The Ownership Complaint Gap: Mutual versus Stock Intermediaries

Jiang Cheng, Wenlan Qian, and David M. Reeb [ID]*

Abstract

We document a substantial customer complaint gap between stock and mutual financial firms. To assess whether this 21% per year complaint gap stems from complaint-prone customers in stock insurers, we examine state-adjudicated complaint success. To further delineate between customer selection or treatment explanations, we exploit within insurer complaints around random claims (natural disasters) and attention shocks (media scrutiny). Further tests reveal the complaint gap widens with greater competition, near insolvency thresholds, and with more price regulation. Overall, the results are inconsistent with the hypothesis that mutual financial firms exhibit low customer satisfaction, suggesting customers find this a beneficial organizational structure.

I.   Introduction

Diverse ownership forms coexist in the financial intermediary industry, including in both stock and mutual firms (Lamm-Tennant and Starks (1993)). Stock ownership, however, is widely viewed as the most efficient ownership form (Mayers and Smith (1986)). The ability of stock intermediaries to issue new equity gives them a distinct advantage in alleviating capital constraints (Masulis (1987)). Cummins, Weiss, and Zi (1999) report that the assignment of residual claims to shareholders, rather than customers, facilitates high operating efficiency and effective corporate governance in stock-based financial intermediaries. A substantial empirical literature demonstrates how stock intermediaries outperform mutual intermediaries across a wide variety of financial dimensions (e.g., Erhemjamts

and Leverty (2010)). Customer treatment or satisfaction likely represents another important dimension of the competition between stock and mutual financial intermediaries. Competition for customers and profits arguably leads stock intermediaries to offer reliable consumer treatment to build a consumer-friendly reputation (Berger and Hannan (1998)). The extensive evidence on effective governance in stock intermediaries, manifested in hiring high-quality managers and possessing effective decision oversight, also suggests they provide dependable customer service (Rasmusen (1988)).

Nevertheless, despite regulatory policies aimed at facilitating stock conversion, mutual intermediaries remain a common organizational form (Dafny and Ramanarayanan (2013)). Fama and Jensen (1983) observe that the coexistence of stock and mutual ownership forms in the financial intermediary industry suggests that both organizational forms enjoy advantages in serving customers. A key characteristic of mutual financials is that the residual claims assigned to customers instead of shareholders. Mutual intermediaries presumably have limited motivation to restrict company spending on customer satisfaction to improve profitability as these profits are returned to policyholders (Mayers and Smith (1981)). Building on this notion, Bubb and Kaufman (2013) argue that mutual intermediaries possess fewer incentives to charge high penalty fees for unanticipated services, such as bank overdrafts, relative to their stock peers. Conversely, Glaeser and Shleifer (2001) describe how stock intermediaries can be encouraged to reduce service reliability to subsidize returns. The distribution of profits to outside shareholders introduces the potential for a wealth transfer from policyholders to shareholders, creating incentives for stock intermediaries to limit spending on customer satisfaction relative to their mutual peers (Hansmann (1985)). Making customers happy is expensive and time consuming, suggesting that spending on customer satisfaction could be a central difference between stock and mutual intermediaries. Credible claims about inadequate managerial oversight imply that mutual financials provide poor quality service, while residual claimant-based arguments suggest they promote dependable customer treatment.

Although there is significant evidence on financial performance differences in mutual and stock financials, scarce results exist on their relative attention to customer satisfaction. An important factor is the difficulty in measuring customer treatment, especially across a large section of financial intermediary firms. In this study, by exploiting a unique data set on customer complaints, we provide the first, large-scale investigation of the role of financial intermediary ownership in customer treatment, focusing on the assignment of residual claims to customers instead of shareholders. We concentrate on insurance firms, an important and prevalent financial intermediary that accounts for 41.7% of financial institution activity in 2016 (https://www.naic.org/state_report_cards/report_card_wa.pdf). Legal scholars describe numerous anecdotal accounts of service quality issues in the insurance industry (Mootz (2002)). Accenture and JD Power report that approximately one-fourth of insurance claimants are dissatisfied, suggesting that this financial intermediary sector provides a good laboratory to investigate customer treatment.

Our analysis relies on a unique data set of consumer complaints and adjudicated outcomes to state regulators in the insurance industry. Complaints to state

regulators cover a spectrum of consumer experiences with insurance intermediaries, ranging from misleading advertisements (ex ante) to reduced claim settlements (ex post). State regulators evaluate these grievances and the responses of insurance companies to reach a decision on the complaint. Consequently, the data allow us to measure consumer satisfaction from all aspects of their engagement with insurers: marketing, underwriting, services, and claim handling.

We construct the data set by manually collecting consumer complaint information for a 7-year period (2005–2011 inclusive) from each firm and each state, retrieving the data from the Web site of the National Association of Insurance Commissioners (NAIC). The NAIC data contain a rich body of information regarding these consumer complaints and their outcomes in the adjudication process. We focus on property-casualty (P-C) insurance, collecting detailed data on the types of complaints on a variety of issues. Notably, 60% of the complaints in our sample result in consumer success, suggesting that complaints represent non-trivial consumer concerns with insurer service reliability. The top three specific complaint types are delayed claim (31%), reduced settlement offer (20%), and denial of claim (11%). Our full sample comprises 1,224 stock insurers and 522 mutual insurers.

To provide empirical evidence on consumer experiences in their dealings with financial intermediaries with different equity structures, we compare the number of consumer complaints regarding stock insurers with those concerning mutual insurers, after considering insurer size and other characteristics. The data allow us to evaluate the regulator-adjudicated outcomes of these consumer grievances regarding their dealings with stock or mutual insurers. Next, we examine how consumer complaints change with random, negative claim shocks, which hold customer profiles, product mix, and other firm or customer profiles constant. We also exploit a shock to consumer attention about intermediary service quality, allowing a pre- and post-comparison of stock and mutual insurers. Finally, we investigate whether the complaint gap differs in states with high and low intermediary competition and across different regulatory regimes.

Our first set of tests rely on simple comparisons of consumer complaints in stock and mutual insurers. Of particular concern is that the magnitude of insurance firms could differ between stock and mutual insurers, leading us to include the log of insurer assets as an important control in the analysis.[1]

In addition, the matched sample for our baseline tests incorporates the number of states in which the insurer operates. We find that stock insurers receive 21%–25% more complaints per year than their matched mutual counterparts. All our analyses include state-year fixed effects to control for unobserved time-varying state heterogeneity. The wedge in complaints between mutual and stock insurers remains stable after excluding zero complaint firms, across various matching schemes and in the full sample. There are several plausible explanations for these findings. Greater complaints may stem from differences in customers' propensities to file complaints, differing product mixes in stock and mutual

---

[1]Using alternative proxies of insurer size, such as the log of policy premiums (Ke (2001)) and policyholder surplus (Ellul, Jotikasthira, Lundblad, and Wang (2015)), we find similar inferences.

insurers, differing incentives to expend resources on customer satisfaction, or from stock insurers' efforts to limit policyholders' inflated claims for losses.

An interpretation based on consumers' choice of insurer type or differing product offerings within this insurance sector implies different adjudication outcomes between stock and mutual insurers. Regulators evaluate these consumer complaints and ultimately decide in favor of the consumer or the insurance company. If stock insurers have more complaint-prone customers than mutual insurers, then consumers of stock insurers should exhibit a lower probability of successful complaints than mutual insurers. To assess whether consumer demographics or differing mixes of products explain the complaint wedge, we investigate complaint success rates (as independently determined by state regulators). We find no differences in the success rates between mutual and stock insurers, despite a greater number of complaints against stock insurers.[2]

However, selection remains an important concern, specifically that unobserved customer heterogeneity drives the stock-mutual complaint gap. For instance, stock insurers could receive more complaints because of differing customer profiles rather than from any difference in customer treatment. Tests of complaints within insurers, before and after random shocks, allow us to hold the profiles of the insurer's consumers and the mix of insurance products constant. We use natural disasters as one source of variation that plausibly exogenously increases intermediary claim processing and places additional strains on customer service (Cortes and Strahan (2017)). Our analysis relies on customer complaints in both affected and unaffected states of mutual and stock insurers. In the most important unaffected states, consumer complaints about stock insurers rise by 27.9%; there is no similar increase for mutual insurers. One interpretation of these results is that stock insurers, because of fewer resources devoted to customer service, move scarce claim adjusters to the affected area, leading to increased complaints in unaffected states. This resource shifting explanation suggests that stock insurers focus on operating costs rather than maintaining operational slack to facilitate customer satisfaction.

A second plausibly exogenous shock in the insurance industry occurs in 2008 with the announcement by the California Insurance Commissioner of a multi-million dollar fine against United Health Care for "poor claim handling" (see Balto (2008), California Department of Insurance Web site (http://www.insurance.ca.gov)). Media coverage of this penalty arguably raises consumer awareness about insurers' customer service and emphasizes the statewide adjudication process. We compare within-insurer changes in complaints between Californian mutual and stock insurers, relative to their counterparts in other states, after this media attention. This analysis holds customer profiles constant and allows for a comparison of subsequent complaint success rates. An increase in frivolous complaints would result in a low customer success rate in the adjudication process. We find a 21% increase in complaints in California after this media attention, which is completely driven by complaints about stock insurers.

---

[2]An alternative empirical strategy is to exploit changes in ownership structure (e.g., demutualization). However, only 29 insurers in our sample changed ownership form. In this subset regression, we find a directionally consistent result even though the test has limited power.

More strikingly, the post-shock complaint success rate increases by 46% for stock insurers, suggesting a significant increase in valid complaints.

Mutual and stock insurer competition differs across states. Greater competition between insurers within a state could encourage firms to compete on service quality. On the other hand, greater competition may also exacerbate the pressure to limit spending on customer satisfaction. The results indicate that relative to mutual insurers, stock insurers receive more consumer complaints in states with low industry concentration and greater insurer presence (i.e., where there is more competition). These findings suggest that the profit pressure arising from competition outweighs reputational forces in explaining the complaint gap between stock and mutual insurers.

Finally, we note that state regulators emphasize the protection of individual consumers. Regulators potentially mediate the complaint gap between stock and mutual insurers, which could limit the ability of mutual firms to gain a competitive advantage. To investigate this issue, we exploit heterogeneity among state regulators in the United States. The results suggest an increasing rather than a diminishing gap in customer satisfaction in states with a stronger regulatory body between stock and mutual insurers. We hypothesize that regulators face constraints due to their dual goals of insurer solvency and promoting customer satisfaction. Consistent with the idea that regulators maintain insufficient resources or possess inadequate incentives to achieve both goals effectively, we find that complaints about stock insurers increase by 129% when they are inadequately capitalized (i.e., approaching regulatory thresholds). In addition, we exploit cross-state heterogeneity in policy pricing rules to gauge a regulatory measure intended to protect consumers. Surprisingly, for every 10% increase in the portion of premiums subject to pricing regulation, stock insurers incur 5.7% more complaints than their mutual counterparts. These results suggest that regulators face substantial difficulty in alleviating the intrinsic conflict between shareholders and policyholders.

This study makes three important contributions to the literature. First, our analysis provides evidence that financial intermediary ownership structure influences consumer treatment. Both the cross-sectional and shock-based test results reveal that stock insurers receive considerably more customer complaints than their mutual peers. As insurance competition increases, the complaint gap between mutual and stock insurers widens. The natural disaster results imply that stock intermediaries operate with more limited operational slack than mutual insurers in their efforts to generate higher returns for shareholders. We interpret this evidence to suggest that the continued co-existence of mutual and stock insurers potentially arises from greater economic efficiency in stock insurers and better consumer treatment by mutual insurers.

Second, our analysis offers evidence on the nature of industry competition in an area that includes both stock and mutual intermediaries. The large number of directly competing stock and mutual organizations provides a unique setting for exploring customer choices across different ownership structures. Rational decision-making customers could anticipate lower customer complaints in mutual, relative to stock, insurers due to the assignment of residual claims. Risk averse, rational customers also understand that the assignment of residual claims to policyholders limits the ability of mutual insurers to raise funds to handle

systemic volatility in insurance claims. In this setting, rational customers balance the higher customer satisfaction in mutual intermediaries with their lower ability to raise additional funds to address successive profitability shocks.

Finally, the analysis highlights the potential difficulties in evaluating insurance providers by customers of these financial intermediaries. Consumers infrequently file claims for losses with insurers, making it difficult for them to learn about intermediary service quality (Israel (2005)). Arguably, these results on the complaint differences between mutual and stock intermediaries emphasize the need for transparency about service reliability. Yet, such data are difficult to obtain from the NAIC, are hard to interpret, and disappear from the regulator Web site after 3 years.

II.   The Insurance Industry

A.   Background Information

The insurance industry serves as an important financial intermediary with total written premiums worth 6.7% of the U.S. gross domestic product and an asset size of $5.1 trillion in 2014. The insurance industry offers products in the form of contingent claims against loss and damage, essentially to all consumers in the U.S. economy. For example, *all* vehicle drivers must purchase auto insurance with compulsory minimum liability coverage. Most homeowners and a large proportion of renters in the United States have home insurance. According to the Insurance Information Institute, U.S. drivers have 213 million auto policies (information from the Automobile Insurance Plans Service Office), while homeowners (and renters) have 240 million insurance policies. The insurance industry also contributes to the economy by providing substantial employment, 2.5 million jobs in 2014 or 2.1% of the U.S. employment, according to the U.S. Department of Labor.

There are 6,118 insurers in the United States (including territories) in 2014, including 2,583 P-C insurers, 1,752 life-health (L-H) insurers, and 1,783 other insurers and related agencies.[3] Given the objective to gauge the service quality of insurers by using the volume of consumer complaints, our analysis focuses on the P-C insurers. Consumer complaints within the L-H industry may correlate weakly with consumer experience, due to the obvious disconnect between purchasers and beneficiaries of these insurance policies: Life insurance policy claimants are typically not the policy buyers, and the purchase of health insurance is often tied to the employer's plan rather than being the individual's choice. P-C insurance companies represent a significant portion of the entire industry; they account for 44% ($502.6 billion) of the total premiums written in the United States in 2014.[4]

---

[3]Other companies include specialty insurers that consist of fraternal (85), title (56), and risk retention groups (252); and other insurance agencies, brokers, and other insurance-related enterprises (1,390). These specialty insurers write only a small fraction of insurance premiums. Source: http://www.iii.org.

[4]P-C insurance primarily consists of three lines: auto, home and commercial insurance. These insurance policies help individual consumers recover from losses stemming from car accidents, or from the effects of a disaster on their home arising from storms or fires.

The largest stock firms in our sample are Allstate and Berkshire Hathaway, while the largest mutual insurers are State Farm and Liberty Mutual.

The P-C industry exhibits the two major ownership forms we are analyzing: stock and mutual (Cummins et al. (1999)). Mutual insurers are owned by their policyholders (or consumers), who also receive the residual cash flows (profits) from the business. In contrast, stock insurers are owned by shareholders, who receive the profits made on the policies held by consumers. Clearly, stock insurance companies have greater conflicts of interests with consumers than mutual insurers, especially after insurance policies are sold. Stock insurers, however, also have greater governance and reputational concerns than their mutual peers. Yet, both stock and mutual companies in the insurance industry are profit-seeking firms that offer similar product types and are subject to the same regulatory scrutiny. Our central research question is whether these incentive differences in mutual and stock insurers translate into differing consumer treatment.

It is important to note that the P-C industry has become more dominated by stock insurers over time. In 2009, stock insurers account for 70%–73% of the industry based on the size of the written premiums or assets (A.M. Best Company, *Best's Aggregates and Averages*, *P/C edition* (2010)). Similarly, in the banking industry, stock banks (i.e., commercial banks) are increasing in size relative to credit unions, which are owned by members (consumers). Based on asset size, commercial banks are nine times as large as credit unions in 2014.[5] The P-C insurance industry is heavily regulated at the state level (Joskow (1973)). While the NAIC seeks to coordinate many regulatory standards through model legislation across states, state regulators have authority to set their own standards and regulate the insurers operating in their state. In the Supplementary Material, we discuss the regulatory environment of the P-C industry in greater detail.

B. Complaint Process

When consumers cannot resolve their concerns about insurance service or claims with the agents or representatives of their insurer (including the consumer complaints department of the insurer), they can file a complaint against their insurer with the state regulator. Consumers need to provide supporting documents for their complaints. A copy of the complaint is sent to the insurer involved, who is given several weeks to respond before further action is taken by the regulator. For example, Illinois allows 21 days for an insurer or agent to respond to a complaint. Thereafter, an experienced and independent arbitrator, assigned or approved by the state regulator, determines the validity of the complaint, whether the insurer has satisfactorily resolved it, and whether further follow-up actions are necessary. Consumer complaints yield a wide range of outcomes, including no action required, company position upheld, withdrawn complaint, insufficient information, compromised settlement, or disciplinary actions against the relevant insurer. Disciplinary actions that can be taken against insurers include a monetary

---

[5]The statistics were obtained from the Federal Reserve Board and the National Association of Federal Credit Unions.

fine and, in extreme cases, revocation of the insurer's license in the state.[6] The state regulator typically advises consumers about the outcome of their complaint within a few months of their filing.

State regulators collect all filed complaints and report them to the NAIC. With the goal of giving consumers information that will help them make their insurance purchase decisions, the NAIC compiles the regulators' reports into its online Consumer Information Source database. The database provides reports on the number of closed consumer complaints by insurer and by year for each state the insurer operates in, along with key financial data about the insurer. For each insurer in a given year, the reasons for complaints are provided and classified into four categories based on the different stages of consumer experience with an insurer: marketing and sales, underwriting, policyholder service, and claim handling (see the Appendix for detailed definitions of these categories). Finally, the database tabulates the outcomes of closed complaints for every insurer in each year.[7]

III.   Data and Sample

A.   Consumer Complaints Data

Using the information on the NAIC Web site, we manually collect all the data for complaints against U.S. licensed P-C insurers for the 7-year period 2005–2011. Table 1 provides a breakdown of the 136,232 complaints in our raw sample according to complaint type, reason, and outcome. Note that the complaint types are not mutually exclusive categories, while the complaint outcome is unique for each case. Panel A shows that the clear majority of complaints (73%) are concerned with claim handling. Panel B presents a frequency breakdown of the top ten reasons cited in the complaints. The NAIC data provide a very detailed list with over 80 types of complaints, but most of the complaints concentrate on a few common categories related to either the claim process or the underwriting process. For example, the top five reasons are: delay of claim (31%), unsatisfactory settlement offer (i.e., reduced settlement offer) (20.3%), denial of claim (11.3%), policy cancellation (7.3%), and premium pricing (6.4%). In the subsequent empirical analysis, we group the reasons into five broad categories reflecting the nature of the concern: policy termination; policy pricing and other terms; denial, delay, and underpayment; misconduct; and customer care (refer to the Appendix for detailed construction of these categories). We also classify the outcomes with specific interest in resolutions that are favorable to the consumer. In Panel C, we tabulate the percentage of complaints that are resolved in compromised settlement (to the consumer), the company's position being overturned, or a fine or other disciplinary action being imposed. Nearly 60% of complaints are based on legitimate claims, that is, the regulators overturned the company's position, which suggests

---

[6]Consumers can also resort to their state's consumer protection division, refer to the Better Business Bureau, or consider pursuing other legal actions. We do not observe their actions through these other venues.

[7]While the number of consumer complaints is available for each of the operating states of an insurer in each year, the data do not provide a breakdown of the complaint reasons by state or a decomposition of the complaint outcomes by state or by the type of complaint reasons.

TABLE 1

Nature of Consumer Complaints

Table 1 provides a breakdown of the 136,232 consumer complaints in our full sample according to the types and nature of the complaints. Panel A presents a frequency breakdown of the types, whether the complaints reflect concerns over marketing and selling of insurance policies, underwriting of insurance policies, policyholder service, or claim handling. Panel B presents a frequency breakdown of the top ten reasons cited in the consumer complaints. Panel C presents the complaint outcome, that is, the fraction of the total complaints that are resolved in favor of consumers, namely, compromised settlement (to the consumer), the company's position being overturned, and fine or disciplinary actions against the insurer. The variable "complaint success" is used in our analysis and is defined in the Appendix.

	Fraction (%) ($N = 136,232$)
Panel A. Types of Consumer Complaints	
Marketing & sales	3.9
Underwriting	24.4
Policyholder service	13.5
Claim handling	72.9
Panel B. Top Ten Complaint Reasons	
Delay of claim	31.0
Unsatisfactory settlement offer	20.3
Denial of claim	11.3
Policy cancellation	7.3
Premium pricing	6.4
Premium refund	5.0
Surcharge	4.1
Nonrenewal of policy	4.1
(Late) premium billing notice	2.7
Adjuster handling	2.5
Panel C. Complaint Outcome	
COMPLAINT_SUCCESS	59.6

that consumer complaints serve as a good indicator of the quality of an insurer's service.

B.   Financial Data

We match the complaint data with the financial information on the insurers from the NAIC's annual statement database. The main control variables in this study are the insurer's size (logarithm of net admitted assets), return on assets (ROA), underwriting profitability (to better measure the operating performance of the underwriting business), and the insurer's independent standing (i.e., it is not part of an insurance group).[8] Information about the ownership form (i.e., stock or mutual) of insurers is further cross-checked with *A.M. Best's Insurance Reports: Property/Casualty Edition* (*Best's Insurance Reports*)[9] and proxy statements of the publicly traded insurers. This renders 20,988 insurer-year observations for the period 2005–2011. We drop all observations with non-positive assets, non-positive premiums written, and non-positive surplus. The insurers that we drop are effectively under regulator control and in the process of reorganization or liquidation. This step reduces the sample size to 16,673 insurer-year observations. Finally, we restrict our sample to stock and mutual insurers, excluding those that switched from stock to mutual or vice versa within our sample period.[10]

---

[8]Throughout the manuscript, the terms logarithm and logs refer to the natural logarithm.

[9]A.M. Best Company, various years, *Best's Insurance Reports: Property/Casualty Edition* (Oldwick, NJ).

[10]There are 37 (2%) converters in our sample period and we exclude them to facilitate a cleaner interpretation as the (likely endogenous) switching decision makes these insurers distinct from others.

This leaves us with a final sample of 1,746 insurers (1,224 of which are stock insurers) and 10,867 insurer-year observations.

C. Regulatory Environment Data

To examine the implications of the regulatory environment, we obtain information about the state-level regulatory staff, budget, and commissioner appointment process from the NAIC's 2010 Insurance Department Resources Report and information on the state-level regulatory law on policy rates from the NAIC's *Compendium of State Laws and Regulations on Insurance Topics*.

IV.   Consumer Complaint Difference between Stock and Mutual Insurers

A.   Univariate Statistics and Matched Sample

Table 2 summarizes the financial characteristics of the stock and mutual insurers in our sample and the consumer complaints about them. The first three columns report the mean statistics, as well as the difference in the full sample between 1,224 stock and 522 mutual insurance insurers. During the period 2005–2011, a typical stock insurer had an asset size of $121.6 million, which is 78% higher than the asset size of a typical mutual insurer, and the difference is statistically significant at the 1% level.[11] In addition, stock insurers exhibit better financial performance than mutual insurers in general. For example, stock insurers have an annual ROA of 0.024, compared to 0.019 for mutual insurers, and the difference is statistically significant at the 1% level. Stock insurers also underwrite or operate in significantly more states and are much more likely to be part of an insurance group.

TABLE 2

Summary Statistics

Table 2 provides the summary statistics of insurer characteristics and consumer complaints for the stock and mutual insurers, respectively. The first three columns present the comparison in the full (unmatched) sample, and columns 4–6 present the comparison in the matched sample, which is constructed using the nearest neighboring matching algorithm based on the insurer's (log) ASSET, ROA, and affiliation status. For variable definitions and details of their construction, see the Appendix. We also perform a two-sided *t*-test for means; *** denotes significance at the 1% level.

	Stock	Mutual Full Sample	Difference	Stock	Mutual Matched Sample	Difference
	1	2	3	4	5	6
log(ASSET)	18.616	18.039	0.577***	18.362	18.373	−0.011
ROA	0.024	0.019	0.005***	0.021	0.021	−0.000
UNDERWRITING_PROFITABILITY	1.684	1.643	0.041	1.696	1.669	0.026
INDEPENDENT (%)	26.5	43.6	−17.1***	34.2	34.2	0.0
#_STATES	21.0	7.8	13.1***	19.0	8.7	10.3***
Log no. consumer complaints (per annum)	1.339	0.963	0.376***	1.247	1.026	0.221***
COMPLAINT_SUCCESS (%)	62.9	62.8	0.1	61.1	62.9	−1.8
N	1,224	522		939	498	

---

[11]In general, the difference, say, X, in log variables between stock and mutual insurers in Table 1 means a percentage difference equal to $\exp(X)-1$. For example, the difference of 0.577 in log assets between stock and mutual insurers (first row of column 3) suggests that the percentage difference is $\exp(0.577)-1=78\%$.

Turning to consumer complaints, stock insurers are associated with a much higher level of complaints filed with the regulators. A typical stock insurer is the subject of 45.6% (= exp(0.376)−1) more consumer complaints per year than mutual insurers. This difference is economically large and statistically significant (at the 1% level). The fact that the rate of consumer complaints differs may reflect the disparity in consumer treatment by the two types of insurers or could be due to them having distinct clientele and the associated difference in their clientele's perceptions of consumer treatment. However, if the higher rate of complaints for stock insurers is due to the selection of customers more prone to complaining, then these complaints should have a lower chance of success. Tracking the outcome of these consumer complaints, 62.9% of the complaints about stock insurers result in success, very similar to the 62.8% success rate for mutual insurers. The (almost) equal complaint success rate between the two types of insurers shifts the interpretation of the drastic difference in complaints from differing clientele behavior towards one that considers the possibility of a disparity in service quality between the two types of insurers.

An obvious factor confounding the preceding interpretation lies in the difference in insurer characteristics between stock and mutual insurers. As indicated in Table 2, stock insurers are much larger and more profitable than mutual insurers. To address the observable differences in the key financial variables between the two types of insurers, we construct a matched sample. Specifically, we use the nearest neighboring matching algorithm and match the stock insurer with the mutual insurer based on log assets, ROA, affiliation status. This exercise leaves us with 939 stock insurers and 498 mutual insurers, and columns 4–6 of Table 2 report the summary statistics of the matched sample.

After matching, there are no discernible differences between stock and mutual insurers in terms of size, measures of performance, or the percentage of insurers that are part of an insurance group. Although the gap in the percentage of complaints against each type of insurer diminishes somewhat, the rate of complaints remains significantly higher for stock insurers. On average, stock insurers in the matched sample receive 24.7% (= exp(0.221)−1) more complaints per year than mutual insurers, and the difference is statistically significant at the 1% level. Similarly, as before, there is no difference in the complaint success rate between the stock and mutual insurers. In summation, the univariate comparison in the matched sample provides the first evidence that the significant difference between stock and mutual insurers in the number of consumer complaints they receive appears to reflect a disparity in service quality and is not driven by observable differences in insurer size and profitability.

Admittedly, the particular matching procedure does not fully eliminate the observable differences between the two types of insurer. Table 2 suggests that stock insurers continue to operate in more states than their matched mutual insurer. We will address this issue explicitly in the next section and study an alternative matched sample that includes the number of underwriting states in addition to size, profitability, and affiliation status as the matching variables. The choice of the current matched sample arises from consideration of the size of the sample and the associated power issues in the empirical tests. Last, matching in this situation may not eliminate the *unobservable* differences between stock and mutual

insurers. Our empirical identification strategy to test for differences in service quality between the two types relies on plausibly exogenous shocks (explained in the subsequent sections) to examine the within-insurer response to consumer complaints after the shock.

B.   Baseline Specification

In this section, we study the difference in consumer complaints between stock and mutual insurers using a multivariate regression framework. If stock insurers are better able to offer high-quality service to consumers, then we expect them to receive fewer complaints than their mutual peers. Conversely, if stock insurers have less reason to provide high-quality service to consumers than mutual insurers, then we expect them to receive more complaints.

Since the NAIC data include the outcome of complaints aggregated at the insurer level, the unit of observation in our baseline specifications is an insurer in a given year. Specifically, we run the following regression specification:

$$
\begin{aligned}
(1) \quad Y_{i,h,t+1} &= \alpha + \gamma_{h,t+1} + \beta_1 \text{STOCK} + \beta_2 size \\
&\quad + \beta_3 \text{ROA} + \beta_4 \text{UNDERWRITING\_PROFITABILITY} \\
&\quad + \beta_5 \text{INDEPENDENT} + \beta_6 \log(\#\_\text{STATES}) + \epsilon_{i,t}
\end{aligned}
$$

where $Y_{i,h,t+1}$ is either the natural logarithm of 1 plus the number of consumer complaints received by insurer i domiciled in state h in time $t+1$ or the fraction of the complaints received by insurer i in year $t+1$ that result in consumer success (i.e., with an outcome of either compromised settlement in favor of consumers, the insurer position being overturned, or disciplinary actions against the insurer). STOCK is a dummy variable equal to 1 for insurers with stock ownership, and 0 for mutual insurers. The choice of the log number of consumer complaints as the key dependent variable facilitates interpretation; the estimated coefficient for STOCK captures the percentage difference in consumer complaints between the stock and the mutual insurers. On the other hand, the number of complaints is directly influenced by the size of the insurer's underwriting business. To take into account the insurer's size, we use the log of the insurer's assets as an independent variable (Doherty, Kartasheva, and Phillips (2012)), Leverty and Grace (2018)).

We also include insurer characteristics in year t as controls (including ROA, UNDERWRITING_PROFITABILITY, INDEPENDENT, and log(#_STATES)), as well as the insurer's home state (i.e., state of domicile)-year fixed effects to control for any time-varying macro conditions or regulatory activities in the insurer's home state. The independent variables (controls) are measured with 1-year lag relative to the dependent variables to take into account either the possible delay in consumer response in filing complaints or simply the lengthy time spent dealing with insurers before consumers can respond (recall that 31% of the complaints in the sample concern delay in claim processing). Detailed definitions of the independent variables are provided in the Appendix.

Columns 1 and 2 of Table 3 report the matched sample results. In general, consumer complaints are positively associated with the insurer asset size and are negatively associated with the insurer performance measures (i.e., ROA and underwriting profitability). In addition, independent insurers are associated with

TABLE 3

Consumer Complaints about Stock versus Mutual Insurers

Table 3 reports the OLS regression estimates of the relationship between the stock status and insurer-level consumer complaints, as well as the complaint outcome. Columns 1 and 2 present the results for the (baseline) matched sample, constructed using the nearest neighboring matching algorithm based on the insurer's (log) assets, ROA, and affiliation status. Columns 3 and 4 present results in an alternative matched sample, constructed using the nearest neighboring matching algorithm based on the insurer's (log) assets, ROA, the number of states in which an insurer underwrites insurance policies, and the insurer's independent status. Columns 5 and 6 report the full (unmatched) sample results. The dependent variables in columns 1, 3, and 5 are the natural logarithm of 1 plus the number of consumer complaints for a given insurer in year $t+1$, and the dependent variables in columns 2, 4, and 6 are the fraction of the insurer's complaints in year $t+1$ that are resolved successfully (i.e., in favor of consumers). The independent variables are measured in year t. For variable definitions and details of their construction, see the Appendix. All regressions include the home state (i.e., state of domicile)-year fixed effects. Standard errors are clustered at the home state-year level. Robust t-statistics are reported in brackets. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

	Matched Sample		Alternative Matched Sample		Full Sample	
	Log Consumer Complaints	Complaint Success (%)	Log Consumer Complaints	Complaint Success (%)	Log Consumer Complaints	Complaint Success (%)
	1	2	3	4	5	6
STOCK	0.188***	−0.036	0.220***	−0.020	0.157***	−0.019
	(3.33)	(−1.52)	(3.72)	(−0.73)	(4.44)	(−1.44)
log(ASSET)	0.323***	−0.005	0.358***	0.004	0.314***	0.001
	(15.58)	(−0.64)	(12.82)	(0.53)	(22.88)	(0.17)
ROA	−0.659	−0.106	−1.404***	−0.180	−0.371	−0.079
	(−1.27)	(−0.55)	(−2.76)	(−0.90)	(−1.29)	(−0.86)
UNDERWRITING_ PROFITABILITY	−0.093***	0.020	−0.044***	0.024**	−0.077***	0.017**
	(−4.67)	(1.52)	(−3.47)	(2.29)	(−8.10)	(2.08)
INDEPENDENT	−0.124**	−0.011	−0.098	−0.006	−0.120***	−0.015
	(−2.54)	(−0.45)	(−1.64)	(−0.17)	(−4.27)	(−1.12)
log(#_STATES)	0.034	0.029***	−0.006	0.027**	0.001	0.021***
	(1.39)	(2.83)	(−0.19)	(2.54)	(0.03)	(3.85)
Constant	−4.718***	0.621***	−5.329***	0.437***	−4.486***	0.537***
	(−12.61)	(4.73)	(−10.76)	(3.23)	(−18.52)	(8.33)
Home state × year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	2,895	1,672	2,397	1,355	9,116	5,379
R^2	0.387	0.241	0.433	0.254	0.325	0.126

fewer consumer complaints. More importantly, after controlling for these insurer characteristics, we find that, consistent with the pattern in the univariate statistics in Table 2, on average, stock insurers receive 20.7% (= exp(0.188)−1) more consumer complaints than mutual insurers on an annual basis in our matched sample. The difference is economically large and statistically significant at the 1% level.[12]

Although the complaint difference could reflect disparities in service quality between stock and mutual insurers, there exists an alternative interpretation that arises from (unobservable) differences in the insurance contracts or simply distinct consumer clientele between the two types of insurers. To differentiate the two interpretations, we study the outcome of the complaints between stock and mutual insurers. If a typical stock insurer tends to attract consumers who are more likely to complain, regardless of the quality of consumer treatment provided by the insurer, we would observe a significantly lower fraction of complaints ex post proven to be legitimate claims against the insurer. Indeed, we find no statistically significant difference in the complaint success rate between the stock and mutual

---

[12]To examine the influence of potential outliers on the estimation result, we also estimate non-parametric regression specifications. Specifically, the median regression result confirms the result in Table 3: Stock insurers experience 25% more consumer complaints than mutual insurers, and the difference is statistically significant at the 1% level.

insurers (Table 3, column 2), which suggests the complaint difference is more likely to reflect the disparity in the service quality provided by the insurers.

For the baseline specification, we conduct one more set of analysis based on a different matched sample. This matched sample includes the number of underwriting states as an additional variable. As a result, stock and mutual insurers are matched not only by insurer size, performance, and affiliation status, but also uniformity in the number of states in which they operate (for brevity, we do not show the summary statistics of this matched sample). Then, we repeat the analysis in equation (1) and report the results in columns 3 and 4 of Table 3. Consistently, stock insurers are subject to 25% ($=\exp(0.220)-1$) more consumer complaints per year than mutual insurers. The difference is statistically significant at the 1% level and is even greater in magnitude than the original matched sample results. We also study complaint outcomes in this matched sample and continue to find no difference in the success rate of complaints between the two types of insurer.

Overall, results based on this alternative matched sample, which exploit a broader set of matching variables, confirm our previous findings. In particular, they alleviate concerns that higher consumer complaints about stock insurers are driven by the omitted variables associated with the number of underwriting states. On the other hand, due to the large difference in the number of underwriting states between stock and mutual insurers in the full sample, the more comprehensive matching results in a significantly smaller (by 17%) sample. Given the consistency in the results in Table 3 for both samples, we use the full (matched) sample in the subsequent analysis to maximize the power of our empirical tests.

Last, to verify the external validity of the results in the matched sample, we repeat the analysis in the full sample. Consistent with the matched sample results, we find a 17% ($=\exp(0.157)-1$) higher rate of consumer complaints per year for stock insurers in comparison to mutual insurers (Table 3, column 5). Again, in the full sample, the success rate for complaints about stock insurers is the same as that for mutual insurers (Table 3, column 6).[13]

An interesting ensuing question relates to the geographical variation in the complaint difference between stock and mutual insurers. Using the full sample of observations, we estimate the specification in equation (1) for insurers headquartered in each state (or district) in the United States, respectively. We obtain the regression coefficients for *stocks* and plot the variation in the difference in complaints between stock and mutual insurers at the state level (Figure 1). There is evident geographical variation; in Kentucky, Rhode Island, Kansas, South Carolina, and Florida, stock insurers receive the greater percentage, comparatively, of consumer complaints, while in Colorado, Nevada, Virginia, Utah, and Washington, DC, mutual insurers receive the greater percentage of complaints. It is important to note that the level and pattern of the cross-state heterogeneity suggests that the documented consumer complaint difference between stock and mutual insurers is not clustered either by location or by eminent economic indicators.

---

[13]For completeness, we also re-estimated the rest of the analysis in the full sample instead of the matched sample. The only exception is Table 5 as the empirical identification requires the two types of insurers to have comparable profitability before the treatment. All results are qualitatively and quantitatively similar. For brevity, we present these results in Table A2 in the Supplemental Material.

FIGURE 1

Wedge in Consumer Complaints between Stock and Mutual Insurers

Figure 1 plots the heat map of the consumer complaint difference between stock and mutual insurers across 51 states (including Washington, DC). For each state (or district), we run the regression as in column 3 of Table 3 in the full sample and obtain the regression coefficient on STOCK. Based on the coefficient estimates, all states (and DC) are grouped into eight categories, with the darkest color corresponding to states with the largest difference in consumer complaint between stock and mutual insurers in our sample. Note that gray is used to indicate states for which we do not have enough data for estimation.
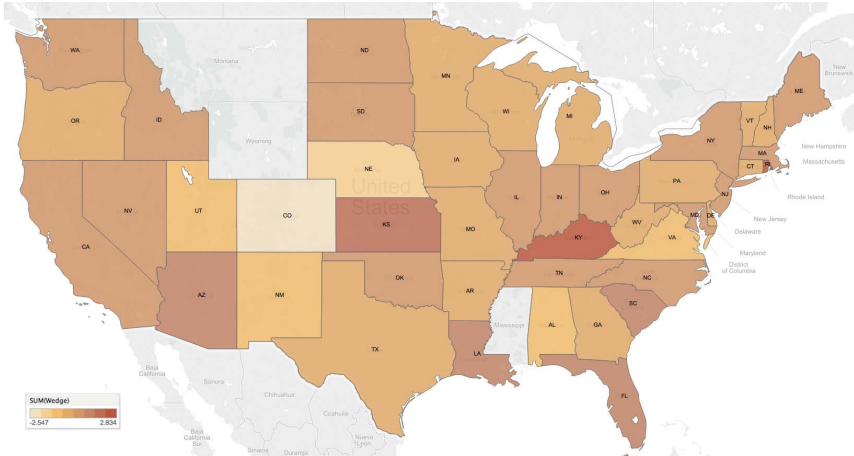
C.   Natural Disasters as Claim Shocks

Previous findings in the matched sample offer a remarkable pattern consistent with the interpretation that stock insurers provided poorer service quality to customers. However, the preceding analysis largely captures the cross-sectional nature of the correlation. Specifically, we cannot fully eliminate concerns about the *unobservable* differences in product features or consumer characteristics between the two types of insurer that could explain, at least in part, the difference in the rate of consumer complaints against each type of insurer.

To identify a causal channel, we analyze exogenous shocks to insurer claims and study the response in complaint rates for each insurer. A claim shock erodes the incentives to serve consumers, especially in stock insurers. If the rate of consumer complaints truly reflects an insurer's service quality, then we expect a larger increase in complaints about stock insurers after a claim shock compared with mutual insurers.

Specifically, we take natural disasters, such as thunderstorms, hurricanes, floods, wildfires, and tornados, as claim shocks to insurers. Severe natural disasters, specifically those that cause significant property damage, will lead to a large number of claims and consequent large increases in expenses for exposed P-C insurers.[14] These shocks are plausibly exogenous to insurers' behavior in the period before the event for the following reasons. First, an insurer's choice of location of their operation is determined long before the occurrence of the disasters in our

---

[14]For example, in the 5-year period between 2009 and 2013, wind and hail accounted for the largest share of claims, affecting 3.2% of the insured homes with an average loss of $8,793.

sample period. Second, while it remains feasible that insurers could have a reasonably good idea of disaster-prone locations, the precise timing and severity of the disasters are much less predictable. This makes insurers less able to change their behavior in full anticipation of a severe natural disaster in the near future. More importantly, to isolate the impact of an exogenous claim shock on insurer's responses to consumer claims, we make use of the fact that a typical insurer operates in multiple states (see the summary statistics in Table 2). When a natural disaster hits state A, the exposed insurers (those that operate in state A) tend to also be operating in states that do not experience a natural disaster. By focusing on the change in consumer complaints in the non-disaster states of exposed insurers, we further alleviate concerns about the unobservable characteristics in product features or consumer profiles that may correlate with the disaster risk in the affected locations.

We obtain natural disaster data from the Spatial Hazard Events and Losses Database (SHELDUS), which is a county-level data set covering the United States. It categorizes various natural hazard events by type, including thunderstorms, hurricanes, floods, wildfires, and tornados. We identify large disaster events in our sample period, specifically those that resulted in losses at the state level of over $500 million. We focus on states with a *single* large disaster in our sample period, removing those that experience multiple disasters. As a result, we identify six states, Michigan, California, Iowa, Oklahoma, Texas, and Tennessee, as the *hit* states with a staggered timing of severe natural disasters during the sample periods, 2007 and 2010.[15]

To increase the power of our empirical analysis, we study insurers that experience a greater claim shock induced by such disasters. Specifically, we define insurers as *heavily exposed* if they underwrite more than 5% of their total premiums in one or more of the six hit states in the disaster year. Given the staggered nature of the disaster shocks, we restrict our analysis to complaints in the non-disaster states of heavily exposed insurers (treatment states). To ensure our treatment states are truly free from (damaging) disasters, we require that the non-disaster states are not one of the six states that experienced $500 million in losses and are not among the five states with the highest losses in the same year. In addition, to facilitate comparable conditions between the stock and mutual insurers before the natural disaster, we use the matched sample in the analysis.

In the first column of Table 4, we study the average consumer complaint response after the disaster shock, without distinguishing stock and mutual insurers. On average, there is no significant change in complaints in the non-disaster states of the heavily exposed insurer. However, when we separate stock and mutual insurers, we observe different responses in complaints. Column 2 of Table 4 shows that relative to the change in complaints in the non-disaster states of heavily exposed mutual insurers, their stock counterparts experience a 2.4% ($= \exp(0.024) - 1$) increase in complaints in the year following the disaster.

---

[15]Specifically, the timing of the natural disaster events is as follows: 2007 for Michigan and California; 2008 for Iowa, Oklahoma, and Texas; and 2010 for Tennessee. We did not consider disasters before 2007 or after 2010 to ensure 2 years of observations in the pre-disaster period and 1 year of observations after the disaster event.

TABLE 4
Natural Disasters as Negative Profitability Shocks

Table 4 reports the regression results on the complaint response in the unaffected states of insurers heavily exposed to natural disasters in the matched sample. We obtain natural disaster events in the United States from SHELDUS and focus on six events, corresponding to the states (WI, CA, IA, OK, TX, and TN) that had a single local disaster with over $500 million loss in a year during the period 2006–2010. Insurers underwriting more than 5% of their total policy premium in (one or more of) the six hit states in the disaster year t are defined as *heavily exposed*. A state is defined to be a *non-disaster state* if it is not subject to $500 million loss in local disasters in year t *and* if it is not one of the top five highest loss states in the same year. The dependent variable is the natural logarithm of 1 plus the number of consumer complaints for a given insurer in a particular state in year $t+1$, and the independent variables are measured in year t. For variable definitions and details of their construction, see the Appendix. All regressions include insurer, state, and year fixed effects. Standard errors are clustered at the insurer level. Robust t-statistics are reported in brackets. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Log State-Level Consumer Complaints of Non-Disaster States | | | |
| | Combined Sample | | Stock | Mutual |
	1	2	3	4
NO_DISASTER_STATE_POST	−0.020	−0.033*	0.009	−0.043*
	(−1.19)	(−1.75)	(0.33)	(−1.86)
NO_DISASTER_STATE_POST × STOCK		0.024*		
		(1.68)		
IMPORTANT_STATE			0.163*	0.297***
			(1.77)	(3.21)
NO_DISASTER_STATE_POST × IMPORTANT_STATE			0.246**	0.000
			(2.03)	(0.01)
log(ASSET)	−0.017	−0.017	−0.017	0.034
	(−0.78)	(−0.76)	(−0.76)	(0.65)
ROA	−0.035	−0.051	0.037	−0.664*
	(−0.37)	(−0.52)	(0.37)	(−1.92)
UNDERWRITING_PROFITABILITY	0.001	0.001	−0.001	0.006
	(0.41)	(0.58)	(−0.47)	(1.42)
STATE_UNDERWRITING_PROFITABILITY	0.000	0.000	−0.000***	0.000**
	(0.74)	(0.70)	(−4.53)	(2.01)
log(STATE_POLICY_PREMIUM)	0.025***	0.025***	0.017***	0.032***
	(6.69)	(6.70)	(5.84)	(3.44)
log(#_STATES)	−0.093***	−0.092***	−0.055	−0.113***
	(−3.89)	(−3.71)	(−1.37)	(−2.91)
Constant	0.418	0.407	0.377	−0.697
	(0.99)	(0.96)	(0.84)	(−0.67)
State FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Insurer FE	Yes	Yes	Yes	Yes
No. of obs.	15,644	15,644	10,635	5,009
R^2	0.517	0.517	0.340	0.620

The effect of a 2.4% increase in complaints in the non-disaster states of heavily exposed stock insurers, relative to their mutual counterparts, may appear marginal, both in economic magnitude and statistical significance (p-value = 0.093). However, this is likely a weak test by assuming a uniform effect across all non-disaster states in which an insurer underwrites. To further gauge the heterogeneity in complaint response regarding the stock insurers, we hypothesize that if the claim shock compels stock insurers to engage in more aggressive consumer practice ex post, it would be more economical for them to concentrate such practices in a few states where they have a large underwriting business. Alternatively, insurers may need to mobilize limited company resources in order to respond to the large number of claims in the disaster states, leading insurers to deploy means or make transfers from their larger underwriting states, which in turn produces deteriorating service quality in those states. In addition, the heterogeneity test can

also help address an alternative interpretation that stock insurers (more promptly) respond to the disaster state's experience and revise the claim processing standard in *all* states, resulting in an increase in complaints in the non-disaster states.

To test this idea, we identify within each insurer the non-disaster states that comprise 25% or more of the insurer's total underwriting business in a year.[16] We label such a state an *Important state,* which typically corresponds to the top one or two underwriting states for an insurer. To ease interpretation, we perform the regressions for the heavily exposed stock and mutual insurers separately. Column 3 of Table 4 shows that for the heavily exposed stock insurers, the increase in consumer complaints after the disaster shock is driven by the top one or two underwriting states of the insurer; complaints increase by 27.9% ($=\exp(0.246)-1$) in these states in the 1 year following the disaster event. The effect is both economically large and statistically significant at the 5% level. In comparison, there is no difference between the *Important state* and the rest for mutual insurers; the coefficient estimate is small (0.000) and statistically indistinguishable from 0.[17]

In summation, these results cast a causal interpretation of the complaint difference between stock and mutual insurers. One explanation of these results suggests stock insurers are ex ante less prepared or staffed for consumer service, resulting in insufficient resources to respond to consumer needs after large natural disasters. In this context, one possibility is that stock insurers move their limited claim adjustors after a natural disaster, leading to greater complaints in these unaffected areas.

Last, as further verification of our empirical design, we consider it useful to study whether insurers are indeed affected by the natural disasters in the six hit states and whether stock and mutual insurers are affected in a similar way. Table A1 in the Supplementary Material shows that consumer complaints in the six hit states increase in the year following the natural disaster, and the increase is substantially greater for insurers that are heavily exposed (i.e., those with a significant underwriting business in the hit states). In addition, heavily exposed mutual and stock insurers both experience an equally significant increase in complaints, suggesting that the effect of the shock in stock and mutual insurers is of comparable intensity.[18] Finally, there is no change in the number of complaints in the disaster year relative to the pre-disaster period, further validating our empirical identification.

---

[16]While the choice of 25% seems ad hoc, we repeat our analysis using the continuous variable, the share of the state's written premium over the insurer's total written premium in a year, and find the same results. To facilitate interpretation, we report the results using the dummy variable based on the 25% cutoff in the paper.

[17]To formally test the statistical difference, we also include both stock and mutual insurers in the same regression and conduct an F-test of the incremental effect of the *Important state* in stock insurers in the post-disaster year relative to the important states of their mutual counterparts in the post-disaster year. The *F*-statistics are highly statistically significant, supporting a strong and positive incremental effect in the stock insurers.

[18]A notable feature of the insurance industry arises from insurers' ability to purchase reinsurance, which helps offset exposure to large natural disasters. Wang, Chang, Lai, and Tzeng (2008) document that firms changing from stock to mutual offerings experience no change in their demand for reinsurance. Lin, Yu, and Peterson (2014) report similar reinsurance usage in both stock and mutual insurers. Furthermore, our results are robust to incorporating reinsurance.

D.   Shocks to Consumer Attention on Insurers' Customer Practice

To provide additional evidence on the potential for differing customer treatment across insurer type, we analyze a shock to customer attention to the claim handling process in California in 2008. Media attention on widespread concerns regarding insurer claim handling errors potentially influenced customers who felt poorly treated by their insurance company and filed a complaint with the state regulator. This attention shock is exogenous to any individual insurer, especially since this series of infractions occurred in health care insurance and, therefore, was unlikely to affect immediate changes in customer profiles.

To test the hypothesis, we study whether firms that had underwriting business in the state of California (prior to the shock) experience an increase in consumer complaints in California after 2008, relative to the change of consumer complaints in other states in which the same insurer underwrites policies. More importantly, we investigate the differential response in consumer complaints between stock and mutual insurers. To ensure comparability of mutual and stock insurers, we carry out the analysis using the matched sample. To isolate the consumer complaint response to the aforementioned attention shock, we focus on the year immediately after the shock as our post-shock period (i.e., 2009).

Table 5 reports the results. On average, treated insurers' consumer complaints experience a significant increase (20.5%) in California after the shock, relative to the same insurers' consumer complaint changes in other states (that they underwrote). The effect is statistically significant (at the 5% level). Moreover, decomposing the effect reveals that the consumer complaint response in California is *entirely* driven by the stock insurers. Column 2 of Table 5 shows that stock insurers experienced a substantial spike in consumer complaints in California. The 61.4% increase in California complaints among treated stock insurers is both economically large and statistically significant (at the 1% level). On the other hand, treated mutual insurers hardly witness any change in California's complaints after the shock.

As we include insurer fixed effects in the regressions, the complaint increase in California cannot be explained by differences in customer profiles across insurers. The immediate response (in the year right after the shock) also suggests that the effect is unlikely due to changes in customer profiles within an insurer resulting from the insurer's response in underwriting behavior. Moreover, the lack of complaint response among treated mutual insurers rules out the possibility that the shock may coincide with other state-level confounding factors, which could independently affect the Californian consumer's complaint filing behavior.[19]

To further address the possibility that customers of stock insurers have a higher propensity to complain after the shock (holding service quality constant), we study the differential change in the complaint success rate between stock and mutual insurers after the shock. Under this hypothesis, we expect to see a lower complaint success rate for treated stock insurers after the shock. As we only observe the complaint outcome at the insurer level (rather than insurer-state level),

---

[19]We also explicitly test and find no evidence of change in complaints in California among treated insurers in the year immediately before the shock. This again validates our identifying assumption that the attention shock is exogenous to consumer complaint filing behavior during the pre-shock period.

TABLE 5

Shock to Consumer Attention on Insurer's Customer Practice

Table 5 reports the regression results on the effect of the attention shock on consumer complaints in California among treated stock and mutual insurers. The dependent variable is the natural logarithm of 1 plus the number of consumer complaints for a given insurer in a particular state in year $t+1$, and the independent variables are measured in year t. CA_POST is a dummy equal to 1 for the state of California in the year of 2009 for insurers who had underwriting business in California in 2008. For other variable definitions and details of their construction, see the Appendix. All regressions include the insurer, as well as state and year fixed effects. Standard errors are clustered at the insurer level. Robust t-statistics are reported in brackets. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

	Log State-Level Consumer Complaints	
	1	2
CA_POST	0.187**	−0.172
	(2.34)	(−1.41)
CA_POST × STOCK		0.479***
		(2.99)
log(ASSET)	0.022	0.021
	(0.96)	(0.95)
ROA	−0.055	−0.059
	(−0.77)	(−0.81)
UNDERWRITING_PROFITABILITY	−0.001	−0.001
	(−0.49)	(−0.51)
STATE_UNDERWRITING_PROFITABILITY	0.000***	0.000***
	(3.83)	(3.84)
log(STATE_POLICY_PREMIUM)	0.028***	0.028***
	(13.09)	(13.07)
log(#_STATES)	−0.105***	−0.106***
	(−6.12)	(−6.16)
Constant	0.187**	−0.172
	(2.34)	(−1.41)
State FE	Yes	Yes
Year FE	Yes	Yes
Insurer FE	Yes	Yes
No. of obs.	34,339	34,339
R^2	0.536	0.537

we carry out the analysis at the insurer level.[20] After controlling for insurer-level characteristics and allowing state specific year fixed effects (i.e., the same controls as in Table 3), we find a higher success rate for complaints about California-based stock insurers, compared with the change in success rate for complaints about California-based mutual insurers. The post-shock increase in the complaint success rate for stock insurers is 46% (significant at the 1% level), which is economically large compared to the average complaint success rate of 60% among insurers (see Table 2). Put differently, we not only observe a substantial increase in complaints among stock insurers after the shock, but these complaints are also more likely to be determined in favor of consumers.

Taken together, the findings in Table 5 corroborate our previous interpretation that stock insurers provide poorer service to their customers than their mutual peers. Stock insurer customers express their dissatisfaction through complaint filing after another insurer's poor customer treatment of others is brought to their attention.

---

[20]For brevity, we describe our finding but do not report this additional result as a separate table in the paper (it is available from the authors).

E. Can Competition Mitigate Insurers' Conflict of Interest with Consumers?

The question arises as to whether there are any market mechanisms that could alleviate the conflict of interest between insurers and their consumers. One appealing argument concerns the effect reputation may have on (potential) consumers, a consideration that would encourage insurers, particularly stock insurers, to incorporate consumer welfare into their service practices. Arguably, concerns about reputation manifest most strongly in environments where competition for underwriting is strongest. While states heavily regulate P-C policy rates, market entry proves very competitive (Joskow (1973)). These factors suggest that insurers have a strong incentive to use service quality to differentiate themselves in the presence of entry threat, as they cannot compete on price to any great extent. On the other hand, greater competition for the same pool of consumers also implies a smaller underwriting business for each insurer on average, further weakening an insurer's incentive, especially that of a stock insurer, to provide quality service to consumers. The net effect remains an empirical question, which we also test and which we report on in this section.

We measure the extent of competitive pressure at the state level, using two proxies. The first one resembles the canonical Herfindahl index, which measures the concentration of underwriting insurers in a given state. Specifically, we construct a STATE_HERFINDAHL_INDEX as the sum of the squares of the market shares of insurers, underwriting within a given state in each year, where the market share for each insurer is equal to the insurer's written premium in the state divided by the state's total written premiums (by all insurers underwriting in the state). A large STATE_HERFINDAHL_INDEX suggests a high concentration (and low competition) in underwriting in the state. The second proxy simply counts the number of insurers underwriting in each state in each year (INSURER_PRESENCE). The more insurers operating in a state, the greater the competition each insurer faces from rivals. To take into account the different sizes of insurers, we weight each insurer by the share of the particular state's written premium relative to the insurer's total written premium across all states in that year. Put differently, we give a higher weighting to insurers that had a significant share of their total underwriting business in the state. The two measures have a correlation coefficient of -0.30, suggesting that they capture correlated but differential aspects of competition in underwriting.

Subsequently, using the matched sample, we study how an insurer's consumer complaints in a particular state and year vary with the level of competition in the state. We include the same control variables (insurer-level variables and insurer-state level characteristics) as in Table 4. In addition to insurer fixed effects, we include state-year fixed effects to control any effects caused by time variations at the state level that might correlate with our competition measures. As a result, the coefficient of the interactive term between the STOCK dummy variable and competition measures estimates the *within* insurer complaint differential between states with a varying degree of competition in a given year in stock insurers (relative to their mutual peers).

We report the results in Table 6. Column 1 shows that the complaint differential between a state with more competition (low STATE_HERFINDAHL_INDEX) and a state with less competition (high STATE_HERFINDAHL_INDEX) is more positive for a stock insurer than a comparable mutual insurer. To facilitate interpretation, we construct a dummy variable for the states in the bottom 10th percentile of the STATE_HERFINDAHL_INDEX distribution (LOW_CONCENTRATION) for each year and repeat the analysis (column 2). For a single stock insurer, complaints in low concentration states (more competition) are 8.8% (= exp(0.084)−1) higher than in the insurer's other states, relative to the equivalent rate for a comparable mutual insurer. Tests based on the measure INSURER_PRESENCE deliver the same message. Specifically, in states with high insurer presence (i.e., states in the top decile distribution of INSURER_PRESENCE in a given year), complaints about a stock insurer are 8.7% higher than for the same insurer in other states, compared to the equivalent rate for a comparable mutual insurer (column 4).

TABLE 6

Competition and Consumer Complaints

Table 6 reports the regression results on the effect of the level of competition within each state on the relationship between consumer complaint and stock status in the matched sample. We construct two proxies (continuous and discrete variables for each proxy), STATE_HERFINDAHL_INDEX and INSURER_PRESENCE, to measure the level of competition for each state. The dependent variable is the natural logarithm of 1 plus the number of consumer complaints for a given insurer in a particular state in year $t+1$, and the independent variables are measured in year t. For variable definitions and details of their construction, see the Appendix. All regressions include the insurer, as well as state-year fixed effects. Standard errors are clustered at the insurer level. Robust t-statistics are reported in brackets. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

	Log State-Level Consumer Complaints			
	1	2	3	4
STOCK × STATE_HERFINDAHL_INDEX	−1.120** (−2.12)			
STOCK × LOW_CONCENTRATION		0.084** (2.38)		
STOCK × INSURER_PRESENCE			0.001** (2.04)	
STOCK × HIGH_INSURER_PRESENCE				0.083*** (2.81)
log(ASSET)	0.016 (0.73)	0.016 (0.73)	0.016 (0.72)	0.016 (0.73)
ROA	−0.034 (−0.56)	−0.035 (−0.58)	−0.035 (−0.57)	−0.034 (−0.57)
UNDERWRITING_PROFITABILITY	−0.000 (−0.19)	−0.000 (−0.20)	−0.000 (−0.23)	−0.000 (−0.19)
STATE_UNDERWRITING_PROFITABILITY	0.000*** (3.55)	0.000*** (3.34)	0.000*** (3.52)	0.000*** (3.39)
log(STATE_POLICY_PREMIUM)	0.029*** (13.84)	0.029*** (13.72)	0.029*** (13.68)	0.029*** (13.72)
log(#_STATES)	−0.108*** (−6.38)	−0.108*** (−6.38)	−0.107*** (−6.34)	−0.107*** (−6.34)
Constant	−0.187 (−0.43)	−0.224 (−0.52)	−0.238 (−0.55)	−0.226 (−0.52)
State-year FE	Yes	Yes	Yes	Yes
Insurer FE	Yes	Yes	Yes	Yes
No. of obs.	41,761	41,761	41,761	41,761
R^2	0.543	0.543	0.543	0.543

These findings reveal that the increased conflict of interest in the presence of greater competition outweighs the reputational forces in explaining the complaint

gap between stock and mutual insurers. While this may appear puzzling at first glance, information asymmetry about customer treatment in a seldom-exercised experience good can explain, in part, the stock insurer's more muted response to the incentive to protect their reputation. Israel (2005) documents that information about the quality of the insurance product arrives slowly due to the infrequent nature of claims, exacerbating the information asymmetry problem. Agarwal, Chomsisengphet, Scholnick, and Zhang (2018) also found that consumer learning regarding quality occurs through informal networks and in a localized context.

V.   Impact of the Regulatory Environment

The results in Section III establish that stock insurers are subject to more consumer complaints, especially after negative profitability shocks and when facing more competitive pressure in the local underwriting business. Furthermore, the strong and persistent pattern of a difference in the number of complaints lodged against stock insurers compared to mutual insurers raises the interesting question of the role regulators play in mediating the complaint gap. In this section, we focus on the variation in the regulatory strength, as well as an anatomy of the regulatory objectives to further gauge the role of regulators.

A.   Does the Complaint Difference Decrease in a Strong Regulatory Environment?

First, we study whether and to what extent variation in the complaint wedge between stock and mutual insurers relates to the strength of the regulatory environment. Insurance companies are regulated at the state level and each state practices regulatory control largely at its own discretion. This poses the question that perhaps a strong regulatory environment in a particular state is associated with better regulatory oversight for consumer interest. While a typical insurer operates in more than one state, regulatory oversight is delegated to the state of its domicile, arguably to avoid the duplication of regulatory activities across states (Grace and Phillips (2008)). Therefore, to test the idea, we examine the relationship between the insurer-level complaint difference between stock and mutual insurers and the regulatory environment of the home state of the insurers. Econometrically, we add an interactive term between the STOCK dummy and various measures of regulatory strength to the specification in Table 3 and run the analysis in the matched sample.

We use the staff and budget size of each state's insurance department to measure the amount of expendable regulatory resources. From the NAIC 2010 Insurance Department Resources Report, we obtain the staff size of each state's insurance department during the period 2006–2010 and the dollar value of budget for each state's insurance department during the period between 2008 and 2011.[21] The first two columns of Panel A of Table 7 show the results with respect to these two measures. Surprisingly, states with more regulatory staff or a larger regulatory budget in each year are associated with a greater, rather than smaller, difference

---

[21]The budget information for year 2011 is the projected amount at the time of the report.

TABLE 7

Regulatory Environment and Consumer Complaints

Table 7 reports the matched-sample regression results on the role of regulatory environments across states in explaining the difference in insurer-level consumer complaints between the stock and mutual insurers. Panel A presents results on the number of consumer complaints, and Panel B presents results on the complaint outcome. The dependent variables are constructed in the same way as in Table 3 and measured in year $t + 1$, and the independent variables are measured in year t. For variable definitions and details of their construction, see the Appendix. We include the same controls as in Table 3. All regressions include home state (i.e., state of domicile)-year fixed effects. Standard errors are clustered at the home state-year level. Robust t-statistics are reported in brackets. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Panel A. Complaints

| | Log Consumer Complaints | | | |
	1	2	3	4
STOCK	−0.702**	−0.184	0.157***	0.261**
	(−2.40)	(−0.87)	(2.81)	(2.37)
STOCK × log(#_STATES) regulatory staff	0.162***			
	(3.20)			
STOCK × log(STATE_REGULATORY_BUDGET)		0.121**		
		(2.14)		
STOCK × New York based			0.310**	
			(2.27)	
STOCK × State commissioner appointed				−0.087
				(−0.71)
Controls	Yes	Yes	Yes	Yes
Home state-year FE	Yes	Yes	Yes	Yes
No. of obs.	2,411	1,430	2,895	2,895
R^2	0.388	0.398	0.385	0.385

Panel B. Complaint Outcomes

| | Complaint Success (%) | | | |
	1	2	3	4
STOCK	0.115	−0.044	−0.030	−0.056
	(0.76)	(−0.41)	(−1.33)	(−1.10)
STOCK × log(#_STATES) regulatory staff	−0.026			
	(−0.96)			
STOCK × log(STATE_REGULATORY_BUDGET)		0.009		
		(0.29)		
STOCK × New York based			−0.054	
			(−0.52)	
STOCK × State commissioner appointed				0.023
				(0.44)
Controls	Yes	Yes	Yes	Yes
Home state-year FE	Yes	Yes	Yes	Yes
No. of obs.	1,392	822	1,672	1,672
R^2	0.240	0.248	0.241	0.241

in complaint numbers between stock and mutual insurers. The effects are consistent for both measures of regulatory resources and both coefficients are highly statistically significant (either at the 1% or the 5% level).

In the insurance industry, New York state is considered to have the most stringent regulation (Pottier and Sommer (1998)).[22] We test whether the difference in complaint numbers between stock and mutual insurers is weaker in the state of New York. Again, much to our surprise, the difference in the overall rate of complaints about P-C insurers based in New York was 36.3% (= exp(0.310)−1) higher than the equivalent rate for other states (column 3 in Table 7, Panel A). The effect

---

[22]For example, it is the only state that requires all insurers licensed in New York to meet New York laws both in New York and other states.

is economically large and statistically significant at the 5% level. Last, we analyze consumer complaints about P-C insurers in each state in relation to the method of assigning the state's commissioner. It is a popular belief that an appointed commissioner is less subject to regulatory capture (e.g., by the insurers) compared to an elected state commissioner (Grace and Phillips (2008)). Unexpectedly, our results (column 4 of Table 7, Panel A) suggest consumer complaint rates are unaffected by the method of the commissioner's assignment. Although the coefficient is negative, it is not statistically distinguishable from 0.

A potential explanation for the preceding surprising result could stem from consumers' rational responses, reflected in their higher propensity to complain, in states with strong regulators. In addition, policyholders with stock insurers may be particularly responsive compared to those with mutual insurers. To investigate this possibility, we compare the difference in complaint outcomes between stock and mutual insurers across states. If consumers of stock insurers are more likely to complain to "tougher" regulators in anticipation of a higher likelihood of their concerns being addressed, we should observe a corresponding increase in the difference in complaint success rates between stock and mutual insurers in states with strong regulators. Panel B of Table 7 shows the results regarding complaint success rates. Across all four specifications, the difference in complaint success rates between stock and mutual insurers is not greater in states with greater regulatory strength. Coefficients are either of the wrong sign or economically small, and, more importantly, they are all statistically indistinguishable from 0. Thus, the greater complaint difference between stock and mutual insurers in states with strong regulators cannot be attributable to a (differential) increase in the inclination to complain among the stock insurers' consumers.

B. When Insurers Approach the Regulatory Threshold of Financial Insolvency

To understand the findings in Table 7, which shows that stock insurers in states with strong regulators are subject to an even higher rate of complaints relative to their mutual peers, we consider the regulator's dual objectives. In addition to promoting consumer protection, financial regulators are charged with guarding the financial health and solvency of the intermediaries. In principle, regulators should exert equal effort in achieving both goals. However, it remains a possibility that they face constraints in meeting both objectives. If so, then we will not necessarily observe a positive link between a strong regulatory environment and better service quality or, equivalently, a lower level of consumer complaints (especially among stock insurers). Furthermore, the regulator's emphasis on financial solvency may imply fewer resources available for supervising insurers' service quality, especially during times when insurers struggle with their financial performance and have limited capacity in catering to customer needs. The findings in Table 8 are indeed consistent with this interpretation.

We also explicitly test the hypothesis by examining the variation in the level of the risk-based capital ratio across insurers. Insurers with a risk-based capital ratio equal to or below 2 are subject to regulatory intervention. As a result, insurers near this insolvency threshold would face stronger regulatory scrutiny to ensure they maintain their financial health, which may exacerbate the tension or conflict

TABLE 8

Regulatory Rules and Complaints

Table 8 reports the matched-sample regression results on the differential response of stock and mutual companies to regulatory rules. Panel A presents the results on the number of complaints and complaint outcome response to the regulatory threshold of financial insolvency. Panel B presents the results on the number of complaints and complaint outcome response to the regulatory requirement on insurance policy rates. The dependent variables are constructed in the same way as in Table 3 and measured in year $t+1$, and the independent variables are measured in year t. For variable definitions and details of their construction, see the Appendix. We include the same controls as in Table 3. All regressions include home state (i.e., state of domicile)-year fixed effects. Standard errors are clustered at the home state-year level. Robust t-statistics are reported in brackets. * and *** indicate statistical significance at the 10% and 1% levels, respectively.

	Log Consumer Complaints	Complaint Success (%)
	1	2
Panel A. Role of Regulatory Threshold of Financial Insolvency		
STOCK	0.151***	−0.032
	(2.84)	(−1.37)
HIGH_INSOLVENCY_RISK	0.035	0.133
	(0.09)	(1.62)
STOCK × HIGH_INSOLVENCY_RISK	0.827*	−0.168*
	(1.77)	(−1.84)
Controls	Yes	Yes
Home state-year FE	Yes	Yes
No. of obs.	2,895	1,672
R^2	0.391	0.242
Panel B. Impact of Regulatory Requirement on Policy Rates		
STOCK	0.003	−0.016
	(0.04)	(−0.42)
%_RATE_REGULATED	0.180	−0.035
	(1.60)	(−0.57)
STOCK × %_RATE_REGULATED	0.449***	−0.036
	(3.28)	(−0.52)
Controls	Yes	Yes
Home state-year FE	Yes	Yes
No. of obs.	2,895	1,672
R^2	0.394	0.242

between the profit objective and consumer interest, particularly for stock insurers. Empirically, we classify these insurers as those whose risk-based capital ratio is equal to or below 2.5 (*High insolvency risk*).[23] Subsequently, in the matched sample, we study the difference in complaint numbers between stock insurers and their mutual peers when they face high financial insolvency risk.

In columns 1 and 2 of Panel A of Table 8, we report that as stock insurers approach the regulatory insolvency threshold, they experience a 129% ($=\exp(0.827)-1$) greater rate of increase in complaints compared with their mutual counterparts in the same position. We also find that their complainants have a 16.8% lower rate of success, compared to mutual policyholders. Both coefficients are significant at the 10% level. These results support our hypothesis that regulators are constrained in promoting service quality especially when insurers' financial health is at risk.

---

[23]The choice of 2.5 arises from the need to measure imminent insolvency risk while ensuring a sufficient sample size (i.e., the power of the test). Alternatively, one can use a less stringent threshold, such as 3.0, which gives an even larger sample size.

C.   The Impact of Stringent Regulatory Laws on Policy Rates

Regulators' constraints in meeting their dual goals (financial health of the business and consumer protection) may also manifest in the multiple aspects of their objective to promote consumer protection. As mentioned earlier, policy rates are heavily regulated at the (underwriting) state level, although the extent of rate regulation varies across states. In particular, where policy rates are stringently regulated, insurers are required to file for prior approval to charge a rate that is different from that determined by a rate advisory organization (Grace and Leverty (2010)). Arguably, the objective of (stringent) rate control is to promote affordable insurance policies to a broad consumer population. However, such a stringent rule may have unintended consequences as regulated prices limit profit margins and, therefore, intensify the conflict between profit objectives and consumer interest.

To examine the implication of stringent regulatory laws on policy rates, we compute, for each insurer, the fraction of its written premium in each year that is written in a state with stringent regulatory laws on policy rates (%_RATE_REGULATED). Subsequently, we study whether the difference in consumer complaints between stock and mutual insurers varies when a higher fraction of an insurer's premiums are subject to stringent rate control. Econometrically, we add an interactive term between the STOCK dummy and %_RATE_REGULATED to the specification in Table 3 and perform the analysis with the matched sample. The results are reported in Panel B of Table 8.

The results show that the difference in complaints between stock and mutual insurers increases when rate control becomes more stringent. Compared with an equivalent mutual insurer, stock insurers experience a 5.7% (= exp(0.449 × 0.1)−1) increase in complaints for a 10-percentage-point increase in the fraction of written premium, subject to stringent rate control. However, the degree of rate control does not appear to affect complaint success rates (i.e., did not lower them).

Taken together, these results are consistent with the interpretation that the regulatory focus on supervising policy rates exerts profit pressure, resulting in a lower ability for insurers, especially stock insurers, to emphasize customer satisfaction.

VI.   Conclusions

In a competitive market, equity structures that survive provide customers with valuable products and services (Fama and Jensen (1983)). Ownership structure arguably influences both firm governance and operating efficiency (Shliefer and Wolfenzon (2002), Mehrota, Morck, Shim, and Wiwattanakantang (2013)). Yet, evaluating the impact of equity structure on corporate outcomes remains difficult. Our analysis exploits a unique database of consumer complaints of 522 mutual and 1,224 stock insurance companies in order to evaluate consumer satisfaction across differing ownership forms. We find that stock financial intermediaries receive 25% more consumer complaints than their equivalent mutual intermediary peers. More importantly, we do not find any differences in the success rates of consumer complaints against stock or mutual insurers that are decided by independent arbitrators. We interpret this result to suggest that differing incidences of complaints between stock and mutual insurers reflect a differing quality in

customer satisfaction. To provide causal evidence for this correlational evidence, we compare insurer responses after natural (state-level) disasters in both the affected states and unaffected states. We find a substantial increase in consumer complaints about stock insurers in unaffected states but not about mutual insurers. Similarly, after a shock to consumer attention about poor claim handling in California, we document a significant increase in complaints about stock insurers (but not mutual insurers). The increased complaints do not appear to be frivolous, as the insurers' adjudication success rate for these complaints increases by 38%.

Further analysis indicates that competition exacerbates the complaint difference between stock and mutual insurers, questioning the effectiveness of market mechanisms in controlling stock insurers' incentives to neglect consumer service. In addition, we find that the difference is even greater in states with stronger regulatory oversight. To evaluate the effects of regulatory constraints due to the dual goals of intermediary solvency and consumer protection, we focus on risk-based capital thresholds. We find substantially greater complaints about stock insurers relative to similar mutual insurers as they approach capital requirement thresholds. Moreover, we find that when regulators seek to promote insurance availability by specifying stringent rate rules, consumer complaints about stock relative to mutual insurers increase.

Our analysis provides several important contributions to understanding the problems in the financial intermediary sector. First, we provide compelling evidence on the existence of substantial problems that consumers face with stock insurers, which highlights the need for greater education and transparency regarding intermediary reliability. Second, our analysis suggests that mutual intermediaries successfully compete in the insurance industry because they provide reliable service quality to their customers. In contrast, stock insurers focus on improving operating efficiency, suggesting these organizational structures lead to differing competitive strategies: product quality versus cost.

Appendix. Variable Definitions

1.   Complaint Variables

CONSUMER_COMPLAINTS: The number of formal complaints insurance consumers file to the state regulators, aggregated at the insurer-year level.

STATE_LEVEL_CONSUMER_COMPLAINTS: Measures the number of formal consumer complaints in a state in which an insurer underwrites in each year.

Complaint Outcome

COMPLAINT_SUCCESS_%: The percentage of an insurer's closed consumer complaints in a year that is resolved in compromised settlement (with the consumer), the company's position being overturned, or a fine or disciplinary action against the insurer.

2.   Insurer Characteristics

Insurer Level

STOCK: A dummy variable equal to 1 if the insurance company has stock ownership, and 0 otherwise.

ASSET: The size of an insurance company's assets in each year.

POLICY_PREMIUM: The direct policy premium written for an insurance company in each year.

ROA: The ratio of net income divided by assets for a given insurance company in a year. It is winsorized at the top and bottom 0.5% level.

UNDERWRITING_PROFITABILITY: The ratio of the direct premium earned by an insurance company in a year divided by the sum of the direct loss incurred, direct defense expenses incurred, and commission and taxes paid by the same insurer in the same year. It is winsorized at the top and bottom 0.5% level.

INDEPENDENT: A dummy variable equal to 1 if the insurance company is not part of an insurance group (or belongs to an insurance group comprised of only one company), and 0 otherwise.

#_STATES: The number of states in which a given insurance company has underwriting business in each year.

Insurer-State Level

STATE_UNDERWRITING_PROFITABILITY: The ratio of the direct premium earned by an insurance company for a particular state in each year divided by the sum of the direct loss incurred, direct defense expenses incurred, and commission and taxes paid by the same insurer for that state in the same year. It is winsorized at the top and bottom 0.5% level.

STATE_POLICY_PREMIUM: The direct policy premium written for a particular state of an insurance company in each year.

NO_DISASTER_STATE_POST: A dummy variable defined as follows: For the six states (WI, CA, IA, OK, TX, and TN) that have a single local disaster with over $500 million loss in a year during the period 2006–2010, insurers underwriting more than 5% of their total policy premium in (one or more of) the six hit states in the disaster year t are defined as *heavily exposed*. A state is defined to be *unaffected* if it is not subject to $500 million loss in local disasters in year t *and* if it is not one of the top five highest loss states in the same year. NO_DISASTER_STATE_POST is equal to 1 for the *unaffected* states in year t of the *heavily exposed* insurers, and 0 otherwise.

IMPORTANT_STATE: A dummy variable equal to 1 for a state of an insurance company if that state's written premium comprises over 25% of the insurance company's total written premium in that year, and 0 otherwise.

STATE_HERFINDAHL_INDEX: The sum of the squares of the market shares of insurers underwriting within a given state in a year, where the market share for each insurer is equal to the insurer's written premium in the state divided by the state's total written premium.

LOW_CONCENTRATION: A dummy variable equal to 1 if the state falls in the bottom decile of the STATE_HERFINDAHL_INDEX: Distribution among all states in each year, and 0 otherwise.

INSURER_PRESENCE: The weighted sum of the number of insurers underwriting in a state in each year, with the weight for each insurer equal to the share of the state's written premium relative to that insurer's total written premium in that year.

HIGH_INSURER_PRESENCE: A dummy variable equal to 1 if the state falls in the top decile of the INSURER_PRESENCE distribution among all states in each year, and 0 otherwise.

Supplementary Material

Supplementary Material for this article is available at https://doi.org/10.1017/S0022109019000474.

References

Agarwal, S.; S. Chomsisengphet; B. Scholnick; and M. Zhang. "Salience and Peer Effects: Durable Good Choice after a Neighbor's Warranty Claim" Working Paper, National University of Singapore (2018).

Balto, D. "Reviving Competition in Healthcare Markets: The Use of Section 5 of the FTC Act, Federal Trade Commission," available at www.ftc.gov (2008).

Berger, A., and T. Hannan. "The Efficiency Cost of Market Power in the Banking Industry: A Test of the Quiet Life and Related Hypotheses." *Review of Economics and Statistics*, 80 (1998), 454–465.

Bubb, R., and A. Kaufman. "Consumer Biases and Mutual Ownership." *Journal of Public Economics*, 105 (2013), 39–57.

Cortes, K., and P. Strahan. "Tracing Out Capital Flows: How Financially Integrated Banks Respond to Natural Disasters." *Journal of Financial Economics*, 125 (2017), 182–199.

Cummins, J.; M. Weiss; and H. Zi. "Organizational Form and Efficiency: The Coexistence of Stock and Mutual Property-Liability Insurers." *Management Science*, 45 (1999), 1254–1269.

Dafny, L., and S. Ramanarayanan. "Does It Matter If Your Health Insurer Is For-Profit: Effects of Ownership on Premiums, Coverage, and Medical Spending" Working Paper, Northwestern University and NBER (2013).

Doherty, N. A.; A. V. Kartasheva; and R. D. Phillips. "Information Effect of Entry into Credit Ratings Market: The Case of Insurers' Ratings." *Journal of Financial Economics*, 106 (2012), 308–330.

Ellul, A.; C. Jotikasthira; C. T. Lundblad; and Y. Wang. "Is Historical Cost Accounting a Panacea? Market Stress, Incentive Distortions, and Gains Trading." *Journal of Finance*, 70 (2015), 2489–2537.

Erhemjamts, O., and J. Leverty. "The Demise of the Mutual Organizational Form: An Investigation of the Life Insurance Industry." *Journal of Money, Credit and Banking*, 42 (2010), 1011–1036.

Fama, E., and M. Jensen. "Separation of Ownership and Control." *Journal of Law and Economics*, 26 (1983), 301–325.

Glaeser, E., and A. Shleifer. "Not-For-Profit Entrepreneurs." *Journal of Public Economics*, 81 (2001), 99–115.

Grace, M., and J. Leverty. "Political Cost Incentives for Managing the Property Liability Insurer Loss Reserve." *Journal of Accounting Research*, 48 (2010), 21–49.

Grace, M., and R. Phillips. "Regulator Performance, Regulatory Environment and Outcomes: An Examination of Insurance Regulator Career Incentives on State Insurance Markets." *Journal of Banking and Finance*, 32 (2008), 116–133.

Hansmann, H. "The Organization of Insurance Companies: Mutual versus Stock." *Journal of Law, Economics, and Organization*, 1 (1985), 125–153.

Harrington, S. "Effects of Prior Approval Rate Regulation Auto Insurance." In *Deregulating Property-Liability Insurance*, J. David Cummins, ed. Washington, DC: Brookings Institution Press (2002), 285–314.

Israel, M. "Services as Experience Goods: An Empirical Examination of Consumer Learning in Automobile Insurance." *American Economic Review*, 95 (2005), 1444–1463.

Joskow, P. "Cartels, Competition, and Regulation in the Property-Liability Insurance Industry." *Bell Journal of Economics and Management Science*, 4 (1973), 375–427.

Ke, B. "Taxes as a Determinant of Managerial Compensation in Privately Held Insurance Companies." *Accounting Review*, 76 (2001), 655–674.

Lamm-Tennant, J., and L. T. Starks. "Stock versus Mutual Ownership Structures: The Risk Implications." *Journal of Business*, 66 (1993), 29–46.

Leverty, J. T., and M. F. Grace. "Do Elections Delay Regulatory Action?" *Journal of Financial Economics*, 130 (2018), 409–427.

Lin, Y.; J. Yu; and M. Peterson. "Reinsurance Networks and Their Impact on Reinsurance Decisions: Theory and Empirical Evidence." *Journal of Risk and Insurance*, 82 (2014), 531–569.

Masulis, R. "Changes in Ownership Structure: Conversions of Mutual Savings and Loans to Stock Charter." *Journal of Financial Economics*, 18 (1987), 29–59.

Mayers, D., and C. Smith. "Contractual Provisions, Organizational Structure, and Conflict Control in Insurance Markets." *Journal of Business*, 54 (1981), 407–434.

Mayers, D., and C. Smith. "Ownership Structure and Control: The Mutualization of Stock Life Insurance Companies." *Journal of Financial Economics*, 16 (1986), 73–98.

Mehrota, V.; R. Morck; J. Shim; and Y. Wiwattanakantang. "Adoptive Expectations: Rising Sons in Japanese Family Firms." *Journal of Financial Economics*, 108 (2013), 840–854.

Mootz, F. "The Sounds of Silence: Waiting for Courts to Acknowledge That Public Policy Justifies Awarding Damages to Third-Party Claimants When Liability Insurers Deal with Them in Bad Faith." *Nevada Law Journal*, 2 (2002), 443–488.

Pottier, S., and D. Sommer. "Regulatory Stringency and New York Licensed Life Insurers." *Journal of Risk and Insurance*, 65 (1998), 485–502.

Rasmusen, E. "Mutual Banks and Stock Banks." *Journal of Law and Economics*, 31 (1988), 395–421.

Shliefer, A., and D. Wolfenzon. "Investor Protection and Equity Markets." *Journal of Financial Economics*, 66 (2002), 3–27.

Wang, J.; V. Chang; G. Lai; and L. Tzeng. "Demutualization and the Demand for Reinsurance." *The Geneva Papers*, 33 (2008), 566–584.