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Essays on Insurance Regulation

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Essays on Insurance Regulation

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Abstract

Insurance industry is an important component of the US economy. In 2013, the industry sold policies worth $ 1.8 trillion and employed 2 million people. Most of the US population has exposure to different kinds of insurance like automobile, health, life etc. which makes the sector politically sensitive. The incentives that various stakeholders face will be critical for the sector. Hence I use my dissertation as an opportunity to explore how the political and regulatory processes affect the policy outcomes.

In the first chapter, I examine how two different selection systems for state insurance regulators, election and appointment, affect policy outcomes in a market with multiple competing firms. In the United States, in some states, insurance regulators are elected (by ballot) while in other states they are appointed (by the Governor). Traditional theory suggests that elected regulators are pro-consumers while appointed regulators are pro-industry. I collected data on premiums paid by an individual on an auto insurance policy across 48 states to show that elected regulators choose policies salient for most consumers (e.g. lower premiums) in contrast to appointed regulators (higher premiums). This impact is larger and statistically significant in the counties where a majority of state's population is concentrated. This is because the marginal cost of reaching out to voters is much lower in areas with higher concentration of population. State level data confirms that premiums per capita written by auto in-

surance firms is much lower in states with elected regulators as compared to states with appointed regulators. Different states have given insurance regulators varying degrees of regulatory powers to fix premiums on automobile insurance premiums.

The second chapter captures the response of the industry to arbitrary fixing of premiums on auto insurance policies. Elected regulators tend to prefer lower premiums on auto insurance policies as compared to appointed regulators. Since the premiums are regulated, insurance firms compete on the unregulated aspects of the market. Competition between firms ensure that the extra revenue earned by charging higher premiums (in states with appointed regulators) is used to other a better product (higher payments on claims filed by policyholders). Hence, an elected regulator offers a bundle of lower prices and inferior product. And an appointed regulator does not ensure pro-industry outcomes as there are no systematic differences in profits in states with elected or appointed regulators (as shown by previous research).

The third chapter of the thesis examines the influence of interest groups on effective insurance premium tax rate. I focus on market concentration as a proxy for the ability of the firms in an industry to organize into an interest group to capture regulation. I find that states with a higher degree of market concentration in the insurance industry tend to have lower effective insurance premium tax rate. To establish causality, I use the coast to area ratio in the state as a source of exogenous variation in the market concentration. This is because exposure to the coast increases the probability of catastrophic events such as hurricanes which leads to the exit of several insurance firms. I find empirical evidence that a 1 percent increase in market concentration is associated with a 0.6 percent reduction in the effective insurance premium tax rate.

Dedication

To my mother and father.

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Chapter 1

Political Economy of Automobile Insurance Premiums: Elected vs Appointed Regulators

In 2013, about $1.8 trillion[1] were paid in premiums on insurance policies sold across the United States. This amounts to about 11.5 percent of the US GDP. The insurance industry employs about 2 million people which is about 1.3 percent of the US labor force[2]. A large fraction of the US population has exposure to different kinds of insurance like health, life, auto, etc - underlying the importance of the sector. About 50 state regulators known as Insurance Commissioners [3] between themselves have significant influence over this industry which in monetary value is big enough to be the 11th largest economy in the world. The role of these regulators is further strengthened by the McCarran-Ferguson Act (1945) which made the business of insurance exempt from most federal regulation, including federal antitrust laws.

[1] Source of this figure is the National Association of Insurance Commissioners (NAIC)
[2] As per 2013 figures.
[3] Also known as Superintendents or Directors.

These commissioners are responsible for protecting the consumers, ensuring healthy competition within the industry and ensuring that insurance firms are financially solvent. However, Stigler (1971) and Peltzman (1976) have demonstrated that regulators often act in their own self-interest and respond to interest groups and electoral pressures. Crain & McCormick (1984) and Besley & Coate (2000) showed that the set of policies chosen by the regulators is motivated by their selection mechanism. *Elected* regulators have to face electoral pressures and hence tend to be pro-consumers. With *appointed* regulators, policy becomes bundled (and confused) with other policy issues the appointing politicians oversee. However, as voters have only one vote and regulatory issues are not always salient for most voters, there are incentives on the part of the appointed regulator to respond to interest groups rather than voter interests.

In 11 states, the insurance commissioner is selected through a statewide simple majority election while, in other states, the commissioner is appointed by the Governor or (the state government). These commissioner(s) have the responsibility to regulate and monitor a large number of firms. According to National Association of Insurance Commissioners (NAIC), in 2013, Alaska had 733 domestic and licensed foreign insurers while Wisconsin had about 2,102 domestic and foreign insurers. Hence, state insurance markets in the United States provide an excellent opportunity to extend the the analysis of the theory of elected vs appointed regulators to a market characterized by the presence of a large number of competing firms. Previous studies have looked at monopolistic markets like utilities (Crain & McCormick 1984; Besley & Coate 2000) or non market environments like judiciary (Hanssen 1999; Lim 2013), city treasurers (Whalley 2013) and city treasurers (Makowsky & Sanders 2013).

I particularly focus on the automobile insurance markets. Premiums on automobile insurance is a salient issue for most voters when they vote to elect an insurance

commissioner. This is because of the almost universal ownership of cars in the United States. According to Federal Highway Administration, there were 84 registered vehicles per 100 people in the United States in 2013. It becomes necessary for drivers to purchase an automobile insurance to cover the risks associated with driving a car. Besides, most states (except New Hampshire) have made it mandatory for the drivers to purchase automobile insurance for their vehicle. As a consequence, in 2014, the insurance industry was able to sell automobile insurance policies worth $ 183 billion [4] in the United States.

To assess the impact of the selection mechanism of insurance commissioner on automobile insurance premiums, I have web scrapped a website maintained by a major insurance company to sell automobile insurance to individual drivers online. This website requires the individual buying a policy to provide a detailed information about himself (e.g. the driving history, age and marital status, etc.), the car (e.g. model, make etc.) and the preferred liability coverage. The website then uses this information to generate a quote or a monthly premium for the individual looking to purchase a policy. Various major automobile insurance companies maintain similar websites to attract a growing number of consumers who prefer to purchase products online. The company whose website I have web scraped sells automobile insurance policy in all the states in the United States. Hence, I was able to collect quotes on an insurance policy for a hypothetical driver living in 48 states and 3047 counties. I was not able to collect data for 3 states (Wyoming, Alaska and Montana) because of the legal constraints imposed by the insurance company on data collection.

I have collected a variety of quotes. First, I have collected quotes for a policy purchased by an individual who represents the median voter. This is because traditional political models predict that politicians cater to the median voter. Second,

[4]Insurance Information Institute http://www.iii.org/table-archive/20967.

I have collected quotes on the cheapest policy (providing minimum liability coverage) which an individual can purchase to insure his car. This is because for a driver looking to buy the cheapest available insurance, automobile insurance premiums will be a salient issue when voting to elect an insurance commissioner. Hence, an elected commissioner should, theoretically, pay attention to the pricing of policies providing minimum coverage. Besides, different states have a different mandatory minimum liability coverage requirement for drivers purchasing policies in their state. Third, I have collected quotes on a policy which provides similar liability coverage to the individual as he moves across different states and counties. This is because the median voter would prefer a different insurance policy in different states and counties based on local conditions. Fourth, I have also collected quotes on a policy purchased by a rich voter. This allows us to observe whether the insurance commissioner caters only to the median voter.

I find evidence that the selection mechanism of an insurance commissioner has a causal impact on the determination of auto insurance premiums. Premiums paid on automobile insurance is a salient issue for most voters when they vote to elect an insurance commissioner. Hence elected commissioners have an incentive to suppress the premiums drivers have to pay on their automobile insurance. This leads to lower automobile insurance premiums in states with elected commissioners as opposed to states with appointed commissioners. However, this impact is substantially higher and statistically significant for drivers living in neighborhoods located in most populous counties (I call them urban counties[5]). In the sparsely populated counties (other than the urban counties), this impact is smaller in magnitude and statistically insignificant. However, there is still a negative bias on premiums for states with elected commissioners. These results are consistent for the quotes collected on a policy pre-

[5]Counties where 50 percent of a state's population is concentrated.

ferred by a median voter, a policy providing minimum coverage, a policy providing constant liability coverage and the policy preferred by the rich voter.

These results are explained by the fact that an insurance commissioner is elected through a simple majority rule in statewide elections. These election are generally bipartisan in nature with two candidates in the fray affiliated to Republican and Democratic parties. The candidate who gets more than 50 percent of the votes polled across the state wins the election. About 50 percent of the US population (in my sample) is concentrated in 307 counties while the other half of US population is disbursed in about 2700 counties. The marginal benefit of using resources to convince voters is potentially higher in counties where a significant proportion of the population lives. Alternatively, marginal cost of reaching out to a voter is substantially lower in counties where most of the population is located. Hence, it is in the interest of an insurance commissioner to pay greater attention to clusters where a majority of state's population is concentrated.

The selection mechanism of an insurance commissioner is exogenous to changes in automobile insurance premiums. This is because it is rare for a state to switch from an elected to appointed position or vice versa. I have collected historical information from state constitutions and state insurance offices to show that in the past 100 years, only three states have switched despite substantial variation in the economic and political environment[6]. I also provide a difference of means t-test (Table 13) to show that there is no substantial difference in the states having an elected commissioner and states having an appointed commissioner which might be driving the results. These states are also not different based on their political orientation.

The empirical results emerging from the individual level data are confirmed by state-level aggregates based on data provided by the Auto Insurance Database

[6]Please see section 3 for a detailed discussion.

Report[7]. Evidence suggests that auto insurance premium per registered vehicle is lower in states with elected commissioners. However, in states with appointed commissioners, higher premium per vehicle does not translate into additional profits for the industry (Grace 2008) as suggested by the theory of elected vs appointed regulators. This theory suggests that elected regulators are pro-industry. However, in a market with several competing firms where prices are regulated, individual firms can use the additional revenues to spend on unregulated domains (e.g. product quality, marketing) to attract consumers. Hence, competition would force the firms to operate on zero profits.

State level data makes it possible to examine the premiums written by the industry on the different components of an automobile insurance policy, namely liability coverage, collision coverage and comprehensive coverage. Liability coverage is the coverage that protects other people and their properties if the policyholder causes an accident. It is mandatory in most states. Collision coverage protects the car of the policy holder in case the policyholder hits other vehicles, people or non-moving objects like fences, poles or kiosks. It covers the policyholder, regardless of who was at fault in an accident. Comprehensive coverage covers everything that collision coverage does not and is often referred to as "other than Collision". It protects the policyholder from theft, fire, vandalism and severe weather conditions.

In 2011, the value of the automobile insurance policies sold (or premiums written) in the United States was about $ 150 bn. Liability coverage component of automobile policies alone accounted for about $ 100 bn amounting to about 65 percent of the total revenues. Premiums from collision coverage accounted for another 26 percent of the revenues while comprehensive coverage accounted for only 10 percent of the total revenues of the industry. Clearly, most people prefer to purchase liability

[7]Published by the National Association of Insurance Commissioners.

coverage (as it is mandatory) or collision coverage. I find evidence that premiums written on liability coverage per registered vehicle by the industry are substantially lower in states with elected commissioners after controlling for a variety of factors. Similarly, I also find that premiums written on collision coverage per registered vehicle are lower in states with elected commissioners. However, I find no impact of the selection mechanism of the insurance commissioner on comprehensive coverage per registered vehicle. This is partly because few people prefer to buy comprehensive coverage. Hence, it ceases to be electorally salient for an elected commissioner to monitor.

The rest of the paper is organized as follows. Section 1 provides a section on literature review of the theory of elected vs appointed regulators and automobile insurance rate regulation. Section 2 provides background information on the role of state legislature and the regulatory powers of the insurance commissioners. Section 3 provides data sources and deals with potential endogeneity issues with the selection of the Insurance Commissioner. Section 4 gives econometric specification and section 5 provides a discussion on the results.

1.1 Literature Review

1.1.1 Elected vs. Appointed Regulators

Stigler (1971) and Peltzman (1976) laid down a general theory of economic regulation. Stigler (1971) suggested that interest groups which are able to organize themselves at lower costs are able to persuade the regulator to set policies which are of benefit to them. Hence, he argues that it is the industry which captures regulation because the industry is able to organize itself into an interest group in a cost effective

manner. On the other hand, consumers are rarely able to organize as an interest group because the costs are much higher. Peltzman (1976) suggested that government tries to maximize electoral support, and the interest groups compete by offering political support for the legislation they benefit from.

In the 1980s, Crain & Mccormick focused on the selection mechanisms of regulators. They developed a Peltzman style theoretical framework and provided empirical evidence on the impact of different institutional settings on regulatory outcomes. They argue that when election or re-election becomes a less important aspect of the regulator's optimization problem, his choices will tend to favor higher regulated prices. They find empirical evidence that average residential prices of electricity are marginally statistically significantly lower in states with directly elected Public Utility Commissioners. They also find higher rates of return for regulated firms in states with appointed utility commissioners. Besley & Coate (2003) came up with similar empirical evidence with utility commissioners. They note that elected commissioners are going to be more closely aligned with voters' interests, but the appointed commissioners are, in turn, appointed by elected officials. However they explain that when regulator is appointed, regulatory policy becomes bundled (and confused) with other policy issues the appointing politicians oversee. However, as voters have only one vote and regulatory issues are not always salient for most voters, there are incentives on the part of the appointed regulator to respond to interest groups rather than voter interests. In contrast, it seems obvious that if regulators are elected, their stance on regulation is the only important issue so that the electoral incentive for the parties is to back a pro-voter or pro-consumer candidate.

Claire Lim (2013) investigates judiciary and concludes that under appointment, the preference of the median voter in the entire state is reflected in policy outcomes while local preferences are reflected under election. Hence she suggests ev-

idence that sentencing decisions of the judges reflected that they were influenced by their private interests. Hanssen (1999) compares litigation in elected and appointed state courts and finds, on balance, more litigation where judges are appointed, consistent with the hypothesis that judicial independence has a net positive effect on decision uncertainty. Makowsky & Sanders (2013) study the political economy of the residential property value assessment under Proposition 2 1/2 and find that appraised values grow more slowly in municipalities with elected assessors. Alexander Whalley (2013) finds that appointive treasurers reduce a city's cost of borrowing by 13% to 23%. Appointive city treasurers appear to reduce borrowing costs primarily through the refinancing of expensive debt at lower interest rates.

1.1.2 Regulation of Auto Insurance

In the literature on regulation of automobile insurance, the relevant studies are Tennyson (2001), Harrington (2002) and Grace et al. (2008). Harrington (2002) analyzed the effect of prior approval rate regulation on automobile insurance premiums from 1972 to 1998 and concluded that in the long run, rate regulation did not significantly reduce prices for consumers. The paper takes inverse loss ratio of the industry (for the auto insurance segment) as a measure of price. Similarly, Cummins, Phillips and Tennyson (2001) suggest price regulation has a disparate impact.

Grace (2008) takes into account the career incentives of insurance commissioners (revolving door hypothesis) using 'unit prices' as a proxy for prices that consumers face[8]. Grace et al (2008) finds that after taking into account the backgrounds and future employment choices of the regulators, states with rate regulation had higher average insurance prices. They estimate that the unit price of insurance in regulated

[8]Unit prices for a given state are calculated as the total state premiums earned divided by the sum of total state direct losses and loss adjustment expenses plus policyholder dividend paid off private passenger auto insurance.

states when the commissioner is someone who desired higher elective office is approximately 8 percent higher than what we would expect from a competitive state with similar characteristics. They argue that insurance commissioners use their position to gain favor with the industry presumably in return for political support during future campaigns. So they tend to argue that the claim that the selection mechanism motivates commissioners is inconsistent with the results of Besley & Coate (2000). However they do find evidence that Insurance Commissioners who happen to be consumer advocates are successful in reducing the price of insurance.

Fields, Klein & Sfiridis (1997) found evidence that the passage of Proposition 103 significantly reduced the value of life insurers doing business in California. Proposition 103 among other things, established a statewide, elected, position of Insurance Commissioner beginning November 1990.

1.2 Background Information

Insurance has historically been and continues to be subject to state regulation with little intervention from the federal government [9]. McCarren-Fergusson Act (1945) exempts insurance from anti-trust federal regulation which makes the state regulations and state regulators the key force driving policy outcomes.

State legislatures set broad policy for the regulation of insurance by enacting legislation providing regulatory framework under which insurance commissioners operate. They set tax rates and establish laws which grant regulatory authority to commissioners and oversee state insurance departments and approve regulatory bud-

[9] In the Paul vs Virginia case (1869) Supreme Court ruled that insurance would be subject to state regulation, beyond the legislative reach of US Congress. In 1944, the Supreme Court overturned the Paul vs Virginia (1869) case. However, the Congress responded by enacting the McCarren-Fergusson Act in 1945 which exempted insurance industry from anti-trust regulations and reinforced the authority of the states on insurance.

gets. Some of the key functions of the insurance commissioners as heads of insurance departments of their respective states are insurer licensing, producer licensing, product regulation, market conduct, financial regulation and consumer services. There is inter-state and inter-temporal heterogeneity in the regulatory powers and functions of an insurance commissioner. Some of these powers and functions are briefly discussed in the next sub-section.

1.2.1 Functions and regulatory powers of an Insurance Commissioner

1.2.1.1 Product Regulation and Rate Regulation

All states equip an insurance commissioner with the power to regulate automobile insurance premiums. This regulatory power varies from state to state. This regulatory power is classified into five categories.

Prior Approval On one extreme is the prior approval system. In states with such a system, an insurance firm needs to take prior approval from the Office of Insurance Commissioner (OIC) before they can change policies. According to NAIC, there are 17 states which have a prior approval rate regulation system.

Flexible Rating Some states have flexible rating system, where insurance firms are allowed to change premiums on a policy within a range in an year and need approval from the OIC if they intend to change their premiums beyond those limits. According to NAIC, four states have a flexible rating system

File and Use Some states have File and Use system, where an insurance firm needs to file an application with the OIC to change the premium it charges on a particular

automobile insurance policy. After filing, the firm can switch to new premiums and continue to use them unless OIC objects to the change. According to NAIC, twenty states have file and use system.

Use and File Some states have Use and File system, where insurance firms can start using the new premiums they want to charge on a policy and inform the OIC of this change within a stipulated time period (usually three months). According to NAIC, nine states have a use and file system.

No File Only Wyoming has a no file system, where insurance firms are not required to seek any kind of approval from OIC to change premiums charged on a policy. However an insurance firm must supply evidence that necessitated a rate change if requested by the commissioner.

However, in a few states, there could be different rating system for different parts of the auto policy. The insurance firms have to seek approval to change the premium relating to only specific components of an insurance policy. Some of these parts could be bodily injury liability coverage, protection from uninsured motorists, changing rates in different geographical regions etc. For example, in Connecticut, there is a Prior Approval rate regulation for body injury coverage and on coverage for protection from uninsured motorists. However, there is a File and Use system for property damage liability coverage for both comprehensive and collision parts of the policy. Besides, there is a flexible rating system of +/- 6 percent and not more than a 15 percent increase in any individual territory. Another state, New Hampshire generally follows a File and Use system but switches to Prior Approval system for those sections of the market which the commissioner deems non-competitive. For purposes of analysis in this paper, I have used the generally prevalent rate regulation

system.

In 2010, over 565,000 filings were processed through the System for Electronic Rate and Form Fillings across the country. National Association of Insurance Commissioners (NAIC) notes that even in states with competitive rating approach, regulators typically retain authority to disapprove rates if they think that competition is not working[10]. Commissioners can also make changes in the insurance policy provisions if they deem them to be unreasonable and unfair as per state law.

1.2.1.2 Insurer Licensing

State laws require insurers and insurance-related businesses to be licensed before selling their products. All U.S. insurers are subject to regulation in their state of domicile and in the other states where they are licensed to sell insurance. Insurers who fail to comply with regulatory requirements are subject to license suspension or revocation, and states may exact fines for regulatory violations. In 2010, there were 342 companies that had their licenses suspended or revoked. Thus, commissioners can use insurer licensing as a potential threat to make companies fall in line.

1.2.1.3 Financial Regulation

State financial examiners investigate an insurers accounting methods, procedures and financial statement presentation. These exams verify and validate what is presented in the insurers annual statement to ascertain whether the insurer is in sound financial standing. When an examination of financial records shows the company to be financially impaired, the state insurance department takes control of the insurer.

[10]Rates for life insurance and annuity products generally are not subject to regulatory approval, although Commissioners may seek to ensure that policy benefits are commensurate with the premiums charged.

1.2.1.4 Market Regulation

Traditional market conduct examinations review producer licensing issues, complaints, types of products sold by insurers and producers, producer sales practices, compliance with filed rating plans, claims handling and other market-related aspects of an insurers operation. When violations are found, the insurance department makes recommendations to improve the insurers operations and to bring the company into compliance with state law. In addition, an insurer or insurance producer may be subject to civil penalties or license suspension or revocation.

1.2.1.5 Producer Licensing

This refers to licensing of insurance agents and brokers. Currently 2 million individuals are licensed to provide insurance services in US. Producers who fail to comply with regulatory requirements are subject to fines and license suspension or revocation. In 2010, roughly 5,000 agents and brokers had their licenses suspended or revoked. Fines exceeded $25 million and over $50 million was returned to rightful owners.

1.2.1.6 Insurance Premium Sales Tax Revenue

In about 35 states, Departments of Insurance are directly responsible for administration and collection of Insurance Premium Sales Tax Revenues. These tax rates are determined by the state legislatures and vary by lines of business. These taxes are levied on direct premiums written. These are in addition to other corporate taxes that the industry has to pay which are usually collected by other state/federal agencies.

1.2.2 Selection mechanism of the Insurance Commissioner

In 11 states, insurance commissioners are selected through election (by ballot). These are California and Washington on the west; North Dakota and Montana in the north; Kansas and Oklahoma in the center; Louisiana and Mississippi in the south; Delaware, North Carolina, and Georgia in the east. In Virginia, the insurance commissioner is appointed by a 3 member Virginia State Corporation Commission[11] which in turn are elected by the General Assembly. In New Mexico, the commissioner is appointed by a 5 member elected board[12]. In remaining states and Washington D.C, an insurance commissioner is selected through appointment by Governor and serves at Governor's pleasure. Previous literature has treated Virginia and New Mexico as having an appointed commissioner and I continue with this practice in this paper.

1.2.2.1 Endogeneity issues with selection of Insurance Commissioners

This section explores whether the selection mechanism of insurance commissioners is endogenous. Does higher premiums on auto insurance premiums induce a switch from an appointed to elected position. I discuss recent cases where states have made a switch from one selection method to another. I also discuss the political orientation of these states. In 2014, of the 11 insurance commissioners who were publicly elected to office, 6 were Republicans and 5 were Democrats. In the 37 states that authorized to appoint insurance commissioners, 17 were appointed by Democrats and 19 were appointed by Republicans.

I have collected information on when was the Office of Insurance Commis-

[11]The commission is responsible for handling all charters "of domestic corporations and all licenses of foreign corporations to do business" within the commonwealth.

[12]New Mexico Public Regulation Commission is responsible for regulation of public utilities, transportation companies, transmission and pipeline companies, insurance companies and other public companies.

sioner / Division of Insurance established in each state. Wherever possible, I have gathered information on who was regulating the insurance industry before such an office/division was established. I also collect information on whether these states switched their selection mechanism (from elected to appointed position or vice-versa). The source of this information is the state constitutions, state insurance offices and general information available on the internet.

In most of the states, by the turn of the twentieth century, an Office of Insurance Commissioner was in place. Since 1960, switches from an elected to appointed Insurance Commissioner have happened in only three states (Louisiana, California and Florida). Louisiana and California switched in 1960 and 1989 respectively from an appointed to an elected position. Florida has moved from an elected to appointed commissioner in 2003-04.

Other states have not switched since the regulatory body was established, despite changes in economic and political environment. Hunter et al.(2013)[13] notes that "Over the past quarter century, auto insurance expenditures in America have risen by more than 40 percent. Consumers in some states are paying 80 percent, 90 percent, and even 100 percent more for auto insurance than they paid in 1989." However we see none of the states switch from an appointed to elected position to force lower rates.

Table 1.1 provides information on when were these Office of Insurance Commissioners established, and in which year they switched (I have provided information on 35 states). The next section discusses the recent cases where states switched.

[13]What Works: A Review of Auto Insurance Rate Regulation in America and How Best Practices Save Billions of Dollars.

1.2.2.2 Cases where selection mechanism were changed

California switched from having an appointed insurance commissioner to having an elected insurance commissioner as a result of Proposition 103 in 1988 which was narrowly passed with the approval of 51 percent of the voters (4,844,312). Proposition 103 was a response to a 1984 law that required California drivers to have auto insurance. There were various provisions of Proposition 103. It required insurance companies to reduce rates for motor vehicle, fire and liability insurance by about 20 percent from 1987 levels and a rate freeze till 1989. It also required the commissioner to approve rate increases before they could take effect and change the Office of Insurance Commissioner from an appointed to an elected position. Characteristics as the drivers place of residence, age, sex, and marital status could no longer be used without the approval of the Commissioner. These factors were frequently used by insurance companies prior to the passage of Proposition 103 (Jaffee & Russell (1998)). Jaffee & Russell (1998) report a significant and positive relationship by county between higher insurance premiums and a yes vote on Proposition 103.

Florida switched from an having an elected insurance commissioner to an appointed insurance commissioner with the passage of Florida Restructuring the State Cabinet Amendment approved on the ballot on November 3, 1998. Fifty-five percent of votes were polled in favor of the Amendment. This amendment merged the cabinet offices of treasurer and comptroller into one chief financial officer; reduces cabinet membership to the chief financial officer, attorney general, agriculture commissioner; secretary of state and education commissioner eliminated from elected cabinet; changed the composition of State Board of Education comprising of the governor and the cabinet to a board appointed by the governor; this board would now appoint the education commissioner; defined the state board of administration, trustees of internal improve-

ment trust fund, land acquisition trust fund. So in Florida, a switch from an elected to appointed position was not related to insurance premiums but a result of the restructuring of the state cabinet.

In the case of California, prices do seem to have motivated voters decision to support Proposition 103. However, states with higher or similar average expenditures like New Jersey, Connecticut or D.C. didnot switch from an appointed to an elected position. In Florida, the switch was part of a large scale restructuring of state cabinet. Other states have not switched despite dramatic changes in economic and political environments so I claim that selection mechanism of an insurance commissioner is exogenous.

1.3 Data and Summary Statistics

Urban and Rural Counties For electing an insurance commissioner, states follow a statewide simple majority electoral system. In such a system, a candidate who gets the most number of votes wins the election. The elections for the position of an insurance commissioner are generally bi-partisan fights between Republican and Democratic candidates where the candidate with more than 50 percent of the votes polled is the winner. An elected commissioner will use be most prominent in those areas where most of the population is concentrated. About 50 percent of the US population is concentrated in 10 percent of its counties. Hence, for an insurance commissioner such areas with heavy concentration of population becomes critical for electoral outcomes.

Therefore, I have classified counties as urban and rural based on the population living in those counties. I rank all the counties within a state in terms of

population with the highest rank assigned to the county having the highest population. I then select those highest ranked counties which contain 50 percent of state's population. I label these counties as urban counties. All other counties are labeled as rural. Therefore, I classify 307 counties as urban and 2740 counties as rural. On an average, about 50 percent of a state's population is located in about 10 percent of its counties. For example, Georgia has 159 counties but 50 percent of Georgia's population is concentrated in 16 counties. Hence, based on this classification, Georgia has 16 urban counties and 143 rural counties. Counties in most states are fairly similar in terms of their geographical areas[14]. Hence most of the urban counties are also generally the most densely populated counties in a state.

Quotes on auto insurance premiums Previous studies on automobile insurance regulation used *unit* price of insurance (the ratio of premium revenue received to losses incurred by the insurer) as a measure of average price paid by insureds per dollar of benefits (loss payments) received. These aggregates are usually at the state level. Data on insurance premiums at the level of an individual is not available because it would reveal the pricing strategies of those firms who disclose their prices to their competitors. However, recent innovations in website development has enabled insurance firms to reach out to potential consumers by providing them quotes on their desired insurance policy online. These websites allow consumers to get accurate quotes after taking into account various characteristics of the individual driver and car. Almost all major automobile insurance firms maintain such websites. A consumer can get a quote for his desired policy from various firms through their websites. Hence, firms use these websites to provide quotes which are competitively priced to attract consumers.

[14]California is an exception.

For this paper, I scrapped a website maintained by a major automobile insurance firm to get quotes on various insurance policies covering 48 counties and 3039 counties. Since it takes about 1.5 minutes to collect one quote, the entire data collection process took 3 months. I collected data from February 2015 to April 2015. In most states, automobile insurance premiums vary by zip-codes. There are about 40,000 zip-codes in the United States. It was not possible to collect quotes for all the zip-codes because of time and legal constraints. Hence for this paper, I have selected one zip-code from each county. This zip-code has the highest resident population in comparison to other zip-codes located in the county. All counties in 48 states are included in the study. For some counties, data on accident rates is not available. Hence, I have dropped these counties. The study does not include Montana, Wyoming and Alaska because of legal constraints on data collection imposed by the firm whose website was being used to collect data.

The basic models in the existing literature suggest that politicians respond to the preferences of the median voter. Hence, for this paper, I collect quotes on automobile insurance policy preferred by a hypothetical individual who represents the median voter in the United States. The hypothetical individual is a 50 years old male (primary driver) living with his wife who is 48 years old and registered as a secondary driver on the policy. Various sources in the industry suggest that for drivers in the age group of 25 years to 65 years, age of the driver does not affect premiums. I also assume that the primary and the secondary drivers have a clean driving record[15] and they stay in a house they 'own'[16].

I also assume that the median voter drives Toyota Corolla. This is a realistic

[15]This is because driver who care about premiums drive safely. Also it simplifies the data collection process.

[16]People who live in the houses they own are more likely to be the resident of the state and hence potential voters.

assumption because Toyota Corolla is a relatively inexpensive car (its market price is about $17000). The cost of maintaining a Toyota Corolla is known to be lower in comparison to other cars. Besides, it can be used for a long period of time. Hence it is in the affordable range of the American middle class and ranks second among the best selling cars in the United States. I also assume that expected annual mileage of the car is about 12,000 miles which is in accordance with the average miles per vehicle reported by the Federal Highway Administration[17]. I have labeled this quote as the `median voter quote`. For a detailed questionnaire, please see the Appendix.

However, even a median voter in different parts of the country would choose a different insurance policy based on the local conditions. Hence, comparing quotes for a hypothetical individual as he moves to different counties would essentially mean comparing two different products. Hence, I have also collected quotes on a standard automobile insurance policy where I keep the liability coverage and deductibles constant. I have labeled these quotes as `constant coverage quote`. In other words,`constant coverage quote` represents the the price of a similar product (automobile insurance policy) across different counties (for a hypothetical individual). In some states, state regulations make it mandatory for the firms to sell additional coverage like Personal Injury Protection etc. However, attention has been paid to keep the coverage constant as much as possible.

Various drivers are only interested in getting the minimum liability coverage on their insurance policy to escape high automobile insurance premiums. For such drivers looking for cheapest possible options, auto insurance premiums are likely to be a salient issue when it comes to electing insurance commissioners. Hence, it is interesting to examine whether selection mechanism of an insurance commissioner will

[17]The exact estimates provided by the Federal Highway Administration is 11,244 average miles per vehicle in the year 2013.

have an impact on the premiums on an auto insurance policy which offers minimum mandatory liability coverage as per state laws. This mandatory minimum coverage is different in different states. Hence, I have collected quotes on insurance policies which offers mandatory minimum coverage to the policyholder. I have labeled them as `minimum quote`.

It is also worth examining whether the elected insurance commissioner caters to the rich driver. This is because elected commissioners could theoretically subsidize median voters at the expense of the rich voters as suggested by Director's Law. Hence, I have collected quotes on auto insurance policies which are likely to be purchased by rich drivers. A rich driver is assumed to be a hypothetical individual (similar to the median voter) who drives Mercedes C Matic 350. This is an expensive car which sells for about $45000 and is likely to be purchased by individuals with high disposable incomes. I have labeled these quotes as `rich driver quotes`.

Other data sources The data on zip code wise population is available from zip-codes.com. This website is also the source of data on average income per household, proportion of black people living in a zip-code and the elevation of the zip code from the sea level. Analysts working in auto insurance firms suggest that rich drivers tend to pay out of pocket in case of an accident. This helps them to avoid paying higher auto insurance premiums in the future. Poor people tend to have financial constraints and are more likely to file a claim in case of an accident. Hence, I have added average income per household in a zip code as a control. I also add proportion of black people as a control because this measure is correlated with various neighborhood characteristics like crime rates, theft rates, etc. I have also added elevation from the sea level as a control because low lying areas are prone to flooding risks and increases the premium on automobile insurance.

Motor vehicle crashes or accidents are an important factor that determines auto insurance premiums. Data on the number of motor vehicle accidents that happened in 2013 in a county are available from the National Highway Traffic Safety Administration (NHTSA). Most appropriate data should have been for the year 2014 which are not yet available. However, data from 2013 can be useful if we assume correlation in accidents in a city across years. This data is available at the level of the city. This is the most reliable data set on accident rates available for the purpose of this study. For 59 counties in the sample, the data on the number of accidents was not available and hence those counties were dropped from the analysis. So, the effectively covers 48 states and 2681 counties.

Information on whether the state has an elected or appointed Insurance Commissioner is available from National Association of Insurance Commissioners (NAIC). NAIC publishes an annual report, the Auto Insurance Database Report. This report provides information on status of rate regulation in a state. Based on this information on rate regulation, states have been classified into 5 categories as discussed in Section 3. Auto Insurance Database Report also provides information on value of automobile insurance policies sold (or the auto insurance premiums written) providing liability coverage, collision coverage and comprehensive coverage. The report provides information on the number of claims made on auto insurance policies written to provide liability coverage, collision coverage and comprehensive coverage. The report also provides information on the payments made by the industry on the claims filed on policies providing liability coverage, collision coverage and comprehensive coverage. This report also provide data on number of motor vehicle accidents per 1000 registered vehicles and the number of motor vehicle thefts per 100000 registered vehicles. This report also provides information on the number of registered vehicles in a state in a year. All this information is available at the state level for the years 2007 to 2011

for all states except Texas. Historical data on Gross Domestic Product (state-wise) for all states and regions in the United States is available at Bureau of Economic Analysis (BEA).

Table 1.2, Table 1.12 provides summary statistics for various variables used. Table 2 provides summary statistics of variables used in the analysis of premiums at the individual level. Table 1.12 provides summary statistics for variables used in examining the premium per vehicle at the state level. The tables show that premiums in urban counties are higher as compared to premiums in rural counties. This is because accidents and population density are much higher in urban counties than in rural counties. Also, standard deviation in premiums is much higher for urban counties as compared to rural counties providing some preliminary evidence of higher cross subsidization in urban counties as compared to rural counties.

Table 1.3 provides a difference of means t-test for urban counties in states with elected commissioners vs urban counties in states with appointed commissioners. The results show that premiums in urban counties are lower in states with an elected commissioner. This difference is statistically significant. 'Number of accidents' and 'population' (living in the zip-code) are not significantly different in states with elected and appointed regulators. Urban counties in states with elected commissioners tend to have lower average income per household and are in low lying areas (which increases the risks of flooding). Proportion of black population too is significantly higher in urban counties located in states with elected commissioners. Low elevation levels and high proportion of black population are associated with higher premiums. However, the table shows that the difference in premiums is significant even without controlling for these factors. Income levels are associated with lower premiums, but the difference in income is not large enough to warrant the difference in premiums. It should also be noted that income of an individual have already been taken in to account while

collecting the data. This is because a lot of variables which were used in collecting data (e.g. type of car owned, ownership of house etc.) are correlated with the income of an individual.

1.4 Econometric Specification

The key variable of interest, the selection mechanism of the insurance commissioner is a dummy variable. However, during the period of analysis, this variable does not change. Hence it is not possible to use a fixed effects model. I have presented my results on the individual level data using a simple OLS estimation method. However for the state level analysis over a 5 year period, I have presented my results using a random effects model as well as a simple OLS model with errors being clustered at the state level. The random effects model allows for un-observable time invariant heterogeneity at the state level which is uncorrelated with other variables.

1.4.1 Determinants of Auto Insurance Premiums: individual level data set

I use OLS regression procedure to estimate the affect of mode of selection of an insurance commissioner on the monthly auto insurance premiums paid by the consumers. These results are clustered at the state level. The results are arrived at, after controlling for factors which might impact the car insurance premiums. Some of these are the accident rates in the county, elevation of the zip-code from the sea level (low lying areas pose increased risks to property because of flooding), average household incomes and rate regulation in the state. Various driver specific and car specific characteristics like driving history, age, income level, marital status, etc have

been controlled while collecting data.

I use the following econometric specification to estimate the determinants of quote for the policy preferred by the median voter, policy offering minimum coverage, policy offering constant coverage across states and counties and the policies purchased by the rich voter.

$$Quote_i = \alpha_0 + \alpha_1 Appointed_i + \alpha_2 Prior\ Approval_i + \alpha_3 Flexible\ Rating_i + \alpha_3 Elevation_i + \alpha_5 Income_i + \alpha_6 Motor\ Vehicle\ Accidents_i + \alpha_7 Prop.\ of\ Black\ Population_i + y_i + e_i \tag{1.1}$$

where $Quote$ is the One month car Insurance Premium in zip-code i; $Appointed$ is a dummy variable which takes the value of 1 if the insurance commissioner is appointed in the state in which zip-code i is located, 0 otherwise; $PriorApproval$ is the dummy variable which takes the value of 1 if the state has a prior approval rate regulation system, 0 otherwise; $FlexibleRating$ is the dummy variable which takes the value of 1 if the state has a flexible rating rate regulation system, 0 otherwise; $Elevation$ is the altitude of the zip code from the sea level measured in feet; $Income$ is the average income of the households living in zip-code i; $MotorVehicleAccidents$ is the number of accidents in the county in which zip-code i is located; $Prop.of Black Population$ is the proportion of population who identify themselves as black in zip-code i; y represent year dummies; e is the error term.

1.4.2 Determinants of Auto Insurance Premiums per registered vehicle: state level data

To estimate the differential impact of appointed vs elected regulators on the premiums paid per capita, I have used the random effects model and the following econometric specification. I have also shown results using the OLS specification. The results are clustered at the state level. The regression analysis uses data from the year 2007 to 2011.

$$Premium\,per\,vehicle_{st} = \alpha_0 + \alpha_1 Appointed_{st} + \alpha_2 Prior\,Approval_{st} + \alpha_3 Flexible\,Rating_{st} + \alpha_4 Accident\,Rate_{st} + \alpha_5 Theft\,rate_{st} + \alpha_6 GDPpercapita_{st} + \alpha_7 GDP_{st} + \alpha_8 Population_{st} + y_i + e_{st} \quad (1.2)$$

where, $Premium\,per\,vehicle$ is the amount of auto insurance premiums per registered vehicle written in a state; *Appointed* is the dummy variable which takes the value of 1 if the insurance commissioner is appointed in the state in which zip-code i is located, 0 otherwise; $Prior\,Approval$ is the dummy variable which takes the value of 1 if the state has a prior approval rate regulation system, 0 otherwise; $Flexible\,Rating$ is the dummy variable which takes the value of 1 if the state has a flexible rating rate regulation system, 0 otherwise; $Accident\,Rate$ is the number of accidents per 1000 registered vehicles in the state as reported by Auto Insurance Database Report; $Theft\,rate$ is the number of motor vehicle thefts in the state per 100,000 registered vehicles; y is the year dummies; e is the error term. s and t are state and year subscripts.

1.4.3 Determinants of auto damage claims paid out on auto insurance policies

To estimate the determinants of claims paid out on the auto insurance policies, I estimate the following equation using the random effects model. I also show the results using the OLS specification. The results are clustered at the state level and uses data from the year 2007 to 2011.

$$\begin{aligned} Payments = \alpha_0 + \alpha_1(Premiums)_{st} + \alpha_2(No.\,of\,Claims)_{st} + \\ \alpha_3(Appointed) * (No.\,of\,Claims)_{st} + \alpha_4 Prior\,Approval * (No.\,of\,Claims)_{st} + \\ \alpha_5 Flexible\,Rating * (No.\,of\,Claims)_{st} + \alpha_6(GDP)_{st} + \alpha_7(Population)_{st} + y_i + e_{st} \end{aligned} \tag{1.3}$$

where $Payments$ is the total amount of dollars paid out by the insurance industry on auto insurance policies; $Premiums$ have three components: Premiums on Liability Coverage, collision coverage and comprehensive coverage respectively. $Liability\,Coverage\,Premiums$ is the premiums (in \$) sold by the industry on the liability coverage component of auto insurance policies written in a state; $Collision\,Covrage\,Premiums$ is the premiums (in \$) sold by the industry on the collision coverage component of auto insurance policies written in a state in a year; $Comprehensive\,Coverage\,Premium$ is the premiums (in \$) sold by the industry on the comprehensive coverage component of auto insurance policies written in a state; $No.\,of\,claims$ is the number of claims filed by consumers on auto insurance policies in a state in a year; *Appointed* is the dummy variable which takes the value of 1 if the insurance commissioner is appointed in the state in which zip-code i is located,

0 otherwise; ;*Prior Approval* is the dummy variable which takes the value of 1 if the state has a prior approval rate regulation system, 0 otherwise; *Flexible Rating* is the dummy variable which takes the value of 1 if the state has a flexible rating rate regulation system, 0 otherwise; y represent year dummies; e is the error term. s and t are state and year subscripts.

1.5 Results and Conclusion

In this chapter, I provide conclusive evidence that selection mechanism of an insurance commissioner has a causal impact on auto insurance premiums. Compared to states with an appointed commissioner, states with an elected commissioner have lower auto insurance premiums in the counties where a majority of state's population is concentrated.

It is critical for an elected commissioner to offer policies which are salient for most voters as well as provide incentive to the industry to make contributions for his electoral campaign. The insurance industry is the only major source of campaign contributions for an insurance commissioner. In a simple majority election, with generally two candidates in the electoral fray, the best strategy for an elected commissioner is to use the limited funds at his disposal to reach out to most voters. Therefore, a commissioner seems to pay greater attention to the counties where a majority of state's population is concentrated. On an average, in the United States, 50 percent population of a state is concentrated in only 10 percent of the counties. Hence, an elected commissioner prefers lower premiums in the most populous counties (as compared to appointed commissioners).

After controlling for a variety of factors like accident rates, theft rates, regulatory powers that a commissioner in a state has to control premiums, I find evidence

that in urban counties (or counties where a majority of state's population is concentrated), an elected commissioner leads to lower premiums. For urban counties, a median voter living in a state with an elected commissioner pays about $50 less on monthly automobile insurance premium as compared to a median voter living in a state with an appointed commissioner. A policy providing minimum coverage costs $42 less per month in an urban county in a state with an elected commissioner. Similarly, a policy providing similar coverage is about $42 less per month in a state with an elected commissioner. A comparison across urban counties reveal that even rich voters have to pay about $53 less per month on an auto insurance policy in a state with an elected commissioner.

The regulatory powers of insurance commissioners vary across states. For example, the power to regulate premium on an automobile insurance policy varies from state to state. Various states have a prior approval rate regulation system. In these states, an insurance firm need to take prior approval from the Office of Insurance Commissioner (OIC) to change the premiums on auto insurance policies. Some states have a flexible rating system of rate regulation where an insurance firm does not need to get approval from OIC if they want to change premiums within a fixed range. On the other extreme is Wyoming where the commissioner has very limited power to regulate premiums.

Theoretically, the impact of rate regulation is ambiguous. The premiums charged by the firms on insurance policies in a state would be a function of the preferences of the regulator as well as his/her power to regulate premiums. Merely having greater regulatory powers does not imply that a regulator would favor lower premiums. Before Proposition 103, the state insurance commissioner in California had the duty to ensure that insurance rates were neither excessive nor inadequate, but as noted by Sugarman (1990), this price control authority was rarely used. Besides,

premiums would be sticky in an environment where it is costly to change premiums which might cause an upward bias on premiums. In this paper, I find evidence which suggests that higher power to regulate premium is associated with higher premiums in urban counties. However, this association is generally not statistically significant. Empirically, rate regulation seems to have no impact on sparsely populated areas. It generally seems to be the case that regulators, whether elected or appointed, tend to pay greater attention to the concerns of the voters located in urban counties.

I have also added a variable to control for the elevation of the zip code from the sea level. This is because low lying areas are prone to flooding and hence greater risks to properties in general. As expected, I found that there is a negative relationship between risks from flooding and auto insurance premiums. In the individual level analysis, number of accidents seems to have no impact on auto insurance premiums. This is partly because while collecting the data, I have already taken into account the driving experiences of the policyholder. However in the state level analysis, higher accident rate does seem to be associated with higher premium per vehicle.

I have also added "proportion of black people" in a neighborhood to control for neighborhood characteristics. For example, a large number of black people are poor and hence they would be forced to live in neighborhoods which have higher crime rates and therefore drive down rental costs in that neighborhood. The results seem to suggest that neighborhoods with higher proportion of black population are associated with higher premiums. Motor vehicle thefts too have a positive impact on auto insurance premiums. I was not able to use theft rates for the individual level analysis because data on theft rates[18] is not available for a large number of counties. However, I do control for theft rates at the state level. I find evidence that higher theft rates are associated with higher premiums.

[18]Available at Uniform Crime Reports, Federal Bureau of Investigation.

State level data also throws some interesting observations. The bulk of revenue of the auto insurance industry comes from selling liability coverage which is mandatory in most states. About 65 percent of total premiums written by auto insurance industry comes from writing liability coverage, 23 percent comes from collision coverage and only 12 percent comes from comprehensive coverage. I use both random effects model and simple ordinary least squares method to show that premium per vehicle is significantly lower in states with elected commissioners for liability and collision coverage. An elected commissioner makes a difference of about $90 per annum on premium per vehicle for liability coverage $30 per annum on premium per vehicle for collision coverage.

However, selection mechanism of the commissioner seems to have no impact on premium per vehicle for comprehensive coverage. This anomaly can be explained by the fact that most people do not care about comprehensive coverage. This is evident from the amount of revenue earned on account of comprehensive coverage by the industry. Hence, it is not electorally rewarding for the commissioner to regulate premiums on comprehensive coverage.

REFERENCES

Klein, Linda S., and James M. Sfiridis. "A market based evaluation of the election versus appointment of regulatory commissioners." Public Choice 92, no. 3-4 (1997): 337-351.

Stigler, George J. "The theory of economic regulation." The Bell journal of economics and management science (1971): 3-21.

Lim, Claire SH. "Preferences and incentives of appointed and elected public officials: evidence from state trial court judges." The American Economic Review 103.4 (2013): 1360-1397.

Besley, Timothy, and Stephen Coate. "Elected Versus Appointed Regulators: Theory and Evdience, 1 (5) J." EURO. ECON. ASSOC 1176 (2003).

Crain and McCormick , Regulators as all Interest Group, in Buchanan and Tollison (eds.), The Theory of Public Choice-II (Ann Arbor: University of Michigan Press(1984)).

Whalley, Alexander. "Elected versus Appointed Policy Makers: Evidence from City Treasurers." Journal of Law and Economics 56, no. 1 (2013): 39-81.

Grace, Martin F., and Richard D. Phillips. "Regulator performance, regulatory environment and outcomes: An examination of insurance regulator career incentives on state insurance markets." Journal of Banking & Finance 32, no. 1 (2008): 116-133.

Harrington, Scott E., "Insurance Deregulation and the Public Interest". AEI-Brookings Joint Center for Regulatory Studies (2000).

Cummins, J. David, Richard D. Phillips, and Sharon Tennyson. "Regulation, political influence and the price of automobile insurance." Journal of Insurance Regulation 20, no. 1 (2001): 9.

Peltzman, Sam. "Toward a More General Theory of Regulation." Journal of Law and Economics 19, no. 2 (1976): 3.

Hanssen, F. Andrew. "The effect of judicial institutions on uncertainty and the rate of litigation: the election versus appointment of state judges." The Journal of Legal Studies 28, no. 1 (1999): 205-232.

Harrington, Scott E. "Effects of prior approval rate regulation of auto insurance." Deregulating Property-Liability Insurance (2002): 285-314.

Makowsky, Michael, and Shane Sanders. "Political costs and fiscal benefits: The political economy of residential property value assessment under Proposition." Economics Letters 120, no. 3 (2013): 359-363.

Randall, Susan, "Insurance Regulation in the United States: Regulatory Federalism and National Association of Insurance Commissioners", Florida State Law Review 26, no. 625.

Automobile Insurance Database Report, National Association of Insurance Commissioners

Sherden, William A. "An analysis of the determinants of the demand for automobile insurance." Journal of Risk and Insurance (1984): 49-62.

Jaffee, Dwight, and Thomas Russell. The causes and consequences of rate regulation in the auto insurance industry. No. w5245. National Bureau of Economic Research, 1995.

Questionnaire

This annexure provides detailed web-form that was filled to generate quotes for auto insurance premiums. There was a slight variation across states on the the questions asked to generate a quote.

Car Information

- **Year** `2014`
- **Make** `Toyota \Mercedes`
- **Model** `Corolla \C MATIC 350`
- **Primary Use** `Commuting to Work/School`
- **What is your estimated annual mileage?** `10,000 - 15,000`
- **What is the ownership status?** `Financed (for Toyota) \Paid (for Mercedes)`
- **Did you purchase the car when it was new?** `Yes`
- **How many years have you owned/leased this vehicle?** `Less than one year`
- **Do you want to add another vehicle?** `No`

Driver Information

- **Name** `.....`
- **Gender** `Male`
- **Marital Status** `Married`
- **Date of Birth** `03 - 05 - 1964`
- **When you got your first drivers license, how old were you?** `21`
- **Email address** `fakeemail@ex.com`
- **Do you currently have car insurance** `No`
- **How long had it been since you had your car insurance** `30 days or less`
- **Has this driver had any major violations in the last 5 years?** `No`

- **Accidents or minor violations in the last 3 years** No
- **Other auto damage claims in the last 3 years** No
- **Street Address** 385 Fake Circle 3
- **City** (the city in which the zip code is located)
- **State** (the state in which the zip code is located)
- **Zipcode** (varies with each observation)
- **Primary Residence** Own Home
- **Education** Bachelor's Degree

Spouse Information

- **Name** .....
- **Would you like to include your spouse on this policy** Yes, additional driver on policy
- **Gender** Female
- **Date of Birth** 04 - 02 - 1966
- **When you got your first drivers license, how old were you?** 21
- **Has this driver had any major violations in the last 5 years?** No
- **Accidents or minor violations in the last 3 years** No
- **Other auto damage claims in the last 3 years** No

Car Insurance History

- **What was your most recent insurance company** Allstate Insurance
- **When did your policy end** Less than one month
- **When would you like your new policy to start** In a week
- **What were the body injury limits on your policy** $50,000 - $100,000
- **What were the deductibles on your policy** $100

Table 1.1: Statwise Historical Information on Office of Insurance Commissioners

	Estd. (1)	Year (2)	Note (3)
Arizona	1969	None	Before 1969, Arizona State Commission regulated the industry
Arkansas	1917	None	
Colorado	1879	None	
Connecticut	1865	None	
Washington	1889	1907	Initially part of Secretary of State's office. Main function was to register insurers doing business
Rhode Island	1939	None	Department of Business Regulation established in 1939
Oregon	1887	None	
New Hampshire	1851	None	
Kansas	1871	1900	Switched from appointed to elected in year 1900
South Dakota	1897	None	
Wisconsin	1870	1881, 1911	Secretary of State was Commissioner of Insurance till 1878. Position of Commissioner was made elective in 1881 and made appointive again in 1911. It has since remained an appointive position
North Dakota	1889	None	
Pennsylvania	1873	None	
Texas	1876	None	
New Mexico	NA	None	
Maine	1870	None	
Alabama	1897	None	
Virginia	1906	None	
Florida	1848	1966, 2003	In 1966, Office switched to appointed position. In 2003, switched back to appointed
Maryland	1872	None	

North Carolina	1899	Yes	The first Commissioner of insurance was first elected by General Assembly and then appointed by Governor. In 1907, the position was made elected and hasn't changed since
Kentucky	1870	None	The department was established as a bureau in Auditor's office in 1870. In 1934, department was designated as a separate identity
Wyoming	1919	None	
Louisiana	1921	1960	State Constitution was amended in 1958 by Acts 1958, No. 125 to create Office of Insurance Commissioner. The position was appointed until 1960. It has been elected since then
Montana	1889	None	
Oklahoma	1907	None	
Missouri	1872	NA	
Vermont	1923	None	From 1923 to 1939, Office was part of the department of Insurance. In 1939, an independant Department of Banking and Finance was created. In 2012 the name was changed to Department of Finance Regulation
Nebraska	1913	None	First complete insurance code enacted in 1913, provided for an insurance board to administer the code. Before 1913, Territorial editor and later State Auditor issued certificates to insurance companies and exercised powers in investigating and inspecting those companies. The duties of insurance board was given to bureau of insurnace in the Department of Trade and Commerce in 1919. In 1933, bureau became Department of Insurance. In 1947, legislature passed laws that updated the 1913 code.

New Jersey	atleast 1895	None	
Indiana	1920	None	
New York	1859	None	
Illinois	1869	None	
Idaho	1901	None	
Massachusetts	1855	None	
California	1868	1988	Proposition 103 (discussed in detail in Section 5.1)

Table 1.2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Urban Counties					
Quote (Median Voter)	159.9	84.4	47.5	652.5	307
Quote (Rich Voter)	163.2	84.3	53.2	516	307
Quote (Min. Coverage)	132.4	72.7	40.2	602.6	307
Quote (Const. Coverage)	155.9	79.3	49.7	467	307
Appointed	0.73	0.44	0	1	307
Prior approval	0.40	0.49	0	1	307
Flexible rating	0.12	0.33	0	1	307
Elevation	793.4	1064.2	0	6947	307
Income	54.7	17.2	24.5	123.0	307
No. of accidents	38.9	55.8	2	546	307
Prop. of black population	0.16	0.19	0.01	0.9	307
Rural Counties					
Quote (Median Voter)	135.2	54.6	47.8	412.9	2681
Quote (Rich Voter)	140.7	52.9	56.8	490	2681
Quote (Min. Coverage)	111.6	41.7	37.5	331.2	2681
Quote (Const. Coverage)	134.4	53.2	49.31	444	2681
Appointed	0.76	0.43	0	1	2681
Prior_approval	0.34	0.47	0	1	2681
Flexible rating	0.09	0.29	0	1	2681
Elevation	1189.9	1400.3	0	10190	2681
Income	43.9	12.6	13.9	126.9	2681
No. of accidents	6.6	8.9	0	121	2681
Prop. of black population	0.10	0.16	0	0.97	2681

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior_approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flex_rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code.

Table 1.3: Difference of Means (t-test): Urban counties in states with Elected vs Appointed regulators

Variable	**Mean**	**Difference**	**Std. Errors**(Diff.)	**N**
Quote (Median Voter)	160.9	-20.5**	10.8	307
Quote (Rich Voter)	164.2	-23.5**	10.9	307
Quote (Min. Coverage)	133.3	-16.61*	9.4	307
Quote (Const. Coverage)	155.9	-14.8**	10.3	307
Income	54,650	- 4,177**	2,214	307
No. of accidents	38.9	1.5	7.2	307
Elevation	793.4	-288.9*	137	307
Population	47,213	-822	2,260	307
Prop. of black population	0.16	0.13***	0.02	307

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

Table 1.4: Monthly Quote on automobile insurance policy preferred by the Median Voter (Urban)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote	(7) Quote
Appointed	23.98	44.76*	46.31*	46.43*	46.43*	45.32*	53.48**
	(18.84)	(25.22)	(24.19)	(24.13)	(24.13)	(24.42)	(26.25)
Prior approval		42.94*	36.57	36.44	36.44	34.30	30.58
		(24.91)	(24.01)	(24.03)	(24.03)	(24.03)	(23.85)
Flexible rating		93.98*	87.71*	87.40*	87.40*	88.19*	87.46*
		(52.21)	(50.16)	(50.21)	(50.21)	(49.30)	(47.26)
Elevation			-0.0169**	-0.0170**	-0.0170**	-0.0163**	-0.0125**
			(0.00736)	(0.00742)	(0.00742)	(0.00725)	(0.00607)
Income				-0.0389	-0.0389	-0.0573	0.163
				(0.290)	(0.290)	(0.285)	(0.349)
No. of Accidents						0.171	0.166
						(0.156)	(0.133)
Proportion of black population							92.43*
							(54.86)
_cons	142.3***	98.06***	113.7***	115.9***	115.9***	111.2***	77.46*
	(10.96)	(28.27)	(27.18)	(31.70)	(31.70)	(31.41)	(41.85)
N	307	307	307	307	307	307	307
R^2	0.016	0.144	0.188	0.188	0.188	0.201	0.234

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code.
Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.5: Monthly Quote on an automobile insurance pollicy providing Minimum Coverage as mandated by state laws (Urban)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	20.07	34.02*	35.51*	35.34*	34.30*	42.75**
	(14.35)	(19.57)	(18.45)	(18.44)	(18.71)	(20.15)
Prior approval		29.44	23.33	23.51	21.51	17.66
		(20.22)	(19.23)	(19.19)	(19.19)	(18.92)
Flexible rating		73.07	67.06	67.48	68.22	67.46
		(51.49)	(49.26)	(49.15)	(47.90)	(44.67)
Elevation			-0.0162***	-0.0161***	-0.0154**	-0.0116**
			(0.00599)	(0.00599)	(0.00578)	(0.00448)
Income				0.0517	0.0346	0.262
				(0.229)	(0.224)	(0.276)
No. of accidents					0.160	0.154
					(0.129)	(0.106)
Proportion of black population						95.73**
						(46.24)
_cons	117.7***	86.46***	101.5***	98.55***	94.19***	59.21*
	(5.927)	(21.97)	(20.55)	(23.69)	(23.49)	(33.39)
N	307	307	307	307	307	307
R^2	0.015	0.116	0.171	0.171	0.185	0.233

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.6: Monthly Quote on an auto insurance policy providing Constant Liability Coverage (Urban)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	14.69	33.94	35.19*	35.16*	34.94*	42.39*
	(17.06)	(21.41)	(20.78)	(20.57)	(20.81)	(21.99)
Prior approval		38.79	33.33	33.36	32.91	29.28
		(25.23)	(25.20)	(25.21)	(25.21)	(26.53)
Flexible rating		70.52**	65.10*	65.19**	65.36**	64.24*
		(32.27)	(32.71)	(32.22)	(32.42)	(34.01)
Elevation			-0.0146*	-0.0146*	-0.0144*	-0.0107*
			(0.00781)	(0.00763)	(0.00773)	(0.00621)
Income				0.0110	0.00731	0.219
				(0.336)	(0.339)	(0.467)
No. of accidents					0.0358	0.0286
					(0.118)	(0.102)
Proportion of black population						96.28
						(76.81)
_cons	145.1***	106.5***	120.1***	119.5***	118.5***	85.49**
	(8.425)	(26.47)	(27.79)	(32.26)	(31.92)	(41.63)
N	307	307	307	307	307	307
R^2	0.007	0.096	0.133	0.133	0.134	0.172

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.7: Monthly quote on an automobile insurance policy brought by a Rich Voter (Urban)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	26.80	44.51**	45.79**	45.73**	45.73**	53.46**
	(17.27)	(21.81)	(21.63)	(21.36)	(21.65)	(23.55)
Prior approval		35.82	30.26	30.32	30.30	26.52
		(26.58)	(26.99)	(27.02)	(27.10)	(28.82)
Flexible rating		67.07**	61.56**	61.72**	61.72**	60.55*
		(30.42)	(30.55)	(30.03)	(30.20)	(30.30)
Elevation			-0.0149*	-0.0148*	-0.0148*	-0.0109*
			(0.00819)	(0.00794)	(0.00812)	(0.00639)
Income				0.0192	0.0190	0.238
				(0.367)	(0.371)	(0.518)
No. of accidents					0.00143	-0.00603
					(0.114)	(0.0968)
Proportion of black population						99.96
						(87.33)
_cons	143.4***	107.6***	121.4***	120.3***	120.2***	86.00*
	(8.650)	(27.49)	(29.41)	(34.11)	(33.77)	(45.51)
N	307	307	307	307	307	307
R^2	0.019	0.090	0.124	0.124	0.124	0.160

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located ; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.8: Monthly Quote on automobile insurance policy preferred by the Median Voter (Rural)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	11.29	17.24	17.90	18.02	16.61	17.46
	(15.33)	(17.29)	(16.90)	(16.92)	(16.80)	(16.83)
Prior approval		2.887	0.408	0.00754	-4.909	-5.876
		(18.79)	(19.17)	(19.14)	(19.21)	(19.41)
Flexible rating		56.36	55.05	54.28	53.69	53.74
		(39.12)	(38.00)	(37.29)	(37.36)	(37.72)
Elevation			-0.00540*	-0.00535*	-0.00485*	-0.00442
			(0.00284)	(0.00283)	(0.00273)	(0.00279)
Income				-0.154	-0.277	-0.234
				(0.275)	(0.274)	(0.312)
No. of accidents					0.921*	0.904*
					(0.532)	(0.521)
Proportion of black population						15.19
						(32.28)
_cons	126.6***	116.1***	123.0***	129.8***	132.1***	128.0***
	(8.413)	(20.52)	(21.30)	(22.52)	(22.28)	(24.65)
N	2681	2681	2681	2731	2681	2681
R^2	0.008	0.089	0.108	0.109	0.130	0.132

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.9: Monthly Quote on an automobile insurance pollicy providing Minimum Coverage as mandated by state laws (Rural)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	5.773	5.381	6.132	6.135	5.063	6.137
	(11.49)	(10.90)	(10.55)	(10.55)	(10.45)	(10.17)
Prior approval		-4.066	-6.220	-6.480	-10.42	-11.96
		(14.59)	(14.89)	(14.99)	(15.04)	(15.08)
Flexible rating		24.05	22.86	22.47	22.06	22.05
		(19.22)	(18.17)	(18.09)	(17.92)	(18.10)
Elevation			-0.00500**	-0.00498**	-0.00458**	-0.00398*
			(0.00205)	(0.00204)	(0.00199)	(0.00210)
Income				-0.0752	-0.174	-0.115
				(0.215)	(0.219)	(0.243)
No. of accidents					0.748*	0.729*
					(0.409)	(0.394)
Proportion of black population						21.16
						(20.21)
_cons	107.2***	106.6***	112.9***	116.3***	118.0***	112.4***
	(5.617)	(14.01)	(14.87)	(18.27)	(18.34)	(19.61)
N	2681	2681	2681	2681	2681	2681
R^2	0.004	0.037	0.065	0.065	0.090	0.095

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.10: Monthly Quote on an auto insurance policy providing Constant Liability Coverage (Rural)

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	-3.108	5.564	6.072	6.490	5.780	6.439
	(13.18)	(17.30)	(17.00)	(16.66)	(16.72)	(16.84)
Prior approval		5.481	3.633	2.296	-0.235	-0.986
		(15.98)	(16.19)	(16.08)	(16.13)	(16.16)
Flexible rating		73.40*	72.43*	69.89*	69.39*	69.40*
		(42.83)	(41.91)	(40.23)	(40.37)	(40.70)
Elevation			-0.00403	-0.00388	-0.00361	-0.00327
			(0.00293)	(0.00290)	(0.00289)	(0.00312)
Income				-0.508**	-0.591**	-0.558*
				(0.239)	(0.243)	(0.284)
No. of accidents					0.470	0.455
					(0.406)	(0.396)
Proportion of black population						11.87
						(33.10)
_cons	136.7***	121.8***	126.9***	149.4***	151.5***	148.2***
	(6.860)	(19.02)	(19.17)	(19.49)	(19.46)	(23.81)
N	2681	2681	2681	2681	2681	2681
R^2	0.001	0.144	0.155	0.169	0.174	0.175

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.11: Monthly quote on an autombile insurance policy brought by a Rich Voter

	(1) Quote	(2) Quote	(3) Quote	(4) Quote	(5) Quote	(6) Quote
Appointed	2.545	8.758	9.126	9.459	8.781	8.977
	(14.29)	(16.47)	(16.37)	(16.16)	(16.31)	(16.38)
Prior approval		1.626	0.284	-0.778	-3.221	-3.445
		(16.32)	(16.75)	(16.61)	(16.86)	(17.14)
Flexible rating		67.99*	67.28*	65.27**	64.45*	64.45*
		(34.17)	(33.61)	(32.28)	(32.40)	(32.51)
Elevation			-0.00293	-0.00281	-0.00272	-0.00262
			(0.00279)	(0.00276)	(0.00276)	(0.00296)
Income				-0.403	-0.461*	-0.450
				(0.247)	(0.242)	(0.284)
No. of accidents					0.394	0.390
					(0.435)	(0.431)
Proportion of black population						3.535
						(33.49)
_cons	138.7***	127.4***	131.2***	149.0***	150.8***	149.9***
	(9.311)	(18.76)	(19.56)	(20.71)	(20.60)	(24.15)
N	2681	2681	2681	2681	2681	2681
R^2	0.000	0.129	0.135	0.144	0.148	0.148

Appointed is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system of auto insurance regulation, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a Flexible Rating system of auto insurance regulation, 0 otherwise; **Elevation** is the geographical altitude of the zip code; **Income** (in thousands) is the average income of the households in the zip code; **No. of accidents** is the number of motor vehicle accidents as reported in a county in which the zip code is located; **Proportion of black population** is the proportion of black population living in the zip code. Standard errors in parentheses; Standard errors clustered at state level

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

Table 1.12: Summary statistics: Auto Insurance Premiums per registered vehicle written by the industry in a state

Variable	Mean	Std. Dev.	Min.	Max.	N
Liability Premiums (LP) (in $ mn)	1,863	2,179	130	11,000	255
Collision Premiums (CP)(in $ mn)	817	1,001	61	6,200	255
Comprehensive Premiums (CmP) (in $ mn)	394	397	42	2200	255
LP per vehicle	377	136	176	1149	255
CP per vehicle	164	53	78	479	255
CmP per vehicle	88	30	48	271	255
Appointed	0.78	0.41	0	1	255
Accident rate	0.16	0.07	0.06	0.43	255
Theft rate	0.3	0.3	0.01	0.3	255
Prior_approval	0.31	0.46	0	1	255
Flex_rating	0.078	0.269	0	1	255
GDP per capita ('000)	49.2	19.4	29.9	182.7	255
State GDP (in $ bn)	285	346	24	2,000	255
State Population ('000)	5,978	6,665	534	37,000	255

Liability Premiums is the premiums (in $ mn) sold by the industry on the liability coverage component of auto insurance policies written in a state; **Collision Premiums** is the premiums (in $ mn) sold by the industry on the collision coverage component of auto insurance policies written in a state in a year; **Comprehensive Coverage** is the premiums (in $ mn) sold by the industry on the comprehensive coverage component of auto insurance policies written in a state; **LP per vehicle** is the liability premiums written by the insurance industry per registered vehicle in a state; **CP per vehicle** is the collision premiums written by the insurance industry per registered vehicle in a state; **CmP per vehicle** the collision premiums written by the insurance industry per registered vehicle in a state; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Accident rate** is the number of motor vehicle accidents per 1000 registered vehicles; **Theft rate** is the number of motor vehicle thefts per 1000 registered vehicles; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise.

Table 1.13: Difference of Means (t-test): States with Elected vs Appointed regulators

Variable	**Mean**	**Difference**	**Std. Errors**(Diff.)	**N**
Liability Premiums per car	373	-9.3	39.51	51
Collision premiums per car	156	-2.27	13.30	51
Comprehensive premiums per car	85	8.6	7.17	51
Accident rate	0.14	0.04***	0.017	51
Theftrate	0.003	0.0004	0.0005	51
GDP per capita	51,780	-3,411	7,271	51
State GDP	302,202	78,412	1,25,455	51
State Population	6,072,498	1,503,650	2,328,774	51

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

Table 1.14: State Level results: Determinants of Liability premiums written by the industry per registered vehicle

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) RE	(7) RE	(8) OLS
Appointed	28.70	70.70*	126.3*	109.8*	108.2*	110.0*	92.47*	77.35
	(33.40)	(41.90)	(66.03)	(58.62)	(56.28)	(56.52)	(49.77)	(47.36)
Prior approval		101.5**	79.14	78.96	81.84	61.56	70.51	75.9*
		(44.17)	(61.03)	(55.00)	(53.17)	(50.87)	(44.46)	(41.98)
Flexible rating		18.13	-34.35	-15.97	-14.98	-3.609	13.47	29.21
		(27.39)	(56.56)	(46.92)	(41.55)	(43.66)	(30.75)	(25.44)
Accident rate			1716.8***	1367**	1395.4**	1419.7**	893.9	276.7
			(622.0)	(568.7)	(574.4)	(574.3)	(564.2)	(333)
Theft rate				16,077**	15,047*	14705.4*	12,427**	23,892**
				(7,535)	(7,709)	(7,505)	(5,862)	(8,822)
GDP per capita (in $ '000)					1.1	.98	1.52**	-1.5
					(0.8)	(0.8)	(0.7)	(1.4)
State GDP (in $ bn)						0.13	0.23	0.58
						(0.19)	(0.26)	(0.40)
State Population (in '000)						-0.001	-0.006	-0.027
						(0.01)	(0.01)	(0.02)
_Cons	362.1***	295.9***	-4.200	8.474	-24.86	-49.74	-2.1	254.2***
	(27.04)	(46.53)	(115.9)	(109.1)	(114.3)	(123.5)	(132.2)	(90.40)
Year Dummies	Y	Y	Y	Y	Y	Y	N	Y
N	255	255	255	255	255	255	255	255
R^2	0.01	0.109	0.19	0.19	0.21	0.25	0.29	0.367

The dependent variable is the liability premiums written per registered vehicle; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Accident rate** is the number of motor vehicle accidents per 1000 registered vehicles; **Theft rate** is the number of motor vehicle thefts per 1000 registered vehicles; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise

Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Table 1.15: State Level results: Determinants of Collision premiums written by the industry per registered vehicle

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) RE	(7) RE	(8) OLS
Appointed	13.29	23.25**	46.52**	36.25**	35.73**	36.66**	32.22**	25.97**
	(12.62)	(10.92)	(22.91)	(17.03)	(15.77)	(14.79)	(13.09)	(10.76)
Prior_approval		24.71**	15.38	15.49	17.27	8.827	11.23	13.23
		(12.46)	(20.59)	(15.73)	(14.73)	(14.17)	(12.54)	(10.46)
Flexible rating		-12.79	-34.75	-23.44	-23.33	-18.44	-14.51	-7.99
		(11.66)	(30.18)	(23.18)	(20.29)	(20.61)	(16.44)	(11.98)
Accident rate			718.2***	496.0**	526.4**	535.2**	394.6*	153.7
			(268.1)	(235.6)	(238.9)	(237.7)	(221.2)	(125.4)
Theft rate				9,448***	8,463***	8,313***	7,794***	11,050***
				(3108)	(3209)	(3118)	(2547)	(2738)
GDP per capita (in $ '000)					0.7***	0.6**	0.6***	-0.39
					(0.000247)	(0.3)	(0.2)	(0.4)
Stategdp (in $ bn)						0.08*	0.09	0.2**
						(0.05)	(0.06)	(0.08)
State Population (in '000)						-0.002	-0.003	-0.009**
						(0.003)	(0.003)	(0.004)
_cons	158.3***	143.7***	11.01	24.12	-6.70	-12.05	8.14	95.26***
	(9.970)	(12.27)	(50.41)	(45.35)	(45.94)	(48.41)	(48.34)	(26.87)
Year Dummies	Y	Y	Y	Y	Y	Y	N	Y
N	255	255	255	255	255	255	255	255
R^2	0.019	0.07	0.07	0.36	0.40	0.46	0.49	0.55

The dependent variable is the collision premiums written per registered vehicle; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Accident rate** is the number of motor vehicle accidents per 1000 registered vehicles; **Theft rate** is the number of motor vehicle thefts per 1000 registered vehicles; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise

Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Table 1.16: State Level results: Determinants of Comprehensive premiums written by the industry per registered vehicle

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) RE	(7) RE	(8) OLS
Appointed	-1.8	-2.8	11.1	5.6	5.4	5.6	2.7	3.29
	(7.9)	(7.6)	(11.6)	(9.8)	(9.6)	(9.7)	(8.9)	(8.2)
Prior approval		-2.3	-7.8	-8.0	-7.4	-8.3	-6.7	-6.9
		(7.1)	(9.5)	(7.9)	(7.5)	(7.8)	(7.0)	(6.3)
Flexible rating		0.5	-12.5	-6.5	-6.4	-5.8	-3.2	-3.08
		(12.3)	(18.7)	(15.2)	(14.8)	(14.7)	(13.0)	(12.4)
Accident rate			428***	316**	325**	326**	238*	237***
			(160)	(138)	(140)	(142)	(136)	(71)
Theft rate				5,466***	5,141***	5,129***	4,499***	4,657***
				(1167)	(1231)	(1235)	(815)	(1327)
GDP per capita (in $ '000)					0.2*	0.2	0.3***	0.1
					(0.1)	(0.1)	(0.1)	(0.2)
Stategdp (in $ bn)						0.02*	0.04	0.08**
						(0.01)	(0.02)	(0.03)
State Population (in '000)						-0.001	-0.002	-0.01**
						(0.0007)	(0.001)	(0.002)
_cons	86.41***	87.84***	20.18	25.24	9.808	10.88	21.65	35.00**
	(6.954)	(7.700)	(26.12)	(23.70)	(27.75)	(29.96)	(29.98)	(16.08)
Year dummies	Y	Y	Y	Y	Y	Y	N	Y
N	255	255	255	255	255	255	255	255
R^2	0.004	0.006	0.194	0.51	0.53	0.55	0.55	0.560

The dependent variable is the comprehensive premiums written per registered vehicle; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Accident rate** is the number of motor vehicle accidents per 1000 registered vehicles; **Theft rate** is the number of motor vehicle thefts per 1000 registered vehicles; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise

Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Chapter 2

The Firms' response to Rate Regulation

2.1 Introduction

In the previous chapter, I showed that selection mechanism of the state insurance regulator has a significant impact on the premiums on auto insurance policies paid by consumers. The elected regulator, because of re-selection incentives, prefers lower premiums on auto insurance premiums as compared to appointed regulators. This effect is more visible for individuals living in areas which have a higher concentration of state's population. The state level data too suggests that in states with elected regulators, auto insurance premiums per registered vehicle written by the insurance industry are lower as compared to states which have an appointed insurance regulator. This is true for premiums written on liability and collision coverage component of auto insurance policy which accounts for over 90 percent of total premiums written by auto insurance firms.

In this chapter, I discuss how the industry responds to rate regulation by the

Office of Insurance Commissioner. The theory of elected vs appointed regulator suggests that appointed regulators are pro-industry (Besley and Coate (2003). However, this claim does not hold in the context of state insurance markets and state insurance commissioners. This is because in states with appointed commissioners, higher premiums per vehicle does not translate into higher profits for the industry (Grace 2008). Hence, it is evident that in the insurance markets, appointed regulators are not necessarily pro-industry. But it is interesting to understand how the extra revenue is distributed amongst the various stakeholders, i.e., the government, producers and consumers.

The key to the puzzle lies in understanding the structure of the state insurance markets and the regulatory environment. The state insurance markets in the US has a large number of participants in the Property & Casuality and Life Insurance segment. National Association of Insurance Commissioners (NAIC) reports that in 2013, Alaska had 733 domestic and licensed and foreign insurers while Wisconsin had about 2102 domestic and foreign insurers. Hence state insurance markets are characterized by the presence of a large number of competing firms. I provide evidence that in a market with a large number of firms where prices are regulated, firms compete with each other on the quality of the product to attract consumers. Payments made by the insurance firms on auto damage claims filed by the policyholders are substantially lower in states with elected commissioners. Since auto damage claims are not a salient issue for voters, this aspect of the insurance policy is left unregulated by the regulators. As a matter of fact, no state has enacted a law to establish how insurance companies should process claims and payments. Hence, lower premiums on auto insurance policies in states with elected insurance commissioners is accompanied by lower quality of the product.

In this chapter, I argue that appointed regulators are not necessarily pro-

consumer and appointed regulators are not necessarily pro-industry. I present evidence that elected regulator offers policies which are salient for most consumers but these policies are not necessarily pro-consumer. For example, elected regulators offer lower prices (which is salient for most consumers) but lower quality. Appointed regulators on the other hand allow the insurance firms to charge higher premiums on auto insurance policies but competition between various insurance firms ensure that companies use the extra revenues to reach out to consumers by improving the quality of the product. The insurance firms could be using the extra revenue on other things like marketing. However, a lack of data on various other aspects makes it difficult to make such comparisons.

As discussed earlier, an auto insurance policy has three components: liability coverage, collision coverage and comprehensive coverage. In the previous chapter, I had shown that states with premiums written per registered vehicle on liability and collision coverage components of an auto insurance policy is higher in states with appointed insurance commissioners as opposed to states with elected insurance commissioners. However, there seems to be no impact of differences in the selection mechanism of the regulators on the premiums written by the industry on comprehensive coverage. Liability and collision coverage account for 90 percent of total premiums written by the insurance industry. Since comprehensive coverage is not salient for most consumers (reflected by only 10 percent market share), elected regulators, too, do not prefer lower premiums charged on it by auto insurance firms.

The dollars paid out on auto damage claims filed by policy holders by the insurance industry reflect similar trends. Dollars paid out on auto damage claims paid out by the auto insurance firms is substantially higher in states with appointed insurance commissioners on liability and collision coverage claims. Since there is no

impact of the selection mechanism of the regulator on premiums written on comprehensive coverage, there is also no impact of the same on dollar value of the auto damage claims paid out by the insurance industry.

2.2 Data

The data on the number of claims filed by policy holders on the liability, collision and comprehensive coverage of auto insurance policy is available from Automobile Insurance Database Report (AIDR) by National Association of Insurance Commissioners (NAIC). This report also provides information on status of rate regulation in a state. This data is available for 50 states for a period of five years from 2007 to 2011. The data on dollars paid out by the insurance industry on auto damage claims is also available from AIDR. Information on whether the state has an elected or appointed Insurance Commissioner is available from National Association of Insurance Commissioners (NAIC). Historical data on Gross Domestic Product (state-wise) for all states and regions in the United States is available at Bureau of Economic Analysis (BEA).

Table 2.1 provides summary statistics for variables used in the analysis of auto damage claims paid by the insurance industry.

2.3 Econometric Specification

To estimate the determinants of claims paid out on the auto insurance policies, I estimate the following equation using the random effects model. I also show the results using the OLS specification. The results are clustered at the state level and

Table 2.1: Summary statistics: Payments by the industry on Automobile Damage Claims (state aggregates)

Variable	Mean	Std. Dev.	Min.	Max.	N
Payments (liability)	1,261	1,483	5.4	7,722	250
Payments (collision)	505	579	41	3,750	250
Payments (comprehensive)	228	200	19	1,086	250
No. of claims (liability)	219	241	16	1,350	250
No. of claims (collision)	150	174	12	1,147	250
No. of claims (comprehensive)	227	199	23	907	250
Appointed	0.78	0.42	0	1	250
Prior_approval	0.32	0.47	0	1	250
Flex_rating	0.08	0.27	0	1	250

The payments are in $ mn; the No. of claims are in $ thousand; **Payments (liability)** is the aggregate payments by the insurance industry on claims related to liability coverage;**Payments (Collision)** is the aggregate payments by the insurance industry on claims related to collision coverage; **Payments (Comprehensive)** is the aggregate payments by the insurance industry on claims related to comprehensive coverage; **No. of claims (Liability)** is the number of claims made on liability coverage in a state in a year; **No. of claims (Collision)** is the number of claims made on collision coverage in a state in a year; **No. of claims (Comprehensive)** is the number of claims made on liability coverage in a state in a year; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise

uses data from the year 2007 to 2011.

$$Payments = \alpha_0 + \alpha_1(Premiums)_{st} + \alpha_2(No.\,of\,Claims)_{st} + \alpha_3(Appointed) * (No.\,of\,Claims)_{st} + \alpha_4 Prior\,Approval * (No.\,of\,Claims)_{st} + \alpha_5 Flexible\,Rating * (No.\,of\,Claims)_{st} + \alpha_6(GDP)_{st} + \alpha_7(Population)_{st} + y_i + e_{st} \tag{2.1}$$

where $Payments$ is the total amount of dollars paid out by the insurance industry on auto insurance policies; $Premiums$ have three components: Premiums on Liability Coverage, collision coverage and comprehensive coverage respectively. $Liability\,Coverage\,Premiums$ is the premiums (in \$) sold by the industry on the liability coverage component of auto insurance policies written in a state; $Collision\,Covrage\,Premiums$ is the premiums (in \$) sold by the industry on the collision coverage component of auto insurance policies written in a state in a year; $Comprehensive\,Coverage\,Premium$ is the premiums (in \$) sold by the industry on the comprehensive coverage component of auto insurance policies written in a state; $No.\,of\,claims$ is the number of claims filed by consumers on auto insurance policies in a state in a year; *Appointed* is the dummy variable which takes the value of 1 if the insurance commissioner is appointed in the state in which zip-code i is located, 0 otherwise; ;*Prior Approval* is the dummy variable which takes the value of 1 if the state has a prior approval rate regulation system, 0 otherwise; $Flexible\,Rating$ is the dummy variable which takes the value of 1 if the state has a flexible rating rate regulation system, 0 otherwise; y represent year dummies; e is the error term. s and t are state and year subscripts.

2.4 Results and Conclusion

Standard economic theory apprises us that in competitive markets, firms operate on zero profits. However, using state-level data, Grace et al. (2008) found no evidence of impact of selection mechanism of an insurance commissioner on unit price which is an indicator of profits of the industry. I have provided evidence to explain this result. In states with appointed commissioners, firms wither away the extra revenues on account of higher premiums by making higher payments per claim. Since firms charge a higher premium per vehicle on liability and collision coverage in states with appointed commissioners, firms make higher payments on claims on liability and collison coverage respectively in such states. As shown in Table 2.2, insurance industry pays out $ 370 more per claim on liability coverage in states with appointed commissioners. Similarly, in table 2.3, industry paid out $ 344 more per claim on collision coverage in states with appointed commissioners.

Since premium per vehicle on comprehensive does not seem to be related to the selection mechanism of the commissioner, payments on claims too, are not associated to the selection mechanism of the commissioner. These results are robust to both random effects model and ordinary least squares estimation procedure (table 2.4).

Firms tend to make higher payments per claim in states with a higher degree of rate regulation. This result is in consonance with higher premiums associated with greater regulation. Hence, competition compels firms to offer a better product when they are able to charge higher premiums.

Hence, I provide evidence that firms respond to regulatory interventions by altering the quality of the product. Firms can alter the quality through payments because there are no laws in any state which gives the commissioner the power to

regulate payments made by firms on claims filed by policyholders. Firms could also be spending extra revenues in other ways (e.g. marketing) to aggressively attract customers. However, data to test such claims are not available. Hence, I provide evidence that in a market with multiple competing firms, elected regulators offer pro-consumer policies to a select group of consumers. However, lower premiums result in a low-quality product. On the other hand, firms are able to charge higher premiums on auto insurance policies. But competition forces firms to use the extra revenue to offer a better quality product (e.g. lower payments per claim).

Interventions by the regulator may also have welfare effects for individuals. High-risk drivers would be worse off living in states with an elected commissioner whereas, low-risk drivers would be worse off living in states with an appointed commissioner. To conclude, elected regulators do choose policies which are salient for consumers. However, having an elected regulator does not lead to pro-consumer market outcomes. Similarly, having an appointed regulator does not lead to pro-industry outcomes.

Table 2.2: State Level results: Payments on Liability coverage claims

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) OLS
Liability Premiums	0.60***	0.60***	0.54***	0.80***	0.80***	0.80***
	(0.12)	(0.12)	(0.14)	(0.11)	(0.11)	(0.11)
No. of Claims (N)	827	470	-53	127	111	127
	(945)	(970)	(987)	(434)	(418)	(434)
Appointed*N		**787****	**1179*****	**370***	**370***	**370***
		(347)	(339)	(205)	(203)	(205)
Prior approval*N			950***	282	283	281
			(364)	(242)	(241)	(242)
Flexible rating*N			331**	-275	-274	-275
			(150)	(196)	(195)	(196)
State GDP				-2320***	-2331***	-2320***
				(498)	(494)	(498)
State Population				60	61	60
				(38)	(37)	(37)
_cons (in $ '00,000)	116	-321	228	94	266	266
	(635)	(548)	(293)	(267)	(207)	(207)
_Year dummies	Y	Y	Y	Y	N	Y
N	250	250	250	250	250	250
R^2	0.932	0.939	0.943	0.951	0.953	0.953

The dependent variable is the aggregate payments by the insurance industry on claims related to liability coverage in a state in a year; **Liability Premiums** is the premiums sold by the industry on the liability coverage component of auto insurance policies written in a state; **No. of claims** is the number of claims made on liability coverage in a state in a year; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise
Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Table 2.3: State Level results: Payments on Collision coverage claims

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) OLS
Collision premiums	0.21***	0.29***	0.21***	0.19***	0.21***	0.35***
	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.06)
No. of Claims(N)	2208***	1700***	1804***	1826***	1869***	865**
	(252)	(318)	(240)	(284)	(306)	(356)
Appointed*N		**185****	**332*****	**325*****	**344*****	**305*****
		(91)	(96)	(42)	(47)	(52)
Prior approval* N			359***	322***	334***	156*
			(97)	(67)	(69)	(93)
Flexible rating*N			209***	269***	266***	154**
			(72)	(80)	(82)	(76)
State GDP				224**	204*	94
				(114)	(118)	(101)
State Population				-8.7	-11.6	4.86
				(8.9)	(9.3)	(7.4)
cons	231***	155**	232***	249***	163**	89
	(73)	(62)	(63)	(78)	(66)	(60)
Year dummies ('$ 00,000)	Y	Y	Y	Y	N	Y
N	250	250	250	250	250	250
R^2	0.9935	0.9951	0.9962	0.9962	0.9962	0.9969

The dependent variable is the aggregate payments made by the insurance industry on claims on auto insurance in a state in a year; **Collision Premiums** is the premiums sold by the industry on the collision coverage component of auto insurance policies written in a state in a year; **No. of claims** is the number of claims made on collision coverage in a state in a year; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise

Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Table 2.4: State Level results: Payments on Comprehensive coverage claims

	(1) RE	(2) RE	(3) RE	(4) RE	(5) RE	(6) OLS
Comprehensive premiums	0.44***	0.43***	0.46***	0.48***	0.40***	0.58***
	(0.05)	(0.07)	(0.07)	(0.14)	(0.15)	(0.11)
No. of Claims (N)	252**	280*	307**	307**	419**	164*
	(102)	(161)	(139)	(157)	(168)	(133)
Appointed*N		**-19.5**	**-48.9**	**-46.1**	**-80.8**	**-10.7**
		(80)	(84)	(79)	(83)	(69)
Prior approval*N			-80.3	-82.4	-88.9	-88.9
			(88.5)	(77.6)	(77.6)	(65.5)
Flexible rating *N			57.1	69.4	80.7	65.4
			(55)	(56)	(65)	(43)
State GDP				110	136	86
				(152)	(144)	(140)
State Population				-6.7	-6.1	-7.27
				(9.8)	(9.6)	(8.83)
_cons ($ '00000)	-107	-102	-153***	-151**	61	68
	(73)	(82)	(53)	(71)	(77)	(67)
Year dummies ('$ 00,000)	Y	Y	Y	Y	N	Y
N	250	250	250	250	250	250
R^2		0.88	0.89	0.90	0.89	0.895

The dependent variable is the aggregate payments by the insurance industry on claims related to comprehensive coverage in a state in a year; **Comprehensive Coverage** is the premiums sold by the industry on the comprehensive coverage component of auto insurance policies written in a state; **No. of claims** is the number of claims on comprehensive coverage in a state in a year; **Appointed** is a dummy variable which takes the value of 1 if the Insurance Commissioner is appointed, 0 otherwise; **Prior approval** is a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise; **Flexible rating** s a dummy variable which takes the value of 1 if a state has a prior approval system, 0 otherwise Standard errors in parentheses; Standard errors clustered at state level

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

For specifications with Random Effects, R^2 is the Overall R^2

Chapter 3

Impact of Market Concentration on Effective Insurance Premium Tax Rate

3.1 Introduction

How is the tax policy determined? Industry often lobbies with the regulators to lower statutory tax rates and procure tax breaks. Media outlets often report that interest groups belonging to different sectors of the industry exert tremendous influence on the tax policy. For example, Huffington Post reported that Nissan got US$ 1.3 billion in tax benefits from the state government of Mississippi [1]. The Daily Beast covered a story on race track owners associated with National Association for Stock Car Auto Racing (NASCAR) getting tax breaks worth about US$ 40 million

[1] "Mississippi Cuts $1.3 Billion From Schools, Gives $1.3 Billion to Nissan", 23rd May 2014, The Huffington Post.

a year[2]. Fox News reported that Senate Finance Committee chairman, Democratic Sen. Ron Wyden was influential in getting tax breaks of upto US$ 2,500 on the purchase of an electric motorcycle while pointing out that the two electric motorcycle manufacturers came from his state of Oregon[3].

These media reports are in consonance with the economic literature on regulation. Stigler (1971) and Peltzman (1976) have shown that regulation is a product of the bargaining process between the interest groups and regulators. In fact, the literature suggests that political agents maximize their own utility rather than striving to provide efficient or optimal solutions for the society. For example, regulators that are appointed (by the Governor) are pro-industry while those elected (by ballot) are pro-consumer (e.g. Crain and McCormick 1984; Besley & Coate 2003). Warren (2012) shows that policy outcomes are a result of the interaction between the executive, legislature and intrinsically motivated bureaucrats. However, the normative or public interest theories of taxation based on Mirrlee (1971) and Ramsey (1927) assume that tax policy is exogenous to these competing interests and strategic behavior of regulators. Posner (1974) criticized the public interest theories and argued that "...a serious problem with any version of the public interest theory is that the theory contains no linkage or mechanism by which a perception of the public interest is translated into legislative action".

In this paper, I propose a positive theory of taxation. I examine the ability of the interest groups in the insurance industry to affect effective insurance premium tax rate. To explore the relationship between interest groups and effective tax rate, I focus on the market concentration in the state insurance markets as a measure

[2]"8 Ridiculous Tax Loopholes: How Companies Are Avoiding the Tax Man", 25th Feb 2012, The Daily Beast

[3]http://www.foxnews.com/politics/2014/12/11/44b-giveaway-congress-prepares-to-extend-tax-breaks-for-horse-owners-green/

of the ability of the industry to organize itself into an interest group to lobby for lower taxes. This is in line with the arguments made by Stigler (1971) and Pittman (1977, 1987) who argued that it is easier for the larger firms to organize themselves as an interest group because they are able to solve the free rider problem. If we assume that the costs of lobbying are shared equally by firms, small firms may not even recover the costs associated with lobbying and hence decide to stay away from the process. Section 3 contains discussions on theoretical arguments to support the empirical evidence provided in the paper.

I find that there is a negative relationship between market concentration and effective premium tax rate in state insurance markets in the US (table 3.3). I use the 'coast to area ratio' of a state as a possible source of exogenous variation in market concentration to address concerns arising out of reverse causality. The instrument, the 'coast to area' ratio directly affects the market concentration because being exposed to catastrophic events pose unique problems for the insurers. Small insurers may not have sufficient resources to cover the losses when exposed to risks created by low probability and high-risk events like hurricanes. The problem becomes even more acute in the absence of reinsurance. Viscusi & Born (2006) show that an unexpected catastrophe leads to the exit of insurance firms from state and firms with low levels of homeowners premiums are most adversely affected.

The instrument also satisfies the exclusion criterion. A major concern seems to be that states exposed to catastrophic events will have higher premiums and a higher number of insureds. However, it is not clear how this would affect the effective tax rate. Another concern appears be that states where the insurance industry faces higher risks associated from catastrophic events, the industry would get greater tax benefits. However, this is unlikely to be true for the following reasons. After hurricane Katrina, the effective tax rate in the 4 states most affected by it was higher (1.6

%) than in other states (1.3 %). Lower tax rates in general would translate into lower prices and not assist smaller insurance firms in overcoming the risks associated with 'lumpy' events like natural disasters. Besides, politicians often care about the premiums faced by the consumers and in most states they have the regulatory powers to control the premiums charged by insurance firms. So, they do not have the incentive to provide tax breaks to insurance firms for this reason.

After employing a number of controls like regulatory features, campaign contributions and size of the economy, and using the two stage least square estimation method, I find that a 1 percent increase in market concentration causes the effective tax rate to go down by 0.6 percentage points which translates into about $ 590,000 less in tax revenues collected from the insurance industry. Employing a similar econometric strategy, I examine the causal relationship between market concentration and insurance premium tax revenues. I find that a 1 percent increase in market concentration causes the insurance premium tax revenues go down by 0.8 percentage points.

This paper, therefore, contributes to the literature on the positive theory of taxation. The paper demonstrates that when market concentration is higher, it is easier for the industry to organize as an interest group and influence the regulatory process. This results in lower effective insurance premium tax rate in states with high market concentration as demonstrated by the empirical results.

There is substantial economic literature on regulatory capture examining the influence of interest groups on regulation. Various regulatory issues have been successfully analyzed using the interest-group framework. These include environmental regulation (Maloney and McCormick 1988), the British factory acts (Anderson and Tollison, 1984), the banning of the importation of slaves into the United States (Anderson et al., 1988), immigration restrictions (Shugart et al., 1986), apostolic decrees

by the Roman Catholic Church (Ault et al., 1987), Luddism (Anderson and Tollison, 1984, 1986), population growth (Tollison 1988), farmer opposition to futures markets (Pashigian, 1988), amongst others.

A positive theory of taxation based on the interest groups framework was developed by Tollison. Tollison (1989) argued that higher barriers to entry in politics make it more difficult for the interests of low-income taxpayers to get representation in the political process. In such situations, government tends to rely more heavily on consumption taxes as sources of revenue. Tollison (1990) showed that the group receiving the benefits of the dedicated revenues has a strong incentive to lobby for higher effective tax rates.

Another positive theory on taxation emerged from the literature on tax competition which argued that governments compete with each other by lowering tax rates in an attempt to attract capital and other resources to their jurisdictions (Oates 1972). Devereux et al. (2002) argued that statutory tax rates have declined due to tax competition. It has also been argued that tax competition has lead to a shift in tax burden from mobile to immobile tax bases (Winner 2005). Oates (1972) expressed concern that the result of tax competition may well be a tendency toward less than the efficient level of the output of local services.

Other studies have shown the effect of political parties and term limits of governors on tax policy. Warren (2013) found that re-electable Democratic governors increase income taxes relative to similarly situated Republicans, yielding divergence between party policy positions. However, governors facing a binding term limit exhibit the reverse policy difference, resulting in a movement of policy back together. Besley and Case (1995) found that Democratic term-limited governors set significantly higher per capita total state taxes and state expenditures than other governors. This literature again reinforces that regulators are seldom driven by considerations of optimal

or efficient solutions and inspires further research on a positive theory of taxation.

In this paper, Section 2 provides a brief description of the regulatory environment in state insurance markets and insurance premium sales tax. Section 3 provides space for theoretical arguments. Section 4 contains data sources and description. Section 5 has a discussion on the instrument and the estimation strategy. Section 6 provides a discussion of the results.

3.2 Insurance Premium Sales Tax and Background Information

McCarran-Ferguson Act of 1945 gave states the sole power over regulation and taxation of insurance which makes the insurance industry exempt from federal anti-trust regulations. An insurance firm requires regulatory approval from each state it wants to operate in. This approval, in the form of a license, is granted by the insurance regulator often known as the Insurance Commissioner. It is also quite common for different insurance firms belonging to a parent organization to operate in multiple segments of the industry. Hence different segments of the insurance industry are linked to each other because they are part of a strategic decision making by the parent organization.

Grace (2008) points out that as states are not subject to the commerce clause, they discriminate against out-of-state companies through taxation. To counter this discriminatory taxation, states adopted a so-called retaliatory tax. That is, if state A would tax state Bs companies at a higher rate than its own companies, state B would tax State As companies at the higher of the two states' tax rates. Retaliatory taxes are imposed to tax away any advantage an out-of-state company may have because

of lower taxes imposed in the state in which the company is domiciled.

To add to the quagmire of tax rates, discriminatory tax rates and retaliatory tax rates, insurance companies also get tax exemptions and credits in different forms in different states. For instance, Georgia taxes 2 percent of gross direct premiums. This rate is reduced to 1 percent for companies having at least 25 percent of total assets, as defined, located in Georgia. The rate is reduced to half a percent for companies with at least 75 percent of their assets in Georgia. In Ohio, the tax does not apply to annuities, deposit type life insurance contract funds, Medicaid payments received before Oct. 1, 2009, Medicare payments, small employer health care alliance premiums, or federal crop insurance premiums. Kansas law K.S.A. 40-252d provides for a tax credit for insurance companies equal to 15 percent of Kansas-based employees salaries (not including commissions or fringe benefits), or up to a maximum of 1.125 percent of taxable premiums dependent on the company's affiliation. The company can claim either the 15 percent credit or up to the 1.125 percent, whichever is less. This could make the effective tax rate on such companies as low as 0.875 percent[4]. These examples are not exhaustive as most states have some kind of tax incentives for the insurance industry. Hence, actual tax rate that insurance firms face, on an average in a state, is quite different than the statutory tax rate.

Therefore, I use effective tax rate (which is a percent of the taxes collected on insurance premiums to total premiums written and annual considerations), as a variable of interest in this paper. States in the US levy a state premium tax on the gross premiums written (rather than on profits) by the insurance industry. The industry is generally exempt from corporate income taxes. $1.67 billion were collected in taxes on insurance premiums on $1.54 trillion worth of insurance premiums and annuity considerations in the United States for the year 2012. Hence, this translates

[4]http://www.kansascommerce.com/index.aspx?NID=447

into 1.1 percent in effective premium tax rate across the United States. Delaware had the lowest effective rate of 0.23% while Nevada had the highest effective tax rate of 2.37%. On an average, premium tax revenues constitute about 2 percent of the total tax revenues of the state. This proportion is the lowest for Alaska at 0.8% and highest for Tennessee at 5.3%.

3.3 Theory

Stigler (1971) and Pittman (1977, 1988) provide theoretical arguments on how market concentration in an industry could be related to the ability of the industry to influence regulation.

Stigler (1971) argued that small firms and consumers do not organize themselves as an interest group to lobby for a desired policy because the costs of organizing as an interest group are high compared to the benefits. Large firms, on the other hand, are able to successfully execute collective action. This is because with fewer firms (required to participate for collective action to happen), costs of organization goes down. Also large firms are able to solve the free rider problem more effectively.

Pittman (1988) too argued that highly concentrated industries are more likely to participate in lobbying to get a desired policy because they will be able to solve the free rider problem.

"However, if the industry in question is unconcentrated, then the firm may decide that the level of benefits accruing to the industry will be unaffected by its own level of contributions, so that the benefits may be enjoyed without incurrence of the costs. Such a calculation may be made by other firms in the industry, of course, with the result that a free-rider problem prevents firms individually from making political contributions, even if it is in their collective interest to do so."

Pittman (1977) also argues that a firm in a less concentrated industry is more likely to decide that its participation in the collective action would cause little change in the occurance of collective action, and the likelihood of the industry receiving special consideration. On the other hand, large firms in a heavily concentrated industry are aware that their participation in the collective action is critical for the collective action to take place. This will make the collective action in a market with high degree of concentration more likely.

3.4 Data and Descriptive Statistics

Effective Tax Rate (τ) is computed by the taking the ratio of revenues collected through insurance premium tax levied in a state to the total premium written by the industry in the state in a specific year. Mathematically,

$$\tau = (\frac{T_{st}}{P_{st}}) * 100 \tag{3.1}$$

where,

$P_{st} = P_{lst} + P_{hst} + P_{p\&cst}$; P_{lst}, P_{hst} and $P_{p\&cst}$ are the premiums written by the life, health, and property & casualty segments of the insurance industry respectively. T_{st} is the insurance premium sales tax revenues as reported by United States Census Bureau (USCB). Data on premium tax revenues is not available by different segments of the industry. Hence, it is not possible to estimate the effect of market concentration on the effective tax rate for each segment.

Market concentration in the insurance industry is the weighted average of Herfindahl index (HHI) of life, health, and p&c segments, the weights being the

proportion of the insurance premiums written by each segment. Mathematically,

$$C_{st} = [(\frac{P_{lst}}{P_{st}}) \cdot C_{lst} + (\frac{P_{hst}}{P_{st}}) \cdot C_{hst} + (\frac{P_{p\&cst}}{P_{st}}) \cdot C_{p\&cst}] * 100 \tag{3.2}$$

where C_{st} is the degree of concentration in the insurance industry; C_{lst}, C_{hst} and $C_{p\&cst}$ are the degree of concentration in the life, health and property & casualty segment of the insurance industry as indicated by HHI [5]; s and t are state and year subscripts.

Data used for constructing the degree of concentration index in different segments of the insurance industry is available from SNL Financial database. This data is available for all 50 states and Washington D.C. I use data over the period 2001-2012. Prior to 2001, SNL Financial database does not have data on health segment of the insurance industry. In comparison to life and property & casualty segment of the industry, health insurance segment is highly concentrated. Hence, I control for the proportion of health insurance segment to ensure that results are not driven by health insurance segment. The data on Coast to Area ratio which is used as an instrument is available from Office of Ocean and Coastal Resource Management of the National Oceanic and Atmospheric Administration (NOAA). These numbers also include the Great Lakes coastlines. The insurance regulator is selected either through appointment (by the Governor) or election (by ballot). The states where the insurance regulator is an elected position is Washington, California, Montana, North Dakota, Louisiana, Mississippi, Oklahoma, Kansas, Georgia, North Carolina and Delaware. This information is available from National Association of Insurance Commissioners (NAIC). In many states, insurance premium tax is collected by the Office of Insurance Commissioner. Other states have delegated this responsibility to

[5]Market share of the insurance groups in different segments of industry have been taken into account while computing C_{lst}, C_{hst} and $C_{p\&cst}$.

departments that generally collect taxes (e.g. the Department of Taxation). This information is available on the websites of the Office of Insurance Commissioner and other sources on the internet. There are only 14 states where the insurance regulator is not responsible for the collection of premium taxes. These are Florida, Iowa, Kentucky, Massachusetts, Maine, Mississippi, Minnesota, Michigan, Oregon, North Carolina, Vermont, Connecticut, Texas and Rhode Island. I use a dummy variable to control for who collects taxes in a state. Historical data on Gross Domestic Product (state-wise) for all states in the United States is available at Bureau of Economic Analysis. Data on campaign contributions by the insurance industry to fund state-level elections is available from National Institute for Money in State Politics. Table 2 provides summary statistics. None of the data are adjusted for inflation.

Table 3.1: Summary statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Tax rate	1.3	0.6	0.17	2.9
InsTax	288,263	355,290	13,313	2,416,073
Premiums	24,810	26,622	1,132	160,000
Appointed				
Regulator	0.784	0.412	0	1
Tax agency	0.7	0.458	0	1
Concentration	12.78	6.06	3.68	71.56
HHI (Life)	0.06	0.05	0.02	0.75
HHI (P&C)	.05	0.009	0.03	0.11
HHI (Health)	0.38	0.20	0.08	0.99
Campaign Contributions	700,500	1,883,479	50	21,013,742

Taxrate is the effective tax rate as defined previously; **InsTax** is the insurance premium sales tax revenues collected in state s and year t; **Premiums** is the total premiums written (in thousands) by the industry in state s and year t; **Regulator**=1, means Insurance Commissioner is appointed, =0 means Insurance Commissioner is elected; **Tax Agency**=1, means that the insurance premium sales tax revenue is collected by the Office of Insurance Commissioner, 0 otherwise; **Concentration** captures the degree of concentration in the insurance industry as defined above; **Campaign Contributions** is the campaign contributions made by the insurance industry in state s and year t in state elections;

3.5 Estimation Framework

3.5.1 Instrument Variable

To estimate the impact of market concentration on the effective tax rate, I use the coast to area ratio of a state as a source of exogenous variation in the market concentration. This instrument is valid subject to two conditions.

First, being exposed to the water bodies affect the market concentration in the insurance industry. The first stage results (table 4) corroborate this claim. There is a positive association between coast to area ratio and market concentration even after employing a variety of controls. The results are robust under different specifications and clustering at the state level. States having higher exposure to water bodies face greater risks from natural catastrophes and hence significant liabilities for the insurance firms operating in that state. In 2010 over 39% of the population of the US lived on the coast as per the US Census Bureau. The average population density of coastal shoreline counties is 446 persons per square miles as compared to national average of 105 persons per square miles. Clearly, any natural disaster along the coast will have a potential to inflict greater damage on life and property. Estimated overall losses caused by natural disasters in the United States for the years 2005-2014 stood at $621.5 billion. Tropical cyclones and flooding alone accounted for 56 percent of total losses. During this period, tropical cyclones and flooding also accounted for 52% of total insured losses faced by the industry. Besides, cyclones and flooding accounted for the highest number of fatalities (refer to table 2 for details). Viscusi & Born (2006) show that unexpected catastrophe leads to the exit of insurance firms from state and firms with low levels of homeowners premiums are most adversely affected. They argue that in the absence of adequate reinsurance, the firm may go bankrupt or may choose to exit a state in which there is a substantial exposure to such

catastrophic risks. They provide examples. In response to losses incurred following Hurricane Katrina, which accounted for over $38 billion in insured losses, a major insurer, Allstate, exited several coastal states while another, State Farm, chose not to renew some policies in these areas[6]. The fourth-largest insurer in Florida, Poe Financial, went bankrupt[7]. Hurricane Andrew too caused 9 insolvencies.

The State of Florida's 2nd Annual Report on Property Insurance Market for Florida Legislature (January 2013) expresses similar concerns. The coast to area ratio for Florida is one of the highest among all states. According to this report, a high number of insurance companies are exiting the Florida market and there is a lack of companies entering to replace them; growing number of insurance companies are no longer writing new policies in Florida; there is a lack of insurance company formation in Florida and a slowdown in the growth of capital to support premiums written by primary insurers in Florida is slow.

Grace & Klein (2002) highlight that insurers have sought to raise prices and decrease exposure to losses. However, the state legislature and insurance regulators have resisted insurers' responses to increased risks in an attempt to preserve the availability and affordability of insurance. Further, they find that in New York and Florida, demand for catastrophe insurance is more price elastic than for non-catastrophic coverage, thereby putting pressure on the insurers. They also find that consumers prefer high-quality solvent insurers in Florida.

Second, the exclusion restriction implied by the instrumental variable regression is that, conditional on other independent variables in the regression, the coast to area ratio has no effect on effective tax rate, other than their effect through market concentration. Such concerns have already been discussed above. Therefore, I assume

[6]The Price of Sunshine, The Economist, June 8, 2006, p. 76 as reported by Viscusi & Born (2006)

[7]Viscusi & Born (2006)

that this instrument is fairly exogenous.

Table 3.2: NATURAL DISASTER LOSSES IN THE UNITED STATES, 2005-2014

Type	Frequency	Fatalities	Overall Losses	Incurred Losses
Tropical cyclone	38	1786	320	170
Severe thunderstorms	802	1606	180	120
Floods	183	292	30	5.5
Winter storms, cold wave, blizzards	122	760	25	15
Earthquake and Geophysical	31	5	1.5	0.4
Wildfire, Heat, Drought	291	542	65	25

This table is taken from the website of Insurance Information Institute. Overall Losses and Incurred Losses are estimated figures in billion dollars

3.5.2 Econometric Model

I primarily focus on the effective tax rate but also show the results of the causal effect of market concentration on premium tax revenues (in table 3.6). I include state and year time fixed effects and results are robust to clustering at the state level. The first stage regression equation is

$$\begin{aligned} \hat{ln(concentration)}_{st} &= \beta_0 + \beta_1 ln(coast2area)_{si} + \beta_2 regulator_{sti} \\ &+ \beta_3 ln(campaigncontributions)_{sti} + \beta_4 DemocratGovernor_{sti} + \beta_5 ln(totaltaxcapita)_{si} \\ &+ \beta_6 prophealth_{sti} + \beta_7 taxagency_{sti} + \beta_8 population_{sti} + \beta_{10} v_t + \beta_{11} f_s + e_{st} \end{aligned} \quad (3.3)$$

where `lnconcentration` is the log of market concentration. `coast2area` is the ratio of the length of the coast to the land area in the state. `regulator` is a dummy variable; it takes the value of 1 if the insurance regulator is appointed (by the Governor) and 0 if elected (by ballot). `campaign contributions` is the

funds provided by the insurance industry for state elections. `Democrat Governor` is a dummy variable; it takes the value if the Governor of the state is from Democratic party. `ln(totaltaxcapita)` is the total tax revenues collected per capita in a state. `prop-health` is the fraction $\frac{P_{hst}}{Pst}$. `tax agency` is a dummy variable; it takes the value of 1 if the premium taxes in the state are collected by the Office of insurance commissioner, 0 if taxes are collected by the state tax department. `v` and `f` are state and year dummies.

Hausman test for endogeneity shows that the market concentration is endogenous. The first-stage relationship between market concentration and coast to land area ratio in a state is positive: coast to land area ratio is significantly related to market concentration at over 99 percent confidence, and this relationship is robust to state and year fixed effects and clustering at the state level. Anderson-Rubin (AR) test and Wald Test for weak instruments underline the strength of the instrument. AR test is significant for every specification at around 5 percent level. Table 3.4 provides the first stage results.

The second stage estimates the impact of market concentration on tax rate is given by the following model.

$$\begin{aligned} ln(taxrate)_{st} = \beta_0 + ln(\hat{concentration})_{st} + \beta_2 regulator_{sti} + \beta_3 ln(campaigncontributions)_{sti} \\ + \beta_4 DemocratGovernor_{sti} + \beta_5 ln(totaltaxcapita)_{si} \\ + \beta_6 prophealth_{sti} + \\ + \beta_7 taxagency_{sti} + \beta_8 populationp_{sti} + \beta_9 v_t + \beta_{11} f_s + e_{st} \end{aligned} \quad (3.4)$$

The results are robust to clustering at the state level and includes time and state fixed effects. Table 3.5 provides the results.

As an additional check, I also use the econometric framework described above to analyze the impact of market concentration on premium tax revenues. The results are reported in Table 3.6.

3.6 Results

I estimate several different specifications to check the robustness of the results. I also add a variety of controls motivated by theoretical arguments made by other studies. I also add controls to account for the regulatory environment. I find that market concentration affects the effective tax rate. A 1 percent increase in market concentration is associated with 0.6 percent reduction in effective tax rate. I get similar results for insurance premium tax revenues. Table 6 provides evidence that a 1 percent increase in market concentration leads to 0.8 percent increase in premium tax revenues. These results clearly show that when it is easier for the industry to organize itself into an interest group, the industry manages to have a greater impact on regulation and get tax benefits. However, this is an average effect. It is likely that the insurance firms that lobby capture tax benefits only for themselves.

The selection mechanism of the insurance regulator seems to matter for market concentration but not for effective tax rate. States with an appointed insurance regulator has a lower degree of market concentration and lower effective tax rate. However, for effective tax rate, the coefficients are not statistically significant. Studies have shown that appointed regulators are more likely to provide benefits for the industry while elected regulators facing electoral pressures, bend towards consumers (e.g. Crain and McCormick 1984; Besley & Coate 2003). Insurance Commissioners

do not play a direct role in determining premium tax rates (which are determined by finance committees appointed by the state legislatures). However, if the elected regulator favors a few insurance firms in lieu for campaign contributions, it will lead to an increase in market concentration in states with elected commissioners. However, these arguments require further corroboration.

Generally an insurance group operates in different segments of the industry in a state by floating different firms. Hence, it is possible that decision making in one segment is influenced by the decision making in another segment. However, as compared to life and p&c segments of the insurance industry, health segment has a much higher degree of market concentration. Hence, I control for the premiums written by the health insurance firms as a fraction of the premiums written by the entire insurance industry. I also find a small but significant association of the size of the economy with the effective tax rate.

In some states, the premium tax is collected by the Office of Insurance Commissioner. Results suggest a strong positive association between such states and effective tax rate. Besides there is a negative association between such states and premium tax revenues collected. Further research is required to derive any meaningful conclusions from these findings.

This paper contributes to the literature on the positive theory of taxation. The paper shows that interest groups have a strong influence on the tax policy. While economists know about the association of market concentration with industry profitability and other economic variables. This paper shows that degree of concentration affects the regulatory outcomes. When few firms are large enough, then it becomes easier to organize the industry as an interest group and capture the regulatory process.

REFERENCES

Anderson, G.M. and Tollison, R.D. (1984). A rent-seeking explanation of the British factory acts, in David C. Colander (ed.) Neoclassical Political Economy. Cambridge, Mass.: Ballinger, pp. 187201.

Anderson, G.M. and Tollison, R.D. (1986.) Luddism as cartel enforcement. Journal of Institutional and Theoretical Economics, 142(December): 727738.

Anderson, G. M., Rowley, C. K., & Tollison, R. D. (1988). Rent seeking and the restriction of human exchange. J. Legal Stud., 17, 83.

Anderson, G. M., Shughart, W. F., & Tollison, R. D. (1989). Political entry barriers and tax incidence: The political economy of sales and excise taxes. Public Finance= Finances publiques, 44(1), 8-18.

Ault, R.W., Ekelund R.B. Jr., & Tollison, R.D. (1987). The pope and the price of meat. Kyklos 40(fasc. 3): 399413.

Becker, G. (1976). Toward a more general theory of regulation. Journal of Law and Economics, 245-248.

Besley, T., & Coate, S. (2003). Elected Versus Appointed Regulators: Theory and Evidence. Journal of the European Economic Association, 1(5), 1176-1206.

Besley, T., & Case, A. (1995). Does Electoral Accountability Affect Economic Policy Choices? Evidence from Gubernatorial Term Limits. The Quarterly Journal of Economics, 769-798.

Besley, T., & Case, A. (2003). Political institutions and policy choices: evidence from the United States. Journal of Economic Literature, 7-73.

Born, P., & Viscusi, W. K. (2006). The catastrophic effects of natural disasters on insurance markets. Journal of Risk and Uncertainty, 33(1-2), 55-72.

Crain and McCormick, Regulators as all Interest Group, in Buchanan and Tollison (eds.), The Theory of Public Choice-II (Ann Arbor: University of Michigan

Press, 1984).

Devereux, M. P., Lockwood, B., & Redoano, M. (2008). Do countries compete over corporate tax rates?. Journal of Public Economics, 92(5), 1210-1235.

Fredriksson, P. G., Wang, L., & Warren, P. L. (2013). Party politics, governors, and economic policy. Southern Economic Journal, 80(1), 106-126.

Grace, M. F., Klein, R. W., & Kleindorfer, P. R. (2004). Homeowners insurance with bundled catastrophe coverage. Journal of Risk and Insurance, 71(3), 351-379.

Grace, M. F., Sjoquist, D.L., & Wheeler, Laura (2008). Effect of Insurance Premium Taxes on Employment. Fiscal Research Center, Georgia State University, FRC Report No. 184, September 2008.

Kimenyi, M.S., Shughart, W.F. II, and Tollison, R.D. (1988). An interest-group theory of population growth. Journal of Population Economics, 1(October): 131139.

Kimenyi, M. S., Lee, D. R., & Tollison, R. D. (1990). Efficient lobbying and earmarked taxes. Public Finance Review, 18(1), 104-113.

Maloney, M.T. and McCormick, R.E. (1982). A positive theory of environmental quality regulation. Journal of Law and Economics, 25(April): 99124.

Oates, W. E. (1972). Fiscal federalism. Books.

Pashigian, P. (1988). Why have some farmers opposed futures markets? Journal of Political Economy, 96(April): 371382.

Pittman, R. (1977). "Market structure and campaign contributions," Public Choice, Springer, vol. 31(1), pages 37-52.

Pittman, R. (1988). "Rent-seeking and market structure: Comment," Public Choice, Springer, vol. 58(2), pages 173-185.

Posner, R. A. (1974). Theories of Economic Regulation. NBER Working

Paper, (w0041).

Ramsey, F. P. (1927). A Contribution to the Theory of Taxation. The Economic Journal, 47-61.

Shughart, W.F. II, Tollison, R.D., & Kimenyi, M.S. (1986). The political economy of immigration restrictions. Yale Journal on Regulation, 4(Fall): 7997.

Stigler, G. J. (1971). The theory of economic regulation. The Bell journal of economics and management science, 3-21.

Stigler, G. J. (1974). Free riders and collective action: An appendix to theories of economic regulation. The Bell Journal of Economics and Management Science, 359-365.

Warren, P. L. (2012). Independent auditors, bias, and political agency. Journal of Public Economics, 96(1), 78-88.

Winner, H. (2005). Has tax competition emerged in OECD countries? Evidence from panel data. International Tax and Public Finance, 12(5), 667-687.

The State of Floridas Property Insurance Market 2nd Annual Report (2013), The Florida Catastrophic Storm Risk Management Center

Table 3.3: Determinants of Effective Premium Sales Tax: OLS estimates

	(1) $\ln(\tau)$	(2) $\ln(\tau)$	(3) $\ln(\tau)$	(4) $\ln(\tau)$	(5) $\ln(\tau)$	(6) $\ln(\tau)$	(7) $\ln(\tau)$	(8) $\ln(\tau)$
ln(Concentration)	-0.33***	-0.34***	-0.34***	-0.35***	-0.35***	-0.35***	-0.35***	-0.35***
	(0.08)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
ln(Population)		-0.36	-0.39	-0.34	-0.60	-0.56	-0.56	-0.56
		(0.69)	(0.66)	(0.67)	(0.68)	(0.68)	(0.68)	(0.68)
Prop_health			0.09	0.16	0.21	0.20	0.20	0.20
			(0.39)	(0.39)	(0.36)	(0.36)	(0.36)	(0.36)
ln(Total tax per capita)				0.13	0.12	0.12	0.12	0.12
				(0.11)	(0.10)	(0.10)	(0.10)	(0.10)
ln(Campaign Contributions)					0.002	0.002	0.002	0.002
					(0.004)	(0.004)	(0.004)	(0.004)
Democrat Governor						0.006	0.006	0.006
						(0.03)	(0.03)	(0.03)
Tax Agency							1.9***	0.7
							(0.09)	(0.9)
Appointed regulator								-1.8
								(2.7)
_cons	1.5***	6.4	6.7	5.9	9.2	8.9	7.0	10.1
	(0.2)	(9.1)	(8.7)	(8.7)	(9.1)	(9.1)	(9.0)	(10.9)
State & Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
N	588	588	588	588	562	562	562	562
R^2	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.90

Standard errors in parentheses

Taxrate is the effective tax rate as defined previously; **InsTax** is the insurance premium sales tax revenues collected in state s and year t; **Premiums** is the total premiums written (in thousands) by the industry in state s and year t; **Regulator**=1, means Insurance Commissioner is appointed, =0 means Insurance Commissioner is elected; **Democrat Governor**=1, means Governor is from Democratic party, =0 means Governor is from Republican party; **Tax Agency**=1, means that the insurance premium sales tax revenue is collected by the Office of Insurance Commissioner, 0 otherwise; **Concentration** captures the degree of concentration in the insurance industry as defined above; **Campaign Contributions** is the campaign contributions made by the insurance industry in state s and year t in state elections;

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

Table 3.4: Determinants of the (log of) Effective Premium Tax Rate (Reduced Form).

	(1) $\ln(\tau)$	(2) $\ln(\tau)$	(3) $\ln(\tau)$	(4) $\ln(\tau)$	(5) $\ln(\tau)$	(6) $\ln(\tau)$	(7) $\ln(\tau)$	(8) $\ln(\tau)$	(9) τ
ln(Concentration)	-0.84*	-0.50*	-0.50*	-0.66*	-0.61*	-0.61**	-0.61**	-0.61**	-1.04***
	(0.45)	(0.28)	(0.28)	(0.36)	(0.34)	(0.30)	(0.30)	(0.30)	(0.39)
ln(Population)		-0.70*	-0.79*	-1.10*	-1.19*	-1.18*	-1.18*	-1.18*	-1.74
		(0.40)	(0.47)	(0.66)	(0.64)	(0.61)	(0.61)	(0.61)	(1.25)
Prop_health			0.49	0.95	0.85	0.84	0.84	0.84	1.37
			(0.87)	(1.12)	(1.02)	(0.92)	(0.92)	(0.92)	(1.47)
ln(Total tax per capita)				0.16	0.15	0.15	0.15	0.15	0.20
				(0.13)	(0.12)	(0.12)	(0.12)	(0.12)	(0.16)
ln(Campaign Contributions)					0.001	0.001	0.001	0.001	.0001
					(0.004)	(0.004)	(0.004)	(0.004)	(.007)
Democrat Governor						-0.001	-0.001	-0.001	-.02
						(0.03)	(0.03)	(0.03)	(0.04)
Tax agency							2.2***	2.2***	2.6***
							(0.27)	(0.27)	(0.36)
Appointed regulator								-1.8	-2.5
								(1.2)	(2.5)
_cons	2.9**	11.4**	12.6*	16.9*	17.9**	17.8**	15.7*	17.5*	27.6
	(1.3)	(5.5)	(6.6)	(9.2)	(8.8)	(8.4)	(8.2)	(9.3)	(19.4)
N	588	588	588	588	562	562	562	562	562
R^2	0.83	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81

Standard errors in parentheses

Taxrate is the effective tax rate as defined previously; **InsTax** is the insurance premium sales tax revenues collected in state s and year t; **Premiums** is the total premiums written (in thousands) by the industry in state s and year t; **Regulator**=1, means Insurance Commissioner is appointed, =0 means Insurance Commissioner is elected; **Democrat Governor**=1, means Governor is from Democratic party, =0 means Governor is from Republican party; **Tax Agency**=1, means that the insurance premium sales tax revenue is collected by the Office of Insurance Commissioner, 0 otherwise; **Concentration** captures the degree of concentration in the insurance industry as defined above; **Campaign Contributions** is the campaign contributions made by the insurance industry in state s and year t in state elections;

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

Table 3.5: Insurance Premium Tax Revenues and market concentration: Two stage least squares estimation

	(First Stage) ln(market concentration)	(Reduced Form) ln(Premium Tax Revenue)
log (coast to land area)	16.5***	-
	(5.3)	
log (market concentration)	-	-0.85*
		(0.35)
ln(Population)	-2.6*	-1.9
	(1.4)	(1.2)
Prop_health	2.5**	2.1*
	(0.9)	(1.3)
ln(Total taxes)	0.09	0.28
	(0.09)	(0.19)
ln (Campaign contributions)	-0.004	-0.002
	(.008)	(0.007)
Democrat Governor	-0.03	-0.03
	(0.03)	(0.03)
Tax agency	-63.258***	-0.85***
	(20.9)	(0.3)
Appointed Regulator	-7.4**	-4.8**
	(3.4)	(2.3)
State and year dummies	Y	Y
N	562	562

Robust standard errors in parentheses

F statistic for the First Stage is 166 and R-square for the Reduced Form is 0.95

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.005$

Table 3.6: Insurance Premium Tax Revenues and market concentration: Two stage least squares estimation

	(First Stage) ln(market concentration)	(Reduced Form) Premium Tax Revenue
log (coast to land area)	16.7***	-
	(5.3)	
log (market concentration)	-	-593.7***
		(0.35)
ln(Population)	-2.5*	-1267
	(1.4)	(762)
Prop_health	2.5**	1498*
	(0.9)	(692)
ln(Total taxes)	5.8e-06	0.02***
	(3.9e-06)	(0.004)
ln (Campaign contributions)	-0.004	-1.9
	(.008)	(4.8)
Democrat Governor	-0.03	-31.0*
	(0.03)	(18.3)
Tax agency	-64.5***	584.1***
	(20.5)	(160.6)
Appointed Regulator	-7.4**	-2180**
	(3.4)	(1552.3)
State and year dummies	Y	Y
N	562	562

Robust standard errors in parentheses

F statistic for the First Stage is 166 and R-square for the Reduced Form is 0.95

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.005$