatal crash occurred in Florida involving a Tesla Model S while the vehicle was in self-drive mode. Tesla issued a press release stating, “Neither autopilot nor the driver noticed the white side of the tractor-trailer against a brightly lit sky, so the brake was not applied” (Vlasic and Boudette, 2016). It also indicated to the U.S. Senate Commerce Committee looking into the cause of that crash that it was the crash prevention system, not the assisted driving system or Autopilot, that failed to work properly. The distinction between the auto-braking system and Autopilot may be an important one going forward since technology is Tesla’s brand, not auto manufacturing (Boudette, 2016).

Almost immediately after the Tesla incident, BMW announced it would enter the AV market, with a focus on driverless cars for ride sharing. The announcement was called a “radical departure” for mainstream automakers, which have generally let the technology companies take the lead. The time frame for BMW’s rollout: 2021 (Marshall, 2016).

## The Regulatory Response

In a 2016 article in *The New York Times*, the authors point out the anomaly that a new driver has to pass a licensing exam, but a new computer-controlled vehicle does not face the same hurdle (Sivak and Schoettle, 2016). They recommended a “go slow” approach to the adoption of these vehicles. They were especially adamant that the pattern-recognition software in the vehicles be tested extensively. They also recommended comprehensive standardized tests for new vehicles entering the market. This sentiment seems to be echoed by others.

The NHTSA has begun to provide some guidelines as it relates to autonomous vehicles. In its “Preliminary Statement of Policy Concerning Automated Vehicles” released in 2013, it cited instances in which its research on new technology has led to regulatory requirements. For example, its findings as it related to electronic stability control (ESC) resulted in an industry standard or requirement that ESC now be included on all new light vehicles. These guidelines were updated in early 2016.

The NHTSA’s goal is to create a consistent national policy to let innovation thrive and to work with partners to develop a model state policy on automated vehicles, keeping public safety at the core. In September, the NHTSA released the “Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety,” which outlined five different levels of automation based on the SAE International definitions. Level 0 is no automation or instances in which the human driver is in full control. Level 1 is the lowest level of automation, which includes vehicles that contain automation systems that can “sometimes assist the human driver conduct some parts of the driving task,” while Level 5 is the highest level of automation and involves automation systems that “can perform all driving tasks, under all conditions that a human driver could perform them” (DOT, 2016).

In addition to providing information on the varying levels of automation, the most recent NHTSA publication discusses the federal and state roles as it relates to vehicles, sets forth specific model state policy and provides some regulatory tools. The federal responsibilities are related to establishing and enforcing vehicle safety standards, reviewing and overseeing any vehicle recalls, and educating people about vehicle safety. The primary state responsibilities include managing motor vehicle registrations, managing driver licensing and regulating insurance.

The document suggests that states should “evaluate their current laws and regulations to address unnecessary impediments to the safe testing, deployment and operation of highly automated vehicles (HAVs), and update references to a human driver as appropriate. States may still wish to experiment with different policies and approaches to consistent standards, and in that way contribute to the development of the best approaches and policies to achieve consistent regulatory objectives.” Very importantly, the policy also indicates that states should work to create consistency as it relates to “laws and policies to avoid a patchwork of inconsistent state laws that could impede innovation and the expeditious and widespread distribution of safety-enhancing automated vehicle technologies” (DOT, 2016).

As it relates to policy, the document outlines several important areas of consideration including:

1. Administration: Identification of the lead agency that will manage the testing of automated vehicles and the development of a “jurisdictional automated safety technology committee” that is created by the lead agency.
2. Testing: Application process for the testing of automated vehicles. Applications must be approved by the lead agency.
3. Deployed Vehicles: Review of existing regulations related to human drivers (such as safety, crash reporting, liability and environmental impacts) should be conducted and “gaps” identified. Registration and titling of AVs should be developed.
4. Liability/Insurance: A determination should be made regarding allocation of liability among various parties (such as owners, operators, guest passengers, manufacturers and others) and insurance requirements.

Over the past few years, the number of states passing legislation related to AVs has increased, with 16 states introducing legislation related to autonomous vehicles in 2015. This is up from 12 states in 2014, nine states and Washington, DC, in 2013, and six states in 2012.<sup>1</sup> In 2011, Nevada became the first state to authorize AV operation. Since then, five other states—California, Florida, Michigan, North Dakota and Tennessee (plus Washington, DC)—have passed

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1. National Conference of State Legislatures, “*Autonomous Vehicles*,” May 26, 2016. [www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx](http://www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx).

legislation related to AVs. Arizona's governor issued an executive order related to AVs.

Table 1 provides a summary of recent legislative activity. Today's laws on driverless cars deal primarily with testing them, and, according to one expert, it is not even clear that such legislation is necessary (Smith, 2016). Several states have attracted research activities for self-driving cars without specific legislation. In fact, while Google pushed for legislation to get things rolling in Nevada and California, it has pulled away from getting involved in the legislative process in other states due to restrictions imposed.

**Table 1:  
Synopsis of Self-Driving Car Legislation**

State	Legislative Focus				
	Encourages development, research, innovation	Sets safety standards	Establishes testing requirements	Authorizes testing on public roads	Involves insurance regulation or liability
California	Enacted 2012 SB 1298	Enacted 2012 SB 1298	Enacted 2016 AB 1592	Enacted 2012 SB 1298	
Florida	Enacted 2012 HB 1207			Enacted 2016 HB 7027	Enacted 2012 HB 1207
Louisiana	Enacted 2016 HB 1143				
Michigan	Enacted 2013 SB 169		Enacted 2013 SB 169		Enacted 2013 SB 663
Nevada	Enacted 2011 AB 511				Enacted 2013 SB 313
North Dakota	Enacted 2015 HB 1065				
Tennessee	Enacted 2015 SB 598	Enacted 2016 SB 1561			
Utah		Enacted 2016 HB 280	Enacted 2015 SB 373		
Washington, DC	Enacted 2013 DC B 19-0931				

According to a 2016 study by the RAND Corporation, all of the enacted regulations similarly define AVs as vehicles with the capability to self-drive without being actively controlled or monitored by a human operator. An operator is defined as the person who engages the technology. This excludes vehicles enabled with active safety systems or driver assistance systems, such as "blind spot" assistance or crash avoidance systems.

In anticipation of the future commercialization of driverless cars, Nevada's law (NAC-482A) requires the driver of an AV to obtain a "certificate of compliance," either from the manufacturer of the vehicle or from a state-certified technology certification facility, if the vehicle operates in non-testing mode. It is the only state to have done so, to date. The compliance certificate identifies the specific geographic location where the licensee can test the vehicle. It also requires

special temporary license plates for each AV and stipulates that two people must be in the car at all times.

Despite the progress made in passing legislation to speed up AV adoption, there are roadblocks. For example, following an unfavorable report while the bill was in committee, Maryland's proposed legislation to establish a task force on self-driving vehicles failed—twice. An additional 14 states are continuing to address the issues surrounding testing of the vehicles and determining liability (CyberLaw).

Since 2012, several of the state legislatures have considered bills that related to autonomous vehicles. These bills had varied experience in their passage toward becoming laws. The bills that have been passed are summarized in Table 1.

The bills can be evaluated on five criteria:

1. Did the bill encourage the development of autonomous vehicles? Did it assist in creating a climate for research and innovation?
2. Did the bill address safety standards related to the operation of autonomous vehicles?
3. Did the bill specifically allow testing of the vehicles being developed?
4. Did the bill allow operation or testing on public roads?
5. Did the bill speak to any specific insurance requirements related to autonomous vehicles?

California is the only state with a law that addresses all of these issues. Other states with successful legislative efforts related to one of these criteria are Florida, Michigan, Nevada, North Dakota, Tennessee and Utah. Few of the laws directly address insurance issues. Most of the laws encourage the development of autonomous vehicles and/or establish safety standards, with the safety standards usually being the requirement to have an “over-ride” system in the vehicle so that a human operator can take over in an emergency situation.

Although some of the laws allow the use of public roads for testing and/or regular operation, few included specific insurance standards. An interesting feature of many of the laws is products liability protection for the vehicle manufacturer. This applies in any case where the seller or user modifies a vehicle.

During 2015 and 2016, state legislatures in California, Georgia, Hawaii, Illinois, Maryland and Texas attempted to pass legislation. However, most of these efforts have failed. Two interesting provisions have appeared in a number of these bills. The first is prohibition of local governments from regulating AVs. The second concerns guidelines for punishment of persons who access the electronic system of an AV inappropriately. Bills attempted in 2016 are summarized in Table 2.

Regulators around the world are dealing with similar issues. The United Kingdom's (UK) Department of Transport released a review of its existing regulations for AV technologies and concluded that its legal and regulatory frameworks were not barriers to testing AVs on public roads (DOT, 2015). Germany and Sweden have reviewed their legislation as well.

**Table 2:  
2016 Attempted Legislative Activity**

State	Legislative Focus				
	Encourages development, research, innovation	Sets safety standards	Establishes testing requirements	Authorizes testing on public roads	Involves insurance or liability
Alabama	Failed S 178				
Georgia	Failed S 113			Failed S 113	Failed S 113
Hawaii	Failed H 2687	Failed S 630			
Illinois	Passed House, in Senate H 3136				
Massachusetts	New draft pending H 4321/S 1841				
Maryland	Failed H 8/S 126				

Driverless vehicles can legally be tested on public roads in the UK, providing a test driver is present and takes responsibility for the safe operation of the vehicle. Drivers are not limited to a test track, do not need certificates or permits, and are not required to provide a surety bond. They are required to have insurance. The report's findings declared that the country is "positioned to become a premium global location for the development of these technologies" (UK Dept. of Transport, 2015). The UK also has developed a Code of Practice for those testing driverless vehicles, published in 2015 (Department for Transport, 2015). It outlines general and safety requirements for vehicles and drivers.

## Liability and Insurance-Related Regulation

The number of car crashes is expected to drop significantly as more crash avoidance technology becomes commonplace. However, the cost of replacing damaged vehicles is likely to rise due to the complexity of the electronics and other components needing repair. As such, the frequency of crashes will decline, but the severity costs remain unknown. Additionally, the advent of AVs brings an expectation that personal liability will decrease, since this technology can reduce human error, ultimately resulting in fewer vehicle crashes. But, exposure for manufacturers and product developers may increase if system failures are determined to be the cause of more and more accidents.

These changes in the distribution of crashes and who is responsible will likely affect how automobiles are insured in the future. It is easier to estimate costs of common occurrences rather than rare ones. Crashes involving AVs will be rare, and the data available to date is related to test-driving, not actual day-to-day operation. It may take decades to generate enough AV data to properly price coverage. However, insurance companies cannot wait decades to make coverage decisions related to AV technology as consumers, technology developers, car manufacturers and regulators may be looking for insurance solutions soon.

The 2016 RAND study suggested that the shift in responsibility from the driver to the manufacturer may make a case for a form of no-fault automobile insurance. Product-liability lawsuits are more expensive and time-consuming than car crash lawsuits, so a no-fault system that quickly compensates victims without assigning fault may be viable. Others foresee something akin to the federal National Childhood Vaccine Injury Act, a no-fault compensation program for vaccine recipients who suffer an adverse reaction. The 1986 legislation was in response to concerns that the availability of the life-saving vaccines would diminish because of the threat of injury claims.

Liability insurance is likely to evolve over time, as lawsuits make their way through the legal system and a precedence is set. Cusack (2016) suggests that there are numerous factors to consider in settling claims involving AVs, including whether there was a technology failure or an operator failure. With the lack of existing data and the continued advances in technology, it may be that more questions exist at this time than solutions. For example, how would a case be handled if a driver, one not operating an AV, causes an accident? Will we strengthen mandatory bodily injury liability and medical payments coverages so that “fault” is not at the core of recovery?

Additionally, uninsured motorist (UM) coverage may become obsolete. Physical damage coverage also may change. This coverage may become mandatory given the potential costs of repairs to expensive, critical systems that would be needed to get vehicles back on the roadway. An alternative would be to require “critical repair” coverage be included in the purchase costs of vehicles. Zelle and Whitehead (2014) describe a similar process with regard to developing new contracts and coverages for cyber liability exposure.

The Insurance Information Institute (III) notes the impact on insurance for driverless cars includes not just regulation and liability, but also underwriting criteria and repair costs (Driverless Car Market Watch, 2016). Many of the traditional underwriting criteria—such as number and kind of accidents an insured has had, the miles driven annually and where the car is garaged—will still apply. But the make, model and style of car may assume greater importance. The implications of where the car is garaged and driven might be different if there are areas set aside for automated driving, such as dedicated highway lanes.

Shared driving between human and machine will make the liability issues even more complicated. During the transition to fully automated driving, insurers may try to rely more on telematics, the “black boxes” that monitor driver activity. Use of telematics is forecasted to grow, and it has the advantage of using

individual and current driving behaviors, rather than relying on past trends (National Association of Insurance Commissioners, July 2016).

In terms of insurance regulation for autonomous vehicles, regulators may face some significant challenges similar to those can be restrictive or helpful. Though states can set their own rules, what is to be the framework? “Regulators will either let self-driving cars on U.S. roads or cede the testing to others” (Crovitz, 2016). Harrington (2016, p.33) decried “excessive conservatism” in getting new products and services to market. He suggested that insurance regulators focus on being helpful rather than being restrictive. Fier, et al (2014) made the similar argument in a paper on reforms of the federal flood insurance program.

When self-driving cars become mainstream, every driver ultimately will benefit since fewer car crashes and fatalities will lower the cost of insurance. But AVs will not eliminate the need for insurance; the shift in liability from the driver to the automaker or manufacturer of the AV technology raises the probability that insurance becomes a standard feature, part of the purchase price of a self-driving vehicle. Determining fault for a car accident will be less of an issue when AV technology is a witness that can sort it all out. However, the sales price of the AV must reflect this liability, which adds to the new-car purchase price and could slow down sales. States still have quite a bit of work to do in the meantime. Many have seen their entry into the AV realm curbed by trying to come up with a definition of the word “driver” in a future where that word is not about a human behind the wheel. *The Week*, quoting *The Wall Street Journal*, suggested that the decline might be as much as 80% of the current \$200 billion in premiums for auto insurance. The article also noted that the auto insurance industry is spending substantial sums on research into autonomous cars and forming partnerships with auto manufacturers (Scism, July 2016). Does that create the possibility that auto insurance will come with the car?

## Conclusion

The vast majority of automobile accidents are caused by human error. As driver assistance devices advances and support of self-driving automotive technology continues, an evolution to FAVs is on the horizon. While there are some clear advantages to FAVs, such as reduced accident frequency, there also may be some challenges.

Currently, Tesla and Google have invested millions as “first movers” and have gained a market advantage. Both are working to find the best guidance system, preferably one that minimizes human participation and driver error. Tesla and Google have been joined in the market by BMW, Ford, GM, Volvo and Uber.

The fact is the technology for the autonomous car is advancing faster than laws and regulations related to the “use, ownership and maintenance” of the car. This puts both the legal system and the regulatory structure in a reactive position. The tort system has proven to be an expensive place to test new technologies, but

the autonomous car will be judged there. Insurance regulators may have to work to catch up in an environment where each state can set its own rules.

The technology for the autonomous car is also advancing faster than operator ability and attitude. The “freedom of the road” is a core American value, and some operators want maximum opportunity to control the vehicle or, at least, some aspects of its operation. A preventable fatality involving a Tesla was related to driver error, something the designers hoped to minimize. This will involve continuous educational efforts—and time.

Finally, progress toward a world of self-driving cars will mean the automobile insurance industry may see a substantial change in how coverage is provided, which could ultimately affect premiums. Since auto insurance is the largest component of property and liability insurance premiums, insurer profits also may decline.

As far back as the 1950s, there was a dream of “pilotless” flying vehicles. As we approach perfecting the AV, will we move on the roadways with electronic sensors? Will the term “traffic engineer” take on a new meaning? The roadblock to manufacturers is a 50-state regulatory system that could, in essence, bring 50 different sets of rules that would be nearly impossible for auto manufacturers to comply with. Think of it as similar to a roadway infrastructure for self-driving cars that ends at the state line, another possible hazard to the process. The need for some consistency is clear.

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# Limitations of German Insurance Disclosures to Improve Consumer Understanding, With Lessons for U.S. Insurance Practices

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## Abstract

Germany changed its insurance regulations to require intermediaries to provide disclosures at the time of application to improve consumer knowledge and protection. The German experience is that the disclosures were incorporated well into the business process but were largely ineffective to improve consumer knowledge. This outcome is consistent with numerous studies on the limitations of disclosures, due to cognitive limitations (bounded rationality) and financial literacy. We review the German practices for effectiveness, compare German and U.S. experiences with insurance disclosures, and conclude that disclosures show little impact on consumer decisions. We recommend that disclosures could provide

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benefit if conveyed in better formats in line with existing research on financial services disclosures. Regulators and consumer advocates should, therefore, be restrained about general proscriptions for disclosures. Greater benefit to consumers may come from improving default coverages and raising the advisory standard for intermediaries.

## Introduction

Information disclosure about insurance has long been recognized as especially complex in insurance markets because of the complexity of the products and the range of risks to be addressed, and because insurance “is a mixture between an experience and a post-experience good” (Kukoc, 1998:227 and 231). The policyholder must know exactly what risks are covered and what risks are excluded under the contract, which requires details about the contract, coverage and exclusions (Kukoc, 1998:233). Disclosures have been the usual proposed solution to inform consumers about their insurance choices, both specifically for insurance and in general for financial services. Germany took another step in this direction by implementation of a Directive of the European Parliament and of the Council of the European Union to improve insurance consumer knowledge and protection through policy disclosures and stronger insurance agent representation requirements. The disclosures include important information about coverage and price, among other items, and new requirements on the agent to advise the client. The idea is that agents (intermediaries) can reduce informational asymmetries between the insurer and the client—with informational advantages to both sides—and, therefore, facilitate the closing of a contract (Cummins and Doherty, 2006; Beenken, 2010; Eckardt and Raethke-Doepfner, 2010; Hoeckmayr, 2012; and others discussed later). These studies show that while disclosures have improved and the burden (transaction costs) on the intermediaries was slight, consumers’ understanding of the insurance products was little changed. These results are in line with numerous other studies in Europe and the U.S. on consumers’ cognitive limitations and the limited effectiveness of disclosures for financial services. Thus, this experience adds evidence to the limitations of disclosure efforts from the quite opaque German market and lessons for the U.S. insurance market on the limited effectiveness of disclosures.

We begin with a review of studies on consumer understanding and limitations to understand financial services. We next review the German implementation of the European Union (EU) Directive. We then compare the practices for insurance transactions with consumers in the U.S., where intermediaries can have different responsibilities to the consumers depending on the intermediaries’ classification as agent/salesperson, broker/order-taker or adviser/fiduciary, and where disclosures also are favored and sometimes required. We conclude that more disclosures are unlikely to accomplish the desired goals of a better-informed consumer making better insurance choices unless disclosures are drafted based on more recent studies as to how to improve readability and understanding. We, therefore, suggest consumers will be better served by rules that mandate default options to increase insurance coverages, as required now in some lines of insurance, and that insurance intermediaries be required to provide a higher level of advice: from salespeople and order-takers to a fiduciary duty. This fiduciary standard exists in the U.S. for insurance when there is a “special relationship” and in financial services under a new U.S. Department of Labor (DOL) rule for rollovers of

employee money. For the U.S. market to accomplish a higher level of advice, the regulators will have to reconcile the diverse roles and legal responsibilities of insurance intermediaries to align the intermediaries' interest with the consumers' interests. As a comparison, the U.S. Securities and Exchange Commission (SEC) continues to study the issue of the financial services intermediary's duty to advise on investment securities (whether to raise that from a suitability standard to a fiduciary standard), and the U.S. federal government is using behavioral economics to create better outcomes and default actions for consumers and citizens. Additionally, European regulators are studying the effects of behavioral economics on the market. (See, for example, Decision Technology Ltd., 2010.)

## **Expected and Actual Benefits from Mandated Disclosures – a Literature Review**

The use of more disclosures to improve consumer knowledge in various financial transactions has been largely ineffective. Cude (2006) found most consumers had limited understanding of disclosures, and many participants said they were unlikely to read disclosures. Ben-Shahar and Schneider (2011) surveyed various studies of the effectiveness of consumer disclosures and found little impact. Issacharoff (2011:59–60) noted that the “soft paternalism” of disclosure had little effect to improve poor decision-making, especially in light of behavioral insight in how consumers make decisions. Fun, Graham and Weil (2011:31-34) noted the imperfections of the real world, which is that people in general have difficulties in comprehending, interpreting and applying information given to them, especially when made available in disclosures. This phenomenon is usually called “bounded rationality.” These studies suggest a priori skepticism that more disclosures will improve consumer knowledge. Issacharoff writes, “A population that is bombarded with disclosure forms and information is not necessarily better off if the recipients are unable to understand what is being presented to them.” (Issacharoff, 2011:60; See also Sovern, 2010; Matthew, 2005). Inderst (2011:6–7) is skeptical that consumers who make only infrequent decisions with limited feedback are able to make better decisions with more information, due to cognitive biases. As he says, “If poor financial capability is ... a matter of psychology rather than one of information, then information-based approaches to educating households are likely to, at best, improve outcomes only modestly.”<sup>1</sup> (See also

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1. Related studies in the sociology of risk are informative here: that lay people evaluate risk differently than experts (Wiedemann, 2003) and how risk communication studies at the macro level might be applied to the individual level with disclosures. Löffstedt (2008) notes the fragmentation of studies in risk communication and perception across multiple disciplines such as environmental, technological, public health, etc. Kievik, ter Huurne and Gutteling (2012: 131–132) discuss the role of information-seeking behavior as “mediator between risk communication and subsequent risk-related knowledge and behavior,” and because risk messages that work in

Fernandes, Lynch and Netemeyer, 2014). Hart (2011:67–76) contends that disclosures are a remedy that masks, and encourages, the problem of the bargaining inequalities.

Omri Ben-Shahar (2009:3–6) argues that the opportunity to read contracts is an unnecessary presumption based on myths of assent based in contract law, and not worth the time and effort for the product. This is probably correct where contracts accompany products, but the idea is problematic for insurance where the product *is* the contract. The difference is sometimes referred to as a “relational contract,” where the parties begin their duties and liabilities when they enter into the contract, against a “transactional contract,” where the contract brings about or culminates in some product or service (Schwartz, 2008:108; Feinman, 2009; Feinman, 2000).

Studies show financial literacy is low in developed countries. “[F]inancial illiteracy is widespread even when financial markets are well developed, as in Germany, the Netherlands, Sweden, Italy, Japan, and New Zealand, or when they are changing rapidly, as in Russia. Thus, observed low levels of financial literacy in the USA are prevalent elsewhere, rather than specific to any given country or stage of economic development” (Lusardi and Mitchell, 2011:503). “In all countries, higher educational attainment is strongly correlated with financial knowledge, but even at the highest level of schooling, financial literacy tends to be low. Among other items, education is not a good proxy for financial literacy” (Lusardi and Mitchell, 2011:504). Lusardi and Mitchell (2014:13) provide details of the types of errors in investment and financial literacy among U.S. consumers: “[F]ew people across countries can correctly answer three basic financial literacy questions. In the U.S., only 30 percent can do so, with similar low percentages in countries having well-developed financial markets (Germany, the Netherlands, Japan, Australia and others), as well as in nations where financial markets are changing rapidly (Russia and Romania).”<sup>2</sup> A study on financial literacy and retirement planning in the Netherlands found most households have weak financial knowledge, which results in poor retirement planning (van Rooj, Lusardi and Alessi, 2011, who note that “thinking about retirement” shows a positive correlation with actually planning for retirement). A World Bank meta-study on financial literacy across many countries at different income levels concluded that studies examining financial education and retirement savings showed improvements in savings and financial record keeping in higher income groups, whereas other measures of financial education and decision-making did not change significantly with higher income levels (Miller, Reichelstein, Salas and Zia, 2014:26).

Other studies and articles note the almost complete absence of reading of any type of standard contract (White and Mansfield, 2002; Ben-Shahar, 2009; Becher

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the lab do not work well in the real world where “risk information has to compete with myriad other issues and messages that call for the individual’s attention.”

2. They also note a persistent gender gap, with women having lower financial literacy than men (Lusardi and Mitchell, 2014:17), a point not important to our argument.

and Unger-Aviram, 2010; Eigen, 2012). Various explanations are given for this, usually in the behavioral economic terminology—for example, Edwards (2005), information overload and cognitive behavioral limitations; Marotta-Wurgler (2010), click-through licenses led to readership between 0.1% and 1.0%; Prentice (2011), bounded rationality, rational ignorance, irrational optimism; Ahn, Park and Haley (2014), optimism bias reduces attention to risk disclosure; Korobkin (2003), bounded rationality and the costliness of shopping for better terms; and Cheremukhin, Popova and Tutino (2011), inattention theory.

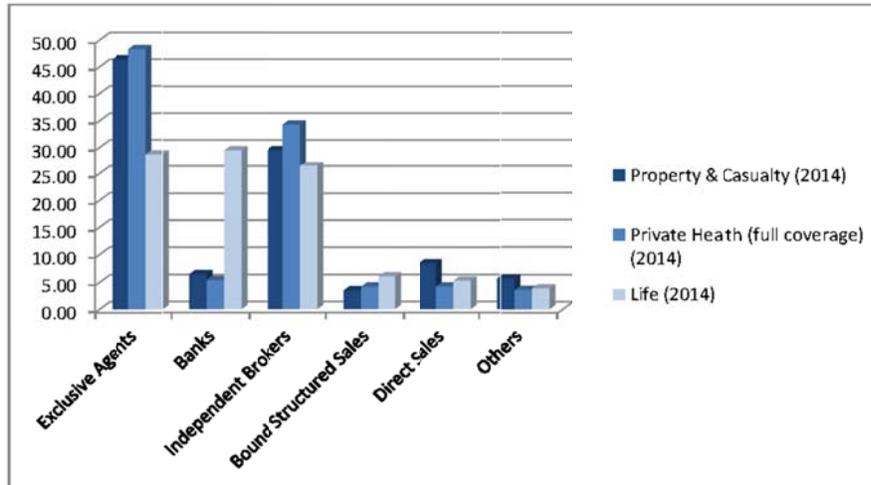
Fung, Graham and Weil (2008:90) write, “Simply providing more information to consumers, investors, employees, and community residents will not assure that risks are diminished or that schools, banks and other institutions improve their practices. Without careful design and implementation, transparency policies can do more harm than good.” Eigen (2012:138–139) finds that the more information is provided in a form contract, the less consumers read it, but the more they do read, the more likely they are to perform as obligated.

Prentice (2011:1065–1066 and 1097–1153) addresses disclosures in investment products offered by stockbrokers and concludes that disclosures do not lead to better decisions. That is because people are not the perfect rational actors using all available information to make the utility-maximizing decisions that theory suggests. (Similarly, Ben-Shahar, 2009; White, 2009.) Worse, according to Prentice (2011: 1096, 1101–1102), persons who believed they acted morally at one point may grant themselves “moral license” to play fast and loose with the rules afterwards, and that “disclosure distortion” may result in even more biased advice, as if there is some “moral equilibrium effect.” Further, consumers who receive disclosures may be more reluctant to question the stockbroker’s recommendations and actually trust the advisor more, or be more reluctant to discount the advice (Cain, Lowenstein and Moore, 2010, and discussed in Prentice).

## **Doing More to Improve Consumer Knowledge – The German Implementation of the Directive 2002/92/EC to Advise and Disclose**

German insurance is mostly sold through intermediaries. German law requires even single-company representatives to do their best for the consumer and enquire of the insured’s needs, if there is a reason to prompt the inquiry, as the law describes it (§ 61 (1) VVG).

**Figure 1:  
Market Share in Germany 2014**



Towers Watson, 2015; Towers Watson, 2016

The dominant forms of insurance intermediaries for private insurance lines in Germany are exclusive agents (legally independent but bound to one specific insurer), followed by independent agents/brokers and banks. Directly marketed products account for only a few sales, partly because discounts are not substantial and partly because consumers perceive agents work for free when paid by commissions rather than by separate fees.

The Directive 2002/92/EC of the European Parliament and of the Council on Insurance mediation came into effect on Dec. 9, 2002, and was implemented into German law by the “Gesetz zur Neuregelung des Versicherungsvermittlerrechts” (Law for the Reorganisation of the Insurance Agent Regulation), enacted Dec. 22, 2006, and effective May 22, 2007. The main political goals of the EU directive for this were to facilitate the career choice and activities of insurance intermediaries within and across the internal market of the EU, and to enhance consumer protection in this field. The regulation covers the intermediary, who provides a service to a third person in exchange for some kind of economic benefit. Excluded are, among others, distribution channels directly controlled by the insurance company (Directive 2002/92/EC of the European Parliament and of the Council of the European Union, 2003:1–24). The German law was the most significant change to the legislation of intermediaries in Germany for 100 years (Reiff, 2006; similarly Farny, 2011). It addressed two major categories: 1) agent qualifications; and 2) various duties to a client. To improve consumers’ knowledge and protect them from abusive behavior by the sales personnel, new laws were imposed on the duties of these intermediaries, creating minimum standards (Hoeckmayr, 2012).

The laws require insurance salespeople to register and obtain a business license. The registration is issued and published by the CCI if: 1) the agent's financial affairs are in acceptable order; 2) the agent is reliable in the sense of not having a relevant conviction within the last five years; 3) the agent provides evidence of proper liability insurance; and 4) the agent has passed the CCI examination. Exemption from the exam can be through longevity in the profession (since Aug. 31, 2000); if the salesperson provides proof of other qualifications accepted as equivalent; or if an insurer assumes unlimited liability for the agent and is responsible for the agent's education, and the appointment of the agent is through an insurer's central registration. Currently, around two-thirds of all registrations fall into this last category (DIHK, 2012). Another exemption is sales personnel selling insurance contracts as an "accessory" for other, more expensive products. These sales personnel can partly or even completely be excused from the requirements mentioned above, such as car salespeople selling insurance with a new car, or travel agencies selling travel cancellation expenses insurance.

To improve consumer protection and enhance consumer understanding, the new regulation imposes duties on the agent to inform, to advise and to document. The duty to inform encompasses the greatest amount of the changes. The salesperson must inform the customer about his or her business in writing upon the first meeting (§ 11 (1) VersVermV). The salesperson must state his or her full name, address, type of insurance salesperson, registration number and the means of checking this information. The duty to inform also includes a duty to disclose. This requires getting information to the insureds earlier in the process, with the intent to enhance consumer protection by improving consumer knowledge and decision-making. All documents must now be disclosed to the consumer prior to submitting the application to the insurer, with enough time to read and understand the documents. A sufficient time span will depend on the knowledge of the consumer and the complexity of the contract. The client may, by a separate written document, abstain from prior disclosure, but still has to be informed immediately after the contract is effective. This disclosure requirement is tied with a change in the insurance contract law, *Versicherungsvertragsgesetz – VVG*, effective Jan. 1, 2008, which altered a 100-year practice (Meixner and Steinbeck, 2011). The new law largely adopts what is called the "Antragsmodell." For the intermediaries, this means a change in the way they organize their appointments and could mean that a second appointment with the client is needed to close the sale. The adoption of the Antragsmodell abolished the "Policenmodell," which presented all information when the insurer sent the contract and provided a 14-day period to cancel it. In this case, the client technically applied for a contract, which the insurer accepted—for instance, by simply sending out the policy. A third model, the "Invitatio-Modell," has been developed: The client asks the insurer to make an offer, which the client may later accept.

Additionally, fact sheets must be provided and put in front of all the information material. These fact sheets must contain information about the kind of insurance product, the duration of the contract and ways to cancel, a description of insured and excluded risks, the amount and the timing of premium payments,

information about exclusions within the contract, and resulting obligations. For life and private health insurance contracts, a disclosure of sales, administration and other costs is required (§ 4 VVG-InfoV).

The duty to advise requires the salesperson to ask the customer his or her wishes and needs, to advise the customer prior to the sale, and to give reasons for this advice. This duty extends throughout the time of the relationship between the intermediary and the client. While the requirement is not well-specified, the idea is that changes in the customer's circumstances may indicate different advice or adaptations.

The third duty imposed on agents is documentation of the transaction. This documentation protocol depends on the complexity of the insurance product in question. The documentation seems of modest benefit to the consumer, while of potentially significant evidentiary benefit to the salesperson in case of claims for compensation for damages. The client, through a separate document, can abstain from the advice and the documentation.

Another change in the law had to do with the representations in the application and the effects on contract enforceability and rescission (as it is called it in the U.S.) by the insurer, not the agent. Previously, the insured was required to strictly comply with the contract, such as to inform about some changes in the risk exposure, or after a loss to completely comply with all duties and conditions; the consequence of minor deviations was to possibly forfeit all benefits recoverable under the insurance contract. The new law changed this: Now slight errors in the application will affect the premium, rather than result in complete contract avoidance or forfeiture. The insured now only has to answer the written questions posed by the insurer, who is now responsible to seek relevant information.

The law also installed an ombudsman to possibly settle disputes without the parties having to go to court. Almost all insurance companies have joined this system and have agreed to adhere to the rulings, if they are below €10,000; above that amount, they are still free to go to court (Ombudsmann fuer Versicherungen, 2011). This comports with a similar rule in effect since 2001 for the private health- and long-term care insurance (LTCI) (§ 13, Statut des Ombudsmanns Private Kranken- und Pflegeversicherung).

## **German Experiences of an Agent as Adviser**

With respect to the intermediaries, the new laws were expected to create significant additional burdens on the intermediaries. Agents predicted the regulations and multiple duties to inform, to advise and to document would make their job more difficult and time-consuming. The reality turned out differently. Processing burdens were not as severe as expected, generally speaking, though the experience of the intermediaries is diverse (Beenken, 2012). A study by YouGovPsychonomics AG from 2008 estimated an increase of up to 11 workdays per year for exclusive agents if the goal is to keep revenue steady. Schwarzbach,

Klosterkemper, Lohse and Schulenburg (2011) tested this claim by means of empirical data obtained from two consecutive questionnaires. BVK (Bundesverband Deutscher Versicherungskaufleute e.V., an organization that represents insurance salespeople) supported the data collection. The data were collected before and after the introduction of the legislation in order to allow for a comparison. Contrary to expectations, the time to advise did not significantly increase from 2007 to 2009, which contradicts the agent's subjective perceptions (Beenken, 2012). The two-year interval in the study captures a longer-term perspective on the experience but may not have captured one-time costs borne the first year, such as technical modifications, adjustments in the distribution process or more general learning costs accrued during the adaptation period. These one-time-costs might explain the results of the YouGovPsychonomics study since it was conducted soon after the regulatory change. Some results of learning and familiarization take effect in the longer run (Beenken, 2012).<sup>3</sup>

With respect to consumers, the new laws were expected to get disclosures into the hands of consumers before the insurance was in place, with consumers being able to study them in advance. Studies showed that the disclosures, though timely and containing important information about the insurance coverage, did not facilitate consumer understanding, primarily because the information and format were not standardized. The fact sheets have remarkable diversity and quantity of information, which sometimes makes a comparison of different financial products, and a comparison with the products of other companies, difficult. Special criticism has been directed towards the readability and comprehensibility of the fact sheets (ITA Institut fuer Transparenz GmbH cited from *VersicherungsJournal*, 2014). This difficulty in comparison exists despite the suggestions of the major lobbying organization of the insurance companies (GDV) for standardized format and content. Simplified and standardized product information likely enables better investment decisions (Decision Technology Ltd., 2010). Companies seem to know about the complexity and shortcomings of the respective fact sheets but are yet to improve them (Schubert, 2013). They face the problem of having to find a compromise between detailed correctness as required by regulation and ease of understanding.

The problem of comparisons also can be found in the required disclosure of costs for life and private health insurance contracts. First, the information is of little use to the purchase decision, since one company might show the cost in total Euro-terms (as required by the VVG-InfoV), and another company might show reduction in yield, calculated in a manner advocated by the main insurers' association (GDV, 2008). Critics of the disclosure say that this information does not provide any additional information that should be relevant for the client's product decision. Second, the disclosure of costs of the contract is flawed because

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3. The study did not address changes in the qualification structure because most agents did not have to pass the necessary exam due to their exemption based on professional experience or being centrally registered intermediaries. Beenken (2010) addressed qualification issues as to market entry and exit for the agents.

the costs included are not standardized, or they are accounted for differently because of incompatible calculation methods or interpretations of the law (Assekurata, 2008). Sometimes all the costs of the insurance company—such as printing, handling of the contract and money paid to the intermediary—are taken into account, and sometimes only parts of these are accounted for. Additionally, the respective explanations and documentation are phrased complicatedly. The value of this information to the consumer is, therefore, doubtful, and a change in the customers' behavior seems not to have occurred (Beenken, Bruehl, Schroeder, Wende, 2012). The consumer-magazine *OeKO-Test* insinuates intentional obscuring and manipulation of the real costs, as well as complication of any comparison by the insurers, in order to appear less costly (OeKO-Test, 2011). Furthermore, the cost disclosures already mislead consumers to believe that the reported sums (especially the apparently higher one-time-costs) are all receivable by the intermediaries. These disclosures in turn might further penalize inexperienced and marginally-literate consumers.

## **Results of Germany's Implementation to Improve Consumer Insurance Transactions**

The ultimate question is: How effective has the law been to raise consumers' knowledge of their insurance purchases? Here, the evidence shows little improvement.

In the first years after the introduction, intermediaries at best only slowly adopted the changes (Schwarzbach, Klosterkemper, Lohse and Schulenburg, 2011; YouGovPsyconomics AG, 2009 cited from *VersicherungsJournal*, 2009; Beenken, 2012). A test sponsored by the central consumer agency showed that the intermediaries regularly abstained from giving advice (Infratest Dimap, 2010), thereby using a criticized exception installed in the law intended for informed customers (§ 6 (3) VVG). The duty to communicate the intermediary's status is hardly adhered to (Stiftung Warentest, 2009; Beenken, 2012). Also, intermediaries did not ask their client for his or her wishes and needs, or about his or her situation as a whole—contrary to the law's requirement. This resulted in important information being omitted, as shown by mystery shopping tests. As a consequence, the recommended products and limited consultation provided little extra value. (See, for example, DISQ, 2011; DISQ, 2012; Stiftung Warentest, 2009; and Barais, Nauhauser and Weiser, 2015.) One difference is seen in the level of service provided to different clients: In the lucrative part of the market, intermediaries do provide advice to, and spend time with, clients with significant insurance needs. But consumers with smaller or fewer contracts in general or only with the respective intermediary may receive less assistance than before.

Consumers do seem aware of the fact that there are new protocols and compliance requirements, and endorse these (YouGovPsyconomics AG, 2009, cited from *VersicherungsJournal*, 2009). The protocols documenting the process

and also stating the reasons for the advice given are used regularly (Schwarzbach, Klosterkemper, Lohse and Schulenburg, 2011) but are (at least for bigger institutions) quite standardized and designed to be filled out quickly, reducing their individual descriptiveness for the respective mediation. This information technology (IT)-based process can become a good business practice and allow for more structured consultations, but it also can be perceived by consumers as pushing unnecessary insurance, or mere compliance.

Regarding the actual impact of providing better information to consumers and consumers actually being better informed, most observers conclude there has been little improvement. Referring to the omission of the Policenmodell, the former Ombudsmann Wolfgang Römer stated that "... it does not matter, if the client does not read the General Terms and Conditions of Insurance before or after receiving the insurance policy"<sup>4</sup> (Roemer, 2006). The required information to be given to the consumer can be documents or electronic files on a compact disc (CD) or universal serial bus (USB) flash drive. The electronic method is efficient but not effective for instilling information. The documents usually are written in a complicated language due to the complexity of the matter and to the actual style of writing, so the average consumer is likely more confused than informed. Also, the large number of pages discourages consumers from studying their content (Schubert, 2013). A CD or USB flash drive usually contains the documents for that transaction with the consumer *and* all other products sold by that insurer, thus overwhelming the insured with more and mostly irrelevant information than necessary for the transaction. This is an example where information, especially excess information, neither helps the customer nor creates any more confidence, although it may provide the insurer with protection against later claims (Goersdorf-Kegel, 2013). In fact, electronic delivery may be, in effect and reality, non-visible information because the consumer does not even glance at the information. This further complicates any intention to have the consumer inform him- or herself. As mentioned above, the fact sheets are meant to facilitate the comparison of different products but in reality are designed differently by almost every company, complicating any such effort.

This outcome of minimal effectiveness is in line with other studies on the need to carefully draft the disclosure forms for readability, structure and context in the form of an educational component "to motivate consumers to read the notice and help them understand what it is about, why it is important and how to use the information in their decision making" (Garrison, Hastak, et al., 2012:228). The experience with the German implementation of the EU directive in requiring disclosures, advice and information, therefore, has not shown much improvement in consumer understanding of insurance transactions nor better advice for those transactions. Part of the problem seems to be the inadequacy of the design of the disclosure, although it contains important basic information about coverage. The lack of standards and simplicity, as well as the resulting diversity of forms,

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4. Translated from Roemer, 2006: "Denn es kommt nicht darauf an, ob der Kunde die Allgemeinen Versicherungsbedingungen vor oder nach Erhalt der Police nicht liest."

complicate the consumer's ability to compare or evaluate the products. Another problem is that disclosures are not read; this is in line with the other studies on financial literacy and disclosures mentioned above. This is not to argue that disclosures are bad, only to say that effective disclosures must be carefully drafted, and even then their effectiveness will be limited.

On the effects of other changes in the law, the installation of an ombudsman for all insurance lines has simplified disputes between an insurance or an intermediary and the respective client and resulted in their accelerated regulation. This helped to reduce the workload of courts, which is mainly achieved by the insurers accepting any ruling where the amount in question does not exceed €10,000. Relevant to this paper, only a small percentage of the complaints actually concern intermediaries. (Ombudsmann fuer Versicherungen, 2012; Ombudsmann Private Kranken- und Pflegeversicherung, 2012).

Another effect of the new regulations was the decrease in the number of intermediaries from 407,000 in 2006 to 250,000 in 2009 (GDV, 2006; GDV, 2009), although available statistics about the number of intermediaries in Germany are not very reliable or comparable (Beenken and Radtke, 2013a). For example, Beenken and Radtke (2013b) calculate a number of around 370,000 intermediaries for 2013. Further, a big part of the decrease may be accounted for by the departure of part-time intermediaries who mostly dealt with family and friends.

In Europe, partly in response to these outcomes and criticisms, but also due to diverse implementations throughout the EU and criticisms with regard to the insurance intermediation (see European Commission, 2012, European Commission Staff working paper), a successor to the Insurance Mediation Directive (IMD) called the Insurance Distribution Directive (IDD) is coming into effect in the next years (Council of the EU, 2015). Therein the scope of the included intermediaries is extended to include everyone selling insurance as, for example, direct sales and reinsurance brokers. A few exceptions remain—for example, for people providing insurance as an “accessory” to their main service or product. The paragraphs mostly focus on consumer protection—for example, by requiring the intermediaries to act in the best interest of the customers, by defining lower limits for the liability insurance and the available cash of the intermediaries, and by disclosing information about the form, sources and in some cases also the amount of payments to the intermediary in order to make conflicts of interest transparent. The payments may not entice the intermediary to act against the customer's best interest. Furthermore, an approval process for insurance products will be implemented, and the participants will have to ensure their professional knowledge through continuing education. Also, more standardized key information documents (fact sheets) will be implemented for all insurances. Systems like the ombudsman have to be installed, and participation will be mandatory. In case of breaches, sanctions—apart from criminal sanctions— will be implemented (Council of the EU, 2015). In Germany, the discussion focuses on the payment scheme for the intermediaries, with the intention to better align the clients' and the intermediaries' interests. (Among others, see Habschick, M., Evers, J., 2008; Beenken, Bruehl, Pohlmann, Schradin, Schroeder and Wende,

2011; Beenken, Bruehl, Schroeder and Wende, 2012; and Koehne, 2014.) This important topic extends beyond the scope of this paper.

## **Insurer Intermediary Law in the U.S.**

The German experience in trying to improve insurance consumers' understanding is informative to similar goals in the U.S. Here, we review the U.S. model of insurance regulation and compare it to the German model. In contrast to German federal law on insurance, in the U.S. insurance is regulated at the state level (as is well known), with only a few national laws bearing on the subject. There is some standardization and coordination through the trade groups such as the National Association of Insurance Commissioners (NAIC) and the National Conference of Insurance Legislators (NCOIL). Despite multiple states' laws, general statements can be made about how states address consumer financial literacy in insurance transactions and, thus, how the German experience can be informative on efforts in the U.S. to improve financial literacy for insurance transactions. Other financial services—such as credit and loans, stock and bond purchases, and investment advisory services—are regulated at the national level through the Federal Reserve, Consumer Financial Protection Bureau (CFPB), and Security and Exchange Commission (SEC), etc. We will note a few of these where relevant.

One consumer protection requirement is that state insurance laws require insurance contracts be written in “plain language” that meets certain readability standards, as measured by “Flesch readability scores” that must be submitted to the states' departments of insurance (DOI).<sup>5</sup> Most states also require that policy forms for consumer insurance be submitted there, either for prior approval or disapproval, under various methodologies not relevant here.

A second protection for consumers is provided by laws that specify a certain minimum coverage that must be provided. Examples for this are financial responsibility limits for automobile liability and for uninsured motorist coverage, which is typically equal to the selected liability limit, and a fire policy (basic homeowner's insurance) meeting at least the classic New York standard fire policy specified by statute. The forms, therefore, are regulated either by approval or disapproval under the various file and use laws, thus assuring some consumer protection and minimal levels of coverage. Major gaps still exist in coverage. (See *Fragmented Risk Symposium*, 2013.) (A similarity is seen in Germany, which

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5. See for example, Conn. Gen. Stat. § 38a-297; Vernon's Texas Statutes and Codes Ann., Ins. Code Art. 5.35, among many statutes; and Cogan, 2010. Flesch readability scores refer to a system devised by Rudolf Flesch, an educator and frequent author on reading and writing, that calculates the readability of text based on the number of syllables per word and words per sentence. Flesch scoring of insurance policies is well-known to U.S. insurance companies because the insurer must submit the score to the state departments of insurance when filing policy forms.

until 1994 had similar processes for approval of consumer insurance contracts, to be submitted to a central government agency. But the deregulation with the resulting product-diversity significantly reduced the transparency on the market. (Beenken, 2010). There is a new effort in Germany to bring back this sort of standardization and review, as advocated, for example, by Hans-Peter Schwintowski (Goersdorf-Kegel, 2013.)

The plain language laws and the regulatory approval laws should result in a clear, understandable contract. Consumers often do not read their insurance contracts, however, due to complexity and low financial literacy, as noted in the references made earlier in this paper. A further problem with trying to get consumers to read disclosures is low literacy levels in the U.S.: Nearly 50% of the U.S. population reads in Level 1 and Level 2 (the basic levels), according to a 2002 literacy survey done by the U.S. Department of Education (Kirsch, et al., 2002; also Cogan, 2010; Inderst, 2011). This is important because in disputes between insureds and insurers, the common law in all states imposes a duty to read the contract on the insureds (Ben-Shahar, 2009; Weston, 2005), yet even if consumers were to read the disclosures and the disclosures were easy to read, the consumer's understanding would be limited. Despite this duty to read, there is little impact in judicial outcomes because judges and juries do not read their own insurance contracts, so the duty has little impact except to require insureds to at least glance at the declarations page for accuracy of the name, address and maybe coverage limits (Weston, 2005, and, for example, *Wiley v. Osmun*, 2012<sup>6</sup>). A few jurisdictions stringently impose the duty. The reality is “there appears to be total consensus on this point. Law professors, treatises, commentators, and *The Restatement (Second) of Contracts* all concede that people do not read their insurance contracts ... .” (Cogan, 2010:102–103. Similarly, Eigen, 2012, noting empirical studies). The same holds for Europe, where studies show only about one-third of the consumers completely read the terms and conditions of service contracts (European Commission, 2011).

A third means of consumer protection is disclosures. U.S. and states' laws favor disclosures of financial information—the “disclosure regime” (Sovern, 2010:823). Disclosures are used in many types of transactions, particularly financial services contracts. In insurance, the common disclosures pertain to uninsured motorist coverage (where the insured typically must opt out of by signing and checking a box), long-term care (LTC), life insurance, mortgage insurance, and in some states homeowners insurance for additional coverages such as extended replacement cost or guaranteed replacement cost coverage.<sup>7</sup> Federal

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6. “[a]n insured is obligated to read the insurance policy and raise questions concerning coverage within a reasonable time after the issuance of the policy ... . An insured who decides not to read the policy proceeds at his or her own risk. ... Despite the Wileys' belief that they had purchased ‘full coverage,’ they bore an obligation to determine that they actually received the coverage they sought. Had they done so, they would have readily recognized that the policy did not, in fact, afford ‘full coverage,’ as it clearly excluded underinsured motorist coverage.”

7. For example, Calif. Ins. Code § 789.8 (long-term care disclosure); Calif. Ins. Code § 10102 (residential property disclosure for replacement cost options); Colo. Div. of Ins. Reg. No.

bank regulations require disclosure when property to be acquired with help of a bank loan is located in a flood zone.<sup>8</sup> Some of the changes to the German insurance laws are similar to what is seen throughout the U.S. jurisdictions, with disclosures given at the time of the application.

A fourth area to compare is with the duty to advise. Here is a major difference between the two countries. As stated above, German intermediaries are (now) expected to advise consumers. The U.S. requirement is to the contrary: There is no duty to advise unless the insured specifically asks for advice (Russ and Segala 4: § 55:5 and cases cited therein). Agents represent the insurer, particularly captive or exclusive agents who represent only one insurer, and are thus salespeople or order takers to the consumer, however much they may seek to do right by their customer. “[A]n agent’s job is to merely present the product of his principal and take such orders as can be secured from those who want to purchase the cover offered,” wrote a Michigan court (*Harts v. Farmers Ins. Exchange*, 1999:50). Similarly, the cases *Barnett v. Security Ins. Co.*,<sup>1987</sup> and *Albany Ins. Co. v. Tillman*, 1995). Independent agents (also called brokers) hold appointments from multiple insurers and may act as dual agents—that is, as agents for the insurer and as brokers for the insured. “An insurance broker is not a salaried insurance company employee or otherwise identified with a single insurer but, rather, is an independent middleman. A broker typically has contracts with a number of insurers and is compensated by way of commissions paid by the insurers with which he places coverage. Brokers are sometimes referred to as independent agents and are generally considered to be the insured’s agent” (Richmond, 2004:5, and 6–11). This textbook definition, while legally accurate, may be “too simplistic to provide an adequate description of the insurance marketplace because independent agents and brokers perform many of the same functions and provide services to both insurers and policyholders” (Cummins and Doherty, 2006:361).

Agents have no duty to advise in general or to recommend any coverage or limit, unless there is a “special relationship” (or “special circumstances” as some courts call this) recognized by the law whereby the agent/broker has agreed to undertake that advisory role. Brokers represent the insured, even while they may also hold appointments as agents for insurers (though this arrangement is not permitted in Germany). Absent such special relationship, the agent need not recommend higher limits, note additional coverages or foresee liabilities that might require particular insurance (*Fitzpatrick v. Hayes*, 1997:927; *Avery v. Diedrich*<sup>2007</sup>:165–166). Agents with a special relationship, and brokers engaged to advise, will by definition have a special relationship. A special relationship is

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72-7 (replacement life insurance); Georgia. Code Ann., § 33-42-6 (long-term care); Ill. 215 ILCS 5/224 (life insurance); Ill. 215 ILCS 5/1305 (mortgage insurance disclosure); Mass. M.G.L.A. 255 § 12G (credit life).

8. 12 Code of Federal Reg. § 208.25, “When a member bank makes, increases, extends, or renews a loan secured by a building or a mobile home located or to be located in a special flood hazard area, the bank shall mail or deliver a written notice to the borrower and to the servicer in all cases whether or not flood insurance is available under the Act for the collateral securing the loan. ...”

assumed in the following cases: 1) an agreement exists (for example, a contract specifying the advisory services to be provided); 2) where there is evidence that the agent/broker held him- or herself out having particular expertise *and* the insured relied on the expertise to the insured's detriment; and 3) where the insured's reliance is shown by the course of conduct between the insured and the agent over a period of years. The existence of an insured-agent relationship alone is not sufficient to create a special relationship.<sup>9</sup> A court in the state of Wisconsin said of this standard position, "The mere allegation that a client relied upon an agent and had great confidence in him is insufficient to imply the existence of a duty to advise. The principal-agent relationship cannot be so drastically expanded unilaterally" (Nelson v. Davidson, 1990:437). Where such relationship exists, the agent/broker has a duty to properly advise the insured and will be liable for failing in that duty (Williams v. Hilb, Rogal, 2009; Jones v. Grewe, 1987; Suter v. Virgil R. Lee & Son, Inc., 1988).

Various reasons are presented why U.S. laws do not impose a duty to advise absent a special relationship. One is that the insured presumably knows his/her situation better than the agent as stranger, and thus the insured should be responsible for determining his/her insurance needs. (Jones v. Grewe, 1987; Suter v. Virgil R. Lee & Son, Inc., 1988). This is largely a fiction, although more likely the insured knows better what he or she does *not* want to disclose and insure, such as a boat the insured admitted he did not disclose to the insurer but later claimed should have been insured when he ran his boat over a swimmer (Deremo v. TWC, 2012). The better reason is that "the creation of a duty to advise could afford insureds the opportunity to insure after the loss by merely asserting they would have bought the additional coverage had it been offered" (Windt, § 6:44<sup>10</sup>). This is what generally happens in the U.S., where a consumer who finds his or her claim uncovered because of inadequate limits or failure to select appropriate coverages then sues the agent or broker claiming the agent or broker should have advised him or her better, or maybe should have provided some advice. In opposition to this contention, a New York court stated (typical of the other courts' statements): "Insurance agents or brokers are not personal financial counselors and risk managers, approaching guarantor status ... permitting insureds to add such parties

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9. Roberts v. Assurance Co. of America, 163 Cal. App. 4th 1398 (2008); Sandbulte v. Farm Bureau Mut. Ins. Co., 343 N.W.2d 457 (Iowa 1984), overruled to extent it limited special relationship to particular factors enumerated in the case, Langwith v. American Nat. Gen. Ins. Co., 793 N.W.2d 215, 223 (Iowa, 2010), then Langwith overruled by statute, Iowa Code § 522B.11.2011 Iowa Acts ch. 70, § 45; European Bakers Ltd. v. Holman, 338 S.E.2d 702 (Ga.App.1985); Bruner v. League General Ins. Co., 416 N.W.2d 318 (Mich.App. 1987); State Auto Property & Cas. Ins. Co. v. Boardwalk Apartments, L.C., 572 F.3d 511, 515 (8th Cir. 2009); Penn-America Ins. Co. v. Zertuche, 770 F. Supp. 2d 832, 844 (W.D. Tex. 2011) (Absent "a long-term relationship with high levels of trust between an insurance agent and an insured, the agent owes only two duties to the insured: (1) to use reasonable diligence to place the requested insurance coverage, and (2) to inform the insured if unable to obtain such coverage").

10. Citing cases such as Blonsky v. Allstate Ins. Co., 128 Misc. 2d 981, 491 N.Y.S.2d 895 (Sup 1985), Peter v. Schumacher Enterprises, Inc., 22 P.3d 481 (Alaska 2001).

to the liability chain might well open flood gates to even more complicated and undesirable litigation” (Murphy v. Kuhn, 1997:976).

A related point for consumer protection is disclosures with check-off requirements and consumer-advantaged default options. These probably do more good for the consumer’s protection, understanding and welfare (Pappalardo, 2012) since the client might engage in an actual and informed decision because of these requirements. Advantages for the insurer and the intermediary arise because the informed choices are documented, which can later be used against claims of malpractice and failure to disclose. Thus, for example, on U.S. automobile insurance, uninsured motorist coverage (mentioned earlier) in most states requires that coverage equal the liability limit unless the consumer checks a box and signs the form to accept lower limits. This has gotten more coverage to consumers because people go with the default (White, 2009:152). The state of California mandates a disclosure for homeowners insurance on the various enhanced replacement cost coverage options on the structure that go beyond the specified Coverage A limits to rebuild the structure (California Insurance Code § 10102). This might be called “bounded choice” to reflect consumers’ bounded rationality (White, 2009:172<sup>11</sup>). For other lines of insurance (variable life insurance, variable annuities, LTC) it is harder to see any connection with disclosures and improved consumer selection, although they may facilitate remedies in cases of unfair conduct. Similar outcomes and reasons explain the U.S. DOL’s approval for employers to have default options on contributions and investment selections on the employer-provided defined contribution retirement accounts known as 401(k) plans (DOL, 2007; Madrian and Shea, 2001).

## **Lessons from the German Experience to U.S. Insurance Requirements**

From the intermediaries’ point of view, the German experience of being able to incorporate disclosures into the business routine rather smoothly also conforms to U.S. experience that these disclosures are just part of the paperwork to the transaction, using pre-printed forms or those that come off the printer along with other documents for the transaction, or on computer discs or drives. This seems to have about the same impact in the U.S. as the new German requirement has had on German consumers—more information, with little obvious real benefit.

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11. Speaking of financial products in general, but not insurance, White writes: “Contract terms involving risks and contingent events, such as loan repayment, are particularly problematic. No amount of information will necessarily overcome the optimism bias, the saliency problem, and the availability heuristic, that is, consumers’ tendency to believe that negative outcomes will not happen to them, or will happen only based on their available knowledge of actual instances where risks have materialized.” Given that insurance is exactly for risks and contingent events, these remarks are very informative.

The German requirement to advise is a significant difference with the U.S. practice, although the German requirement seems equivalent to the U.S. in those situations where the special relationship exists between the insured and the intermediary so that the common law imposes such a duty to advise. Imposing a duty to advise, as the German law requires, might generate more benefit to the insured in selecting appropriate insurance, although there will always be second-guessing if a loss is not covered but might have been with a different endorsement. Further research will be needed on what impact, if any, this will have on intermediaries' conduct towards insureds. Here, the "knowledgeable intermediary" or "learned intermediary" (a term borrowed from U.S. product liability law) might come into play. If advice is actually sought from the intermediary, and the intermediary actually knows what he or she is talking about, then the intermediary can do some good to improve the consumer's position. That would be the best outcome because, as Cummins and Doherty (2006:362) write, "the role of the intermediary is to break through the complexity by helping buyers to understand and purchase insurance." However, the reality of some intermediaries' competency, dedication, conflicts of interest and self-protection to avoid liability claims against themselves (a practice all financial intermediaries rightly use to protect themselves), might not accomplish the desired result. (See, for example, Furletti, 2005:9-10; and Inderst, 2011, who describe the potential conflicts of interest and the need for appropriate compensation schemes.<sup>12</sup>) There is also the cost to the transaction for insurers and intermediaries where the risks are fairly standard and the advisory needs are relatively simple; in contrast, commercial insureds generally seek and obtain more independent advice from intermediaries (Regan and Tennyson, 1996).

In the U.S., the SEC continues to study whether broker-dealers for financial products (not insurance) should be held to a fiduciary standard rather than the existing "suitability" standard." (See the SEC's *Study on Investment Advisers and Broker-Dealers*, 2011; Michaels, 2013.) Such a change, if enacted, could provide important guidance for whether insurance intermediaries should also have their standard raised. The U.S. DOL, in contrast, has now imposed a fiduciary standard over financial advisers who assist or direct employee/participant retirement contributions rolled over to individual retirement accounts (IRAs). Under the new rule, 25 CFR Parts 2510 et seq., implemented April 8, 2015, and effective (final) June 7, 2016, and applicable April 10, 2017, "the Adviser and Financial Institution must give prudent advice that is in the customer's best interest, avoid misleading statements, and receive no more than reasonable compensation. Additionally, Financial Institutions generally must adopt policies and procedures reasonably

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12. Some authors who seek improvement through intermediaries sometimes mean something other than the transaction-type agents and brokers discussed here. Issacharoff (2011) argues for the use of "agents," for him meaning government and plaintiffs' lawyers bringing class action lawsuits, to protect consumers, with resulting improved information to the next round of consumers. Fung, Graham and Weil (2008: 122-124) refer to political interest groups, financial analysts, investigative reporters and unions to analyze the information and advice and advance the individuals' interests.

designed to mitigate any harmful impact of conflicts of interest, and disclose basic information about their conflicts of interest and the cost of their advice” (DOL, 2016). The DOL explained that it changed the rule now because its original rule was made in 1975, after enactment of the federal Employment Retirement Income Security Act of 1973 (ERISA) but before the advent of directed contribution 401(k) plans, the contents of which are usually rolled over to the employee/participant’s personal IRA after departure from that employer. The DOL explained the reason for the new rule:

“Non-fiduciaries may give imprudent and disloyal advice; steer plans and IRA owners to investments based on their own, rather than their customers’ financial interests; and act on conflicts of interest in ways that would be prohibited if the same persons were fiduciaries. In light of the breadth and intent of ERISA and the Code’s statutory definition, the growth of participant-directed investment arrangements and IRAs, and the need for plans and IRA owners to seek out and rely on sophisticated financial advisers to make critical investment decisions in an increasingly complex financial marketplace, ... the Department will replace the 1975 regulations with a definition of fiduciary investment advice that better reflects the broad scope of the statutory text and its purposes and better protects plans, participants, beneficiaries, and IRA owners from conflicts of interest, imprudence, and disloyalty.”

The new rule also extends to investment annuity and investment life insurance plans, and the life insurance agents who sell those (29 CFR 2510.03-21). This application was challenged in a court case; the court ruled in favor of the DOL (*National Association for Fixed Annuities v. Perez*, 2016).

Another area of possible guidance from Germany is the ombudsman. This idea is common in Europe but is disfavored in the U.S., because the U.S.’ preferred method of resolution is litigation. Even arbitration is often disfavored in insurance disputes and prohibited by some states’ insurance statutes (Dolin and Long, 2013).

## Conclusion

Improved knowledge and information through disclosures is always to be preferred, particularly where the model is to equalize information asymmetries in a marketplace or to have the consumer make better decisions about the financial products. But better consumer decisions do not necessarily follow from increased information unless the information is perfectly conveyed in the right way at the right time. The real goal of better consumer decisions is consumer welfare, which requires more than disclosures, whose value remains limited. Unfortunately, numerous studies and now this stringent disclosure and advisory mandate in Germany show that asymmetry reduction fails to improve consumer

understanding, decisions and welfare. The German experience of insurance disclosure adds to the evidence of constraints in consumer understanding of financial literacy. Further making the comparison useful are studies showing that the U.S. and EU views on consumer rationality, reasonableness and bounded rationality for consumer protection are converging (Hacker, 2015:311–312: “The development of consumer concepts in the EU can be divided into two stages, which track remarkably well the parallel evolution of consumer concepts in the U.S. The process in Germany is representative of the tendency in the wider EU.”). For the U.S. market, which generally favors disclosures as the solution to market inequalities and inequities, and where consumer protection for insurance is addressed by each state rather than at the national level, regulators should be doubtful of the value of more disclosures to consumers who are ever less capable to interpret and process the increasing complexity and sophistication of financial products.

Carefully constructed disclosures can improve consumer understanding of some limitations and options, and may prompt the consumer to ask for advice. A more standardized implementation of the key fact sheets by the IDD has the possibility to bring along improvements. Related to this, the U.S. federal government has begun using research in behavioral economics to draft better forms that result in governmental efficiency and improved consumer decisions (Social and Behavioral Sciences Team 2015 Annual Report). Similar work is being done in the United Kingdom (UK) (Gino, 2015) and Germany (Hacker, 2015:315). Research on such changes in financial products and services in the U.S., Australia and New Zealand show that “nudges” and default opt-outs have been useful, but are incomplete solutions to improve consumer decisions and welfare (Ali, Ramsay and Read, 2014). Disclosures lacking such careful construction will likely accomplish more to insulate the insurer and the agent rather than motivate them to provide better products and service. Within this recommendation, a distinction might be made for sales through intermediaries and sales online, as the online buyers can be guided through opt-outs, defaults and disclosures along the way towards their purchase. The defaults and opt-outs could result in better coverages, though consumers might view these as additional forced sales, while the disclosures could mean more “click-through” terms that are ignored but if crafted well and appropriately could at least make information available at the right time. A salesperson doing the same opt-outs and defaults might also be viewed as trying to sell more, but with a duty to advise, the salesperson could be able to explain why such choices are generally in the consumer’s interest.

As Hacker (2015:317–318) contends, normative models must be informed by empirical studies, and he recommends that a pluralistic view of consumers’ range of rationality and reasonableness be embraced. Similarly, Lunn (2015:323–326) provides a useful analysis that consumer preferences may be too pluralistic such that a remedy designed to move consumers towards a model agent in an ideal market does not fit with the studies of consumer behavior. (Fernandes, Lynch and Netemeyer (2014:1874) discussed the idea of a “smart default” to deal with the

heterogeneity.) Aligned with this, we suggest that better consumer protection will be accomplished by changing default processes for coverage selection, as is done now in some insurance lines, and changing the intermediary's role to a higher standard of advice. Default coverage selections, which can provide opt-outs, have been effective to improve consumer financial decisions and insurance coverage. The limited range of most consumers' understanding of insurance and financial services indicates the need for ever greater advice by intermediaries' who can put the consumers' interest foremost.

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# Key Stakeholders' Stock Returns and the Affordable Care Act

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## Abstract

The federal Affordable Care Act (ACA) is the most influential and sweeping health care reform of our generation. Within the ACA legislation, there are a number of key stakeholder industries that are affected by provisions in the law: health care providers, health insurance companies, medical/biotechnology companies and pharmaceutical companies. We investigate the effect of the passage of the ACA on the capital market response to the key stakeholder industries during the time period surrounding the date the final version of the bill was signed into law (March 23, 2010) and the date the law was upheld in the Supreme Court (June 28, 2012). These dates are particularly important as they convey new information to the market regarding the evidence the ACA would become law. Overall, we find that the passage of the ACA has a negative effect on health insurance companies, medical device companies, and companies that operate simultaneously in the health care and insurance industry, while having a positive influence on firms in the health care industry.

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## 1. Introduction

On June 28, 2012, the Supreme Court upheld critical provisions of the ACA, which aims to expand health insurance to many of the 50 million currently uninsured Americans. The ACA represents a sweeping health care reform that will change the health system in the U.S. and will have a profound impact in the years to come (Harrington, 2010). The final bill included numerous changes in the tax code to help fund its central doctrine, including an expansion of Medicaid and federal health insurance subsidies for low socio-economic individuals and families. Concurrently, a number of additional revenue streams were proposed and/or implemented, including the medical device excise tax, changes to the funding mechanisms and regulation of pharmaceutical companies, as well as taxes and restrictions on a number of health care plans and disbursements from health savings accounts. Given the ACA legislation is unlikely to be reversed, the various key stakeholders across the health care market are now focusing on its impact and implementation.

While many industries are subject to the effects of the health care regulations, the U.S. pharmaceutical, medical device/biotechnology, health care and health insurance industries have been particularly concerned about the passage of some type of health-reform legislation. These industries are inextricably linked to the provision of health care, and in recent years, there have been numerous questions and concerns about the potential impact any health care reforms would have on the structure and viability of these industries (Jayakumar and Kliff, 2012; Abelson, 2010; Kristof, 2012). As discussed in more detail below, these concerns appear to have been well founded, as provisions of the ACA potentially affect the operations of firms in each industry. However, the extent to which the ACA will have a significant and beneficial/detrimental impact on these industries is not well understood. While some have suggested the ACA will have a significantly positive impact on the pharmaceutical and health care provider industries and a significantly negative impact on the health insurance and medical device/biotechnology industries, there is little empirical evidence to validate this supposition. As such, the impact of the ACA on the capital market positions of these key industries is largely uncertain.

The uncertainty regarding the impact of the ACA on the capital market positions of these key stakeholder industries represents a large void in the literature. The overarching purpose of the ACA is to provide access to affordable health care and health insurance to all Americans, and this goal likely cannot be achieved without well-functioning pharmaceutical, medical device/biotechnology, health care and health insurance industries. As a result, if the provisions of the ACA have a significantly negative impact on the market's expectations of performance generated by these industries, regulators and public policymakers should be particularly concerned about the viability of the ACA and its long-term effects on health care-related industries. Conversely, if the ACA improves the capital market positions of key industries, this would suggest that the market

believes the new regulatory changes will increase future performance and ultimately benefit firms in those industries. Further, no change in capital market position would suggest that the market does not share the view of the ACA's detractors that it will significantly undermine the operations of certain aspects of the health care industry's infrastructure.

We attempt to fill this void by examining stock price reactions of firms that are members of the U.S. pharmaceutical, medical device/biotechnology, health care and health insurance industries. In particular, we focus on abnormal returns for these firms surrounding two dates that are most likely to provide new information about the likelihood of the ACA becoming law. While on March 21, 2010, the U.S. House of Representatives approved the U.S. Senate's version of the bill and paved the way for President Barack Obama to sign the bill, the bill was not signed into law until two days later on March 23, 2010 (henceforth, *Pass Date*). Since numerous studies have reported an association between the U.S. Supreme Court decisions and the capital market response (Abraham and Voos, 2005; Freedman and Stagliano, 1991; McWilliams, Turk and Zardkoohi, 1993; Mullin, Mullin and Mullin, 1995), we also examine abnormal returns around June 28, 2012, which is the date the U.S. Supreme Court upheld the constitutionality of the ACA (henceforth, *Supreme Court Date*). Examining two separate dates (March 23, 2010, and June 28, 2012), where the market received new information about the ACA, adds an important element of robustness to our analysis.

The results of our analysis suggest a significant capital market reaction surrounding the release of new information regarding the ACA, particularly as it relates to health insurers and health care-related companies. Our event study analysis suggest that in the days immediately surrounding the approval of the Senate bill, U.S. pharmaceutical, medical device/biotechnology, health care and health insurance industry firms, in aggregate, have significantly high returns. However, these results are short-lived and center on only the small window of time immediately surrounding the *pass date*. When examining the *Supreme Court date* (June 28, 2012), the returns are relatively normal in the three-day period surrounding the event date and the two-day period immediate after the event date. However, when extending the period out over the following 10-day period, returns are both positive and economically significant.

We also extend the univariate analysis to separately analyze returns in each of the four stakeholder industries, both when the company falls within a single industry or the company has cross over into multiple industries. We find that around the *Pass Date*, there are short-term positive returns for health care providers, medical device companies and companies that are classified as having operations as a combination of health care and device companies. However when looking at the *Supreme Court Date*, we find positive returns for health care providers and negative returns for health insurers and companies that are classified as having operations as a combination of health care and insurance companies. Recognizing the need to control for other factors that may influence returns, we also use a regression framework to examine the market response to our

stakeholder industries. Consistent with our univariate results, we find a significant negative relationship to returns in health insurers and medical device firms, as well as the combination of those types of companies, following both the *Senate and Supreme Court Pass Dates*.

Considered in their entirety, our analysis indicates that the market revised expectations of publicly traded health insurers and medical device companies downward following the Supreme Court's decision to uphold the constitutionality of the ACA. This suggests that the market believes the regulatory constraints imposed by the ACA will serve to lower the expected cash flows of health insurers and medical device companies and, to the extent that markets exhibit a degree of efficiency, is of relevance to regulators and policymakers as they evaluate the operations of the health insurance market in the post-ACA era. In addition, this result also suggests that the ACA influences aspects of health insurer operations such as capital costs and capital budgeting decisions, which have impactful consequences for the future financial health of the private health insurance market. We also find weaker evidence that the market has a more optimistic view of the effects of the ACA on health care firms, which should encourage regulators' and policymakers' outlook on the viability of the ACA. As a result, we conclude that, of the industries considered here, the health insurance industry, the medical device industry, and companies operating simultaneously in the health care and insurance market were the only to suffer negative and significant capital market response as a result of the ACA.

As this study is one of the first to consider capital market responses to the ACA, it represents a valuable contribution to the academic literature. While Dong (2014) and Ababneh and Tang (2013) provide evidence of market reactions surrounding the ACA, their analysis focuses on a different subsample of firms and considers a relatively short event window. In addition, their studies do not provide evidence using a multivariate analysis to control for other factors that influence returns. As a result, our analysis, which considers multiple event windows and multivariate models, both complements and extends these studies by examining market reaction to the ACA for a unique sample of stakeholder firms. The inclusion of medical device manufacturer firms and health care firms in our analysis also helps to further differentiate our study. As a result, we contribute to the underdeveloped area of the literature related to capital market reaction surrounding the ACA.

The remainder of this article is structured as follows. The next section provides background information on the stakeholder industries affected by the ACA. The third section develops our hypotheses and also describes our sample, data and methodology. The fourth describes our empirical methods and results. Finally, we provide conclusions in the last section.

## 2. Background

### 2.1 Stakeholder Industries

The ACA imposes a variety of provisions that alter many aspects of the health care industry.<sup>1</sup> The law creates health insurance exchanges, expands Medicaid, alters the tax code and imposes a variety of additional regulations that have the potential to affect key stakeholders in the health care industry. In particular, the literature suggests that health care providers (e.g. Kristof, 2012), health insurance companies (e.g. Jayakumar and Kliff, 2012), medical device manufacturers (e.g. Van de Water, 2013) and pharmaceutical companies (e.g. Abelson, 2010) are stakeholders that could potentially be significantly affected by the provisions of the ACA.

#### 2.1.1 Health Care Providers

The consensus in the literature is that the ACA will positively influence the cash flows of health care providers. In fact, many suggest that health care providers are the principle beneficiary of the ACA and have even described the ACA as a dowry from the Supreme Court to health care providers and their shareholders (e.g. Kristof, 2012; Krantz, 2012). Other studies suggest that the expected increase in cash flow from the ACA has led parties such as health care provider executives and the American Hospital Association (AHA) to support the ACA (Brubaker, Burling, Sell, and Von Bergen, 2012; Rogoff and Yerramalli, 2012).

Various factors are cited as reasons for the increase in health care providers' cash flows following the ACA. The first is that the ACA's requirement that all citizens purchase insurance will reduce the expenses associated with treating uninsured patients and ultimately lead to higher profits for health care providers (Jayakumar and Kliff, 2012; Smith, 2012). Similarly, others suggest that due to higher health insurance coverage rates, health care providers will gain more customers who will be more willing to be receive treatment (e.g., Hamilton and Tangel, 2012). Still others suggest that the ACA's health care quality and efficiency incentives will ultimately reduce spending and improve the bottom line of health care provider organizations (e.g., Mukherjee, 2012.)

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1. A detailed discussion of the ACA's provisions and their effects on the health care and health insurance industry is outside the scope of this paper, as the topic has been extensively considered in the literature. However, we rely on the literature to identify how the provisions of the ACA will affect stakeholder industries and summarize this evidence below.

### 2.1.2 Health Insurance Companies

Many suggest that health insurers face significant financial pressure under the ACA that will negatively affect cash flows for a variety of reasons. From a broad perspective, the new regulatory constraints imposed by the ACA will necessitate a fundamental change in the operational strategies of insurers when compared to the pre-ACA era (Jayakumar and Kliff, 2012). The resulting costs associated with this change will likely have an adverse effect on health insurer profits (Hamilton and Tangel, 2012). Similarly, it is argued that the ACA will result in higher tax liabilities for health insurers, which would also have a negative impact on income (Kavilanz, 2010).

Underwriting restrictions enacted by the new law also are expected to negatively affect health insurers' cash flows. As noted by Kristof (2012) and others, health insurers will not be permitted to deny coverage on the basis of preexisting conditions and also will not be permitted to set lifetime benefit ceilings. As a result, health insurers potentially will pay out significantly higher amounts in claims relative to the pre-ACA era, ultimately leading to lower profit margins. Further, another negative impact on health insurer profits is expected to come from the ACA's provisions on medical loss ratios (MLRs), which require plans to direct 85% of premium revenue in the employer market (80% in the individual market) toward medical costs (Young, 2012). This minimum MLR rule is expected to cost insurers billions of dollars (*Insurance Journal*, 2012) and represents another potentially adverse effect of the ACA on health insurer cash flows.

### 2.1.3 Medical Device Companies

The medical device industry has been prosperous in the U.S., with estimated sales of \$116 billion per year made up of as many as 460 public and 1,247 venture capital-backed companies (Nexon and Ubl, 2010). It is suggested that the 10 largest medical device makers will pay 86% of the revenue collected from the medical device excise tax implemented under the ACA (Van de Water, 2012). The tax is projected to generate \$29 billion over the next 10 years, and large companies are expected to shoulder additional tax burdens of as much as \$30 million and \$150 million per year, respectively<sup>2</sup> (Wall, 2013; Weaver, 2012). Companies with annual revenues of less than \$5 million are exempt from the tax (Torres, 2010). However, these small and startup medical device companies will not achieve profitability until they reach at least \$100 million to \$150 million in sales; this

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2. A survey of 57 medical device companies performed by the *Massachusetts Medical Devices Journal* estimates that profits for small companies, such as Exactech and Theragenics, could be cut by as much as half, and even larger companies with annual revenues of more than \$300 million, such as Analogic and NuVasive, could be pushed from profitability into the red (Wall, 2013).

exemption threshold remains too low to protect these vulnerable companies<sup>3</sup> (Nexon and Ubl, 2010).

Although the medical device excise tax is paid by the medical device manufacturer or importer, it may nonetheless have important implications for hospitals, physicians and their patients. Overall, it is suggested that while the medical device excise tax is a potential revenue stream, its unintended consequences may cause a barrier to entry and innovation (Van de Water, 2012). As a result, the ACA is expected to negatively influence the cash flows of medical device firms.

#### *2.1.4 Pharmaceutical Industry*

While the literature generally agrees that the ACA will have a significant effect on the pharmaceutical industry's profits, it is not clear whether the net effects will be positive or negative. More specifically, some have argued that the increased number of persons with health insurance coverage will lead to more doctors' visits and ultimately more prescription drug purchases (Abelson, 2010). A report by the federal Centers for Medicare & Medicaid Services (CMS) indicates prescription drug spending is expected to increase approximately 6.5% per year from 2015 through 2022 largely due to provisions of the ACA (CMS, 2012). As a result, there is sentiment in the literature that the pharmaceutical industry will benefit from the enactment of the ACA (Milne and Kaitin, 2010).

Others, however, have suggested that the ACA ultimately will have a negative influence on the cash flows of the pharmaceutical industry. Because the law requires pharmaceutical firms to provide discounts on drugs to prescriptions in the Medicare "donut hole" (Sebelius, 2010), there exists the potential for lower profit margins (e.g. Mellor, 2009; Drew and Burt, 2011). One study suggests that pharmaceutical firms will incur costs of approximately \$32 billion over the next decade as a result of efforts to close the donut hole (Favole, 2010). In addition, the law also influences generic drug manufacturers in ways that potentially disrupt the competitive dynamic between brand-name and generic drug manufacturers.

### *2.2 Capital Market Responses to Regulatory Action*

Many previous studies find evidence of significant capital market reactions to regulatory events. For example, Fier and Liebenberg (2013) find evidence that the passage of the federal Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) was viewed by the market as a negative event for the U.S. insurance industry. Dumm, Liebenberg, Liebenberg and Ruhland (2010) find that the announcement of a special regulatory legislative session in Florida was associated with a negative stock price reaction for insurers with property exposure

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3. Based on 2009 revenues, NxStage would have paid an estimated \$3.4 million in additional taxes despite posting losses of \$43.5million—a potentially profound effect for a company trying to achieve profitability (Weaver, 2012).

in Florida. In addition, Hendershott, Lee and Tompkins (2002) find that insurers and investment banks exhibited significantly positive price responses to the federal Financial Services Modernization Act of 1999. These and similar studies suggest that capital market responses to the ACA by key stakeholder industries would be consistent with previous literature.

There is also a breadth of literature that has examined the capital markets response to a Supreme Court decision. Abraham and Voos (2005) examine the effect of the Supreme Court decisions regarding the Health Care & Retirement Corporation of 1994 and Kentucky River of 2001 cases and provide evidence of a positive capital market reaction to the decisions. In addition, Mullin, Mullin and Mullin (1995) studied the capital market to the Supreme Court decision not to dissolve U.S. Steel and found evidence of a significant positive reaction. Another example is McWilliams, Turk and Zardkoohi (1993), who examine the impact of the Supreme Court's decisions on the capital market for companies involved in merger negotiation cases. Their results indicate that firms engaged in merger negotiations saw a negative price reaction to the decision. Considered in its entirety, the literature provides ample evidence that Supreme Court decisions often illicit market responses for firms with a stake in the outcome of the ruling.

To our knowledge, only two studies have extended the literature related to market reactions surrounding regulatory action and Supreme Court decisions to consider the ACA. The first is Dong (2014). Dong examines returns around the passage of the ACA of firms across 12 health care-related industries and finds the market appears to support the ACA. The other study is Ababneh and Tang (2013), who examine a series of reform events related to the ACA, including the passage of the law and the Supreme Court decision. When they examine the average cumulative abnormal stock returns (CARs) surrounding these reform events, they conclude that the ACA had a negative impact on health insurers but a positive impact on hospitals, while there were mixed findings related to drug manufacturers. While both studies represent valuable contributions, they consider few, short event windows and do not perform multivariate evidence to verify the robustness of their results. They also consider a relatively narrow sample of stakeholder industries.

### **3. Background and Data Description**

When we jointly consider the evidence in the literature that the ACA potentially has meaningful implications for the key stakeholder industries of pharmaceutical, medical device/biotechnology, health care and health insurance and that regulatory actions illicit capital market responses for the affected industries, we believe that events that convey new information to the market regarding the ACA would be associated with stock price reactions of firms in the key stakeholder industries. More specifically, it has been suggested that the ACA will have a negative and significant impact on the cash flows of health insurers

and medical device companies, a positive and significant impact on the cash flows of health care providers, and a significant but ambiguous impact on pharmaceutical companies. As a result, new information regarding the certainty of the ACA's enactment should be reflected in the stock prices of the stakeholder firms. That is, we would expect to observe a stock price reaction in the time surrounding the release of new information regarding the likelihood of the ACA becoming law.

Because the ACA is expected to influence the cash flows in different ways for each of our shareholder industries, we are unable to hypothesize the direction of the stock price reaction for all four of these industries in aggregate. However, we do expect a statistically significant reaction. As it relates to each individual industry, evidence in the previously discussed prior studies lead us to expect a negative and significant reaction for health insurers and medical device companies, a positive and significant reaction for health care providers, and a significant but ambiguous reaction for pharmaceutical companies.

To test these expectations, we use data from the Center for Research on Security Prices (CRSP). We gather closing daily share prices, market capitalization, volume, shares outstanding, etc. from the CRSP. These market-specific variables are widely used in the market reaction literature. From the CRSP, we also obtain the Standardized Industry Code (SIC). We restrict our sample to the universe of CRSP firms that have SIC codes that capture pharmaceutical companies, health care providers, health insurers and medical device companies. Additionally, we classify companies as a combination of two of these company types if the company operates across multiple industries. The objective of our tests is to provide standard event studies around dates when information about passing of the ACA is made publicly available.

We select two dates that are most likely to provide new information about the likelihood of the ACA becoming law. The first date is March 23, 2010, which is the date U.S. House of Representatives approved the U.S. Senate's version of the bill and represents the first time that the market was certain that the bill would become law. This event, which we refer to this date as the *Pass Date*, therefore represents a significant change in the market's belief about the likelihood that the bill would become a law. The second date that we select is the date that the U.S. Supreme Court upheld the constitutionality of the ACA, which occurred on June 28, 2012. This event, which we refer to as the *Supreme Court Date*, effectively removed the market's uncertainty regarding the law's constitutionality conveyed important information regarding the long-term viability of the law.

Table 1 reports statistics that describe our sample. Panel A reports the summary statistics on the *Pass Date*, while Panel B shows the statistics on the *Supreme Court Date*. We note that there are 458 firms in our sample surrounding the *Pass Date* and 500 firms in our sample surrounding the *Supreme Court Date*.

Table 1 shows that average firm had a share price (*Price*) of \$18.95 and a market capitalization (*MktCap*) of \$3.83 billion on the *Pass Date*. These mean values of these variables were \$20.93 billion and \$4.08 billion on the *Supreme Court Date*. We calculate share turnover (*Turn*) by dividing daily volume by

shares outstanding (in percent). We note that on the *Pass Date*, the average firm had share turnover of 1.83%, while on the *Supreme Court Date*, the average firm had share turnover of 2.08%.

**Table 1:**  
**Summary Statistics**

Panel A. Pass Date (N=458)					
	Mean	Median	Std. Dev.	Min.	Max.
	[1]	[2]	[3]	[4]	[5]
<i>Price</i>	18.95	8.34	26.18	0.26	348.13
<i>MktCap</i>	3833731.87	286634.54	14543388.24	8263.13	179708217.00
<i>Turn</i>	1.8317	1.4010	1.6788	0.0164	12.1972
<i>Spread</i>	0.0061	0.0014	0.0136	0.0001	0.0975
<i>Pvolt</i>	0.1351	0.0971	0.1729	0.0273	1.8596
<i>DRUG</i>	0.1441	0	0.3516	0	1
<i>HEALTH CARE</i>	0.4132	0	0.2231	0	1
<i>INSURER</i>	0.2306	0	0.1723	0	1
<i>DEVICE</i>	0.1288	0	0.3354	0	1
<i>DRUG-HC</i>	0.1245	0	0.3305	0	1
<i>HC-INS</i>	0.0175	0	0.1311	0	1
<i>HC-DEV</i>	0.1092	0	0.3122	0	1
<i>DRUG-INS</i>	0	0	0	0	0
<i>DRUG-DEV</i>	0	0	0	0	0
<i>INS-DEV</i>	0	0	0	0	0

Panel B. Supreme Court Date (N=500)					
	Mean	Median	Std. Dev.	Min.	Max.
	[1]	[2]	[3]	[4]	[5]
<i>Price</i>	20.93	9.36	35.48	0.56	553.79
<i>MktCap</i>	4078619.16	319130.70	15601928.31	14321.01	185544892.00
<i>Turn</i>	2.0833	1.4199	4.8676	0.0074	95.2366
<i>Spread</i>	0.0090	0.0018	0.0219	0	0.2063
<i>Pvolt</i>	0.2329	0.1593	0.6703	0.0612	0.2152
<i>DRUG</i>	0.1600	0	0.3670	0	1
<i>HEALTH CARE</i>	0.4202	1	0.2340	0	1
<i>INSURER</i>	0.2113	0	0.1708	0	1
<i>DEVICE</i>	0.1120	0	0.3299	0	1
<i>DRUG-HC</i>	0.1340	0	0.3410	0	1
<i>HC-INS</i>	0.0180	0	0.1331	0	1
<i>HC-DEV</i>	0.1040	0	0.3056	0	1
<i>DRUG-INS</i>	0	0	0	0	0
<i>DRUG-DEV</i>	0	0	0	0	0
<i>INS-DEV</i>	0	0	0	0	0

The table reports statistics that describe the sample of firms. Panel A reports the results for the statistics as of the *Pass Date*, which occurred on March 23, 2010. Panel B shows the results on the day the Supreme Court decision was made on June 28, 2012. *Price* is the closing share price according to the Center for Research on Security Prices (CRSP). *MktCap* is the firm's market capitalization. *Turn* is the share turnover or the daily volume scaled by shares outstanding. *Spread* is the bid-ask spread using closing bid and ask prices from CRSP. *Pvolt* is a measure of price volatility, which is the difference between the daily high price and the daily low price scaled by the daily high price. *DRUG* is an indicator variable equal to one if the particular firm is classified as a pharmaceutical company according to standard industry codes—zero otherwise. *HEALTH CARE* is an indicator variable capturing health care companies. *INSURER* is an indicator variable capturing whether the company is considered a health insurer. *DEVICE* is an indicator variable equal to one if the company is classified as a medical products company. *DRUG-HC*, *HC-INS*, *HC-DEV*, *DRUG-INS*, *DRUG-DEV* and *INS-DEV* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously.

We also calculate the security's bid-ask spread using closing ask and bid prices from the CRSP,<sup>4</sup> and *Spread* is the difference between ask price and the bid price scaled by the spread midpoint. The mean value of this variable on the *Pass Date* (*Supreme Court Date*) is 0.006 (0.009). The final variable that will be used as an additional control variable below is price volatility (*Pvolt*), which is the difference between the highest price during a particular day and the lowest price during a particular day, scaled by the highest price.<sup>5</sup> We find that the average stock had price volatility of 13.51% on the *Pass Date* and 23.29% on the *Supreme Court Date*.

We also calculate 10 indicator variables determining the type of firm, classified by SIC code, used in the analysis. *DRUG* is an indicator variable capturing pharmaceutical companies, while *HEALTH CARE* is a dummy variable categorizing health care providers. Similarly, the indicator variable *INSURER* identifies those firms that are considered health insurers, while *DEVICE* captures those firms that manufacture medical devices. Approximately 14% of companies are considered pharmaceutical companies, while nearly 41% of firms are considered health care providers. Only 23% of firms are health insurers, and nearly 12% are identified as medical device companies. We note that these percentages do not sum to 100%. The reason is because some firms are identified as two or more types of firms. As such, we classify firms as duplicate types across the four previously defined variables. *DRUG-HC* is a dummy for firms who are classified as having operations across pharmaceutical companies and health care providers. *HC-INS*, *HC-DEV*, *DRUG-INS*, *DRUG-DEV* and *INS-DEV* follow the same construction methodology. *DRUG-HC*, *HC-INS* and *HC-DEV* exist in our data, while *DRUG-INS*, *DRUG-DEV* and *INS-DEV* are not represented in the sample. For example, 113 of 458 firms have duplicate firm types for our *Pass Date* sample, and 124 of 500 firms have duplicate firm types for our *Supreme Court Date* sample.

## 4. Empirical Analysis and Results

In this section, we discuss our empirical analysis and the associated results. First, we conduct a univariate analysis, where we examine the performance of our sample firms using traditional event study techniques surrounding our two event dates. Second, we conduct a series of multivariate tests to determine the performance of the various types of companies used in our analysis.

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4. Roll and Subrahmanyam (2010) and Chung and Zhang (2013) show that spreads that are calculated using closing ask and bid prices closely approximate more traditional measures of the bid-ask spread that are calculated using transaction data.

5. Diether, Lee and Werner (2009) contend that this measure of price volatility captures more volatile stocks.

### Univariate Analysis

We begin by examining the stock performance of all firms in our sample surrounding both the *Pass Date* and the *Supreme Court Date*. Table 2 reports the results from the event study. We estimate CARs for various post-event time periods where CARs are estimated using a daily market model, and abnormal returns are defined as the residuals from the market model.

Panel A shows the results for the *Pass Date*. We report both parametric and non-parametric estimates of CARs for the three-day period surrounding the event date ( $CAR(-1,1)$ ). We find mean CARs are positive and reliably different from zero in the three-day period surrounding the event date (column [1]), suggesting that in the period immediately surrounding the *Pass Date*, the entire sample of firms in our analysis have abnormally high returns. In column [1], the mean estimate for  $CAR(-1,1)$  is not only statistically significant, but also the estimate is economically meaningful.

Since a contribution of our analysis is to examine longer-term effects, we also report the estimates of CARs for the two-day period ( $CAR(0,1)$ ), the four-day period ( $CAR(0,3)$ ), the six-day period ( $CAR(0,5)$ ) and the 11-day period ( $CAR(0,10)$ ) after the event date. The results of the two-day period immediately after the event date (column [2]) further suggest that firms in our sample have significantly higher returns in the period immediately surrounding the *Pass Date*. However, the mean CARs are not reliably different from zero in any of the other event window, suggesting that the information contained in the passage of the ACA is relatively short-lived as the information is quickly incorporated into the stock prices of our stakeholder firms.

Interestingly, when focusing on the median CARs, we find that these estimates are markedly lower than the mean CARs in column [1] and column [2]. A likely explanation for the difference between our parametric and non-parametric tests is that a small subset of firms are driving the positive relation between firm performance and the passage of the ACA. In an ensuing analysis, we further explore this possibility by separately examining the effects of the ACA on a given stakeholder industry.

Panel B of Table 2 shows the results surrounding the *Supreme Court Date*. Contrary to our findings in Panel A, results in Panel B show that returns are relatively normal in the three-day period surrounding the event date and the two-day period immediate after the event date. However, mean CARs in column [3] through column [6] are both positive and economically significant. Considered in their entirety, the mean CAR results in Panel B indicate that the effect of the Supreme Court's decision had a longer impact on the returns of the stakeholder firm relative to the *Pass Date*, suggesting that the market knew very little about the outcome of the Supreme Court decision on the day before the decision was made. Additionally, in Panel B of Table 2, we again find that median estimates of CARs in column [3] through column [6] are substantially lower than mean estimates of the CARs in the corresponding columns. These findings further

suggest that the mean CARs are likely driven by a subset of firms in our sample. We, therefore, explore this possibility next.

**Table 2:**  
**Cumulative Abnormal Returns for the Entire Sample**

Panel A. <i>Pass Date</i> (March 23, 2010)						
	<i>CAR(-1,1)</i>	<i>CAR(0,1)</i>	<i>CAR(0,3)</i>	<i>CAR(0,5)</i>	<i>CAR(0,10)</i>	<i>CAR(0,30)</i>
	[1]	[2]	[3]	[4]	[5]	[6]
<i>Mean</i>	0.0093** (0.012)	0.0057* (0.058)	0.0017 (0.431)	-0.0098 (0.287)	-0.0056 (0.387)	-0.0201 (0.258)
<i>Median</i>	0.0052	0.0026	-0.0058	-0.0201	-0.0294	-0.0301
<i>Std. Dev.</i>	0.0811	0.0707	0.0814	0.1458	0.2864	0.1894
Panel B. <i>Supreme Court Date</i> (June 28, 2012)						
	<i>CAR(-1,1)</i>	<i>CAR(0,1)</i>	<i>CAR(0,3)</i>	<i>CAR(0,5)</i>	<i>CAR(0,10)</i>	<i>CAR(0,30)</i>
	[1]	[2]	[3]	[4]	[5]	[6]
<i>Mean</i>	-0.0016 (0.664)	0.0021 (0.312)	0.0058** (0.037)	0.0167*** (0.000)	0.0246*** (0.000)	0.0184** (0.049)
<i>Median</i>	0.0024	0.0019	0.0013	0.004	0.0064	0.0074
<i>Std. Dev.</i>	0.0604	0.0346	0.0.12	0.0478	0.1123	0.1113

The table reports cumulative abnormal returns (CARs) for various event windows. CARs are obtained from estimating a daily market model and summing the residual returns across the event window. *CAR(-1,1)* measures the cumulative abnormal return from day  $t-1$  to  $t+1$ , where day  $t$  is the event day. Similarly, *CAR(0,1)* is the cumulative abnormal return from day  $t$  to  $t+1$ . *CAR(0,3)* is the cumulative abnormal return from day  $t$  to  $t+3$ , and so on. We report the mean CAR along with a corresponding t-statistic testing for statistical significance from zero. We also report the median CAR and the cross-sectional standard deviation of the CARs. Panel A reports the results for the *Pass Date*, while Panel B shows the results for the *Supreme Court Date*. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05 and 0.01 levels, respectively.

Table 3, Panel A reports the mean CARs separately by the seven firm types for the *Pass Date*. Column [1] reports the results for pharmaceutical companies, while column [2] shows the CARs for health care providers. Similarly, column [3] and column [4] present the results for health insurers and medical device companies, respectively. Column [5] through column [7] present results for the combination firm types. Panel A shows that the positive abnormal returns during the period immediately surrounding the *Pass Date* (given in Table 2) are primarily driven by health care providers, medical device companies, and firms that have operations across health care providers and medical device companies. While, for health care providers, this result is consistent with our previously described expectations regarding the effect of the ACA on stakeholder cash flows, it is not consistent with our expectations for medical device firms. We do not find abnormal returns in pharmaceutical companies or in health insurers (column [1] and column [3]) in the event periods immediately surrounding the *Pass Date*.

**Table 3:**  
**Cumulative Abnormal Returns by Type of Company**

Panel A. <i>Pass Date</i> (March 23, 2010)							
	<i>DRUG</i>	<i>HEALTH CARE</i>	<i>INSURER</i>	<i>DEVICE</i>	<i>DRUG-HC</i>	<i>HC-INS</i>	<i>HC-DEV</i>
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<i>CAR(-1,1)</i>	0.006 (0.103)	0.012** (0.011)	0.018 (0.134)	0.012*** (0.000)	0.018 (0.121)	0.022 (0.303)	0.011** (0.044)
<i>CAR(0,1)</i>	0.004 (0.187)	0.008* (0.058)	-0.009 (0.216)	0.006** (0.039)	0.007 (0.215)	0.019 (0.187)	0.021** (0.034)
<i>CAR(0,3)</i>	-0.004 (0.511)	0.006 (0.103)	-0.009 (0.302)	0.002 (0.521)	0.011 (0.229)	0.009 (0.117)	0.011 (0.213)
<i>CAR(0,5)</i>	-0.006 (0.512)	-0.009 (0.304)	-0.008 (0.303)	0.002 (0.511)	0.009 (0.121)	0.026 (0.156)	0.017 (0.206)
<i>CAR(0,10)</i>	-0.007 (0.612)	-0.008 (0.512)	-0.021 (0.164)	-0.002 (0.201)	0.013 (0.271)	0.019 (0.169)	0.007 (0.154)
<i>CAR(0,30)</i>	0.004 (0.402)	0.008 (0.206)	0.011 (0.203)	0.016 (0.132)	0.009 (0.339)	0.017 (0.411)	0.008 (0.226)
Panel B. <i>Supreme Court Date</i> (June 28, 2012)							
	<i>DRUG</i>	<i>HEALTH CARE</i>	<i>INSURER</i>	<i>DEVICE</i>	<i>DRUG-HC</i>	<i>HC-INS</i>	<i>HC-DEV</i>
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<i>CAR(-1,1)</i>	-0.003 (0.411)	0.000 (0.664)	-0.027** (0.026)	-0.011 (0.432)	-0.009 (0.614)	-0.014** (0.015)	0.003 (0.235)
<i>CAR(0,1)</i>	0.005 (0.365)	0.001 (0.203)	-0.031** (0.016)	-0.001 (0.412)	0.002 (0.384)	-0.021** (0.042)	0.003 (0.165)
<i>CAR(0,3)</i>	0.006 (0.207)	0.007** (0.022)	-0.022** (0.018)	-0.007 (0.413)	0.009* (0.087)	-0.006 (0.214)	0.011** (0.035)
<i>CAR(0,5)</i>	0.026** (0.018)	0.018** (0.016)	-0.002 (0.444)	0.004 (0.663)	0.006 (0.346)	0.001 (0.321)	0.009** (0.022)
<i>CAR(0,10)</i>	0.003 (0.521)	0.0204** (0.009)	-0.013** (0.043)	-0.003 (0.542)	0.007 (0.231)	-0.023** (0.034)	0.016** (0.023)
<i>CAR(0,30)</i>	0.002 (0.401)	0.024** (0.007)	-0.013** (0.036)	-0.004 (0.123)	0.003 (0.264)	-0.021** (0.012)	0.014** (0.035)

The table reports cumulative abnormal returns (CARs) for various event windows. CARs are obtained from estimating a daily market model and summing the residual returns across the event window.  $CAR(-1,1)$  measures the cumulative abnormal return from day  $t-1$  to  $t+1$ , where day  $t$  is the event day. Similarly,  $CAR(0,1)$  is the cumulative abnormal return from day  $t$  to  $t+1$ .  $CAR(0,3)$  is the cumulative abnormal return from day  $t$  to  $t+3$  and so on. We report the mean CAR along with a corresponding t-statistic testing for statistical significance from zero. Further, we estimate mean CARs for each of the four types of firms used in the sample. *DRUG* captures firms that are classified as a pharmaceutical company according to standard industry codes. *HEALTH CARE* captures health care companies. *INSURER* specifies companies that are considered a health insurer. *DEVICE* determines whether the company is classified as a medical products company. *DRUG-HC*, *HC-INS* and *HC-DEV* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously. Panel A reports the results for the *Pass Date*, while Panel B shows the results for the *Supreme Court Date*. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 3, Panel B reports the mean CARs separately by the seven firm types for the *Supreme Court Date*. We find that cumulative abnormal returns are significantly negative for health insurers and firms that operate across the health care and medical device area during the period surrounding the *Supreme Court Date*. For instance, the mean  $CAR(-1,1)$  for health insurers is -2.7%, while the

estimate for  $CAR(0,1)$  is markedly larger (mean CAR = -3.1%). These findings suggest that investors knew very little about the outcome of the Supreme Court decision on the day before the decision was made. Instead, the abnormally negative returns (as shown in  $CAR(-1,1)$ ), are driven by the last two days of that event window. The mean  $CAR(0,3)$  also is significantly negative. The reliability of these estimates is striking given that only 15 firms in our sample are considered health insurers. In fact, when examining the mean estimate for  $CAR(0,1)$ , we find that all 15 health insurers report negative CARs that range from 1% to -3.1%.

Panel B also reports that health care providers typically drive the positive abnormal returns given in column [4] and column [5] of Table 2. These results further suggest that while other types of firms had abnormal returns during the longer time windows examined in this analysis, health insurers had an almost immediate negative reaction in stock price after the Supreme Court decision.

### Multivariate Analysis

We recognize that other factors might influence the post-event returns of the firms used throughout the analysis. In this subsection, we attempt to control for these factors in a number of multivariate tests. In particular, we estimate the following equation using cross-sectional data.

$$CAR(0,1)_i = \alpha + \gamma_1 DRUG_i + \gamma_2 HEALTH\ CARE_i + \gamma_3 INSURER_i + \gamma_4 DEVICE_i + \gamma_5 HC-INS_i + \gamma_6 HC-DEV_i + \beta_1 Ln(size)_i + \beta_2 Turn_i + \beta_3 Ln(price)_i + \beta_4 Spread_i + \beta_5 Volt_i + \varepsilon_i \quad (1)$$

The dependent variable is the two-day cumulative abnormal return for each stock  $i$  from day  $t$  to  $t+1$ , where day  $t$  is the event date of interest. The independent variables of interest are the six indicator variables.<sup>6</sup>  $DRUG$  is an indicator variable for pharmaceutical companies.  $HEALTH\ CARE$  is an indicator variable capturing health care companies.  $DEVICE$  is an indicator variable equal to one if the particular firm is classified as a medical device company according to standard industry codes—zero otherwise.  $INSURER$  is an indicator variable capturing whether the company is considered a health insurer.  $HC-INS$  and  $HC-DEV$  are indicator variables for the combination types of firms. We omit the indicator variable  $DRUG-HC$  in order to avoid violating the full rank condition required for consistent estimates.<sup>7</sup> We also include five control variables  $Ln(size)$  in the natural log of market capitalization.  $Turn$  is the share turnover for each stock, while  $Ln(price)$  is the natural log of share price.  $Spread$  is the bid-ask spread, and  $Volt$  is

6. For robustness, we examined the influence of firms operating in a single industry sector and firms operating simultaneously across two industry sectors and found no significant difference between firm types. As such, we focus our analysis on the industry firm type Dummy variables.

7. We performed a number of scenarios to gauge any change in results. The results were robust to different combinations of company interactions as the omitted variable. We settled on  $DRUG-HC$  as the omitted variable as in table 3 column 5 for both senate and Supreme Court dates, the CARs were insignificant across all time stratifications.

the price volatility. *P*-values, which are obtained from robust standard errors that account for clustering across firms, are reported in parentheses.

**Table 4:**  
**Cross-Sectional Regressions – *Pass Date***

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<i>Intercept</i>	0.0072 (0.206)	-0.032 (0.501)	-0.0014 (0.412)	0.0004 (0.436)	0.0064 (0.106)	0.0031 (0.411)	0.0142 (0.303)
<i>DRUG</i>	0.0021 (0.213)	0.0131 (0.119)	0.0241 (0.224)	0.0087 (0.185)	0.0356 (0.146)	0.0221 (0.357)	0.0451 (0.334)
<i>HEALTH CARE</i>	-0.0024 (0.438)	-0.0013 (0.504)	-0.0052 (0.313)	0.0016 (0.606)	-0.0006 (0.712)	-0.0201 (0.323)	-0.0014 (0.412)
<i>INSURER</i>	-0.0231 (0.203)	-0.0123* (0.081)	-0.0316*** (0.000)	-0.0203* (0.067)	-0.0112 (0.204)	-0.0146** (0.026)	-0.0223** (0.043)
<i>DEVICE</i>	-0.0003 (0.144)	-0.0026* (0.071)	-0.0013* (0.076)	-0.0017* (0.059)	-0.0016* (0.083)	-0.0058** (0.051)	-0.0024** (0.064)
<i>HC-INS</i>	-0.0997 (0.276)	-0.0209* (0.065)	-0.0321* (0.063)	-0.0141* (0.055)	-0.0312* (0.087)	-0.0113** (0.045)	-0.0126** (0.032)
<i>HC-DEV</i>	-0.0032 (0.341)	-0.0054* (0.071)	-0.0132* (0.076)	-0.0045* (0.075)	-0.0381* (0.066)	-0.0022* (0.054)	-0.0012** (0.021)
<i>Ln(size)</i>		0.0021 (0.216)	0.0031 (0.304)	0.0027 (0.213)	0.0034 (0.198)	-0.0072 (0.113)	-0.0061 (0.214)
<i>Turn</i>			0.0019* (0.072)	0.0034 (0.213)	0.0057 (0.119)	0.0871 (0.312)	0.0061 (0.303)
<i>Ln(price)</i>				0.0048* (0.064)	0.0121* (0.056)	0.0201* (0.076)	0.0261** (0.033)
<i>Spread</i>					-0.1123 (0.201)	-0.0986 (0.211)	-0.0142 (0.503)
<i>Volt</i>						0.3412 (0.303)	-0.0206 (0.471)
Adjusted R <sup>2</sup>	0.0026	0.0019	0.0831	0.0026	0.0017	0.0059	0.1784

The table reports the results from estimating the following equation using cross-sectional data:

$$CAR(0,1)_i = \alpha + \gamma_1 DRUG_i + \gamma_2 HEALTH\ CARE_i + \gamma_3 INSURER_i + \gamma_4 DEVICE_i + \gamma_5 HC-INS_i + \gamma_6 HC-DEV_i + \beta_1 Ln(size)_i + \beta_2 Turn_i + \beta_3 Ln(price)_i + \beta_4 Spread_i + \beta_5 Volt_i + \varepsilon_i$$

The dependent variable is the two-day cumulative abnormal return (CAR) for each stock *i* from day *t* to *t+1*, where day *t* is the *Pass Date* (March 23, 2010). The independent variables of interest are the three indicator variables. *DRUG* captures firms that are classified as a pharmaceutical company according to standard industry codes. *HEALTH CARE* is an indicator variable capturing health care companies. *DEVICE* is an indicator variable equal to one if the particular firm is classified as a medical device company according to standard industry codes—zero otherwise. *INSURER* is an indicator variable capturing whether the company is considered a health insurer. *DRUG-HC* and *HC-INS* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously. We omit the indicator variable *DRU-HC* in order to avoid violating the full rank condition required for consistent estimates. We also include five control variables. *Ln(size)* is the natural log of market capitalization. *Turn* is the share turnover for each stock, while *Ln(price)* is the natural log of share price. *Spread* is the bid-ask spread, and *Volt* is the price volatility. *P*-values, which are obtained from robust standard errors that account for clustering across firms, are reported in parentheses. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

**Table 5:**  
**Cross-Sectional Regressions – Supreme Court Date**

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
<i>Intercept</i>	0.0003 (0.234)	-0.0201 (0.112)	0.0023 (0.567)	-0.0099 (0.395)	0.0027 (0.256)	0.0012 (0.556)	-0.0032 (0.543)
<i>DRUG</i>	0.0017 (0.211)	0.0122 (0.321)	0.0287 (0.119)	0.0167 (0.206)	0.0106 (0.184)	0.0214 (0.266)	0.0306 (0.112)
<i>HEALTH CARE</i>	0.0036 (0.553)	0.0103 (0.406)	0.0067 (0.344)	0.0052 (0.461)	0.0106 (0.487)	0.0039 (0.336)	0.0049 (0.248)
<i>INSURER</i>	-0.0487*** (0.000)	-0.0386*** (0.000)	-0.0213*** (0.000)	-0.0506*** (0.000)	-0.0449*** (0.000)	-0.0345*** (0.000)	-0.0487*** (0.000)
<i>DEVICE</i>	-0.0213** (0.047)	-0.0168* (0.066)	-0.0089* (0.091)	-0.0054* (0.066)	-0.0197* (0.084)	-0.0101** (0.033)	-0.0084** (0.043)
<i>HC-INS</i>	-0.0154** (0.034)	-0.0201** (0.073)	-0.0044* (0.084)	-0.0102** (0.047)	-0.0154** (0.049)	-0.0129** (0.024)	-0.0043** (0.017)
<i>HC-DEV</i>	-0.0101 (0.302)	-0.0203 (0.416)	-0.0041* (0.084)	-0.0067 (0.223)	-0.0236 (0.164)	-0.0087* (0.073)	-0.0051* (0.061)
<i>Ln(size)</i>		0.0036*** (0.000)	0.0044 (0.145)	0.0056 (0.113)	0.0058 (0.155)	0.0101 (0.266)	-0.0007 (0.604)
<i>Turn</i>			-0.0011 (0.106)	0.0099 (0.434)	0.0187 (0.459)	0.0222 (0.298)	-0.0004* (0.074)
<i>Ln(price)</i>				0.0031*** (0.000)	0.0203* (0.067)	0.0087* (0.084)	0.0032* (0.063)
<i>Spread</i>					-0.0134*** (0.000)	-0.0442 (0.308)	-0.0947 (0.301)
<i>Volt</i>						0.0084 (0.211)	0.0057 (0.336)
Adjusted R <sup>2</sup>	0.0311	0.0258	0.0266	0.0304	0.0387	0.0297	0.0378

The table reports the results from estimating the following equation using cross-sectional data:

$$CAR(0,1)_i = \alpha + \gamma_1 DRUG_i + \gamma_2 HEALTH\ CARE_i + \gamma_3 INSURER_i + \gamma_4 DEVICE_i + \gamma_5 HC-INS_i + \gamma_6 HC-DEV_i + \beta_1 Ln(size)_i + \beta_2 Turn_i + \beta_3 Ln(price)_i + \beta_4 Spread_i + \beta_5 Volt_i + \varepsilon_i$$

The dependent variable is the two-day cumulative abnormal return for each stock  $i$  from day  $t$  to  $t+1$ , where day  $t$  is the *Supreme Court Date* (June 28, 2012). The independent variables of interest are the three indicator variables. *DRUG* captures firms that are classified as a pharmaceutical company according to standard industry codes. *HEALTH CARE* is an indicator variable capturing health care companies. *DEVICE* is an indicator variable equal to one if the particular firm is classified as a medical device company according to standard industry codes—zero otherwise. *INSURER* is an indicator variable capturing whether the company is considered a health insurer. *DRUG-HC* and *HC-INS* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously. We omit the indicator variable *DRU-HC* in order to avoid violating the full rank condition required for consistent estimates. We also include five control variables. *Ln(size)* is the natural log of market capitalization. *Turn* is the share turnover for each stock, while *Ln(price)* is the natural log of share price. *Spread* is the bid-ask spread, and *Volt* is the price volatility. *P*-values, which are obtained from robust standard errors that account for clustering across firms, are reported in parentheses. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4 reports the regression results from estimating equation (1). We recognize the possibility that including all of the control variable might produce multicollinearity bias. In unreported tests, we estimate variance inflation factors for the full specification. We find that all variance inflation factors are below 3.15,

suggesting that the effects of multicollinearity do not bias our results. However, we estimate a variety of different specifications of equation (1) while including different combinations of independent variables to show that our results are unaffected by multicollinearity issues.

**Table 6:**  
**Cross Sectional Regressions – Pass Date**

	CAR(0,3)	CAR(0,5)	CAR(0,10)	CAR(0,30)
<i>Intercept</i>	0.1456 (0.303)	0.1558 (0.254)	0.1874 (0.266)	0.1997 (0.312)
<i>DRUG</i>	0.0032 (0.324)	0.0222 (0.242)	0.0321 (0.554)	0.0223 (0.346)
<i>HEALTH CARE</i>	0.0087 (0.223)	0.0033 (0.306)	0.0101 (0.199)	0.0079 (0.345)
<i>INSURER</i>	-0.0236*** (0.000)	-0.0213*** (0.000)	-0.0224*** (0.000)	-0.0187*** (0.000)
<i>DEVICE</i>	-0.0104** (0.049)	-0.0066** (0.038)	-0.0024*** (0.000)	-0.0106*** (0.000)
<i>HC-INS</i>	-0.0086* (0.058)	-0.0034* (0.76)	-0.0111** (0.035)	-0.0237** (0.027)
<i>HC-DEV</i>	-0.0187 (0.312)	-0.0213 (0.118)	-0.0056 (0.321)	-0.0331 (0.431)
<i>Ln(size)</i>	-0.0046 (0.223)	-0.0204 (0.164)	-0.0041 (0.213)	-0.0101 (0.265)
<i>Turn</i>	0.0054 (0.378)	0.0102 (0.412)	0.0134 (0.289)	0.0044 (0.125)
<i>Ln(price)</i>	0.0216** (0.033)	0.0245** (0.041)	0.0187* (0.057)	0.0134** (0.026)
<i>Spread</i>	-0.0324 (0.235)	-0.0224 (0.211)	-0.0376 (0.323)	-0.0167 (0.268)
<i>Volt</i>	-0.0141 (0.246)	-0.0223 (0.455)	-0.0144 (0.256)	-0.0431 (0.266)
Adjusted R <sup>2</sup>	0.187	0.213	0.221	0.187

The table reports the results from estimating the following equation using cross-sectional data:

$$CAR_i = \alpha + \gamma_1 DRUG_i + \gamma_2 HEALTH\ CARE_i + \gamma_3 INSURER_i + \gamma_4 DEVICE_i + \gamma_5 HC-INS_i + \gamma_6 HC-DEV_i + \beta_1 Ln(size_i) + \beta_2 Turn_i + \beta_3 Ln(price_i) + \beta_4 Spread_i + \beta_5 Volt_i + \varepsilon_i$$

The dependent variable is the cumulative abnormal return for each stock  $i$  from day  $t$  to  $t+3, t+5 \dots t+180$ , where day  $t$  is the *Pass Date* (March 23, 2010). The independent variables of interest are the three indicator variables. *DRUG* captures firms that are classified as a pharmaceutical company according to standard industry codes. *HEALTH CARE* is an indicator variable capturing health care companies. *DEVICE* is an indicator variable equal to one if the particular firm is classified as a medical

device company according to standard industry codes—zero otherwise. *INSURER* is an indicator variable capturing whether the company is considered a health insurer. *DRUG-HC* and *HC-INS* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously. We omit the indicator variable *DRU-HC* in order to avoid violating the full rank condition required for consistent estimates. We also include five control variables. *Ln(size)* is the natural log of market capitalization. *Turn* is the share turnover for each stock while *Ln(price)* is the natural log of share price. *Spread* is the bid-ask spread, and *Volt* is the price volatility. *P*-values, which are obtained from robust standard errors that account for clustering across firms, are reported in parentheses. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

In general, the regression results are similar across columns. For example, we find that the indicator variable *HEALTH CARE* does not produce estimate that are reliably different from zero. However, we do find the indicator variables *DEVICE*, *INSURER* and *HC-INS* produce negative estimates in five of the seven columns in Table 4. These results suggest that after controlling for a variety of factors that might affect stock returns, during the period immediately after the *Pass Date*, health insurers have unusually negative returns when compared to *DRUG-HC* companies. In column [7], the coefficient on *INSURER* (-0.0223) and *DEVICE* (-0.0024) suggests that after controlling for a number of independent factors, health insurers and device companies underperform *DRUG-HC* in the two-day period immediately after the *Pass Date*. These latter findings suggest that not only are the results for health insurers and device companies statistically significant, but also the results are economically significant. We also note that the positive and significant coefficients on the natural log of share prices only suggest the positive influence on CARs—whether the CARs are initially positive or negative. We find some evidence that stocks with higher share prices generally have abnormally high returns during the period immediately after the *Pass Date*. From a broad perspective, Table 4 support the notion that the passage of ACA was a viewed as a negative event for health insurers and medical device companies as compared to companies who operate simultaneously in the pharmaceutical and health care sector.

Table 5 reports the results when the data is measured during the period surrounding the *Supreme Court Date*. As before, the coefficients reported in Table 5 come from estimating equation (1) with robust standard errors. As before, we estimate variance inflation factors in unreported results and show that these factors are each below 3.6, suggesting that multicollinearity does not appear to be a significant issue in in these tests. However, for robustness, we again estimate various combinations of equation (1) to show that the results are generally unaffected despite which control variables are included.

The results in Table 5 are qualitatively similar across each column, so, for brevity, we only discuss our findings in the full specification (column [7]). First, we find some evidence that stocks with low share turnover and stocks with higher share prices generally have abnormally high returns during the period immediately after the *Supreme Court Date*. As before, we also find that the indicator variable *HEALTH CARE* produces a coefficient that is not reliably different from zero. More importantly, we find that the indicator variable *INSURER*, *DEVICE* and *HC-INS* produce negative estimates in each of the seven columns.

**Table 7:**  
**Cross-Sectional Regressions – Supreme Court Date**

	CAR(0,3)	CAR(0,5)	CAR(0,10)	CAR(0,30)
<i>Intercept</i>	0.1991 (0.206)	0.1874 (0.184)	0.1744 (0.227)	0.1945 (0.306)
<i>DRUG</i>	0.0162 (0.167)	0.0112 (0.324)	0.0237 (0.112)	0.0213 (0.245)
<i>HEALTH CARE</i>	0.0022 (0.414)	0.0109 (0.216)	0.0166 (0.379)	0.0067 (0.461)
<i>INSURER</i>	-0.0165*** (0.000)	-0.0223*** (0.000)	-0.0182*** (0.000)	-0.0306*** (0.000)
<i>DEVICE</i>	-0.0103** (0.043)	-0.0055*** (0.000)	-0.0067*** (0.000)	-0.0058** (0.016)
<i>HC-INS</i>	-0.0088* (0.067)	-0.0106* (0.059)	-0.0231* (0.069)	-0.0145** (0.041)
<i>HC-DEV</i>	-0.0206 (0.235)	-0.0143 (0.123)	-0.0087 (0.227)	-0.0143 (0.356)
<i>Ln(size)</i>	-0.0056 (0.366)	-0.0014 (0.223)	-0.0044 (0.144)	-0.0156 (0.387)
<i>Turn</i>	0.0033 (0.212)	0.0265 (0.223)	0.0201 (0.309)	0.0221 (0.223)
<i>Ln(price)</i>	0.0165*** (0.000)	0.0256* (0.058)	0.0106** (0.043)	0.0225** (0.031)
<i>Spread</i>	-0.0435 (0.324)	-0.0236 (0.124)	-0.0121 (0.238)	-0.0098 (0.116)
<i>Volt</i>	-0.0212 (0.511)	-0.0113 (0.111)	-0.0098 (0.243)	-0.0329 (0.221)
Adjusted R <sup>2</sup>	0.198	0.133	0.214	0.187

The table reports the results from estimating the following equation using cross-sectional data:

$$CAR_i = \alpha + \gamma_1 DRUG_i + \gamma_2 HEALTH\ CARE_i + \gamma_3 INSURER_i + \gamma_4 DEVICE_i + \gamma_5 HC-INS_i + \gamma_6 HC-DEV_i + \beta_1 Ln(size_i) + \beta_2 Turn_i + \beta_3 Ln(price_i) + \beta_4 Spread_i + \beta_5 Volt_i + \varepsilon_i$$

The dependent variable is the cumulative abnormal return for each stock  $i$  from day  $t$  to  $t+3, t+5 \dots t+180$ , where day  $t$  is the *Supreme Court Date* (June 28, 2012). The independent variables of interest are the three indicator variables. *DRUG* captures firms that are classified as a pharmaceutical company according to standard industry codes. *HEALTH CARE* is an indicator variable capturing health care companies. *DEVICE* is an indicator variable equal to one if the particular firm is classified as a medical device company according to standard industry codes—zero otherwise. *INSURER* is an indicator variable capturing whether the company is considered a health insurer. *DRUG-HC* and *HC-INS* are indicator variables capturing whether the companies have joint indications between multiple company types simultaneously. We omit the indicator variable *DRU-HC* in order to avoid violating the full rank condition required for consistent estimates. We also include five control variables. *Ln(size)* is the natural log of market capitalization. *Turn* is the share turnover for each stock, while *Ln(price)* is the natural log of share price. *Spread* is the bid-ask spread, and *Volt* is the price volatility.  $P$ -values, which are obtained from robust standard errors that account for clustering across firms, are reported in parentheses. \*, \*\* and \*\*\* denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Further, the magnitude of the coefficients is economically meaningful. For instance, results in column [7] suggest that after controlling for other factors that might influence the level of stock returns during the period immediately after the

Supreme Court decision, health insurers underperform companies that operate simultaneously in the pharmaceutical and health care sector by 5.6%, while medical device companies underperform companies who operate simultaneously in the pharmaceutical and health care sector by 0.9%.

We further expand our event window to examine the impact of the *Pass Date* and *Supreme Court Date* at greater lengths than a typical three-day window. We estimate equation 1 with the dependent variable as the cumulative abnormal return for each stock  $i$  from day  $t$  to  $t+3$ ,  $t+5$  and so on where day  $t$  is the *Pass Date* or the *Supreme Court Date*. Table 6 and Table 7 report results of a three-, five-, 10- and 30-day event window around the *Pass Date* and *Supreme Court Date*, respectively. The results mirror that of the two-day event window and report that while health care providers realize little market reaction to the ACA legislation, health insurers, medical device companies, and companies with operation in health care and insurance underperform companies that operate simultaneously in the pharmaceutical and health care sector over an extended event window. These findings suggest that not only are the results for health insurers, device companies and joint health care-insurance companies statistically significant, but also the results are economically significant.

## 5. Conclusion

The provisions of the ACA likely will have a significant influence on performance of firms operating in the health care arena. This suggests that new information regarding the likelihood of the ACA becoming law should be disseminated by the market and reflected in the stock prices of firms in the industries affected by the ACA. As a result, we analyze the returns of stocks in the pharmaceutical, health care, health insurance<sup>8</sup> and medical device industries during the time period surrounding the *Pass Date* and the *Supreme Court Pass Date*. The firms in these industries appear to be key stakeholders, and the market's expectation of the future cash flow of these firms is likely to be adjusted by the new information contained in both regulatory events.

It is important to consider that under the assumption that the ACA would increase the number of insureds, the demand for health care is likely to increase. The positive response in health care stocks is likely reflecting the market's perception that firms providing health care are going to benefit from the increase in the number insured. The results also show a negative price response in insurance companies. While the signs are opposite when comparing health care companies to insurance companies, the results are intuitive. The ACA reduces the flexibility of insurance companies to insure those that are likely to file more

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8. While stock companies only make up about 19% of the number of health insurers, the three largest health insurers (WellPoint, Aetna and UnitedHealth Group) hold more than 50% of the national market for commercial health insurance. These firms are in our sample and give us a foundation from which to generalize our results.

claims. Therefore, the market bids down the prices of insurance stocks due to the potential for higher losses.

Our results indicate a significant stock price reaction among the six stakeholder industries during the time period surrounding the release of new information regarding the likelihood of the ACA becoming law. In particular, our results suggest that the passage of the ACA legislation has a negative effect on health insurance, medical device companies, and companies that operate jointly in the health care and insurance sectors. We also find some evidence that the regulatory events had a positive influence on firms in the health care industry. The results are important to regulators in examining the impact the ACA has on its key stakeholder industries.

Taken in their entirety, our results suggest that the market revised expectations of publicly traded health insurers' and medical device companies' cash flows downward when it became more evident the ACA would become law. To the extent that the market demonstrates a degree of efficiency, this suggests that regulators may need to take actions to ensure the stability of health insurance and medical device markets in the post-ACA era. It also suggests that for health insurers and medical device firms, the ACA may have adverse consequences for capital budgeting and other decisions sensitive to the cost of capital. However, our finding that the ACA's regulations have a positive influence on health care firms offers insight to policymakers and regulators who seek to assess the potential benefits of the ACA on the participants in the health care market.

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# A Post-Mortem of the Life Insurance Industry's Bid for Capital During the Financial Crisis

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## Abstract

In this paper, we show that life insurance companies were under significant capital strain during the recent financial crisis. This was the case not just for the notable case of American International Group (AIG), or for life insurers within the largest life insurance groups that applied for government funds, but for life insurers across the entire industry. The ability to access government funds, the benefit of regulatory actions and the large internal capital transfers received by life insurers from their non-insurance parents during the crisis combined to contribute significant amounts of reported statutory capital to life insurance companies. Moreover, capital contributions to life insurers from their parents are not limited to crisis periods; they also exhibit a business cycle pattern. This study provides evidence suggesting two important policy recommendations and calls for additional research on these issues: 1) insurance supervisors should have the

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ability to assess capital adequacy and availability beyond the level of the insurance operating company, including the ability to assess the capital adequacy of, and availability of capital from, holding companies not currently supervised by state insurance regulators, and these supervisors should take a consolidated view in monitoring the size, type and direction of internal capital transfers when evaluating the viability of entity-level life insurers; and 2) life insurance supervisors would benefit from staff with expertise in understanding and forecasting the impact of macroeconomic and financial conditions on life insurers' balance sheets.

## Introduction

The 2008–2009 financial crisis was the most serious shock to the U.S. financial system since the Great Depression of the 1930s. A number of large financial institutions failed during the crisis. Many institutions that survived did so only because of extraordinary actions undertaken by company management to maintain solvency, or through the extension of extraordinary support by the federal government and the Federal Reserve System.

The impact of the financial crisis on the banking sector has been the subject of extensive research, discussion and debate. Academic and policy researchers, as well as several government investigations, have examined the measures undertaken by bank managers, banking industry regulators and governments in response to the crisis (Financial Crisis Inquiry Commission, 2011; Stanton, 2012). By comparison, relatively few studies have examined the experience of the life insurance sector during the crisis or the response of company managers and insurance regulators during the crisis period. This paper begins to fill that gap.

The near-failure and rescue by the U.S. Treasury and the Federal Reserve Bank of New York of AIG is the most spectacular example of an insurer experiencing financial difficulties during the recent financial crisis. The collapse of AIG was due at least in part to problems arising within that firm's life insurance businesses (McDonald and Paulson, 2015; Schwarcz, 2015), and its rescue required the extension of financial support totaling \$182.3 billion (McDonald and Paulson, 2015).

But was AIG unique? Or were financial difficulties within the U.S. life insurance industry more widespread? Harrington (2009) argues that, aside from AIG and firms in the mortgage insurance sector, insurance companies were on the sidelines. Baranoff (2015) provides data on the number of failures in the insurance sector during the crisis and points out that insurer failures were rare, at least when viewed in comparison to the number of failures of commercial banks. However, failure rates do not tell the whole story. Failure rates do not account for near misses—instances in which a company might have become insolvent but for the timely or fortuitous actions of insurance and insurance holding company managers, or intervention by regulators, the federal government, or the Federal Reserve. Observed failure rates also provide limited insight about what might have transpired had actual events turned out differently. The crisis period involved a sharp decline in asset prices in 2008 and early 2009, followed by a sustained, rapid recovery in asset values thereafter. However, insurance company managers had no way to know during the crisis that the subsequent market rally would take place or that the rally would favor assets held by life insurers.

Section 1 of this paper examines external signals of the extent of solvency concerns in the life insurance sector during the crisis. We argue that such concerns were not limited to AIG or a small subset of insurers. Instead, solvency concerns were widespread. During the crisis period, credit default swap (CDS) spreads for the largest U.S. life insurers exceeded by several times the spreads for the largest

U.S. commercial and investment banks. Several large insurers other than AIG sought and participated in government support programs, even though accessing those programs was not costless. Participants in government support programs often became subject to stricter regulatory oversight, and news regarding management's decision to apply for government programs or of a firm's acceptance into these programs can provide a negative signal to market participants concerning the financial strength of the firm.

Section 2 and Section 3 of this paper examine the extent to which insurance regulators and company managers resorted to extraordinary measures to restore or enhance the reported statutory capital position of life insurers during the crisis. The intensity of the use by firms in the life insurance sector of accounting or financing measures to boost reported statutory capital provides an indication of the extent of solvency concerns among company managers and insurance supervisors. Actions taken by managers and regulators during the 2008–2009 crisis also provide insight into what measures managers and supervisors may employ if the life insurance sector again experiences widespread financial difficulties.

Section 2 analyzes the use of regulatory actions by insurance supervisors. During the crisis period, insurance supervisors adopted accounting rules that tended to improve the reported capital positions of firms in the life insurance sector. Some of these changes applied to all insurers, while in other instances, favorable accounting treatments were allowed on a firm-by-firm basis. We show that the more lenient accounting practices allowed by some state supervisors during the crisis resulted in a meaningful increase in reported statutory capital levels for several large insurers.

Section 3 examines the extent of internal capital reallocation activity among holding company groups that contained at least one U.S.-domiciled life insurer. We find a sharp uptick in the amount of internal capital reallocation during the crisis period. We also document a reversal in the direction of intercompany flows during the crisis. That is, rather than insurance operating companies acting as a source of funds for the non-insurance parent holding companies, holding companies acted as a source of support for life insurance operating companies during the crisis. The rise in internal capital reallocation activity and the reversal of the direction of flows occurred both for firms that participated in or sought access to government support programs and for other firms in the industry. These results suggest that while internal capital markets among insurance holding company groups were acting beneficially to support life insurers during the crisis by allocating capital towards life insurance affiliates, pressures on firms in the insurance industry were widespread.<sup>1</sup> Our results also show that groups containing insurance firms were more likely to behave as consolidated entities during the crisis period than in earlier or later periods, and that life insurers' dependence on

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1. There are a number of papers highlighting the important role played by internal capital markets in efficiently allocating scarce capital within holding company groups for both bank and insurance holding company systems (Houston, James and Marcus, 1997; Campello, 2002; Ashcraft, 2008; Powell, Sommer and Eckles, 2008; Holod and Peek, 2010; Niehaus, 2014).

their non-insurance parents, entities outside the purview of the existing regulatory system, was substantial.<sup>2</sup> We also find a cyclical pattern of parental support to life insurers, indicating that stress on life insurers' capital positions is related to business cycles.

The results of our paper are summarized in the concluding section. The concluding section also contains several observations regarding the relevance of our findings for the supervision of firms in the life insurance sector.

## **Section 1. Solvency Concerns in the Life Insurance Sector During the Crisis**

### *Pressure on Life Insurer Balance Sheets*

The financial crisis affected both sides of U.S. life insurer balance sheets. The general account investment portfolios of U.S. life insurers are heavily weighted toward medium- and longer-term fixed income assets such as corporate bonds, residential mortgage-backed securities (RMBS), commercial mortgage-backed securities (CMBS) and commercial mortgage loans.<sup>3</sup> The prices of assets in each of these categories declined significantly during the crisis. As a result, insurers experienced significant realized and unrealized losses in their investment portfolios. A study by the U.S. Government Accountability Office (GAO) (2013) estimated total realized and unrealized losses on investments for U.S. life insurers in 2008 at \$123.7 billion. AIG accounted for slightly less than half of this total. An analysis in *Barclay's Capital* (Klein, 2009) of realized and unrealized investment losses by U.S. life insurers placed total losses during 2008 at \$154.9 billion.<sup>4</sup> In comparison, at year-end 2007, the aggregate amount of statutory capital of all U.S. life insurers was \$266.9 billion.<sup>5</sup> Using either the GAO or *Barclay's* estimate of

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2. While the ability to allocate capital within a holding company group is an important risk management tool, it is worth pointing out that the lack of regulatory oversight of internal capital transfers in such groups have played a role in various life insurance insolvencies (GAO 1992; GAO 1995). The failure of Consecro is an example of an insurer failure resulting from financial difficulties at its parent, a parent that was not an insurer and, hence, outside the purview of the state-based regulatory system (Norris and Berenson, 2002).

3. Assets held by U.S. life insurers are partitioned into those held in the insurer's separate account and those held in the general account. Insurers bear the investment risk on assets held in the general account. Customers bear the investment risk on assets held in separate accounts.

4. Both the GAO study and *Barclay's* study likely provide a lower bound on insurer life investment losses in 2008. The *Barclay's* study includes a wider range of asset classes than does the GAO study. The GAO study is for the industry, while the *Barclay's* study includes only major insurers. Both rely on statutory filings; consequently, the estimates do not include additional losses that may have occurred at the holding company level.

5. AIG's life insurance affiliates had \$13.2 billion in statutory capital at year-end 2007. Excluding AIG, total statutory capital of the U.S. life insurance industry at year-end 2007 was \$253.7 billion.

losses, investment losses by U.S. life insurers in 2008 amounted to a substantial portion of industry capitalization.

Events during the crisis also stressed the liability side of life insurer balance sheets. This was particularly true for life insurers that were issuers of variable annuity (VA) contracts. Life insurers are required to maintain sufficient reserves to meet future obligations to the holders of insurance contracts. Reserves are a liability on insurance company balance sheets. Benefits that insurance companies are required to pay to VA contract holders are tied to the value of assets in an underlying investment fund. The investment fund is similar to a mutual fund. The level of payments that a VA contract holder is to receive when the contract is annuitized is tied to the value of the assets in the fund. However, insurers also offer contracts with provisions or riders that guarantee the contract holder a minimum level of benefits. Such guarantees provide protection to contract holders but also expose insurance companies to the risk of a decline in asset values. When asset values fell during the crisis, insurance companies that offered such guarantees were required to increase reserves for their future obligations to VA contract holders. The increase in reserves for obligations to VA policyholders put further pressure on life insurer capital levels. The aggregate impact of such guarantees on the financial position of life insurance companies was substantial. Sun et al. (2009), in a research report published by Milliman, an actuarial consulting firm, estimated that as of Oct. 31, 2008, near the nadir of the crisis, the aggregate benefit value promised by U.S. life insurers to VA contract holders exceeded the underlying account values by \$232 billion. However, Sun et al.'s estimate of the gap does not account for offsetting impacts from insurer hedging programs. But even at a 90% level of hedge effectiveness, the gap between account values and benefit obligations of VA issuers was substantial.<sup>6</sup> This estimate of the increase in liabilities, combined with the estimates of the decline in assets, implies a large squeeze on life insurers' capital and surplus.<sup>7</sup>

### *Solvency Concerns Emerge*

The crisis brought about a dramatic revision of the assessment of the financial strength of firms in the life insurance sector. CDS spreads provide one indicator of investors' assessment of the financial condition of a firm.<sup>8</sup> The price of a CDS contract reflects the cost of protection against the risk of loss from the default of an obligor. Like other forms of insurance, prices for CDS contracts reflect the cost

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6. The Milliman report estimates an average hedge effectiveness of 90% among client firms participating in their survey.

7. Cummins and Weiss (2014) show that life insurers more involved in writing group annuity business are more likely to score higher on the market-based measure of systemic risk, SRISK, developed by Acharya et al. (2010).

8. Prices for CDS contracts are quoted in basis points. The spread reflects the cost for credit protection relative to the face value of the underlying obligation. For instance, a CDS spread of 1000 basis points indicates that the party receiving protection has to pay \$10 per year for protection on a bond with a face value of \$100.

to the contract buyer to obtain protection from the seller against the risk of loss. In the market for CDS contracts, prices reflect investors' assessments of expected loss on a bond—the combination of the probability that the issuer will default and the expected loss on the bond in the event of default. All else being equal, the higher is the probability of default or the larger the expected loss in the event of default, or both, the higher is the price for a CDS contract.

**Figure 1:**  
**CDS Spreads of Large U.S. Insurance Firms**

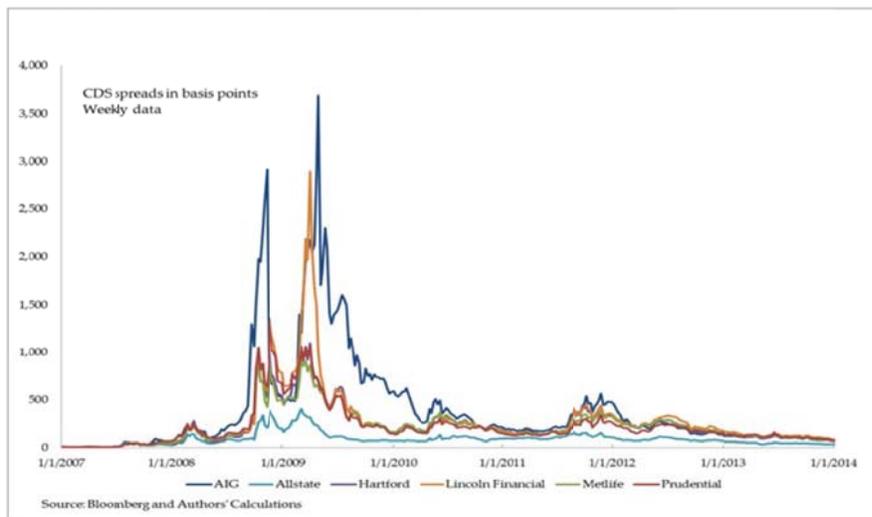
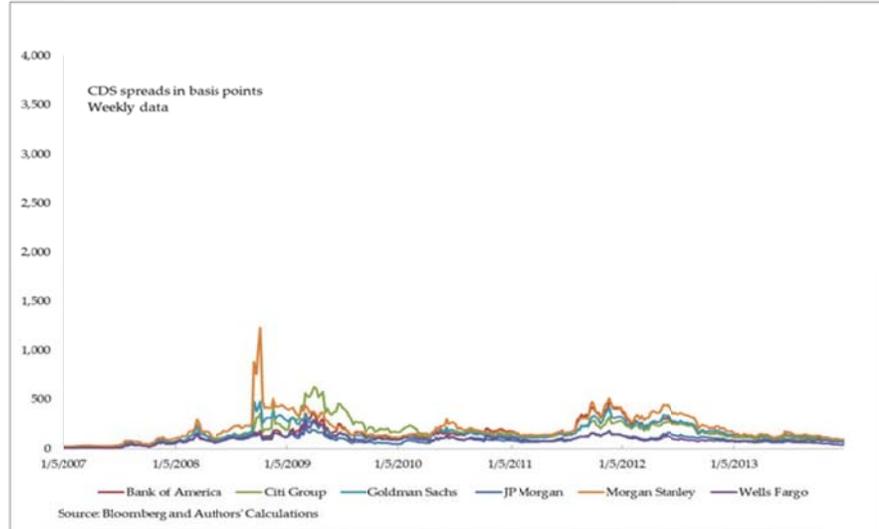


Figure 1 contains CDS spreads for six large, publicly traded insurers.<sup>9</sup> Three of the six firms in Figure 1—Prudential, MetLife and Lincoln Financial—are primarily life insurers. Each of the three derived more than 95% of its insurance revenues and held more than 98% of its insurance assets in its life insurance businesses. The insurance businesses of the other three firms—AIG, Allstate and Hartford Financial—were more diversified. At year-end 2007, Hartford Financial's life business accounted for 74% of its U.S. insurance revenues, 86% of its U.S. insurance assets and 56% of its U.S. general account insurance assets. AIG's business was more evenly split between its life segment and its property/casualty (P/C) segment. Allstate had the smallest life business. As of year-end 2007, Allstate's life insurance business accounted for slightly more than half of its general account insurance assets, but only 20% of the firm's U.S. insurance revenues.

9. CDS pricing data are available only for those firms with actively traded contracts. The six insurers appearing in Figure 1 represent the set of insurers for which CDS data during the crisis period are available on Bloomberg.

**Figure 2:**  
**CDS Spreads of Large U.S. Banks**  
**(Plotted on Same Scale as Figure 1)**



The series in Figure 1 show a rise in the cost of credit protection for all six insurers starting in early 2008. Spreads continued to increase as the economy weakened in the second half of that year. Spreads on AIG CDS were higher than for other insurers. During the fourth quarter of 2008, the price of a CDS contract on AIG debt averaged 1386 basis points (bps). But critically, AIG was not the only insurer for which CDS spreads had risen far beyond pre-crisis levels. The average cost of a CDS contract on Lincoln National in the fourth quarter of 2008 was 886 bps, for Prudential it was 882 bps, for Hartford Financial it was 702 bps, and for MetLife it was 646 bps. Spreads for Allstate increased only modestly during the crisis period. Among the six insurers in Figure 1, Allstate had the least exposure to the life insurance sector. The sharp increase in CDS spreads in the second half of 2008 for firms in the life insurance sector suggests that solvency concerns in the sector were not limited to AIG. Instead, solvency concerns in the insurance sector were more widespread. These concerns would persist well beyond the initial stages of the crisis.

Solvency concerns in the insurance sector were acute in comparison with those for large firms in the commercial and investment banking sectors. Figure 2 contains the time series of CDS spreads for the six largest U.S. banking firms. For ease of comparison, the series in Figure 2 have been plotted using the same vertical scale as those in Figure 1. As the crisis unfolded, the cost of credit protection on the largest banks also rose. However, at no point during the crisis was the average cost of credit protection for the largest banks as high as for the largest insurers, even if AIG were excluded from the latter group.

*Government Support for the Life Insurance Sector*

During the crisis, governments and central banks provided several types of support programs to the financial sector. These programs were intended to recapitalize struggling firms, provide additional liquidity to the sector or both. Depending on their circumstances, life insurance companies were eligible to participate in several of these support programs.

Participation in government programs is not costless. Participation in government or central bank support programs typically entails additional reporting requirements and also may subject a firm to heightened regulatory or legal requirements. News that a firm is participating in or seeking to gain access to government or central bank support programs may be interpreted by market participants as bad news: that the firm's financial situation or future prospects are worse than expected. Government bailout programs often are politically unpopular, exposing participating firms to negative media coverage.<sup>10</sup> It is reasonable to assume that management teams would weigh the costs of accessing government or central bank support programs against the costs of obtaining additional capital or liquidity from private sources. The decision by company managers to participate in government programs may provide an indication that traditional sources of capital or liquidity are either unavailable or have become more costly. Rational managers would be expected to weigh the costs of participation against the firm's current financial need or the likelihood that the firm would need to avail itself of support programs in the future.

Some U.S. life insurance companies took advantage of, or sought access to, several government and central bank support programs. During the crisis, five life insurers with operations in the U.S. received capital injections from the U.S. and Dutch governments.<sup>11</sup> Several other firms with U.S. life insurance operations applied for access to government programs designed to recapitalize troubled institutions. In the U.S., the main source of capital support came from the Treasury's Capital Purchase Program (CPP). The Treasury created the CPP using \$250 billion in funds from the Troubled Asset Relief Program (TARP). AIG was the first insurer to participate in the CPP. On Nov. 25, 2008, the Treasury used \$40 billion of CPP funds to buy AIG preferred stock and warrants. On March 2, 2009, the Treasury made a second purchase of \$29.8 billion in AIG preferred stock and warrants. AIG also received support from the Federal Reserve and numerous other government programs during the crisis (McDonald and Paulson, 2015).

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10. Ng, Vasvari and Wittenberg-Moerman (2015) find that negative media coverage depressed stock prices of banks participating in the Troubled Asset Relief Program during the crisis.

11. Life insurer regulatory capital requirements in the U.S. are applied at the operating company level. Section 2 and Section 3 of this paper examine the actions taken by insurance company managers to bolster reported statutory capital levels at the operating company level. Because the focus of these sections is on insurance operating companies in the U.S., we include in the set of firms seeking access to support programs firms with substantial U.S. life insurance operations that received support from foreign governments.

While AIG's participation in government support programs was the most significant among U.S. insurers, two other domestic insurers—Lincoln National and Hartford Financial—also participated in the TARP program (U.S. Treasury Transaction Report, various dates, e.g., March, 24, 2011, or Nov. 19, 2016).<sup>12</sup> The Transaction Report shows that Hartford Financial received \$3.4 billion from the CPP through the issuance of preferred stock and warrants. It also shows that Lincoln National received \$950 million from the CPP through the issuance of preferred stock and warrants. Two foreign insurers with significant U.S. life insurance operations received support from the Dutch government. ING Group NV, parent of Voya Financial, received EUR 10 billion (\$13.8 billion, from ING Group's 2008 annual report, page 6), and AEGON NV, the parent of Transamerica Life, received €3 billion (\$3.7 billion, Aegon's 2008 Form 20-F filed with the U.S. Securities and Exchange Commission (SEC), page 98).

Several other large insurance companies sought approval to access TARP funds (Koijen and Yogo, 2015a). Among those insurers with significant life insurance activities, Allstate, Ameriprise, Principal Financial and Prudential Financial each applied for and were approved for access to funds through the TARP program (Dowell and Heller 2009). Because the TARP program was open only to bank holding companies, several insurers sought to obtain a bank holding company charter through the acquisition of a savings and loan. Three life insurers—Genworth (Frye, 2009), Phoenix Life (The Phoenix Life Companies Inc., 2009)<sup>13</sup> and Protective Life (Protective Life 2009 Form 8-K, page 2)—were unable to complete the acquisition of a savings and loan institution and were thus ineligible to participate in the TARP program.

Participation in the TARP program entailed costs to these life insurers. The amount and form of TARP support received by participating firms were disclosed in reports issued by the Treasury. Participants were subject to additional reporting and recordkeeping requirements.<sup>14</sup> Firms receiving TARP funds also were subject to limits on senior executive officer compensation and the extension of golden parachute payments to departing executives (Calomiris and Khan, 2015). Indeed, Bayazitova and Shivdasani (2012) show that restrictions on senior management compensation were a significant disincentive to participation in the CPP. While the Treasury did not disclose the set of firms applying or inquiring about possible

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12. The U.S. Treasury provides transaction details of the CPP, including amounts of preferred shares and warrants purchased by the U.S. Treasury from participants in the CPP, here: <https://www.treasury.gov/initiatives/financial-stability/reports/Pages/TARP-Investment-Program-Transaction-Reports.aspx>.

13. Phoenix Life's press release is available at <http://amda-1s0c1x.client.shareholder.com/releasedetail.cfm?ReleaseID=761715>.

14. See Calomiris and Khan (2015) for a more thorough analysis of the TARP program and Koijen and Yogo (2015a) for insurance holding companies' bid for external capital through various means, including TARP, during the crisis.

TARP funding, public companies seeking support often disclosed this information in SEC filings or through other sources.<sup>15</sup>

Insurance companies that were issuers of commercial paper also could gain access to the Federal Reserve's Commercial Paper Funding Facility (CPFF). The CPFF was created in October 2008 to provide liquidity to U.S. issuers of commercial paper. The program was open to life insurance company issuers of commercial paper so long as the paper was rated at least A-1/P-1/F1 by a major rating agency. Seven U.S. life insurers, as well as AEGON and ING, participated in the CPFF. Altogether, these firms issued \$74.6 billion through the CPFF, of which \$60.2 billion was issued by AIG.<sup>16</sup>

At least 13 firms with significant U.S. life insurance operations either sought access to or participated in support programs during the crisis period. The 13 firms, along with the total assets of their U.S. life insurance operating companies, appear in Table 1. The combined assets of these firms at year-end 2007 were just more than \$2.3 trillion. These firms accounted for just less than half of the total assets of the U.S. life insurance sector. As discussed above, access to and participation in government and central bank support programs were not costless. That the management teams of firms comprising more than half of the U.S. life insurance sector (by assets) determined that it might be beneficial to secure access to some form of government or central bank support is consistent with the notion that concerns regarding the financial strength of the sector were acute and widespread.

While several insurers found it beneficial to access government support programs, the evidence appearing in Table 1 does not definitively show that the choice to access such programs was motivated by financial difficulties within the industry. It might have been the case that some insurers opted to participate because support programs were a low-cost source of funds. Such a view is consistent with Harrington's (2009) assessment that, other than for AIG and certain firms in the mortgage insurance sector, solvency concerns in the insurance sector during the crisis were overblown. If solvency concerns in the sector were, indeed, overblown, then we would expect to see firms seeking access to support programs having little impact on investors' assessment of the likelihood of default.

The time series of insurer CDS spreads suggest that this was not the case. Instead, solvency concerns for most large insurers were significant, and access to support programs had a significant role in stabilizing the industry. Consider again the time series of CDS spreads on insurer obligations appearing in Figure 1. For most firms, the series exhibit two peaks—one in the second half of 2008 and a second in the first half of 2009. At the time that the Treasury created the CPP, it was not clear whether insurance companies other than those deemed to be of

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15. Transaction details related to the TARP program can be found on the U.S. Treasury's website. For example, CPP transactions can be found at <https://www.treasury.gov/initiatives/financial-stability/reports/Pages/TARP-Investment-Program-Transaction-Reports.aspx>.

16. Transactions related to the CPFF program can be found on the New York Federal Reserve Bank's website at [https://www.federalreserve.gov/newsevents/reform\\_cpff.htm](https://www.federalreserve.gov/newsevents/reform_cpff.htm).

systemic importance would be eligible to participate. As economic conditions deteriorated, investors became increasingly concerned about the financial condition of most major insurers. Figure 3 shows the time series of CDS spreads for five of the six insurers for which data are available for the first half of 2009.<sup>17</sup> As measured by CDS spreads, and leaving aside AIG, solvency concerns were particularly acute for Lincoln National, a firm heavily involved in the provision of VA contracts.<sup>18</sup>

**Table 1:**  
**U.S. Life Insurers Seeking Access to Emergency Support Programs**

Insurer [1]	Programs and Nature of Involvement [2]	U.S. Life Insurance Assets (\$billion) at YE2007 (Statutory Filings) [3]
<i>Companies That Applied for U.S. Government Support Programs</i>		
Allstate	TARP/PPP-Approved	86
American International Group, Inc	TARP/PPP-Participated, CPFF-Participated, Additional Credit Arrangements w/ FRB-NY and the U.S. Treasury	262
Ameriprise	TARP/PPP-Approved	85
Genworth Financial	TARP/PPP-Applied, CPFF-Participated	68
Hartford Financial Services	TARP/PPP-Participated, CPFF-Participated	264
Lincoln National	TARP/PPP-Participated, CPFF-Participated	155
MetLife	CPFF-Participated	556
Phoenix Companies	TARP/PPP-Applied	22
Principal Financial Group	TARP/PPP-Approved, CPFF-Participated	136
Protective Life	TARP/PPP-Applied	26
Prudential Financial	TARP/PPP-Approved, CPFF-Participated	387
<i>Companies with U.S. Operations Obtaining Assistance from Foreign Governments</i>		
Transamerica (AEGON NV)	Capital contribution from Dutch government, CPFF-Participated	74
Voya Financial (ING Groep NV)	Capital contribution from Dutch government, CPFF-Participated	191
Total		2,309
Total US Life Industry at YE2007		4,986

TARP/PPP=Troubled Asset Relief Program/Capital Purchase Program; CPFF=Commercial Paper Funding Facility.

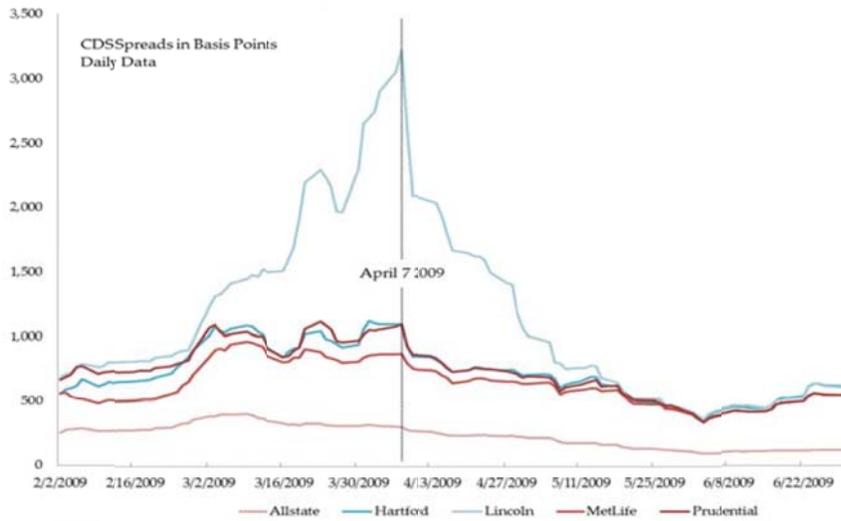
Applied=institution applied for access but was either denied or the application was withdrawn; Approved=institution received approval but did not take part in the program; Participated=institution received funds or guarantees under the program.

Sources: Company SEC filings, SNL Financial, various news sources.

17. Because AIG already received TARP funds in 2008, it is not included in this figure.

18. Dennis Glass, CEO and president of Lincoln Financial, in a presentation at the Lehman Brothers Global Finance Services Conference on Sept. 9, 2008, stated, "In our VA business, we're talking market share in 2008, you can see industry sales fell minus 6; Lincoln sales up 3. We ranked 5th overall in the industry." In a 2008:Q4 Lincoln National Earnings conference call on Feb. 10, 2009, Dennis Glass also stated, "We were able to retain our No. 1 VA [variable annuities] sales ranking in top firms, including Edward Jones, Wachovia, Smith Barney and UBS through November [of 2008]."

**Figure 3:  
Insurer CDS Spreads in Early 2009**



Source: Bloomberg and Authors' Calculations

Change in spreads around the appearance of the 4/8 WSJ story regarding TARP access for troubled insurers

	4/7	4/8	4/9	Pct. Decline 4/7 to 4/9
Lincoln	3224	2602	2090	-35%
Hartford	1094	928	850	-22%
Prudential	1094	928	862	-21%
MetLife	869	793	755	-13%
Allstate	305	287	275	-10%

News that insurers would be considered for support through the TARP program caused market participants to significantly lower their assessment of the likelihood of default of most major insurance companies. While a final determination of which insurers would be able to participate was not made until May 2009, on April 8, 2009, *The Wall Street Journal* reported that the Treasury had decided to expand the TARP program to include firms in the life insurance sector (Patterson, Solomon and Scism, 2009). As shown in Figure 3, CDS spreads for Lincoln National—as well as Hartford, Prudential and MetLife—each narrowed significantly following this news. The decrease in spreads surrounding the announcement suggests that the ability to access TARP funding had a significant stabilizing effect on the life insurance industry as a whole, not just on AIG.

## Section 2. Regulatory Actions

By late 2008, state insurance regulators were aware that the events surrounding the financial crisis were placing considerable stress on both sides of insurers' balance sheets, and regulators recognized the impact that these events would have on insurers' reported statutory capital levels. Life insurance companies and industry representatives also knew that the potential existed for capital stress. Wall Street analysts were expressing their concerns about the ability of life insurers to absorb not only the realized losses, but also the sizable unrealized losses in their investment portfolios (Goldman Sachs, 2010; Daly and Russell, 2009). In addition to the problems related to volatility in the securities markets, another cause of financial stress cited by some market participants came from life insurers' relatively high level of dependence on various funding mechanisms, such as letter of credit (LOC) arrangements, used to provide funding needed to write certain lines of business (Sidley Austin, 2008).<sup>19</sup> As these sources of funding became less available, life insurers faced further capital strain (Sidley Austin, 2008).

In the fourth quarter of 2008, the American Council of Life Insurers (ACLI) sent the National Association of Insurance Commissioners (NAIC) a set of proposals for variances (exceptions) to standard accounting requirements. The proposals were intended to provide life insurers "the necessary capital flexibility to operate in a highly volatile economic climate" (Society of Actuaries, 2009). When the NAIC denied the ACLI's request to relax capital requirements, insurers then turned to their individual state insurance commissioner to request specific accounting exceptions (NAIC, 2009a).

Some of these exceptions were granted by individual state insurance commissioners, which improved the statutory capital position of many life insurance companies (Voss, 2009; Hudson, 2009). Some insurance commissioners spoke out against allowing such exceptions to be used, supporting the NAIC's decision (Kofman, 2009). One commissioner in favor of these exceptions publicly commented that financial condition and credit ratings were considered before allowing more-relaxed accounting standards, and that these exceptions were not granted to "make a weak company look healthy."<sup>20</sup> Another insurance commissioner further argued that since such exceptions are disclosed in filings in the public domain, inappropriate exceptions "would face harsh scrutiny from

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19. Traditional insurance companies can transfer risk to captive insurers, which usually have lower standards for accounting, capital and regulatory oversight than traditional insurers. Captives often are subject to less-stringent accounting standards, capital requirements and regulatory oversight than traditional insurers. LOCs are acceptable forms of collateral for captive life insurance subsidiaries and are used to back insurance liabilities transferred to a captive insurer. Products noted in this article include level premium term and universal life with secondary guarantees, both lines of business where captive transactions were involved. The Financial Stability Oversight Council's Annual Report (2014) outlines several regulatory concerns related to captives.

20. Susan Voss, Iowa's Insurance Commissioner, as quoted in Murillo (2009).

fellow commissioners.”<sup>21,22</sup> The ACLI noted that its proposed changes “could provide balance sheet relief in a challenging economic environment, but they won’t alter a company’s ability to meet its financial obligations.”<sup>23</sup>

Prior to granting individual insurer accounting exceptions, a state commissioner is required to provide advance notice to all other states where an insurer is licensed, with significant confidential disclosures; however, if states fail to provide this notice, the permitted accounting practice is still valid (Roehl, 2009). The GAO (2013), as well as various academics, characterized these exceptions granted during the crisis as “regulatory forbearance” granted to the insurance sector (Becker and Opp, 2013).

There are two types of exceptions that state regulators can make to insurer statutory accounting standards—prescribed and permitted practices. Prescribed practices are applicable to all insurance companies domiciled in that state and are incorporated directly or by reference to state laws, regulations and regulatory authority. Permitted practices are those granted on a case-by-case basis to the insurer seeking the exception (NAIC, 2008). Our review of the prescribed and permitted practices granted during the financial crisis suggests that state regulators primarily granted exceptions to insurers on a permitted rather than a prescribed basis (NAIC, 2008).

Two types of accounting exceptions used by many insurers relate to deferred tax assets (DTA) and reserves. DTA-related permitted practices accounted for about half of all the accounting forbearance granted. This type of exception provided insurers with relief from the significant write-downs related to impaired assets. On the liability side of the balance sheet, reserving exceptions accounted for about another third of all the prescribed and permitted practices (NAIC, 2008). Examples of such allowed exceptions include variances in mortality risk factors for life insurance reserves and modifications to asset adequacy testing for variable annuity reserves (Lifehealthpro.com, 2009).

In addition to permitted and prescribed accounting practices that affected capital levels, state insurance regulators also changed the risk-based capital (RBC) valuation methods for certain invested assets—notably mortgage-backed securities. In 2009, in response to a request by the ACLI, the NAIC changed the method for valuing RMBS (NAIC, 2009b; Fitch, 2009).<sup>24</sup>

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21. Thomas Hampton, Washington, DC, insurance commissioner, as reported in Murillo (2009).

22. The information is included in the notes to an insurer’s annual statutory financial statements and includes the exception(s) used, and a reconciliation showing the impact on capital without the exception.

23. Whit Corman, ACLI spokesperson, as quoted in Murillo (2009).

24. Fitch (2009) noted that the life industry held about \$145 billion in non-agency RMBS at year-end 2008, with an RBC requirement estimated at \$2 billion. Given the subsequent downgrades in 2009, Fitch reported that the industry estimated the capital requirement would increase to \$11 billion, with slightly more than half of this increase affecting the top 20 life insurers. Fitch also describes the shift in approach by the NAIC from a probability of default (PD) basis to an expected loss measure that could capture both PD and expected recoveries.

**Table 2:**  
**Impact of Prescribed and Permitted Practices on Life Insurer Surplus at Year-End Net Increase (Decrease) in Capital Levels (\$000) Relative to NAIC Statutory Accounting Principles (TARP Recipients in Bold)**

Firm	2007	2008	2009	2010
Allstate	0	1,384,000	0	0
American International Group	<b>(164,515)</b>	<b>(171,494)</b>	<b>(142,629)</b>	<b>(128,780)</b>
Ameriprise	0	(33,733)	0	(17,117)
Genworth	0	0	0	4,459
Hartford Financial Services	<b>360,068</b>	<b>1,551,086</b>	<b>878,999</b>	<b>2,938,726</b>
Lincoln National	<b>221,866</b>	<b>961,665</b>	<b>310,450</b>	<b>294,193</b>
MetLife	(451,390)	409,657	736,093	540,334
Phoenix Companies	0	0	-	0
Principal Financial Group	236,360	387,378	246,077	244,862
Protective Life	(9,292)	11,839	(868)	(177,562)
Prudential Financial	(81,745)	22,131	25,460	18,051
Subtotal: U.S. Firms	111,353	4,522,530	2,053,582	3,717,168
Transamerica (AEGON NV)	3,722,858	2,928,186	2,643,831	2,938,726
Voya Financial (ING Groep)	0	179,820	(1,003,715)	(5,630)
Total: All Firms	3,834,211	7,630,537	3,693,699	6,650,263

Source: SNL Financial

During the crisis, historically high levels of failed mortgages had resulted in rating agency downgrades of a majority of these securities. The state regulators changed the valuation approach after concluding that the tranches of RMBS held by life insurers had not experienced the same level of losses as others and, therefore, should maintain a higher credit rating (NAIC, 2009b). These higher ratings resulted in lower capital requirements for some 60% of all insurer RMBS investments, equal to \$7.3 billion of higher reported statutory capital for the U.S life sector at year-end 2009 (NAIC, 2013). While Fitch noted that appropriate credit risk metrics for structured securities were being debated in the capital markets and that the NAIC RBC requirements for fixed-income investments did not differentiate between credit risk of corporate and structured securities, other observers have questioned the objectivity of this shift in valuation (Becker and Opp, 2013).

Insurance companies are required to report the impact of the prescribed and permitted practices on statutory capital in their annual filings with state insurance commissions. The use of such practices increased dramatically as the crisis worsened.<sup>25</sup> Table 2 presents data on the net impact of prescribed and permitted practices on the capital levels of insurers that are known to have participated in or

25. Similar trends for the insurance industry as a whole were reported (GAO 2013).

sought access to the TARP and CPFF (Table 1).<sup>26</sup> For the U.S. insurers in this group, the aggregate impact of prescribed and permitted practices on capital rose from \$111 million in 2007 to \$4.5 billion in 2008. This is a lower bound on the impact of exceptions on reported capital levels. The figures in Table 2 do not include capital benefits afforded by the RMBS capital valuation change, as such information is not reported in insurer statutory filings. As expected, the dollar impact of prescribed and permitted practices declined for most firms in 2009 and 2010 as the crisis subsided.

How significant were accounting allowances for the large life insurers seeking government support? Table 3 shows the percentage of capital reported in the annual financial statements of these companies that was attributable to the effect of prescribed and permitted accounting practices. For the U.S. life insurers seeking government support, prescribed and permitted practices accounted for just 0.1% of capital in 2007, rising to 4.1% in 2008. Including the foreign insurers receiving government assistance, the relative impact of prescribed and permitted practices on statutory capital rose from 2.9% of capital in 2007 to 6.1% in 2008. Among the firms with the largest relative impacts from allowances were two of the three recipients of TARP funds—Lincoln National and Hartford Financial.

The use of various forms of regulatory actions to respond to insurers' financial stress by state insurance regulators has been controversial. Such practices were sharply criticized by the GAO in its review of the handling by insurance regulators of the failure of four large life insurers in the early 1990s (GAO, 1992).<sup>27</sup> The report cited statutory accounting and reporting practices that failed to ensure accurate financial statement disclosure of the actual magnitude of the deterioration of those insurers' financial condition.<sup>28</sup> In this regard, our findings provide similar evidence with respect to the relaxation of accounting and capital standards. In 2008, two of the firms appearing in Table 3 had their capital positions bolstered by more than 30% by prescribed and permitted practices. Others hypothesize that such regulatory behavior with respect to temporary relaxation of capital requirements may be viewed as a form of "macro-prudential regulation 'on the fly,' aiming to avoid macro-economic distress, and, in particular, to avoid the negative effects in insurance markets of insurance company failures" (Becker and Opp, 2013).

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26. Data appearing in Table 2 are for life insurance groups. For accuracy purposes, we cross-checked these data with the individual legal entity disclosures. Group-level impacts are computed by SNL Financial from filings by insurance operating companies.

27. The report also highlighted issues with respect to asset valuation, as well as lack of oversight of intercompany transactions, including intercompany loans and certain forms of capital relief, which we discuss in the following section of this paper.

28. The GAO report notes, "Regulators were ill-equipped and unwilling to act effectively in handling the four insurers' problems. Statutory accounting and reporting requirements prescribed by regulators failed to ensure the filing of financial statements that presented the true magnitude of the deterioration in the four insurers' financial condition. Reported surplus was inflated by the surplus relief accounting gimmick and loans from parent holding companies. Moreover, the approach to determining statutory reserves for troubled and nonperforming assets is flawed and delayed recognition of the insurers' mounting junk bond losses."

**Table 3:**  
**Permitted Practices as a Percentage of Policyholder Surplus at Year-End**  
**(TARP Recipients in Bold)**

Firm	2007	2008	2009	2010
Allstate	0.0%	35.7%	0.0%	0.0%
American International Group	<b>-0.6%</b>	<b>-0.7%</b>	<b>-0.5%</b>	<b>-0.4%</b>
Ameriprise	0.0%	-1.2%	0.0%	-0.4%
Genworth	0.0%	0.0%	0.0%	0.1%
Hartford Financial Services	<b>2.8%</b>	<b>12.5%</b>	<b>5.6%</b>	<b>17.7%</b>
Lincoln National	<b>3.7%</b>	<b>17.3%</b>	<b>4.3%</b>	<b>3.9%</b>
MetLife	-1.6%	1.7%	2.8%	2.0%
Phoenix Companies	0.0%	0.0%	-	0.0%
Principal Financial Group	6.4%	8.0%	5.3%	5.5%
Protective Life *	-0.5%	0.7%	0.0%	-6.8%
Prudential Financial	-0.9%	0.2%	0.2%	0.2%
Subtotal: U.S. Firms	0.1%	4.1%	1.6%	2.7%
Transamerica (AEGON NV)	33.6%	37.4%	30.7%	36.5%
Voya Financial (ING Groep)	0.0%	2.5%	-13.3%	-0.1%
Total: All Firms	2.9%	6.1%	2.6%	4.4%

Source: SNL Financial

\* Includes only the surplus of Protective Life Insurance Company, the main subsidiary of Protective Life.

Capital relief afforded insurers through regulatory actions undertaken in response to the crisis provides support for this viewpoint. In 2012, state insurance regulators responded to the financial crisis by establishing a framework for examining their existing solvency regulation framework, the scope of which includes a review of capital requirements, statutory accounting and financial reporting, reinsurance, and governance and risk management. This initiative is ongoing. While the actions of regulators can offer temporary relief from short-term financial stresses and can allow insurers to rebuild capital buffers, such practices also could encourage insurers to delay actions that could enable them to fully recover, and permanent relief measures may encourage increased risk-taking (Abaza and Harris, 2013; Becker and Opp, 2013).

### Section 3. Intragroup Transfers of Capital

Financial holding company structures allow institutions a degree of flexibility in the redeployment of capital from one affiliate to another.<sup>29</sup> Internal capital transfers within an insurance company group may allow managers of financial firms to efficiently reallocate capital within the holding company group to bolster the capital levels of affiliates that otherwise would experience a capital shortfall.

29. Houston, James and Marcus (1997), Ashcraft (2008), and Holod and Peek (2010) examine intragroup transactions in bank holding companies. Niehaus (2014) examines intragroup transactions within life insurance company groups to understand insolvency risk management.

They also permit a means to channel funds from a parent to a troubled subsidiary. In this section, we examine how the magnitudes and patterns of intragroup flows changed during the crisis period.<sup>30</sup>

Life insurance holding company managers have several strategies they may pursue to obtain capital to inject into struggling affiliates. External funds could be raised at the holding company level and injected into struggling life insurers by their parents. Alternately, holding company managers may be able to obtain additional capital that could be sent downstream to life insurance subsidiaries by increasing the level of dividends paid to the parent by affiliates with excess capital. These affiliates may be healthy life insurance company affiliates, non-life insurance company affiliates or affiliates outside of the insurance sector. Life insurance company managers themselves could reduce the dividends they typically would pay to their parents.

The purpose of the aggregate analysis of intragroup capital transfers presented in this section is not to weigh in on whether such internal capital transactions are beneficial or efficient, as they can be (e.g., Houston, James and Marcus, 1997; Campello, 2002; Ashcraft, 2008; Powell, Sommer and Eckles, 2008; Holod and Peek, 2010; and Niehaus, 2014), and arguably were for life insurance entities during the crisis as shown by Niehaus (2014). Instead, the purpose of the aggregate analysis presented here of decisions made by managers within the insurance holding company group is to ask two questions of the aggregate data. First, what can be learned about the capital support of, and likewise inferred about the capital pressure faced by, life insurance entities from changes in magnitudes and patterns of intragroup transfers over the business cycle and during the financial crisis? Second, what can be learned about the types of affiliates that provided such capital support in aggregate?

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30. Insurance companies report transactions between group members on Schedule Y of their annual statutory filings. The schedule includes the name of the affiliate, the net amount of capital received or given during the year, the amount of dividends received or paid out, and an identifier if the affiliate is a U.S. insurance company. We construct a database of intragroup transactions for all U.S. life insurance companies. Thus, our sample of entity-level life insurance operating companies includes only those life insurers that were in an insurance holding company group during the 2000–2014 sample we considered. We use the NAIC code and other identifying information to classify each entity within an insurance holding company group appearing in Schedule Y as one of four mutually exclusive types of entities: (i) “U.S. Life Insurers;” (ii) “U.S. P&C Insurers;” (iii) “U.S. Health Insurers;” (iv) “Parents (Non-Insurance); and (v) “Other Non-Insurance Affiliates.” For a given year, summing net internal capital transactions across all of these categories will sum to zero absent rounding error, with positive amounts representing contributions to and negative amounts representing contributions from particular categories of affiliates. For the following analysis presented in Table 4 and Table 5, the “U.S. Life Insurers” category is further broken down into AIG’s U.S. life insurance affiliates (“AIG Life Co’s”) and the group of U.S. life insurance affiliates seeking government support ex AIG (“Firms Seeking Support ex AIG”). Category membership is based on insurers’ NAIC Codes, as well as affiliates’ Federal Employer Identification Numbers (FEIN or EIN), both of which are provided in the Schedule Y, Part 2, data. Additional information from Schedule Y, Part 1a, is used to help identify the parents of the U.S. life insurers in our sample. Additional details on dataset construction are available upon request from the authors.

*Parental Support in Times of Macroeconomic/Financial Stress*

During the crisis, insurance company groups made widespread use of internal transfers to bolster the reported statutory capital levels of life insurance operating companies. Table 4 summarizes the impact on the level of capital of net internal capital contributions among different types of affiliates within insurance holding companies. In particular, the life insurance group is broken down into the following mutually exclusive categories of affiliates: U.S. Life Insurers (column 2), U.S. P&C Insurers (column 5), U.S. Health Insurers (column 6), Parents (Non-Insurance) (column 7) and Other Non-Insurance Affiliates (column 8). Summing across columns 2, 5, 6, 7 and 8 for each year will yield a value of zero, absent rounding error, since this table fully describes the net capital contributions within groups for all insurance holding company groups with at least one life insurer. Positive numbers in a particular column represent capital inflows into that category of affiliates, and negative numbers indicate outflows of capital. As a result, it is possible to see the direction of capital contributions across the categories of affiliates identified in the columns of Table 4. Column 3 and Column 4, AIG Life Co's and Firms Seeking Support ex AIG, respectively, are subcategories of column 2, provided for the sake of distinguishing differences among patterns of capital contributions apparent for AIG, the group of large insurers with direct access to government support programs ex AIG and the remaining U.S. life insurance industry.

Column 2 of Table 4 contains the time series of net capital contributions to (positive numbers) and from (negative numbers) U.S. life insurance operating companies. In 2008 and 2009, contributions to U.S. life insurers, largely from non-insurance parents outside the purview of the state-based insurance regulatory system, totaled \$48.8 billion (summing the entries for 2008 and 2009 in column 2). From which category of affiliates did these significant capital contributions to U.S. life insurers come? In total over 2008 and 2009, parents (non-insurance) of U.S. life insurers made \$71.2 billion in capital contributions to their groups (summing the amounts for 2008 and 2009 in column 7), with U.S. life insurance subsidiaries being the main beneficiaries during the crisis.<sup>31</sup> The magnitude of these capital contributions constituted nearly 25% of the total statutory capitalization of the U.S. life insurance sector.<sup>32</sup> There was little support to the life insurance holding company group from any affiliates other than non-insurance parents of life insurers during the crisis.

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31. Parents (non-insurance) contributed about \$48.1 billion in 2008 and \$23.1 billion in 2009 (column 7 of Table 4), whereas other non-insurance affiliates, affiliates that were not U.S. life, health, or P/C insurers and also not parents of life insurers, received \$8.3 billion in 2008, and an additional \$14.9 billion in 2009 on net from the rest of their holding companies (column 8 of Table 4).

32. In 2008, the total amount of statutory capital (and surplus) of all U.S. life insurance companies that were part of a holding company group but not part of AIG was \$263.9 billion (unconsolidated). The average across 2008 and 2009 was \$288.5 billion (ex AIG, unconsolidated).

**Table 4:**  
**Net Capital Contributions to and from U.S. Life Insurance**  
**Operating Companies**

Year (1)	All U.S. Life Insurers (2)	AIG Life Co's (3)	Firms Seeking Support ex. AIG (4)	P/C Insurers (5)	Health Insurers (6)	Parents (Non- Insurance) (7)	Other Non- Insurance Affiliates (8)
2000	-1,997	347	-2,886	-4,838	0	2,728	4,107
2001	7,128	151	6,938	2,105	800	-10,963	930
2002	11,663	2,534	3,380	4,926	199	-13,977	-2,812
2003	3,756	619	1,603	8,464	-173	-10,620	-1,426
2004	7,229	408	3,958	544	-36	-9,374	1,637
2005	-7,412	55	-3,510	2,575	23	-4,077	8,890
2006	-2,530	-12	-2,793	-529	-683	-4,478	8,220
2007	1,879	2,049	-854	-1,210	-190	-5,832	5,452
2008	38,750	22,642	10,423	832	210	-48,074	8,283
2009	10,048	995	2,920	-2,060	276	-23,129	14,865
2010	-1,665	497	-239	-13,351	-686	-26,408	42,109
2011	-1,603	1,186	-5,011	-1,603	-545	-4,721	8,472
2012	4,116	5,803	-3,544	-2,627	1,132	-16,200	13,579
2013	-1,678	475	-2,075	-8,984	677	-12,071	22,056
2014	-5,152	0	-6,777	-13,805	437	9,389	9,131

Source: SNL Financial. Note: Net capital contribution is the net amount each affiliate type either receives from (positive number) or contributes to (negative number) the rest of its insurance holding company system.

Net capital contribution is the amount contributed less any notes retired or redeemed.

Capital injections were not limited to those large life insurance firms that sought or received government support (Table 1). AIG accounted for about 48% of the total internal capital contributions received by U.S. life insurers during the crisis, \$23.6 billion (summing the 2008 and 2009 amounts in column 3 of Table 4). But significantly, other U.S. life insurers received large capital injections as well. Firms other than AIG seeking support received \$13.3 billion (sum of 2008 and 2009 amounts in column 4), or about 53% of the amount received by all U.S. life insurers excluding AIG, but the rest of the U.S. life insurance industry received \$11.8 billion during these crisis years (column 2, summing entries for 2008 and 2009, minus the sum of column 3 and column 4 for 2008 and 2009)—still a significant amount. The extensive use of internal capital transfers within the life insurance sector during the crisis, therefore, suggests that pressure on the life insurance sector was pervasive and not limited to AIG or a small set of large insurers that was seeking government assistance.

There is also a notable cyclical pattern in these capital contributions to life insurers from their non-insurance parents. Over the years 2001 and 2002, life insurers received about \$18.8 billion in internal capital contributions (summing the entries for 2001 and 2002 of column 2 in Table 4). Again, this came largely from their non-insurance parents, who were outside the purview of state insurance

regulators, as parents contributed about \$24.9 billion to their life insurance groups over the 2001–2002 recession and early recovery period (summing the amounts for 2001 and 2002 of column 7). Other non-insurance affiliates contributed \$1.9 billion over this period (column 8). Unlike the experience in the most recent recession and financial crisis period, during this previous recession U.S. P/C insurers also received \$7 billion from the life insurance group affiliates, primarily from non-insurance parents of life insurers (column 5).<sup>33</sup> Thus, over the past two business cycles, only life insurers were significant recipients of capital contributions from their groups, primarily from their non-insurance parents. This indicates that life insurers may be exposed to cyclical macroeconomic and/or financial shocks, contrary to the traditional depiction that life insurance companies are insulated from these types of shocks. Although the received wisdom of the life insurance industry is that life insurers are immune to macroeconomic shocks, Browne, Carson and Hoyt (2001) showed that the performance of life insurers as ongoing concerns was related to both insurer-specific and macroeconomic factors. It is worth noting that the study was supported by the Society of Actuaries (SOA), and its intent was to provide actuaries for life insurance companies with an approach to evaluating the impact of adverse macroeconomic conditions on life insurers' performance.

### *Conservation of Capital through Reductions in Dividends*

In addition to providing downstream flows from a parent to its operating company, insurance company managers could conserve capital in times of stress by reducing dividends from the operating company to the parent. If U.S. life insurers manage to pay lower dividends to their non-insurance parents from one period to the next, they can effectively save capital. This is what U.S. life insurers did during the recent crisis.

Table 5 shows the aggregate amount of dividends paid to and received from insurance companies and other categories of insurance holding company group affiliates, and is organized like Table 4. The data in the table are again in levels, and present the net effect of these types of internal capital transactions on reported capital for the different categories of affiliates. The aggregate dividend payments from (negative numbers) and to (positive numbers) life insurance operating companies appear in column 2. In aggregate, U.S. life insurers tend to send dividends to their parents, as the entries in column 2 are all negative.

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33. The 2001 and 2002 amounts for columns 2, 5, 7 and 8 sums nearly to zero, about \$-1 billion, which is about the amount that U.S. health insurers received from capital contributions in 2001 and 2002 (column 6).

**Table 5:**  
**Shareholder Dividend Payments to and from U.S. Life**  
**Insurance Operating Companies**  
**(Amounts in \$Million)**

Year	All U.S. Life Insurers	AIG Life Co's	Firms Seeking Support ex. AIG	P/C Insurers	Health Insurers	Parents (Non-Insurance)	Other Non-Insurance Affiliates
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2000	-5,607	-389	-1,469	-9,860	0	11,884	3,583
2001	-11,216	-618	-6,807	-5,120	-293	10,835	5,793
2002	-8,634	-400	-2,026	467	-886	8,388	665
2003	-4,857	-678	-824	-2,334	-1,358	8,857	-308
2004	-11,523	-386	-4,569	-4,195	-1,920	16,590	1,049
2005	-21,284	-1,174	-10,229	-1,513	-2,996	23,363	2,429
2006	-19,665	-743	-8,631	-8,795	-3,395	31,033	822
2007	-19,599	-2,378	-6,953	-15,233	-4,869	38,553	1,148
2008	-13,281	-294	-4,144	-8,896	-5,533	30,796	-3,085
2009	-3,184	304	-1,197	-5,826	-7,071	18,870	-2,788
2010	-16,347	269	-6,685	-7,036	-2,725	27,992	-1,885
2011	-17,433	-1,807	-5,425	-10,556	-4,163	37,407	-5,254
2012	-19,834	-6,807	-5,093	-10,416	-5,620	41,906	-6,037
2013	-22,162	-4,738	-6,390	-16,678	-5,029	42,861	1,009
2014	-23,930	-9,523	-5,503	-7,500	-6,478	50,380	-12,472

Source: SNL Financial. Note: Shareholder dividend is the net amount each affiliate type either receives from (positive number) or contributes to (negative number) the rest of its insurance holding company system.

There is a sharp annual decline in dividends during the crisis years, however, reversing the usual pattern of life insurers providing additional capital to their parents each year through dividends, as the annual changes in 2008 and 2009 for U.S. life insurers are positive instead of negative (column 2).<sup>34</sup> So, while they still paid dividends to their non-insurance parents (column 7), they reduced the amount paid, thereby conserving capital, instead of increasing the amount paid as they usually do.

Aggregate dividend payments from life insurance operating companies declined 83.8% between 2007 and 2009, a decline of about \$16.4 billion (column 2). A similar phenomenon occurred for U.S. P/C insurers, although the magnitude was smaller at \$9.4 billion (column 5, a 61.8% decline). Parents (non-insurance), on the other hand, experienced a decline in dividends received of about \$19.7

34. Whereas in Table 4, the levels of capital contributions for 2008 and 2009 were summed together, here the change in levels from 2007 to 2008 and from 2008 to 2009 are summed together and reported in the text. The annual changes are negative for the following years: 2001, 2004, 2005, 2010, 2011, 2012, 2013 and 2014, indicating that for these years, the amount of dividends paid by U.S. life insurers to their affiliates (largely their non-insurance parents) increased.

billion over the same period (column 7, aggregating the annual changes from 2007 to 2008 and from 2008 to 2009). Similarly, the other non-insurance affiliates experienced a total reduction in dividends received over this period of \$3.9 billion (column 8).<sup>35</sup> This shows that U.S. life insurers also managed to preserve capital during the crisis by reducing the amount of dividends sent upstream, largely to their non-insurance parents.

AIG reduced dividends sent to its group from 2007 to 2009 (column 3). It went from contributing \$2.4 billion in 2007 to receiving \$0.3 billion in 2009, a conservation of about \$2.7 billion in reported capital. The group of large life insurers other than AIG seeking government support also reduced dividends by about \$5.8 billion (column 4) from 2007 to 2009. All U.S. life insurers (column 2) reduced their dividend issuances to their group by about \$16.4 billion over this same period. Thus, as with capital contributions, there appears to have been an industry-wide effort to conserve capital by life insurers through dividend reductions: This phenomenon was not limited to AIG or the group of large life insurers listed in Table 1 that sought government support.

The annual changes in dividends for U.S. life insurers are greater than \$1.6 billion only in the years 2002 and 2003 and in 2008 and 2009, at \$6.4 billion (the change from year-end 2001 to year-end 2003) and \$16.4 billion (the change from year-end 2007 to year-end 2009), respectively. This implies that it is not unusual for U.S. life insurers to save capital by reducing the amount of dividends they pay around business cycle downturns, while during normal times they spend their capital by increasing the dividend contributions to their non-insurance parents, suggesting that this is not just a practice employed during the recent financial crisis. Although not emphasized here, this phenomenon occurs for U.S. P/C insurers as well; the magnitudes for U.S. P/C insurers in 2002 and 2003 are about one-third of that for U.S. life insurers, and about 40% in 2008 and 2009.

The substantial decline in aggregate dividend payments from U.S. life insurers to their non-insurance parents and other affiliates during the crisis is consistent with life insurance company managers taking steps to conserve capital within their insurance operating companies. It also is consistent with the notion that financial difficulties in the life sector were extensive. The low level of dividend payouts by life insurance operating companies to their parents suggests that few life insurance operating companies had excess capital that could be used to bolster the capital levels of struggling life insurance affiliates within the group through intercompany transfers. In short, life insurance operating companies dried up as a source of capital for insurance company groups, and they instead saved capital by reversing their usual pattern of sending dividends upstream to their non-insurance parents.

Neither were non-life insurance affiliates a source of capital for the parents of life insurance companies. As shown in column 5 and column 6 of Table 5, dividends from P/C insurers to parents and other affiliates decreased during the

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35. Again, these amounts sum to almost zero, \$2.2 billion, with the difference arising because U.S. health insurers also contributed about \$2.2 billion on net to their group by increasing the dividends they paid to their group by this amount from 2007 to 2009.

crisis by about \$9.4 billion, while dividends of health insurers changed little (an outflow of about \$2.2 billion). Hence, it does not appear that parents were receiving much capital support from their non-life insurance operating affiliates during the crisis.

The widespread use of non-insurance parental support during times of stress suggests two implications for the supervision of firms in the life insurance sector. First, the results suggest that state insurance supervisors should have the ability to assess capital adequacy and availability beyond the level of the insurance operating company domiciled in their own state, including the ability to assess capital adequacy of holding companies, as well as the availability of capital transfers from holding companies, not currently supervised by any of the following: individual state insurance regulators, their cross-state group supervisory entities, supervisory college efforts or other non-insurance regulators.<sup>36</sup> Second, because the pattern of capital flows between insurer and parent is cyclical, supervisors should remain attuned to trends and developments in macro/financial conditions, as well as to developments within the insurance sector. It appears that U.S. life insurers, and not only AIG or those that are large and sought government support during the crisis, are exposed to macroeconomic and financial shocks, contrary to the conventional wisdom about the life insurance industry.

The change in the magnitude and pattern of intragroup capital transfers reveals that: 1) life insurers in aggregate were under duress during the crisis; and 2) life insurers' use of internal capital transfers across different legal entities within their groups was an important tool for managers seeking to bolster the capital levels of life insurance operating companies. The extensive use of parental support across the entire life insurance industry is consistent with the notion that the capital stresses in the life insurance industry were not limited to AIG or to the group consisting of very large life insurers that sought government support. Instead, the pressure on life insurers' capital, and the means used by managers of life insurers to relieve this pressure, including relying on capital relief from parents outside the network of insurance regulation, was a phenomenon that extended throughout the life insurance industry.

It is worth noting that Biggs (2014) quotes the National Organization of Life & Health Insurance Guaranty Associations (NOLHGA) as claiming that they have the capacity to raise assessments on a yearly basis by about \$10 billion a year in aggregate across all states in the event of insolvency among life and health insurers combined.<sup>37</sup> If all U.S. life insurers belonging to an insurance holding

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36. Because state statutes in U.S. life insurers' state of domicile ultimately govern the regulation and supervision of U.S. life insurance operating companies in the current state-based regulatory system, this also opens up the question of whether life insurers should be regulated at the federal, rather than state, level. The answer to this question requires further research and goes beyond the scope of this paper.

37. Biggs (2014) also states that NOLHGA estimates its 10-year capacity to deal with life and health insurance company failures at \$100 billion. The purpose of these guarantee associations is to make good on policyholder claims up to some limit, which varies by state in the event of a life or health insurer's insolvency; this information on statutory limits on

company group had not been supported by internal capital transfers from their non-insurance parents, with total support amounting to roughly \$45.1 billion in 2008 (\$20.3 billion ex AIG) and \$20.1 billion in 2009 (\$18.6 billion ex AIG), and instead had failed, they could well have tested the capacity of the state-level guarantee associations' ability to deal with life insurer insolvencies.<sup>38</sup>

Another means of internal capital management that improves the capitalization of operating subsidiaries is the use of internal or external reinsurance. This topic is beyond the scope of the current paper. However, some related papers address this topic; see, for example, Koijen and Yogo (2015b) and Du and Martin (2014) for studies focusing on the life insurance industry, and Powell and Sommer (2007) and Powell, Sommer and Eckles (2008) for studies of the P/C insurance industry. There also are other types of internal capital transfers from Schedule Y that are not considered here; instead, our paper's focus is on the two types of internal capital transfers that exhibited the most significant changes during the financial crisis years of 2008 and 2009.<sup>39</sup>

## Conclusion

This paper contributes to the nascent literature on the extent of solvency concerns in the U.S. life insurance sector during the 2008–2009 financial crisis. We have shown that such concerns were not limited to AIG or to only a few insurers, but instead, were widespread and applied to a large share of the life insurance industry by assets. Such concerns are manifested in the fact that CDS spreads for the largest U.S. life insurers exceeded the spread of those for the largest U.S. commercial and investment banks. The concerns also are evident from the number of large insurers other than AIG that sought and participated in government support programs.

We also have documented the extent to which insurers took advantage of various federal government programs during the crisis and the degree to which insurance regulators took various actions that bolstered the capital position of life

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policyholders' claims is available on state insurance commissioner websites but cannot, by law, be published. This is a procyclical and ex post system, in that assessments are made on remaining insurers in the state to help satisfy the statutory limits of policyholders' claims once an insurer has failed, and assessments are not related to the assessed insurers' risk profile.

38. These figures add the level of capital contributions from column 2 of Table 4 to the change in internal shareholder dividends from column 2 of Table 5 for the years 2008 and 2009 for the amounts for U.S. Life Insurers. To obtain the numbers ex AIG, one must similarly subtract out the level of capital contributions to AIG and the change in internal shareholder dividends from AIG from these totals for the U.S. Life Insurers' figures.

39. The Schedule Y data include the net impact on capital from reinsurance recoverable (payable) on losses and/or reserve credit taken (liability), which has witnessed a substantial upward trend over time for life insurers; however, unlike capital contributions and internal shareholder dividends, these data did not show a marked reversal or change in pattern during the financial crisis or the previous recession.

insurers by significant amounts. Last, we have analyzed the management behavior of the insurance firms and illustrated a dramatic change in their internal management of capital within life insurance holding companies, given the difficulty life insurers had in securing external financing during the height of the crisis (Klein, 2009; Koijen and Yogo, 2015a). In this regard, our findings show that during the crisis period, insurance firms were more likely to behave as consolidated entities than in earlier or later periods. We also show that such behavior was not limited to AIG or the largest life insurers that may have needed government assistance.

During the financial crisis, the increased use of government assistance, regulatory forbearance and internal capital transfers allowed for an improved statement of financial condition of many of the large life insurers in our group of large insurers that sought government support. These actions boosted reported statutory capital levels. These actions may have at least partly alleviated the concerns of industry analysts and investors, as well as policyholders. As mentioned above, such intragroup reallocation of capital may in fact be beneficial and efficient. From a supervisory perspective, too, engaging in regulatory forbearance during periods of stress might be viewed as an expedient choice for an industry with significant long-term liabilities. Supervisors also might agree that reallocating capital to the parts of a holding company structure in greatest need can be seen as responsible management behavior. However, it is concerning that support came largely from non-insurers, outside the purview of insurance regulators. This highlights the importance of supervisors having the ability to take a consolidated view in monitoring the size, type and direction of internal capital transfers. It also highlights the need for supervisors to have sufficient capacity to analyze and, if necessary, approve, the large number of intragroup transactions that would be expected to take place during crisis periods.<sup>40</sup> State budgets are notably squeezed during business cycles with the reduction of tax receipts, and were particularly so during the recent crisis (Gerst and Wilson, 2010; Dietz, Haughwout and Steindel, 2010), implying that even less resources may have been available to state-based insurance regulators during the recent crisis or even normal business cycles when such resource needs could be greater.

Our paper also sheds light on the question of whether management's intragroup transfers of capital were a one-time occurrence. Our analysis suggests that internal capital flows in life insurance groups are cyclical. Our data on internal transfers exhibits the same pattern during the downturn period of 2001–2002, albeit with less intensity than during the crisis later in that decade. Our findings counter arguments that the life insurance business model has limited exposure to macroeconomic risks. Our findings also suggest that regulators supervising life

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40. As noted in Schwarcz (2015), the default is approval of all such internal capital transactions after a 30-day review period. It seems likely that since insurance commissioners are notoriously under-resourced, particularly during a time when their review of such internal capital transactions would be most needed, as in a financial crisis, their ability to review such transactions in a timely fashion would be overwhelmed.

insurers may benefit from staff with expertise in understanding and forecasting macroeconomic/financial conditions. While some states may have regulatory staff with such expertise, these results indicate the importance of having this staff capability for all state insurance regulatory departments, and for business cycle dynamics to be a regular consideration in evaluating the solvency of life insurers on a consolidated group basis.

As we know, the story of the 2008–2009 crisis ended well, with financial markets opening up, so that neither insurance nor banking institutions were exposed to further stresses. We do not know the extent to which insurers would have been able to withstand a longer period of stress or the extent to which such continued relaxation of regulatory requirements and internal capital transfer actions could have masked a significant deterioration in their financial condition.

After the financial crisis, banking regulators determined that the consolidated capital requirements for banking institutions should be increased and took action accordingly, within their scope of supervisory authority. Within their supervisory purview, state insurance regulators are now also undertaking a review of capital requirements. In the absence of state regulators' ability to attest to parental support of their supervised entities, our analysis supports a recommendation for insurer capital standards sufficient to weather a future storm of significant macroeconomic and/or financial stress.

Even with the 2014 NAIC *Insurance Holding Company System Regulatory Act* (#440), the main impediments to group-wide consolidated solvency analysis relate to the basic issue that states do not necessarily have legal jurisdiction over non-regulated and/or non-insurance affiliates of insurers. This means they likely do not have jurisdiction to compel the production of documents that would enable state-based regulators to properly monitor solvency on a group wide basis, even if all states were to adopt Model #440. The existing Model #440 allows for some strengthening of the “windows” in the “windows and walls” approach to group supervision of life insurers.<sup>41</sup> However, even if *all* states and territories chose to adopt the NAIC's model law, there would still be improvements needed Model #440.<sup>42</sup> Additionally, standards used to require internal transactions to be sent to

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41. Requiring the ultimate controlling person of an insurer to file an Enterprise Risk Report, which information should be provided annually with registration of an insurer with its state regulator, expanding the insurance regulator's right to access books and records of affiliates of insurers along with compelling document production through the power of subpoena, and allowing for group-wide supervision of internationally active insurance holding company systems are prominent examples of strengthening the “windows” part of the “windows and walls” approach to group supervision as codified in Model #440.

42. Section 6 of the Model Law, regarding examinations, which typically occur only every three to five years, states that commissioners can order insurers to produce documents in possession of their affiliates and can compel document production through subpoena; but if affiliates are outside the state jurisdiction of the commissioner, this power could be difficult to implement, requiring uncertain cooperation across jurisdictions. Section 7 of the Model Law, which relates to supervisory colleges, also appears to need a strengthening of the “windows” aspect of the “windows and walls” approach to group supervision in that there can still be legal jurisdiction issues if there are important affiliates that are outside the legal jurisdiction of any

the state regulator for approval differ by states, and it would be helpful if states would adopt a uniform standard to apply, such as that promulgated by Model #440. Finally, as of 2015:Q1, only 42 states had substantially adopted the 2010 amendments to the model act (Model Regulation Services 2015).

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member states of the supervisory college due to an affiliate being unregulated or domiciled outside the legal jurisdiction of the supervisory college exam team. Additionally, and importantly, the enhanced group supervision provided by such supervisory colleges is only available for insurers in an insurance holding company system with international operations.

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# Abstracts of Significant Cases Bearing on the Regulation of Insurance 2016

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Jennifer M. McAdam\*

## Supreme Court of the United States

*Gobeille v. Liberty Mut. Ins. Co.*, 136 S. Ct. 936 (U.S. 2016)

In this case, the Supreme Court held that a Vermont law requiring certain insurers and other health care payers to submit health care claims data to an All-Payer Claims Database (APCD) was preempted by federal Employee Retirement Income Security Act (ERISA) law, as applied to self-insured employee benefit plans like the one issued by Liberty Mutual. In its ruling, the Supreme Court affirmed the Second Circuit, holding that “reporting, disclosure, and recordkeeping are central to, and an essential part of, the uniform system of plan administration contemplated by ERISA.” The Court held that Vermont’s reporting regime intrudes upon “a central matter of plan administration” and “interferes with nationally uniform plan administration.” Of note, the Court suggested that the Secretary of Labor “may be authorized to require ERISA plans to report data similar to that which Vermont seeks, though that question is not presented here.”

The National Association of Insurance Commissioners (NAIC) filed an amicus brief in this case at the request of the Insurance Division of the Vermont Department of Financial Regulation. The NAIC was joined by the National Governors Association, National Conference of State Legislatures, Council of State Governments, and Association of State and Territorial Health Officials, arguing that the Vermont law and the similar APCD laws of 17 other states were not preempted by ERISA. Following this decision, the Department of Labor issued a proposed rulemaking that would require ERISA plans to submit data similar to that required by state APCD laws.

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*Zubik v. Burwell, 136 S. Ct. 1557 (2016)*

Nonprofit religious employers sued the Secretary of Health and Human Services (HHS) and other government officials, challenging the Affordable Care Act's (ACA) regulatory mandate to provide insurance coverage for contraceptives. Federal regulations require companies to cover certain contraceptives as part of their health plans, unless they submit a form stating that they object on religious grounds to providing contraceptive coverage. The nonprofit religious organizations argued that submitting the notice substantially burdens the exercise of their religion in violation of the Religious Freedom Restoration Act.

Following oral argument, the Court requested supplemental briefing regarding "whether contraceptive coverage could be provided to petitioners' employees, through petitioners' insurance companies, without any such notice from petitioners."

The parties agreed that the Court's suggested remedy would be feasible. The religious employers explained that their religious exercise is not infringed where they "need to do nothing more than contract for a plan that does not include coverage for some or all forms of contraception," even if their employees are still able to receive free contraceptive coverage. Likewise, the Government agreed that the procedures could be modified so they would not infringe on the employers' constitutional rights. The Court vacated the decision below and remanded for further proceedings.

## **United States Courts of Appeal**

*Cont'l Cas. Co. v. Symons, 817 F.3d 979 (7th Cir. 2016)*

This case involves fraudulent transfers from a subsidiary corporation to its parent, in which the subsidiary was evading debt from its purchase of a crop insurance business. In 1998, IGF purchased a crop insurance business from Continental Casualty Company. In 2002, IGF sold the business to Acceptance Insurance Company for \$40 million, while it still owed \$24.5 million to Continental from its 1998 purchase. In structuring the 2002 sale, money from Acceptance's purchase price was transferred to IGF's parent company, Symons International and related entities. Symons asserted there was adequate consideration for several of these transfers, including a reinsurance treaty and noncompete agreements.

The Court ruled that Symons was liable as an obligor on IGF's outstanding debt to Continental. The Court also held that the corporate veil could be pierced in this case because the corporations had raided each other and commingled assets. Finally, the judgment held that items of consideration were merely a pretext for fraudulent transfer.

*Cent. United Life Ins. Co. v. Burwell*, 827 F.3d 70 (D.C. Cir. 2016)

Insurers offering fixed indemnity health care plans filed suit against the Secretary of the HHS, challenging a rule requiring that the plans could be sold only to those who already had minimum essential coverage under the ACA. Fixed indemnity plans pay a predetermined amount to the policyholder for specified medical events and are typically less expensive than comprehensive health care coverage. Prior to the HHS promulgating this rule, fixed indemnity plans could be purchased as stand-alone coverage, as an excepted benefit under the federal Public Health Service Act (PHSA). Once the ACA was adopted, requiring individuals to purchase minimum essential coverage or pay a penalty, many opted to save money by paying the penalty and buying a fixed indemnity plan.

The HHS argued that the PHSA's requirement that fixed indemnity plans be "offered as independent, noncoordinated benefits" meant that they must be independent from *something* and that the HHS simply filled in the blank with "minimum essential coverage." The Court, however, did not agree that the provision was ambiguous. It explained that the requirement regulated providers and not consumers, which meant consumers could purchase additional coverage but were not required to do so. The Court did not afford Chevron deference to the HHS because it was not merely interpreting law but was amending it to govern the actions of a different classification of people than Congress had intended.

## United States District Courts

*King v. Nat'l Gen. Ins. Co.*, No. 15-CV-00313-DMR, 2016 WL 2851861 (N.D. Cal. May 16, 2016)

Putative class members filed suit against a number of insurers with whom they contracted to receive private passenger automobile insurance (PPA policies), claiming, among other things, breach of contract, breach of the covenant of good faith and fair dealing, fraud, and violations of the state Unfair Competition Law. Under California law, an insurance company that offers PPA policies must also offer a "good driver" discount of at least 20% below the rate the policyholder would otherwise be charged. Policyholder plaintiffs alleged that the defendant insurers shared common ownership, management or control, and therefore, belong to the same "control group." California law requires agents of an insurer within a control group to offer a policyholder who qualifies as a good driver the lowest rate offered by any of the insurers "for that coverage" in the control group ("cross-offer requirement"). Policyholders alleged that defendant insurers failed to offer good drivers the lowest rates for coverage. Additionally, they alleged that the insurers did not reimburse the overcharges when they were discovered.

Insurers argued that the cross-offer requirement underlies all of the claims and falls within the Department of Insurance's (Department) exclusive jurisdiction, pursuant to the rate, rate-making and rate regulation authority, precluding a private cause of action. The Court held that to the extent a claim does not challenge a rate approved by the Department or Department's ratemaking authority, a private cause of action under the cross-offer requirement can be sustained. The Court found that the action can stand where, as here, plaintiffs argue that insurers wrongly applied the higher rate, rather than the lower rate, both of which the Department approved. Defendants further argued that the term "for that coverage" meant that plaintiffs could be harmed only if lower rates existed for the exact coverage provided to the policyholder. The Court disagreed that the statute should be read so narrowly. The Court granted defendants' motion to dismiss because the law placed the burden on agents, not insurers, to offer the good driver policies, and plaintiffs' claims failed to distinguish these facts. Nevertheless, the Court provided plaintiffs an opportunity to amend their complaint, rejecting defendants' argument that an amendment would be futile.

*Burroughs v. PHH Mortgage Corp., No. 15-6122 (NLH/KMW), 2016 WL 1389934 (D.N.J. Apr. 8, 2016)*

PHH, a loan servicer, filed a motion to dismiss a class action in this case involving force-placed insurance policies. The plaintiffs alleged that PHH acted together with Assurant Specialty Property to exploit PHH's ability to force-place hazard and wind insurance in order to reap additional, unjustified profits in the form of payments disguised as "expense reimbursements," below-market-rate portfolio tracking, subsidized mortgage servicing and other forms of consideration at the expense of borrowers whose hazard or wind insurance was force-placed.

The Court rejected PHH's argument that any filed rate approved by the governing regulatory agency is per se reasonable and unassailable in judicial proceedings. In denying the motion to dismiss, the Court reasoned that regardless of the rate charged for force-placed insurance, what is being challenged here and in similar cases is not the rate itself, but rather the mortgage servicer's alleged exploitation of its ability to force-place hazard insurance in order to reap additional, unjustified profits in the form of payments disguised as purportedly legitimate fees.

*Amtrust N. Am., Inc. v. Safebuilt Ins. Servs., Inc., No. 16-MC-169 (CM) (JLC), 2016 WL 2858898 (S.D.N.Y. May 16, 2016)*

The issue before the Court was whether a defendant insurer could assert privilege over an examination report and related documents. Amtrust North America, Inc. et al. filed suit in the U.S. District Court for the Southern District of New York against Safebuilt Insurance Services, Inc., several other insurers and

reinsurers, and the individuals who owned them. The parties had entered reinsurance agreements whereby Amtrust agreed to reinsure policies underwritten by one of the individual defendant's companies. In turn, defendants were to reinsure Amtrust and cover costs, through a captive reinsurance company, Pacific Re, Inc. and its protected cell, Pac Re. Amtrust contended that Pacific Re and Pac Re were unable to fulfill their obligations because they were mismanaged and undercapitalized. Amtrust sought to pierce the corporate veil to recover its losses. Amtrust served Pacific Re's corporate law firm with a subpoena seeking documents and communications with the Office of the Montana State Auditor and Commissioner of Securities and Insurance (CSI) related to the creation of Pacific Re's protected cell, Pac Re. The law firm produced a number of documents, including an examination report and orders of supervision issued to Pacific Re, which it later attempted to claw back as "confidential." Amtrust noticed a deposition of CSI to obtain additional information regarding the creation of Pac Re, CSI's examination of Pacific Re, and the orders of supervision. Defendants moved to quash the subpoena but CSI appeared and answered questions over objections.

The Court held that the examination report and related documents were not privileged for three reasons. First, the Court reviewed the confidentiality provision of Montana's examination law, which states, in part, that the examination reports, working papers and other documents are "confidential, are not subject to subpoena, and may not be made public by the commissioner ... without the written consent of the company or upon court order." The Court reasoned that the law protects documents from disclosure by CSI, not the company. Furthermore, the law provides that the documents are "confidential" but not "privileged." Second, the Court found a number of persuasive opinions from other jurisdictions interpreting similar statutes and finding that they did not protect examination documents as privileged. Finally, the Court gave deference to CSI's interpretation of the law based on its cooperation with the deposition despite defendants' objections. While the Court did not find the documents to be privileged, it did allow them to be subject to a stipulated protective order. The Court granted Amtrust's motion to enforce the subpoena and denied defendants' motion to quash.

## State Courts

### Illinois

*Walsh v. Illinois Dep't of Ins.*, 54 N.E.3d 207, appeal denied, 60 N.E.3d 883 (Ill. 2016)

Joseph Walsh appealed the Illinois Department of Insurance's order revoking his producer license. Walsh argued that the Department abused its discretion by ignoring cases he claimed were comparable to his and by issuing sanctions without accounting for mitigating evidence he presented. He also argued that the sanctions imposed were inconsistent with the law because they "do not protect the public interest."

The Court reviewed the underlying facts before the Department. On various producer license applications in 2007, 2009 and 2011, Walsh had answered "no" in response to a question asking whether he had "an insurance license denied, revoked, suspended or surrendered for disciplinary reasons in any state." But upon investigation, the Department discovered that Walsh's producer license had been revoked by the Ohio Department of Insurance; that the Wisconsin Office of the Insurance Commissioner denied a producer license application he had filed; and that he had entered into a Consent Order and Stipulation with the Michigan Office of Financial and Insurance Regulation. The Department found that Walsh had "obtained a license through misrepresentation" and assessed a \$15,000 penalty. Following entry of the Department's revocation order, Walsh requested a hearing on the matter. At the hearing, the investigator revealed that in 2002, Walsh had forged a customer's signature on an insurance policy application and that Walsh had provided false answers to questions on producer license applications in a number of states asking whether he had ever been subject to discipline. In reviewing the agency decision, the Court found that the Department did not abuse its discretion and that the sanctions were appropriate because each instance in which Walsh falsely answered "no" constituted a separate sanctionable episode of misconduct, warranting the penalty assessed.

### Maryland

*United Ins. Co. of Am. v. Maryland Ins. Admin.*, 144 A.3d 1230 (2016)

United Insurance Company of America (United) challenged a state law requiring life insurers to use the Social Security Administration's Death Master File as a cross-reference against its list of in-force life insurance policies, annuity contracts, and retained asset accounts to determine whether any policyholders had

died in order to provide beneficiaries with the necessary claim forms and instructions. Prior to enactment of the law, United and many other insurers paid only when a beneficiary submitted “due proof of death,” pursuant to contractual language. This practice resulted in many beneficiaries missing timely receipt of settlements owed.

The law did not indicate whether its provisions applied to policies placed prior to the statute’s effective date. United met with the insurance commissioner, who advised that she interpreted the law to apply retroactively to those policies. Following the meeting, United filed a civil suit challenging the constitutionality of retroactive application of the law. United argued that retroactive enforcement of the law altered contractual rights and responsibilities, which would result in increased administrative costs. The Supreme Court affirmed the decision to dismiss the lawsuit based on a failure to exhaust administrative remedies. The Court found that United did not overcome the rebuttable presumption that an administrative remedy is intended to be primary. Furthermore, the Court held that the claim did not fit within the constitutional exception to the exhaustion requirement since United did not challenge the constitutionality of the statute as a whole but how it applied in a particular situation.

## **Pennsylvania**

*Erie Ins. Exch. ex rel. Sullivan v. Pennsylvania Ins. Dep’t*, 133 A.3d 102 (Pa. Commw. Ct.), appeal denied, 145 A.3d 728 (Pa. 2016)

Erie Insurance Exchange (Exchange) brought a civil action against its attorney-in-fact, Erie Indemnity Company (Indemnity). Both parties are part of an insurance holding company system, pursuant to the Insurance Holding Companies Act (IHCA). As Exchange’s attorney-in-fact, Indemnity issued insurance contracts and collected premiums from subscribers under an agreement entitling Indemnity to a maximum of 25% of all paid premiums. In its action, Exchange contended that Indemnity violated the agreement by collecting additional service charges from subscribers without passing them on to Exchange. Exchange alleged breach of contract, breach of fiduciary duty, and unjust enrichment. The trial court bifurcated the proceedings under the doctrine of primary jurisdiction, which allows a court to refer certain issues within an agency’s area of expertise to that department for consideration. In this case, the Court transferred issues falling within the Insurance Department’s (Department) expertise to that agency. The Department determined that the sole issue before it was whether Indemnity’s retention of added service charges violated the standards contained in the IHCA. After reviewing pleadings and discovery, the Commissioner found that Indemnity did not violate the IHCA standard as the agreement was fair and reasonable.

On appeal, Exchange argued that the Department erred in asserting primary jurisdiction over the common law claims and that even if jurisdiction was appropriate, the Department erred in finding that Indemnity did not breach the

agreement or its fiduciary duties. The Department claimed that it only addressed the issue falling within its expertise: whether the agreement violated the IHCA. The Court determined that the agreement could be found fair and reasonable under the IHCA while also constituting a breach of contract, but that Exchange's pleadings did not allege that the transactions were unfair and unreasonable. Therefore, the Court found that the trial court erred in transferring the matter to the Department. The Court vacated the Department's order and remanded the case back to the Department for transfer to the trial court for further proceedings.

*Crosby Valve, LLC v. Dep't of Ins.*, 131 A.3d 1087 (Pa. Commw. Ct. 2016)

Crosby Valve LLC and other corporate policyholders petitioned to intervene in proceedings with the Insurance Department in which Armour Group Holdings Limited, through its subsidiary Trebuchet U.S. Holdings, Inc., filed a Form A application under the IHCA stating its intent to acquire One Beacon Insurance Company and other entities. The policyholders argued that the acquisition was the insurers' attempt to shed their asbestos, environmental, and other long-tail liabilities, for which they did not have adequate reserves. The Department denied the policyholders' petition to intervene and approved the proposed acquisition.

On appeal to the trial court, policyholders argued that the Department's denial of its petition to intervene was an abuse of discretion and contrary to law, violating their due process rights. Specifically, policyholders argued that the Department should have granted intervention under the General Rules of Administrative Practice and Procedure (GRAPP), which governs practice and procedure before agencies under the Administrative Agency Law. The Court determined that the GRAPP does not apply to the Department's consideration of Form A filings under the IHCA, holding that review of a proposed transaction under the IHCA is a regulatory act, not subject to intervention by non-parties. Furthermore, the Court held that even if the GRAPP applied, the policyholders do not satisfy requirements for intervention under that law because their interest is speculative. The Court affirmed the Department's denial of the petition to intervene and dismissed the petition for review as moot.

## Case in Which the NAIC Filed as *Amicus Curiae*

*MetLife, Inc. v. Financial Stability Oversight Council, No. 16-5086*  
(D.C. Cir. 2016)

The NAIC submitted an amicus brief in the United States Court of Appeals for the District of Columbia in the case of *MetLife, Inc. v. Financial Stability Oversight Council* on August 22, 2016. The NAIC filed this brief in support of MetLife, which had prevailed in its arguments at the District Court level. 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, 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.



# Journal of Insurance Regulation

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Cummins, J. David and Richard A. Derrig, eds., 1989. *Financial Models of Insurance Solvency*, Norwell, Mass.: Kluwer Academic Publishers.

Manders, John M., Therese M. Vaughan and Robert H. Myers, Jr., 1994. “Insurance Regulation in the Public Interest: Where Do We Go from Here?” *Journal of Insurance Regulation*, 12: 285.

National Association of Insurance Commissioners, 1992. *An Update of the NAIC Solvency Agenda*, Jan. 7, Kansas City, Mo.: NAIC.

“Spreading Disaster Risk,” 1994. *Business Insurance*, Feb. 28, p. 1.

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