When Insurers Cannot Raise Prices: Product Design and Coverage Adjustment in Home Insurance *

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July 27, 2026

JMP preliminary draft - Do not circulate

Abstract

I study home insurers' responses to pricing constraints. I combine manually collected California rate and product-design changes filings with insurer-product-ZIP-code underwriting records. Proposed rates systematically update to reflect past exposure-related costs but diverge from actuarial fundamentals and bunch at a 7% regulatory threshold. Using this bunching as an instrument, I find that pricing-constrained insurers restrict policy forms, revise underwriting rules, reduce exposures, and withdraw from wildfire-prone areas. Consistent with supply-side dynamics, the insurer of last resort expands where more insurers are price-constrained. Adjustments shift from price to nonprice margins to reduce exposure to inadequately priced risks.

JEL classification: G22, G28, L51, Q54, D22
Keywords: Home insurance; rate regulation; climate risk; product design; underwriting guidelines.

*For helpful comments, I thank Miguel Ferreira, Andreas Fuster, Steven Ongena, Felix von Mexerinck, Zacharias Sautner

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1 Introduction

With the increased frequency and scale of climate disasters, climate-related damages to property have grown, exposing affected insurance markets to heightened stress. On the one hand, climate-related losses have increased the cost of providing coverage (Sastry, Sen, and Tenekedjieva, 2024; Keys and Mulder, 2024). On the other hand, concerns about affordability, insurance regulation, and households' limited understanding of their climate risk exposure have limited insurers' ability to increase premiums (Oh, Sen, and Tenekedjieva, 2025; Boomhower, Fowlie, and Plantinga, 2023; Boomhower, Fowlie, Gellman, and Plantinga, 2025). The resulting tension is central to the emerging home insurance gap. When prices cannot adjust, insurers may reduce exposure to inadequately priced risk by adjusting nonprice margins, including product redesign via revised underwriting guidelines, ultimately resulting in reduced effective coverage, with significant implications for homeowners exposed to climate risks.

This paper studies how home insurers respond to rising exposure costs under constrained rate increases. The empirical setting is the California homeowners insurance market. California is a natural laboratory for three reasons. First, the state is highly exposed to wildfire risk, making the tension between cost of coverage and affordability especially salient for insurers (California Department of Insurance, 2023). Second, California's regulatory environment, with Proposition 103, requires insurers to file product level rate changes, justified with detailed actuarial inputs, and product design changes, consisting of redesigned underwriting guideline forms and pricing rules (e.g., exclusion of endorsements, properties with characteristics that expose them to heightened risk, ZIP codes exposed to concentrated risk). These requirements allow for granular measurement of insurer-product actuarially justified pricing, chosen pricing, and coverage design characteristics. Third, the regulatory process imposes rate change pre-approvals, limiting insurers' incentives to increase rates above a stated threshold of 7% (relative to the previous rate). This regulatory framework constitutes

an ideal empirical setup to study quasi-exogenous rate setting of insurers that depart from actuarial pricing drivers to bunch at the regulatory threshold.

I construct a novel dataset from more than 2,000 hand-collected regulatory filings for 118 insurers and four homeowners insurance product markets-owner-occupied homes, condominiums, tenants, and mobile homes-over 2016-2023. These filings contain insurer-product level actuarial pricing inputs, including past losses, developing losses, legal expenses, and catastrophe factors. Notably, they detail regulatory-suggested and actuarially justified minimum and maximum rate changes and insurers' ultimate rate setting. I supplement this dataset with novel product-redesign filings, reflecting underwriting guideline changes, exclusions, ineligibility rules, and pricing-rule revisions. Lastly, I obtain insurer-product-ZIP code-year underwriting data via a Freedom of Information Act (FOIA) request to the California Department of Insurance, covering written premiums and exposures. Overall, this dataset maps past exposure costs to pricing and product redesign decisions, and realized insurance availability.

I present three main findings. First, I document the drivers of insurers' rate changes. Using a hazard analysis, I show that higher developing losses, rather than realized losses, are strongly associated with the probability of an insurer filing for a rate change. Conditional on filing, past losses, developing losses, and catastrophe factors predict higher rate changes. The effects are economically sizeable: a one-standard-deviation increase in past exposure losses increases proposed rate changes by approximately 36% relative to the unconditional average proposed change. These results validate that regulatory filings for rate changes capture economically meaningful cost pressure. Notably, they document that insurers systematically update rates in response to cost pressure, indicating that their past rates do not adequately price in experienced losses.

Second, I study insurers' pricing constraints and nonprice adjustment margins. I find

evidence of significant regulatory pricing constraints across all home insurance products. Insurers' rate changes significantly bunch at the 7% regulatory rate change threshold, effectively limiting rate hikes and detaching rates from actuarial inputs. I use a bunching estimator and instrumental variable approach, in the spirit of Collier, Ellis, and Keys (2025), to compare filings with the same minimum actuarially justified regulatory rate level, but with minimum actuarial regulatory rate changes just above and below the 7% threshold, thereby subject to binding and nonbinding regulation, respectively. This design holds fixed the level of actuarially indicated rate need while exploiting the discontinuous regulatory cost of proposing an increase at or above 7%. I find that constrained rate hikes induce product restrictions: A 1% lower increase in rates, instrumented by the bunching at the regulatory threshold, increases the likelihood of product restriction by about 8%. Overall, these results uncover the use of nonprice levers in insurers' product design when confronted with regulatory constraints.

I additionally study the heterogeneity in product restrictions. The regulatory framework studied classifies insurance product redesign into underwriting guideline forms and rules revisions. Specifically, I uncover that the effects of insurance pricing constraints are especially concentrated within cases of underwriting guideline forms' restrictions and rating-rule revisions. Results indicate that when insurers cannot fully incorporate actuarial cost pressures into prices, they redesign their products to limit coverage of risks that remain inadequately priced.

To address the concern that the effects are driven by years with abnormal wildfire-related losses, I saturate the baseline specification with matched minimum regulatory formula-implied rate bin-by-filing-year fixed effects. Additionally, to address the concern that the effect is characterized by within-insurer spillovers from one constrained product to another, I saturate the specification with insurer-by-product fixed effects. These fixed effects therefore compare insurer-product rate and product-design filings occurring in the same year and at

similar formula-implied rate levels, but involving changes above or below 7% relative to the previously approved rate.

Third, I relate insurers' pricing constraints to realized coverage and insurance availability at the ZIP code level. If insurers adjust nonprice margins to respond to pricing constraints by restricting underwriting guideline forms and pricing rules, I expect to observe supply-side-driven constrained coverage for such insurers. Specifically, contrary to usual demand-supply dynamics, pricing constraints should not imply heightened insurance coverage, but insurers' withdrawals. To study insurance coverage implications of pricing constraints, I merge the regulatory filing data with insurer-product-ZIP code-year underwriting data. I replicate the threshold-based instrument approach, which compares insurers within the same rate level bin, but with minimum actuarially justified rate changes just above and below the threshold. Additionally, to control for local insurance coverage demand shocks, I further saturate the main specification with ZIP code-by-year fixed effects. I find that threshold bunching-induced pricing constraints consist of lower increases in average premiums per exposure and lead to restricted exposures written and higher exit probability. Effects are economically sizeable: a 1% reduction in rates lowers written premiums by 1-2% and exposures written by approximately 1.6% and increases exit probability by 0.42 percentage points. These results support the evidence of nonprice adjustments targeting effective coverage restrictions, rather than accommodating increased insurance coverage demand, as insurers face pricing constraints.

To further uncover the drivers underlying insurers' responses to constrained rates, I investigate the heterogeneity of these results conditional on the wildfire risk level of different ZIP codes. If insurers' underwriting decisions target reduced exposure to nonpriced actuarial costs, I expect insurers facing constrained pricing to experience reduced average premiums and exposures in every ZIP code on average, but to fully withdraw especially from high wildfire-exposed ZIP codes. Consistent with product restrictions, results show no differen-

tial in reduced premiums and exposures, but significant concentration of exits of pricing-constrained insurers in wildfire-risk-exposed ZIP codes.

I next address the concern that the observed effects are not supply-side, but demand-driven, for instance due to households' physical relocation away from high wildfire-exposed ZIP codes. I show that the California insurer of last resort expands coverage in areas where pricing-constrained insurers previously had larger market shares. The results suggest that the insurer of last resort absorbs part of the coverage displaced from the pre-existing insurance supply and further supports the interpretation of the effects being driven by insurers' adjustments over nonprice margins, rather than demand dynamics.

The paper contributes to two streams of literature. First, it adds to work on insurers' responses to frictions. Work focusing on pricing as an adjustment margin shows that constrained insurers distort prices across product lines when other business lines are subject to financial constraints (Koijen and Yogo, 2015b,a; Ge, 2022), or across geographies, when other markets are subject to regulatory constraints (Oh, Sen, and Tenekedjieva, 2025). Unlike prior settings, I exploit a regulatory environment that allows me to map pricing and nonpricing adjustment margins as responses to rising cost pressure within *the same* product line, thereby uncovering a mapping from pricing constraints to product design within the supply side of home insurance. Foundational work focusing on catastrophe insurance documents that several frictions, such as limited diversification, can result in premium spikes and limited quantities when risk exposure increases (Froot, 2001; Froot and O'Connell, 2008; Zanjani, 2002; Ibragimov, Jaffee, and Walden, 2009). Recent work motivated by rising climate change-driven losses explores these dynamics within the property insurance context (Jung and Jung, 2025; Abramson, Sastry, Sen, and Tenekedjieva, 2025; Boomhower, Fowlie, Gellman, and Plantinga, 2025; Sastry, Sen, and Tenekedjieva, 2024; Keys and Mulder, 2024; Ge, Lam, and Lewis, 2022). I further add to this literature by exploring supply-side re-

sponses to pricing constraints, as growing climate-related loss pressure becomes binding. I uncover product design as a novel nonpricing margin through which insurers can respond to constraints on their ability to reflect higher expected losses in rates.

Second, this paper contributes to the broader literature on rate regulation and firm behavior. Fundamental work shows that rate-regulated firms may respond to price constraints by adjusting other margins such as quality, investment, or supply (Baron, 1981; Hatfield, Plott, and Tanaka, 2012; Dixit, 1991; Earle, Schmedders, and Tatur, 2007). I complement this evidence by studying the implications of rate regulation within the home insurance market. I show that, similar to other corporations, pricing-constrained insurers adjust nonprice levers such as product design and coverage, consistent with reduced product quality. However, unlike other corporations, reduced insurance quality and supply consist of reduced effective coverage, with potentially severe implications for households exposed to rising climate risks.

2 Institutional Background

California homeowners insurance rates are regulated under Proposition 103, a 1988 law that applies to property and casualty insurance products sold in the state. For homeowners insurance, insurers must file product level rate changes with the California Department of Insurance. These filings include detailed financial data and actuarial calculations supporting the proposed rate change.

The first central feature of the filing process is the distinction between actuarially suggested regulatory rate changes and the insurer's proposed rate change. The regulator maps insurer-product financials into a minimum and maximum suggested rate change. The minimum is intended to protect insurer solvency, whereas the maximum limits the burden on policyholders, thereby effectively defining a regulatory corridor of suggested rate changes. These rates are predetermined based on a fixed regulatory formula that inputs for each

insurer-product past years' loss experience, developing losses, income offsets, and regulatory profit parameters. In practice, ultimately the insurer chooses a proposed rate change deliberately.

The second central feature is a regulatory rate change threshold. Prior to the approval of the proposed rate, if the rate change is greater than 7%, it can trigger public notice, potential consumer-intervenor participation, and a formal administrative hearing process.[1] This threshold is fixed and independent of the regulatory minimum and maximum rate change corridor. In other words, even if actuarial data justify rate increases above 7%, insurers may have incentives to propose increases below the threshold to avoid an onerous regulatory path.

This institutional environment creates two empirical advantages. First, the filings reveal both cost-based actuarial benchmarks and insurers' chosen proposed rates. Second, the 7% threshold creates quasi-experimental variation in pricing constraints: filings with actuarially indicated predetermined minimum rate changes just above 7% face a discontinuously stronger incentive to limit proposed rates than otherwise similar filings just below the threshold.

3 Data

3.1 Regulatory Rate Filings

I hand collect more than 2,000 California homeowners insurance regulatory filings over 2016-2023. The sample covers 118 insurers and four product markets: homeowners insurance, condominium insurance, tenants insurance, and mobile-home insurance. From each prior-approval rate change filing, I extract the insurer, product, filing date, financial inputs, proposed rate, minimum regulatory rate, maximum regulatory rate, and the associated percentage rate changes.[2] These documents make it possible to observe both cost-based actuarial

[1] Consumer-intervenor proceedings between 2013 and 2023 were associated with substantial delays and costs, including an average delay of 263 days and total intervenor compensation of 12.2 million dollars (Lehmann and Adams, 2024).

[2] Figure IA.1 shows an example of the regulatory filing documents.

indications and insurers' pricing choices.

Insurers file for product level rate changes on average every 400 days. The average proposed rate change is approximately 6%. The mean minimum regulatory indicated change is approximately -7%, while the mean maximum regulatory indicated change is approximately 22%. Thus, the average proposed change lies near the midpoint of the regulatory corridor. Summary statistics for the regulatory filing data are reported in Table 1.

I also collect product-design filings and underwriting guideline change records. From prior-approval underwriting guideline forms and pricing rules filings, I extract whether an insurer changes underwriting forms, restricts eligibility, withdraws rules, or revises pricing rules. I classify product-design changes into four categories: any restriction, form restriction, rule withdrawal, and rule revision.

These filings provide direct evidence on nonprice product-market decisions.[3] Between 2016 and 2023, 60% of insurers filed at least one restriction for at least one product. Insurers experienced, on average, three product restriction events during the sample period. Owner-occupied and mobile-home coverages are the most frequently restricted.

3.2 ZIP Code Level Underwriting Records

I obtain administrative records on insurer-product-ZIP code-year level underwriting activity from the California Department of Insurance through a Freedom of Information Act (FOIA) request. I extract written premiums and exposures by insurer, product, ZIP code, and year from 2015 to 2022.[4]

I link these records with regulatory filings described in Section 3.1 at the insurer-product-

[3] Figure IA.2 shows an example of the product-design filing documents.

[4] While administrative records include data on dwelling and force-placed insurance products, I align with the regulatory filings dataset described in Section 3.1 by extracting data on homeowners insurance, condominium insurance, tenants insurance, and mobile-home insurance.

experience year level. Insurers are identified by their NAIC codes, and products are identified by their regulatory policy form codes, which are consistent across the datasets.[5]

Summary statistics for the underwriting data are shown in Table 2. Insurers underwrite approximately 72 exposures per insurer-product-ZIP code-year on average. Average premiums are approximately $891 per exposure, with substantial heterogeneity across products: tenant coverage is less expensive, while owner-occupied coverage is more expensive.

4 Rate changes

Rate filings and rate changes are ultimately deliberate insurer level decisions, which call for an analysis of their determinants. First, I document the role of actuarial determinants of rate changes, focusing on past exposure-related losses and expenses. Second, I study the role of regulation and potential regulatory constraints affecting insurers' rate change decisions.

4.1 Actuarial Determinants of Rate Changes

Insurers in California can file rate changes with the regulator deliberately at any time of the year. They need to justify their proposed changes by disclosing the actuarial determinants of the new rates, including the detailed history of past exposure-related losses and expenses, in turn, providing a unique setting to document the strategic timing of rate changes. I examine how insurers select their rate filing timing conditional on past experience using a discrete-time, hazard-style choice design. I link each insurer–product filing, at the spell level, to its product-specific financials from the previous six reported historical experience years into a filing-period panel and define the filing experience year as the most recent of the six. The experience period is chosen based on the California Insurance Regulation (Proposition 103), which sets the maximum number of previous experience years that may justify a rate change

[5] I extract information at the individual legal entity level of granularity, rather than grouping it at the insurer-parent level, consistently with the level of granularity of regulatory filings. Regulatory policy form codes are *HO* for homeowners, *HC* for condominium, *HT* for tenant, *MO* for mobile-home.

to six. I then estimate the following linear probability model in which selection is related to the key financials deemed as relevant by the regulators to assess insurers' rate change requests:

$$\begin{aligned} Filing\ probability_{ipt} = {} & \beta_1 Past\ losses_{ipt} + \beta_2 Developing\ losses_{ipt} + \beta_3 Past\ legal\ expenses_{ipt} \\ & + \beta_4 Developing\ legal\ expenses_{ipt} + \beta_5 Catastrophe\ factor_{ipt} \\ & + \alpha_t + \alpha_{ip} + \varepsilon_{ipt}. \end{aligned} \tag{1}$$

where $Filing\ probability_{ipt}$ equals one if experience year t is selected for filing any rate change request for product p by insurer i, and zero otherwise. The specification includes filing quarter fixed effects, α_t, which capture events driving financials and filing decisions of insurers and products jointly, such as the occurrence of a significant wildfire. Moreover, it includes insurer-product fixed effects, α_{ip}, which ensure that estimates reflect the comparison of candidate experience years for the same insurer-product pair over time, thereby absorbing all time-invariant determinants. Standard errors are clustered at the insurer level. The estimates of the coefficients β_k, with k from 1 to 5, test whether insurers systematically time the experience window used to justify a rate request toward periods exhibiting more adverse realized or projected underwriting fundamentals.

Table 3 reports the results in Column 1. Insurers' choice of the experience period underlying a rate filing for a given product is driven primarily by developing actuarial adjustments rather than by realized losses. Within a given filing, experience periods with larger projected loss development are substantially more likely to be selected as filing years: a one-standard-deviation increase in the developing-loss measure, $\approx 30\%$ increase, is associated with a $\approx 34\%$ increase in the probability that the experience year is chosen to file a rate change. Higher developing legal expenses exhibit a similarly statistically significant association with the filing

probability. By contrast, realized losses and legal expenses are negatively associated with selection, albeit the effect is not statistically significant for the former. The catastrophe factor is not a significant determinant of the filing probability. The results suggest that insurers do not mechanically update prices in response to realized costs. Instead, the timing of rate filings is systematically related to the actuarial development assumptions.

Having assessed the probability of any rate change filing, conditional on past exposure, I now investigate the determinants of the size and direction of such change, and the minimum and maximum regulatory change corridor, conditional on filing any rate change. I estimate the following OLS regression at the insurer-product filing spell level:

$$\begin{aligned} \textit{Rate change}_{ipt} = {} & \beta_1 \times \textit{Past losses}_{ipt} + \beta_2 \times \textit{Developing losses}_{ipt} + \beta_3 \times \textit{Past legal expenses}_{ipt} \\ & + \beta_4 \times \textit{Developing legal expenses}_{ipt} + \beta_5 \times \textit{Catastrophe factor}_{ipt} \\ & + \alpha_t + \gamma_i + \delta_p + \varepsilon_{ipt}. \end{aligned} \tag{2}$$

where *Rate change* is either the minimum, the proposed, or the maximum regulatory rate change, in filing year t, for product p and insurer i. The specification includes filing year, insurer, and product fixed effects. Standard errors are clustered at the insurer level.

Table 3 reports the results in Columns 2 to 4. The estimates in Columns 2 and 4 are mechanical: the minimum and maximum regulatory changes, respectively, are predetermined as they are constructed from ratemaking formulas that explicitly incorporate the loss, loss-development, expense, and catastrophe measures appearing on the right-hand side. Their strong relationships with realized losses, developing losses, and catastrophe adjustments are primarily intended to document how the regulatory corridor of suggested rate changes moves positively with actuarial inputs and acts as a summary measure of past financials at the insurer-product level.

Differently, Column 3 measures how insurers' deliberate proposed changes respond to the same inputs. An additional USD 100 of realized losses per exposure is associated with only a 0.5 percentage-point increase in the proposed change, compared with increases of 2.1 and 2.7 percentage points in the minimum and maximum suggested changes. Likewise, a 0.1 increase in the loss-development factor raises the proposed change by approximately 0.6 percentage points, versus 2.8 and 3.6 percentage points for the regulatory bounds, while a 0.1 increase in the catastrophe factor increases the proposed change by 0.5 percentage points, compared with 3.4 and 4.5 percentage points for the bounds. Thus, although proposed rates move in the direction implied by actuarial fundamentals, their sensitivity is muted, reaching only about 15-25% of that embedded in the permissible corridor.

Overall, the results validate the actuarial inputs as a measure of insurer-product cost pressure: insurers systematically update their rates based on past experience, indicating that proposed rates incorporate only part of the adjustment supported by the actuarial inputs. Consistently, results point to substantial compression between the cost-based rate adjustment supported by the filing and the increase the insurer ultimately requests.

4.2 Regulatory Determinants of Rate Changes

The results in the previous subsection point to a positive association between actuarially justified cost pressure and insurers' rate changes, albeit chosen changes are significantly muted even when compared to the minimum regulatory formula-implied rate change suggested to ensure solvency. This section explores the role of regulatory pricing constraints in limiting insurers' ability to raise rates to fully reflect past experience costs.

Figure 1 plots the distribution of proposed rate changes and minimum regulatory indicated rate changes. Panel A shows sharp bunching of proposed changes at the 7% regulatory threshold. Formally, a McCrary density test rejects continuity at the threshold at the 1%

level. Panel B shows that the distribution of minimum regulatory formula-implied changes is smooth around the same threshold. This contrast indicates that bunching reflects insurers' pricing choices rather than underlying actuarial cost measures.

Figure 2 provides complementary evidence. Proposed rates are strongly related to minimum regulatory formula-implied rates, but the relationship flattens as cost pressure rises. In particular, the slope is lower above the 7% threshold, pointing to regulatory constraints as a possible significant driver of the compressed rate adjustments, relative to insurer-product level cost pressure. Overall, this evidence suggests that insurers pass through less of the actuarially indicated rate need when the regulatory constraint is likely to bind.

4.3 Identification of Pricing-Constrained Insurers

To formally estimate the size of the pricing constraint, I use a bunching-style estimator. The approach follows the event-study logic of the difference-in-bunching estimator in Collier et al. (2025). The key source of variation is the 7% threshold for proposed rate changes. Crossing this threshold exposes a filing to public notice, potential consumer intervention, and a substantially more burdensome review process. Insurers therefore have an incentive to limit the rate adjustment requested in filings for which the cost-based regulatory formula supports an increase above 7%.

I first partition filings into bins according to the minimum suggested rate change implied by the regulatory formula. This variable captures the rate adjustment supported by the insurer's actuarial pricing inputs and, as seen in the previous section, summarizes insurer-product past realized and developing losses and expenses, and is therefore distinct from the proposed change chosen deliberately by the insurer. I then estimate the following OLS regression at the insurer-product-quarter level:

$$Rate_{ipq} = \sum_{b \neq b_0} \beta_b \times \mathbf{1}\{\Delta^{\min}_{ipq} \in b\} + \alpha_{ip} + \gamma_q + \varepsilon_{ipq}, \tag{3}$$

where i indexes insurers, p indexes insurance products, and q indexes filing quarters. The coefficients β_b measure the difference in the log proposed rate for filings in minimum regulatory formula-implied change bin b, relative to the omitted bin immediately below the 7% threshold. The insurer-by-product fixed effects, α_{ip}, absorb persistent differences in pricing levels and product design across insurer-product pairs, while the filing-quarter fixed effects, γ_q, absorb aggregate changes in costs and insurance-market conditions. The key empirical challenge is that filings above and below the 7% threshold may differ in underlying premium needs. To address this concern, I compare filings within the same minimum regulatory formula-implied rate bin. Empirically, I saturate the main specification with fixed effects for deciles of the minimum regulatory formula-implied rate interacted with the filing year. Standard errors are clustered at the insurer level.

The identifying assumption requires that, conditional on these fixed effects, proposed rates would evolve smoothly with the formula-implied minimum change in the absence of the additional regulatory costs triggered at 7%. Under this assumption, the coefficients below the threshold provide an event-study-style assessment of the counterfactual relationship, while the change in the coefficients once the minimum regulatory formula-implied change crosses 7% identifies the pricing compression induced by the threshold. The design therefore compares filings with similar cost-supported rate levels but different exposure to the discrete regulatory burden associated with requesting an increase of 7% or more.

Figure 3 reports the estimates. Proposed rates fall sharply when the minimum regulatory formula-implied change crosses the 7% threshold. Relative to filings immediately below, filings immediately above the threshold have proposed rates lower by $\approx 8\%$. The effect remains negative and statistically significant with higher minimum regulatory formula-implied change bins, consistent with the regulatory constraint becoming more costly as the gap between the insurer's cost-supported rate and the threshold grows. If the identifying assumption holds,

and there are no other cost pressures that discontinuously change at the 7% threshold beyond regulatory constraints, effects should increase for filings in the $\geq 7\%$ bin that are more exposed to regulatory pressure, conditional on the same minimum regulatory formula-implied rate level bin. I calculate regulatory pressure by classifying filings into those that are legally allowed to deviate from regulatory formulas (according to Under 10 CCR §2644.27), and those for which regulation is fully binding. I re-estimate the baseline specification in Equation 3 by interacting the bin indicators equal to 1 for filings that are exposed to a more binding regulatory pressure in a differences-in-bunching empirical approach. Figure 4 reports the results. The estimated reduction is larger for filings facing more binding regulatory pressure, thereby supporting the validity of the identifying assumption that the threshold generates a pricing constraint rather than merely capturing smooth differences in costs.

5 Pricing-Constrained Insurers and Nonpricing Margins

The previous section documents that insurers systematically update their rates to reflect past exposure losses and expenses. In this section, I investigate insurers' decisions when such pricing margins are constrained. If risks insurers are exposed to cannot be fully priced in rates, insurers may adjust their products to reduce their exposure to such unpriced risks in the future, thereby effectively reducing coverage through product design. I leverage the unique setup of insurers' rate changes bunching at the 7% threshold established in the previous section as a quasi-exogenous constraint on insurers' pricing margins. I next use this threshold-induced pricing compression to study whether insurers substitute toward nonpricing margins when regulation limits their ability to adjust prices.

5.1 Pricing-Constrained Insurers and Product Design

To assess insurers' adjustments through nonpricing margins, I investigate whether they respond to a constrained rate by restricting eligibility through policy forms, withdrawing underwriting rules, or revising the pricing rules for the specific product subject to pricing constraints. This substitution across margins is important because regulation may compress the price of insurance while simultaneously reducing effective coverage provided, i.e., the set of risks that insurers are willing to cover.

The empirical design combines the bunching estimator with a 2SLS approach in the spirit of Collier et al. (2025). In the first stage, I instrument insurer-product pricing compression by reproducing the bunching estimator in 3. In the second stage, I use the instrumented constraint in pricing margins to study the differential probability of revisions to insurance product design by insurers. Specifically, I rely on a range of nonpricing outcomes that describe the reduction in effective coverage provided by insurers. I focus on local variation around the threshold by restricting the estimation sample to the two minimum regulatory formula-implied change bins around the 7% threshold. I estimate the following 2SLS system at the insurer-product-quarter level:

$$\text{First stage: } Rate_{ipq} = \pi \mathbf{1}\{\Delta^{\min}_{ipq} \geq 0.07\} + \alpha_{ip} + \gamma_q + u_{ipq}. \tag{4}$$

where *Rate* is the natural logarithm of the proposed rate in the filing submitted by insurer i for product p in quarter q and equation 4 replicates the approach in equation 3.

$$\text{Second stage: } Y_{ipq} = \beta \widehat{Rate}_{ipq} + \alpha_{ip} + \gamma_q + \varepsilon_{ipq}, \tag{5}$$

where Y_{ipq} is one of four possible product-design outcomes: *Any restriction*, *Form restriction*, *Rule withdrawal*, or *Rule revision*. Any restriction reflects any of the following product design changes: Form restriction, which measures the tightening of underwriting guidelines

or their withdrawal; rule withdrawal, which measures the withdrawal of a pricing rule by the insurer, and rule revision, which measures the introduction of a new pricing rule by the insurer. The outcomes are binary. Therefore, β measures the change in the probability of the corresponding nonpricing adjustment associated with a one-log-point increase in the proposed rate. Standard errors are two-way clustered by insurer and filing quarter.

Identification relies on the exclusion restriction discussed in the previous section, that is, within the local sample around the threshold bin and conditional on the fixed effects, crossing the 7% threshold affects nonpricing adjustments only through its effect on the proposed rate.

Table 4 reports the first-stage and instrumental-variables estimates. Column 1 shows that crossing the 7% threshold reduces the log proposed rate by 0.035, corresponding to a decline of approximately 3.4%. The estimate is statistically significant at the 1% level, and the first-stage F-statistic is 16.09. Thus, the additional regulatory burden associated with the threshold generates a statistically and economically meaningful reduction in the rate requested by the insurer.

The second-stage estimates show that insurers respond to this pricing constraint by adjusting nonprice dimensions of the product. A 1% regulation-induced reduction in the proposed rate increases the probability of any restriction by approximately 8.3 percentage points. The effect is concentrated among form restrictions, the most direct measure of effective coverage restriction. Economically, a 1% reduction in the rate raises the probability of introducing a restrictive form by approximately 8%, relative to the unconditional probability of observing a form restriction in the sample.

The consistent signs and magnitudes across different product design measures are consistent with insurers treating price and contract design as substitutes: form restrictions directly reduce the set of risks eligible for coverage and rule revisions alter how rates are applied across policyholders. Both responses are consistent with insurers attempting to restore underwrit-

ing profitability when uniform rates cannot fully adjust. Overall, this evidence indicates that when regulation prevents them from fully incorporating costs into the rate, they preserve underwriting margins by effectively restricting exposure through nonprice margins.

5.2 Pricing-Constrained Insurers and Insurance Coverage

I next examine whether rate adjustment constraints affect the amount of insurance coverage effectively provided by insurers. The analysis links each insurer-product's most recent applicable rate filing to administrative data from the California Department of Insurance on written exposures and premiums at the insurer-product-ZIP code-year level. This structure allows me to study both the intensive margin of coverage, measured as the number of exposures written, and the extensive margin, measured by an insurer's exit (i.e., whether the insurer writes zero exposure for a product in a ZIP code).

I estimate the following 2SLS system at the insurer-product-ZIP code-year level:

$$\text{First stage: } Rate_{ipzy} = \pi \times \mathbf{1}\{\Delta^{\min}_{ipy} \geq 0.07\} + \alpha_{ip} + \gamma_{zy} + u_{ipzy}, \tag{6}$$

where *Rate* is the natural logarithm of the proposed rate in the filing submitted by insurer i for product p in ZIP code z and year y and equation 6 replicates the approach in equation 3.

$$\text{Second stage: } Y_{ipzy} = \beta \times \widehat{Rate}_{ipzy} + \alpha_{ip} + \gamma_{zy} + \varepsilon_{ipzy}. \tag{7}$$

where Y is one of four possible insurance coverage outcomes: the natural logarithm of *Premium*, *Average premium* per exposure written, *Exposure*, and *Exit*, a dummy variable for writing zero exposure. The exposure regression captures the intensive-margin response among insurer-product-ZIP observations with positive coverage, whereas the zero-exposure

indicator captures the extensive margin. Because the first three outcomes and the endogenous pricing variable enter in logs, their coefficients have elasticity interpretations. In the final specification, β measures the percentage-point change in the probability of writing zero exposure associated with a one-log-point change in the rate.

The empirical design replicates the combination of a bunching estimator and a 2SLS approach adopted in the previous section. Similarly, the identifying assumption requires that, within tight bins around the 7% rate change threshold and conditional on the fixed effects, crossing 7% affects ZIP code level underwriting outcomes through the resulting constraint on the rate. Different from the previous sections, within this more granular empirical setup, the identifying assumption further requires ruling out a discontinuity in local insurance demand. Therefore, I additionally include ZIP code-by-year fixed effects in the spirit of Khwaja and Mian (2008) to control for demand-side drivers of insurance coverage within each ZIP code, thereby ultimately comparing the coverage decisions of pricing-constrained and unconstrained insurer-product pairs within the same ZIP code in the same experience year.

Table 5 presents the estimates. Column 1 presents first-stage estimates. The result confirms that the regulatory threshold imposes significant rate change constraints, with an economic magnitude of $\approx 5.1\%$ lower rate changes for filings above the 7% threshold.

In Columns 2-5, second-stage estimates show that pricing-constrained insurers significantly reduce insurance supply. Consistent with constrained rates, relative to insurers facing similar costs and local demand, Columns 2 and 3 indicate that these insurers experience more constrained realized premiums and average premiums per exposure, respectively, when they encounter demand. Column 4 implies an elasticity of written exposure with respect to the rate of 1.61 (a 1% regulation-induced reduction in the rate reduces the number of exposures written by $\approx 1.6\%$). Column 5 shows that insurers also act at the extensive margin as they are significantly more likely to exit ZIP codes after experiencing a rate change constraint.

Both at the intensive and extensive margin, insurers effectively reduce coverage or experience higher exit probabilities when they experience compressed pricing. The effects are economically meaningful. Evaluated at the 5.2% first-stage decline, the estimates imply an approximately 8.4% reduction in written exposure and a 2.2-percentage-point increase in the probability of zero coverage.

Overall, the positive exposure elasticity is therefore a supply response rather than evidence of a conventional downward-sloping demand curve: the instrument isolates reductions in premiums arising from a constraint on insurers' pricing choices, and those reductions are accompanied by less, rather than more, coverage. Together with the product-design results, the evidence indicates that insurers respond to binding price regulation along several nonprice margins, by restricting contract terms, reducing exposures, and withdrawing coverage.

5.2.1 Wildfire Risk and Heterogeneous Effects of Pricing-Constrained Insurers

The previous sections show that constrained rates lead to restrictions in underwriting guidelines, through forms and pricing rules, and consistently to reduced insurance coverage on both the intensive and extensive margins. To further pin down that these estimates are consistent with insurers adjusting nonprice margins to reduce the exposure to risks they cannot fully price, I next examine whether these responses vary with local expected losses and expenses. Specifically, anecdotal evidence suggests that new product design featuring form restrictions allows insurers to limit coverage selectively in locations where wildfire risk is highest (Munce, 2025). To investigate effective coverage changes in ZIP codes with heterogeneous wildfire risk exposure, I estimate the following OLS specification:

$$Y_{ipzy} = \beta_1 \times \mathbf{1}\{\Delta_{ipy}^{\min} \geq 0.07\} \times WildfireRisk_z + \beta_2 \times \mathbf{1}\{\Delta_{ipy}^{\min} \geq 0.07\} + \alpha_{ip} + \gamma_{zy} + \varepsilon_{ipzy}. \tag{8}$$

where for each insurer i, product p, ZIP code z and experience year y, Y is one of four possible insurance coverage outcomes: the natural logarithm *Premium* written, *Average premium* per exposure written, *Exposure* written, and *Exit*, a dummy variable for writing zero exposure. Equation 8 is a reduced-form extension of Equations 6 and 7, detailed in the previous section, that interacts the threshold indicator with a predetermined measure for wildfire risk. The latter is proxied by the share of ZIP code exposures covered by the California FAIR Plan in 2015. The FAIR Plan is the state's insurer of last resort, insuring locations in which private-market coverage was already difficult to obtain. Using the 2015 share limits the possibility that the measure itself responds to the subsequent pricing constraints studied, thereby mitigating endogeneity concerns.

The results are in Table 6, which reveals a sharp distinction between the intensive and extensive margin effects. Columns 1–3 show no statistically significant differential intensive-margin effects by wildfire risk, consistent with the instrumented version of this reduced-form estimation. In contrast, Column 4 shows a positive and statistically significant differential effect on zero coverage. A one-percentage-point increase in the *Wildfire risk* measure is associated with an exit probability 0.261 percentage points higher than the baseline effect of crossing the regulatory threshold.

The concentration of the heterogeneous response on the extensive margin further clarifies the mechanism underlying the aggregate coverage effects. When insurers cannot fully reflect costs in premiums, they do not reduce coverage proportionally across markets. Instead, they redesign their products in ways that facilitate withdrawal from high-risk areas, selectively limiting exposure to risks they cannot adequately price.

5.2.2 Pricing-Constrained Insurers and Insurer of Last Resort Take-Up

The previous designs study the implications of pricing constraints on the use of nonpricing margins by exploiting several features of the institutional setting to isolate supply-side

responses. The regulatory threshold generates reductions in rates that originate from constraints on insurers' pricing choices rather than from changes in consumer demand. Moreover, the coverage specifications compare insurers operating in the same ZIP code and year, thereby absorbing local demand and risk shocks common to the market. The finding that lower (constrained) rates are accompanied by fewer written exposures-the opposite of the response implied by a conventional demand mechanism-provides further evidence that the contraction reflects a supply-side effect.

In this section, I provide a complementary test. If nonprice margin adjustments consistent with reduced coverage emerge from supply-side drivers, the California FAIR Plan, the state's insurer of last resort, should absorb coverage reduction observed for insurer-product pairs subject to rate constraints. Differently, if the decline in private coverage reflects reduced consumer demand, there is little reason to expect households to shift toward FAIR Plan provided coverage.

I estimate the following OLS regression at the ZIP code-year level:

$$Y_{zy} = \beta \times Constrained\ insurers\ share_{z,y-1} + \alpha_z + \gamma_y + \varepsilon_{zy}, \tag{9}$$

where z indexes ZIP codes and y indexes exposure years. The dependent variable Y is one of three possible FAIR Plan coverage outcomes: the natural logarithm of the *FAIR Plan exposure share*, the *FAIR Plan average premium* per exposure, and the *FAIR Plan written premium*. The main regressor, *Constrained insurers share*, measures the presence of rate-constrained insurers in a given ZIP code.

I measure *Constrained insurers share* using an exposure-weighted share constructed at the ZIP code-year level. I classify an insurer-product as constrained when the minimum

permissible rate change in its last applicable filing is at least 7% and calculate

$$Constrained\ insurers\ share_{zy} = \frac{\sum_{ip} Exposure_{ipzy} \mathbf{1}\{\Delta^{min}_{ipy} \geq 0.07\}}{\sum_{ip} Exposure_{ipzy}}, \tag{10}$$

I use the lagged measure of constrained insurer presence, and I further saturate the specification with ZIP code and experience year fixed effects.

Table 7 reports the results. Across all outcomes in columns 1 to 3, a higher presence of constrained insurers is associated with a greater FAIR Plan activity, with higher FAIR Plan exposure shares, higher average premiums, and higher total written premiums. These results are suggestive of coverage restrictions in admitted markets being at least partly absorbed by the insurer of last resort. In particular, the increase in average premiums suggests that the additional policies entering the FAIR Plan are drawn from relatively costly risks, rather than representing a general expansion in demand for residual-market insurance. The expansion of the FAIR Plan therefore reinforces the interpretation that the decline in private coverage reflects a supply contraction, consistent with constraints in risk pricing at the insurer-product level, rather than diminished household demand.

6 Conclusion

This paper studies how home insurers adjust pricing, product design, and insurance supply when regulation limits their ability to incorporate rising exposure costs into rates. I combine detailed California regulatory filings with insurer-product-ZIP code underwriting records. The filings uniquely report both the rates supported by actuarial inputs via a regulatory formula and those deliberately proposed by insurers, allowing me to measure pricing constraints directly and trace their consequences across adjustment margins.

I document three main findings. First, insurers' filing decisions and proposed rate changes are systematically updated to respond to realized and developing exposure costs. Proposed

rates adjust considerably less than the changes supported by the regulatory formula. Accounting for regulatory pricing constraints explains that crossing the threshold constraints proposed rate changes by approximately 8% more, relative to insurers with similar actuarial pricing inputs, but unexposed to regulatory pricing constraints and relative to the unconditional outcome mean.

Second, insurers substitute toward nonprice margins when rates are constrained. Insurers experiencing compressed rates adjust their product design. Leveraging unique data on underwriting guideline forms and pricing rules updates, I show that these insurers are significantly more likely to introduce more restrictive policy forms, including exclusions and withdrawing coverage, and new pricing rules, consistent with a reduction in effective coverage provided.

Third, insurers experiencing compressed pricing ultimately reduce written exposures and become more likely to cease writing coverage locally. The extensive-margin response is stronger in markets with greater pre-existing wildfire risk and private-market tightness. Consistent with displaced coverage rather than declining demand for insurance, the insurer of last resort subsequently expands in markets where pricing-constrained private insurers have a larger presence.

The results show that the incidence of rate regulation extends beyond the premiums paid by policyholders who retain coverage. By limiting adjustment on the price margin, regulation changes the insurance product itself and the set of risks insurers are willing to cover. Rate suppression can therefore shift costly risks from admitted insurers toward nonprice restrictions, local coverage withdrawal, and the insurer of last resort.

Table A.1: Variable definitions

Variable	Definition	Source
	Panel A: Rate filing variables	
Rate (USD)	Rate (or base premium) proposed by the insurer for a given insurer-product rate filing, measured in U.S. dollars. The proposed rate is the pricing choice submitted by the insurer to the regulator.	California Department of Insurance rate filings
Min reg. rate (USD)	Minimum regulatory formula-implied rate for a given insurer-product filing, measured in U.S. dollars. This amount is computed by applying the regulatory formula to the insurer-product financial information submitted in the filing.	California Department of Insurance rate filings
Max reg. rate (USD)	Maximum regulatory rate for a given insurer-product filing, measured in U.S. dollars. This amount is computed by applying the regulatory formula to the insurer-product financial information submitted in the filing.	California Department of Insurance rate filings
Proposed change (pp)	Proposed change in the insurer-product rate relative to the previously approved rate. The variable is expressed in percentage points, with 0.06 corresponding to a 6% proposed increase.	California Department of Insurance rate filings
Δ^{min}, *Min reg. change (pp)*	Minimum regulatory formula-implied rate change in the insurer-product rate relative to the previously approved rate. The variable is calculated using the regulatory formula and is expressed in percentage points, with 0.07 corresponding to a 7% indicated increase.	California Department of Insurance rate filings
Max reg. change (pp)	Maximum regulatory indicated percentage change in the insurer-product rate relative to the previously approved rate. The variable is calculated using the regulatory formula and is expressed in percentage points, with 0.07 corresponding to a 7% indicated increase.	California Department of Insurance rate filings
Past losses (USD)	Past losses expressed in USD per unit of exposure.	California Department of Insurance rate filings
Developing losses (USD)	Developing losses expressed in USD per unit of exposure.	California Department of Insurance rate filings
Past legal expenses (USD)	Past legal expenses expressed in USD per unit of exposure.	California Department of Insurance rate filings
Developing legal expenses (USD)	Developing legal expense expressed in USD per unit of exposure.	California Department of Insurance rate filings
Catastrophe factor	Catastrophe adjustment factor used in the regulatory rate-setting formula expressed in factor units.	California Department of Insurance rate filings
Binding reg.	Equals one if the insurer-product filing faces binding regulatory pressure, defined as a minimum regulatory formula-implied rate change at or above the 7% regulatory threshold, and zero otherwise.	California Department of Insurance rate filings
	Panel B: Product design variables	

Any restriction	Equals one if an insurer-product filing includes any product restriction, including a form restriction, rule withdrawal, or rule revision that restricts coverage, eligibility, or the application of pricing rules, and zero otherwise.	California Department of Insurance product filings and underwriting guideline filings
Form restriction	Equals one if an insurer-product filing includes a restriction to policy forms, coverage forms, underwriting eligibility, exclusions, or ineligibility conditions, and zero otherwise.	California Department of Insurance product filings and underwriting guideline filings
Rule withdrawal	Equals one if an insurer-product filing withdraws an existing underwriting or pricing rule, and zero otherwise.	California Department of Insurance product filings and underwriting guideline filings
Rule revision	Equals one if an insurer-product filing revises underwriting rules, rating rules, or the way rates are applied across risks, and zero otherwise.	California Department of Insurance product filings and underwriting guideline filings
Panel C: Insurer-product-ZIP code underwriting variables		
Exposure (#)	Number of insurance exposures written by an insurer for a given product in a given ZIP code-year.	California Department of Insurance underwriting data obtained through public records request
Premium (USD mln)	Total written premium by an insurer for a given product in a given ZIP code-year, measured in millions of U.S. dollars.	California Department of Insurance underwriting data obtained through public records request
Average premium (USD)	Written premium per exposure for a given insurer-product-ZIP code-year, measured in U.S. dollars. It is calculated as total written premium divided by exposures written.	California Department of Insurance underwriting data obtained through public records request
Exit	Equals one if an insurer-product exits a ZIP code-year market, defined as no longer writing positive exposures in that ZIP code-year after previously writing coverage there, and zero otherwise.	California Department of Insurance underwriting data obtained through public records request

References

Abramson, Boaz, Parinitha Sastry, Ishita Sen, and Ana-Maria Tenekedjieva, 2025, Insurance guaranty funds .

Baron, David P, 1981, Price regulation, product quality, and asymmetric information, *The American Economic Review* 71, 212–220.

Boomhower, Judson, Meredith Fowlie, Jacob Gellman, and Andrew Plantinga, 2025, How are insurance markets adapting to climate change? Risk selection and regulation in the market for homeowners insurance, NBER Working Paper.

Boomhower, Judson, Meredith Fowlie, and Andrew J Plantinga, 2023, Wildfire insurance, information, and self-protection, in *AEA Papers and Proceedings*, volume 113, 310–315, American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203.

California Department of Insurance, 2023, California progress report on wildfires and insurance, Technical report, California Department of Insurance.

Collier, Benjamin L, Cameron M Ellis, and Benjamin J Keys, 2025, The cost of consumer collateral: Evidence from bunching, *Econometrica* 93, 779–819.

Dixit, Avinash, 1991, Irreversible investment with price ceilings, *Journal of Political Economy* 99, 541–557.

Earle, Robert, Karl Schmedders, and Tymon Tatur, 2007, On price caps under uncertainty, *The Review of Economic Studies* 74, 93–111.

Froot, Kenneth, 2001, The market for catastrophe risk: a clinical examination, *Journal of Financial Economics* 60, 529–571.

Froot, Kenneth A, and Paul GJ O'Connell, 2008, On the pricing of intermediated risks: Theory and application to catastrophe reinsurance, *Journal of Banking & Finance* 32, 69–85.

Ge, Shan, 2022, How do financial constraints affect product pricing? Evidence from weather and life insurance products, *Journal of Finance* 77, 449–503.

Ge, Shan, Ammon Lam, and Ryan Lewis, 2022, The effect of insurance premiums on the housing market and climate risk pricing, *Available at SSRN 4192699* .

Hatfield, John William, Charles R Plott, and Tomomi Tanaka, 2012, Understanding price controls and nonprice competition with matching theory, *American Economic Review* 102, 371–375.

Ibragimov, Rustam, Dwight Jaffee, and Johan Walden, 2009, Nondiversification traps in catastrophe insurance markets, *Review of Financial Studies* 22, 959–993.

Jung, Hyeyoon, and Kyle Jaehoon Jung, 2025, Economics of property insurance, *FRB of New York Staff Report* .

Keys, Benjamin J, and Philip Mulder, 2024, Property insurance and disaster risk: New

evidence from mortgage escrow data, Technical report, National Bureau of Economic Research.

Khwaja, Asim Ijaz, and Atif Mian, 2008, Tracing the impact of bank liquidity shocks: Evidence from an emerging market, *American Economic Review* 98, 1413–1442.

Koijen, Ralph, and Motohiro Yogo, 2015a, The cost of financial frictions for life insurers, *American Economic Review* 105, 445–475.

Koijen, Ralph S. J., and Motohiro Yogo, 2015b, The cost of financial frictions for life insurers, *American Economic Review* 105, 445–475.

Lehmann, R.J., and Ian Adams, 2024, The questionable value of california's rate intervenors, Technical report, International Center for Law & Economics, Accessed: 2026-05-01.

Munce, Megan Fan, 2025, California wants regular insurers to grow. but it's the FAIR Plan that's growing faster than ever.

Oh, Sangmin, Ishita Sen, and Ana-Maria Tenekedjieva, 2025, Pricing of climate risk insurance: Regulation and cross-subsidies, *Journal of Finance* forthcoming.

Sastry, Parinitha, Ishita Sen, and Ana-Maria Tenekedjieva, 2024, When insurers exit: Climate losses, fragile insurers, and mortgage markets, Working Paper.

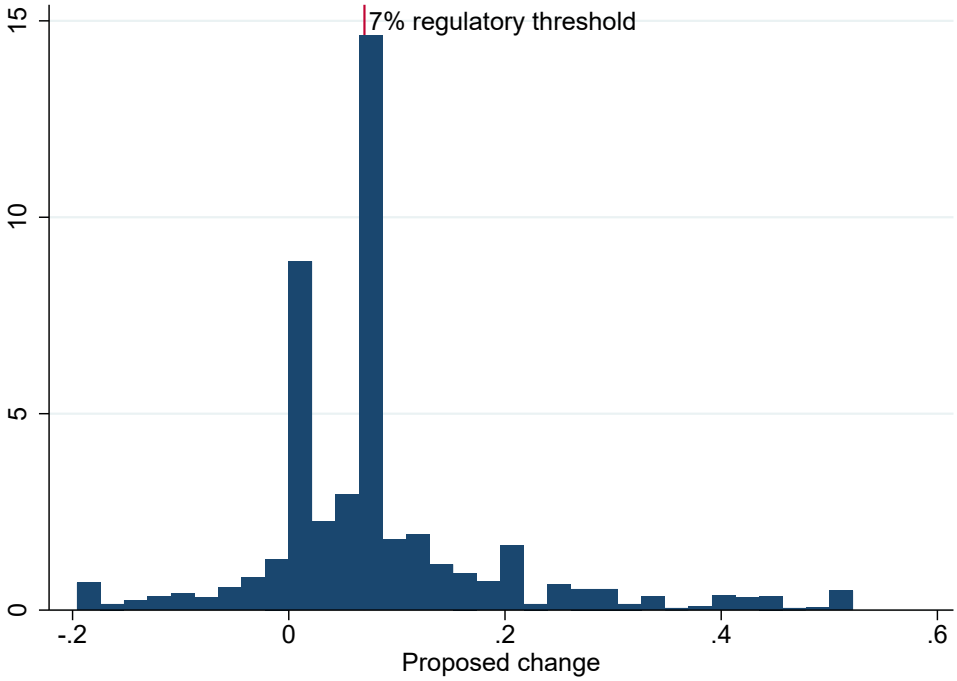
Zanjani, George, 2002, Pricing and capital allocation in catastrophe insurance, *Journal of financial economics* 65, 283–305.

Figures

Figure 1: Bunching at the 7% regulatory threshold

The figure compares the distribution of insurers' proposed rate changes with the distribution of minimum changes implied by the regulatory formula. Panel A plots proposed rate changes. Panel B plots minimum formula-implied changes. The vertical line marks the 7% threshold at which additional regulatory procedures may apply. The excess mass in proposed changes, together with the smooth distribution of formula-implied changes, indicates that bunching reflects insurers' pricing choices rather than a discontinuity in cost pressure.

Panel A: Proposed rate changes



Panel B: Minimum regulatory formula-implied indicated changes

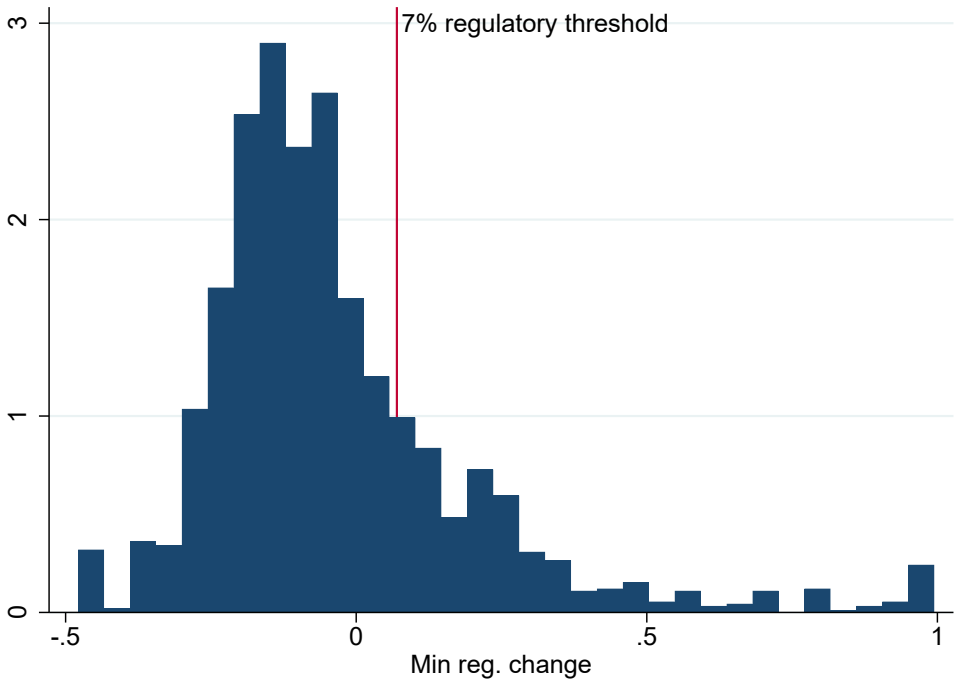


Figure 2: Minimum regulatory formula-implied rates and proposed rates

The figure plots the proposed rate against the minimum rate implied by the regulatory formula. Both variables are normalized by the rate corresponding to a 7% change. Points represent binned means, and the fitted relationship summarizes pass-through from the cost-supported minimum rate to the rate requested by the insurer.

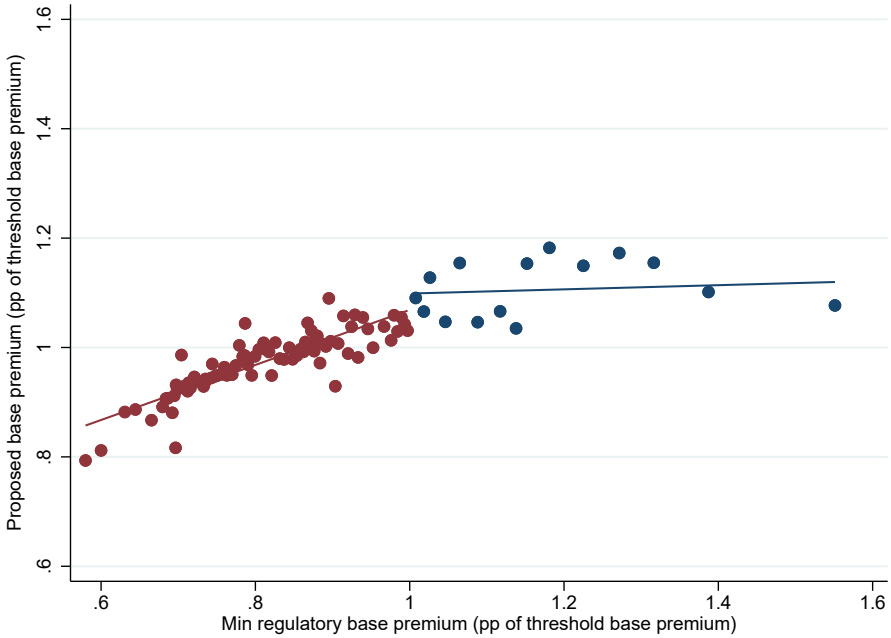


Figure 3: Estimated rate effects around the 7% threshold

The figure reports estimates from the following binned regression:

$$Rate_{ipq} = \sum_{b \neq b_0} \beta_b \times \mathbf{1}\{\Delta^{\min}_{ipq} \in b\} + \alpha_{ip} + \gamma_q + \varepsilon_{ipq}.$$

The dependent variable, *Rate*, is the natural logarithm of insurer i's proposed rate for product p in filing quarter q. The coefficients β_b correspond to bins of the minimum formula-implied change, $\Delta^{\min}$, and are measured relative to the omitted bin b_0 immediately below 7%. Vertical bars report 90% confidence intervals based on standard errors clustered at the insurer level. The dashed line marks the 7% regulatory threshold.

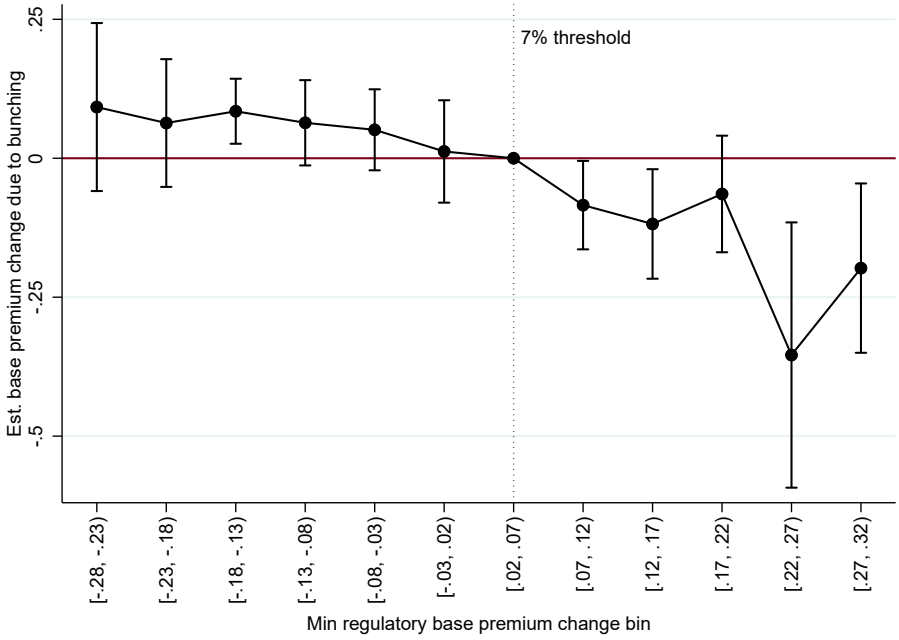
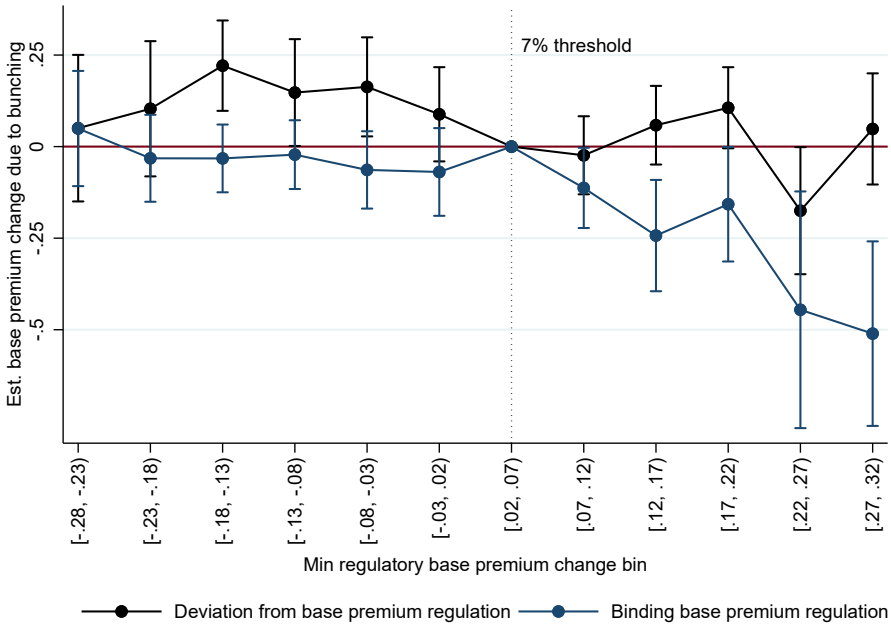


Figure 4: Pricing constraints by the intensity of regulatory pressure

The figure reports estimates from the following difference-in-bunching specification:

$$Rate_{ipq} = \sum_{b \neq b_0} \beta_b \times \mathbf{1}\{\Delta^{\min}_{ipq} \in b\} + \sum_{b \neq b_0} \theta_b \times \mathbf{1}\{\Delta^{\min}_{ipq} \in b\} \times Binding_{ipq} + \alpha_{ip} + \gamma_q + + \varepsilon_{ipq}.$$

The dependent variable is the natural logarithm of the proposed rate. $Binding_{ipq}$ identifies filings subject to binding rate regulation rather than filings permitted to deviate from the regulatory formula. The coefficients β_b describe filings in the less-binding group, while $\beta_b + \theta_b$ describe filings subject to binding regulation. The omitted category is the minimum-change bin immediately below 7%. The specification includes insurer-product fixed effects, filing-quarter fixed effects, and minimum-regulatory-rate-decile-by-filing-year fixed effects. Vertical bars report confidence intervals based on standard errors clustered at the insurer level, and the dashed line marks the 7% threshold.



Tables

Table 1: Descriptive statistics for regulatory rate filings

The table reports descriptive statistics for the insurer-product regulatory rate-filing sample. Proposed, minimum regulatory, and maximum regulatory formula-implied rates are measured in U.S. dollars. Rate changes are measured in percentage points. The sample covers California homeowners insurance filings from 2016 through 2023.

	Obs.	Mean	Std	*p25*	*p50*	*p75*
Rate (USD)	7,160	1,066.92	1,245.92	339.87	815.16	1,300.92
Min reg. rate (USD)	7,160	945.63	1,106.78	307.33	743.33	1,147.91
Max reg. rate (USD)	7,160	1,249.66	1,477.83	403.49	956.67	1,511.91
Proposed change (pp)	7,161	0.06	0.10	0.00	0.06	0.10
Min reg. change (pp)	7,150	-0.07	0.19	-0.20	-0.11	0.00
Max reg. change (pp)	7,150	0.22	0.24	0.06	0.18	0.31
Past losses (USD)	9,635	4.22	4.67	1.65	3.54	5.16
Developing losses (USD)	9,783	1.43	0.34	1.22	1.37	1.54
Past legal expenses (USD)	9,635	0.05	0.10	0.00	0.01	0.06
Developing legal expenses (USD)	9,783	1.97	1.84	1.19	1.40	1.66
Catastrophe factor	9,783	1.15	0.15	1.03	1.08	1.24
Binding reg.	10,677	0.47				
Any restriction	10,677	0.03				
Form restriction	10,677	0.02				
Rule withdrawal	10,677	0.01				
Rule revision	10,677	0.09				

Table 2: Descriptive statistics for ZIP-code-level underwriting activity

The table reports descriptive statistics for the insurer-product-ZIP-code-year underwriting records obtained from the California Department of Insurance. Exposure is the number of written exposures, written premium is measured in millions of U.S. dollars, and average premium equals written premium divided by written exposures. The administrative records cover 2015 through 2022.

	Obs.	Mean	Std	*p25*	*p50*	*p75*
Exposure (#)	3,184,170	71.65	176.60	2.00	9.17	49.67
Premium (USD mln)	3,184,170	0.07	0.20	0.00	0.01	0.03
Average premium (USD)	2,923,937	891.10	900.47	264.91	656.40	1,151.16
Exit	3,148,554	0.08				

Table 3: Past exposure costs and rate change filings

The table reports estimates from two related specifications. Column 1 estimates

$$\begin{aligned} \textit{Filing probability}_{ipy} = {} & \beta_1 \times \textit{Past Losses}_{ipy} + \beta_2 \times \textit{Developing Losses}_{ipy} + \beta_3 \times \textit{Past Legal Expenses}_{ipy} \\ & + \beta_4 \times \textit{Developing Legal Expenses}_{ipy} + \beta_5 \times \textit{Catastrophe Factor}_{ipy} + \alpha_y + \gamma_{ip} + \varepsilon_{ipy}. \end{aligned}$$

where the dependent variable equals one if experience year y is selected for a rate-change filing by insurer i for product p. Columns 2–4 estimate

$$\begin{aligned} \textit{Rate change}_{ipt} = {} & \beta_1 \times \textit{Past losses}_{ipt} + \beta_2 \times \textit{Developing losses}_{ipt} + \beta_3 \times \textit{Past legal expenses}_{ipt} \\ & + \beta_4 \times \textit{Developing legal expenses}_{ipt} + \beta_5 \times \textit{Catastrophe factor}_{ipt} + \alpha_t + \alpha_i + \alpha_p + \varepsilon_{ipt}, \end{aligned}$$

where the dependent variable is, respectively, the minimum regulatory formula-implied change, the (proposed) rate change, or the maximum regulatory change for a rate-change filing by insurer i for product p and in filing year t. The first specification includes filing-date and insurer-product fixed effects; the remaining specifications include filing-date, insurer, and product fixed effects. Standard errors are clustered at the insurer level.

		Conditional on filing		
	Filing probability	*Min reg. change*	*Prop. change*	*Max reg. change*
Past losses	-0.003	0.021***	0.005***	0.027***
	(0.003)	(0.004)	(0.001)	(0.005)
Developing losses	0.458***	0.275***	0.064***	0.357***
	(0.089)	(0.033)	(0.015)	(0.044)
Past legal expenses	-0.152**	0.094	0.061	0.122
	(0.064)	(0.074)	(0.040)	(0.106)
Developing legal expenses	0.058***	0.002	0.001	0.004
	(0.010)	(0.003)	(0.002)	(0.004)
Catastrophe factor	2.258	0.338***	0.052**	0.449***
	(1.564)	(0.071)	(0.024)	(0.095)
Experience year FE	Yes	No	No	No
Filing year FE	No	Yes	Yes	Yes
Insurer-product FE	Yes	No	No	No
Insurer FE	No	Yes	Yes	Yes
Product FE	No	Yes	Yes	Yes
Obs.	2,738	1,018	1,018	1,018
Adj. R^2	0.526	0.600	0.445	0.582
# Insurers	97	94	94	94

Table 4: Constrained rates and product design

The table reports two-stage least-squares estimates from

$$Rate_{ipq} = \pi \mathbf{1}\{\Delta^{\min}_{ipq} \geq 0.07\} + \alpha_{ip} + \gamma_q + u_{ipq},$$
$$Y_{ipq} = \beta_m \widehat{Rate}_{ipq} + \alpha_{ip} + \gamma_q + \varepsilon_{ipq}.$$

Rate is the log proposed rate, instrumented with an indicator that the minimum regulatory formula-implied change is at least 7%. Y is an indicator for any restriction, a form restriction, a rule withdrawal, or a rule revision. The sample is restricted to the minimum-change bins around the threshold. The terms α_{ip} and γ_q denote insurer-product fixed effects and quarter fixed effects, respectively. Standard errors are two-way clustered by insurer and filing quarter.

	First stage	Second stage			
	Rate	*Any restriction*	*Form restriction*	*Rule withdrawal*	*Rule revision*
	(1)	(2)	(3)	(4)	(5)
$\Delta^{min} \geq 7\%$	-0.035***				
	(0.009)				
$\widehat{Rate}$ (log)		-8.289*	-8.935**	-3.150	-6.146*
		(4.459)	(3.993)	(3.301)	(3.159)
Matched min rate decile × filing year	Yes	Yes	Yes	Yes	Yes
Insurer × product FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Obs.	860	860	860	860	860
First-stage F	16.09				

Table 5: Constrained rates and insurance coverage

The table reports two-stage least-squares estimates from

$$Rate_{ipzy} = \pi \mathbf{1}\{\Delta^{\min}_{ipy} \geq 0.07\} + \alpha_{ip} + \gamma_{zy} + u_{ipzy},$$
$$Y_{ipzy} = \beta_m \widehat{Rate}_{ipzy} + \alpha_{ip} + \gamma_{zy} + \varepsilon_{ipzy}.$$

where *Rate* is the natural logarithm of the rate from the last applicable filing, instrumented with an indicator that its minimum formula-implied change is at least 7%. Y is the natural logarithm of written premium, average premium per exposure, written exposure, or an indicator for writing zero exposure. The sample is restricted to the minimum regulatory formula-implied change bins around the threshold. Standard errors are clustered at the insurer level.

	First stage	Second stage			
	Rate	*Premium* (log)	*Average premium* (log)	*Exposure* (log)	Exit
	(1)	(2)	(3)	(4)	(5)
$\Delta^{min} \geq 7\%$	-0.052***				
	(0.001)				
$\widehat{Rate}$ (log)		2.460***	1.128***	1.610***	-0.417***
		(0.505)	(0.083)	(0.530)	(0.057)
Matched min rate decile × year	Yes	Yes	Yes	Yes	Yes
Insurer × product FE	Yes	Yes	Yes	Yes	Yes
Year × ZIP code FE	Yes	Yes	Yes	Yes	Yes
Obs.	80,301	80,353	80,834	80,301	84,349
First-stage F	7,282.41				

Table 6: Pricing constraints, insurance coverage, and wildfire risk

The table reports reduced-form estimates from

$$Y_{ipzy} = \beta_1 \times \mathbf{1}\{\Delta^{\min}_{ipy} \geq 0.07\} \times WildfireRisk_z + \beta_2 \times \mathbf{1}\{\Delta^{\min}_{ipy} \geq 0.07\} + \alpha_{ip} + \gamma_{zy} + \varepsilon_{ipzy}.$$

where Y is is the natural logarithm of written premium, average premium per exposure, written exposure, or an indicator for writing zero exposure. $WildfireRisk$ is the California FAIR Plan's share of written exposures in ZIP code z in 2015. Standard errors are clustered at the insurer level.

	Premium (log)	*Average premium* (log)	*Exposure* (log)	*Exit*
	(2)	(3)	(1)	(4)
$\Delta^{min} \geq 7\%$	-0.138***	-0.058***	-0.095***	0.020***
	(0.025)	(0.004)	(0.027)	(0.003)
$\Delta^{min} \geq 7\% \times$ *Wildfire risk*	1.416	-0.213	1.614	0.261**
	(1.155)	(0.159)	(1.077)	(0.115)
Matched min rate decile × year	Yes	Yes	Yes	Yes
Insurer × product FE	Yes	Yes	Yes	Yes
Year × ZIP code FE	Yes	Yes	Yes	Yes
Obs.	80,317	80,798	80,270	84,265
Adj. R^2	0.624	0.784	0.603	0.187

Table 7: FAIR Plan take-up in markets with constrained private insurers

The table reports estimates from

$$Y_{zy} = \beta \times Constrained\ insurers\ share_{z,y-1} + \alpha_z + \gamma_y + \varepsilon_{zy},$$

where Y is the California FAIR Plan's exposure share, average premium, or total written premium in ZIP code z and exposure year y. And *Constrained insurer share* is constructed as

$$Constrained\ insurer\ share_{zy} = \frac{\sum_{i,p} Exposure_{ipzy} \mathbf{1}\{\Delta^{\min}_{ipy} \geq 0.07\}}{\sum_{i,p} Exposure_{ipzy}}.$$

It therefore measures the exposure-weighted local presence of insurer-products whose last applicable filing has a minimum formula-implied change of at least 7%. The regressions use the lagged, logged constrained-insurer share and include ZIP-code fixed effects, α_z, and year fixed effects, γ_y. Standard errors are clustered by ZIP code.

	FAIR plan exposure share (log)	*FAIR avg. premium* (log)	*FAIR written premium* (log)
	(1)	(2)	(3)
Constrained insurers share (log)	0.059***	0.032***	0.082***
	(0.019)	(0.011)	(0.023)
ZIP code FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Obs.	4,256	4,292	4,249
Adj. R^2	0.923	0.873	0.857

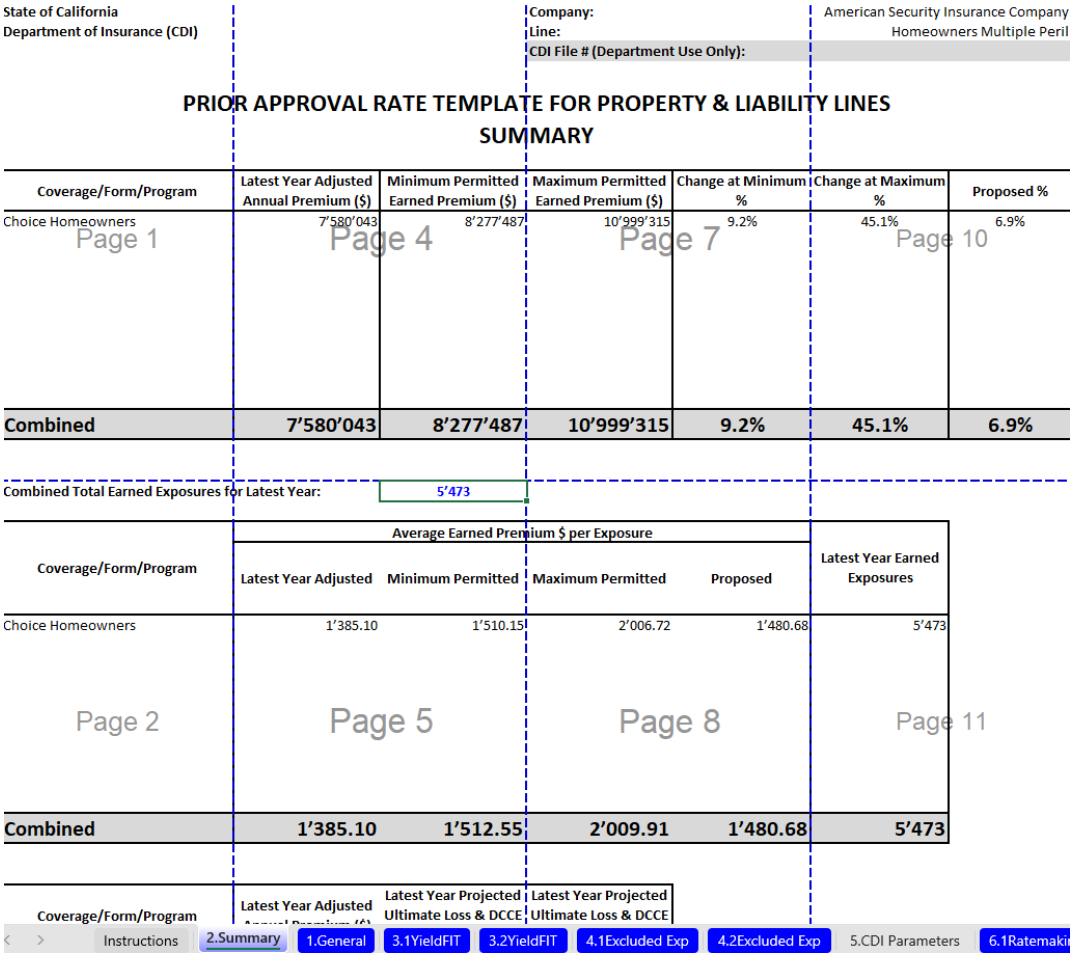
Internet Appendix to

When Insurers Cannot Raise Prices: Product Design and Coverage Adjustment in Home Insurance

A. Additional Figures and Tables

Figure IA.1: Example of a California homeowners insurance rate filing

The figure presents an example of a rate-filing document submitted to the California Department of Insurance. The filing reports the previously approved rate, the minimum and maximum rates implied by the regulatory formula, and the base premium proposed by the insurer.



State of California
Department of Insurance (CDI)

Company: American Security Insurance Company
Line: Homeowners Multiple Peril
CDI File # (Department Use Only):

PRIOR APPROVAL RATE TEMPLATE FOR PROPERTY & LIABILITY LINES
SUMMARY

Coverage/Form/Program	Latest Year Adjusted Annual Premium ($)	Minimum Permitted Earned Premium ($)	Maximum Permitted Earned Premium ($)	Change at Minimum %	Change at Maximum %	Proposed %
Choice Homeowners	7'580'043	8'277'487	10'999'315	9.2%	45.1%	6.9%
Combined	**7'580'043**	**8'277'487**	**10'999'315**	**9.2%**	**45.1%**	**6.9%**

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Combined Total Earned Exposures for Latest Year: 5'473

Coverage/Form/Program	Average Earned Premium $ per Exposure				Latest Year Earned Exposures
	Latest Year Adjusted	Minimum Permitted	Maximum Permitted	Proposed	
Choice Homeowners	1'385.10	1'510.15	2'006.72	1'480.68	5'473
Combined	**1'385.10**	**1'512.55**	**2'009.91**	**1'480.68**	**5'473**

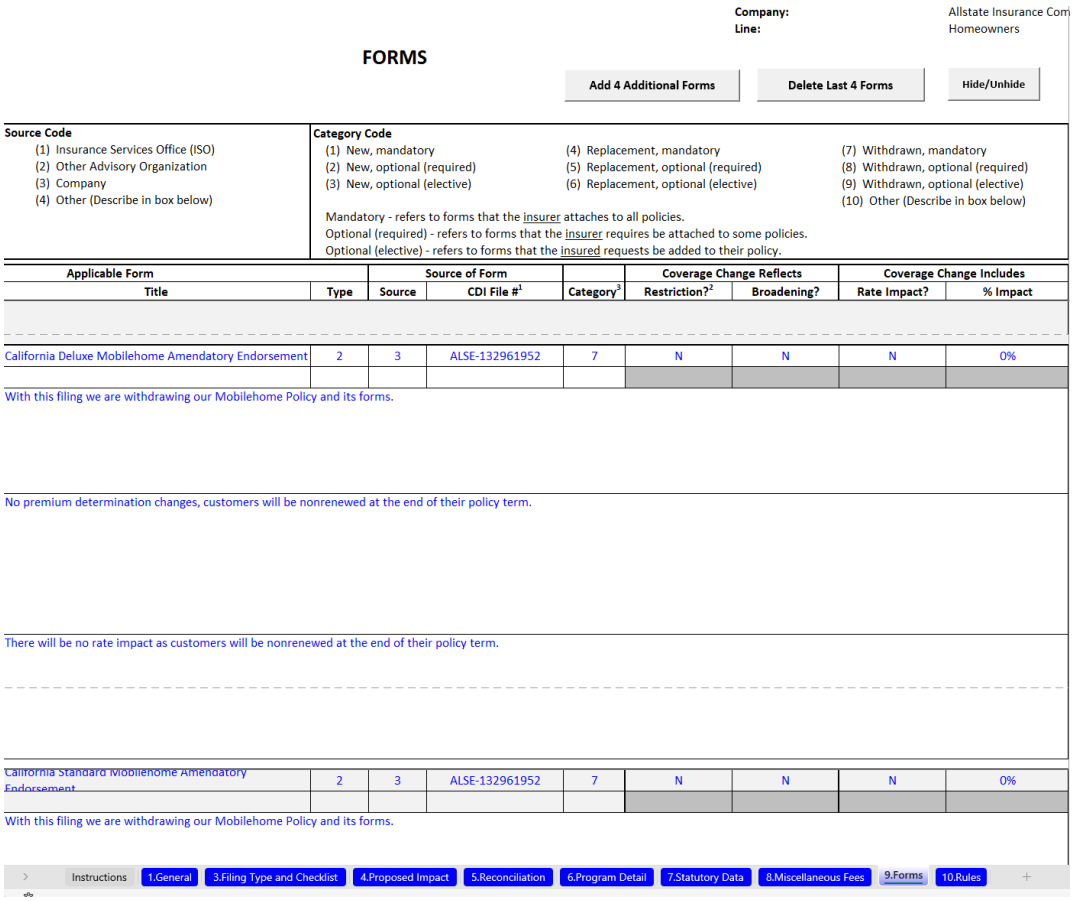
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Coverage/Form/Program	Latest Year Adjusted	Latest Year Projected Ultimate Loss & DCCE	Latest Year Projected Ultimate Loss & DCCE

Instructions | 2.Summary | 1.General | 3.1YieldFIT | 3.2YieldFIT | 4.1Excluded Exp | 4.2Excluded Exp | 5.CDI Parameters | 6.1Ratemaki

Figure IA.2: Example of a product-design and underwriting-guideline filing

The figure presents an example of a product-design filing submitted to the California Department of Insurance. These filings record changes to policy forms, underwriting eligibility, exclusions, and the rules used to classify or price risks.



Company: Allstate Insurance Com
Line: Homeowners

FORMS

Add 4 Additional Forms | Delete Last 4 Forms | Hide/Unhide

Source Code
(1) Insurance Services Office (ISO)
(2) Other Advisory Organization
(3) Company
(4) Other (Describe in box below)

Category Code
(1) New, mandatory
(2) New, optional (required)
(3) New, optional (elective)
(4) Replacement, mandatory
(5) Replacement, optional (required)
(6) Replacement, optional (elective)
(7) Withdrawn, mandatory
(8) Withdrawn, optional (required)
(9) Withdrawn, optional (elective)
(10) Other (Describe in box below)

Mandatory - refers to forms that the insurer attaches to all policies.
Optional (required) - refers to forms that the insurer requires be attached to some policies.
Optional (elective) - refers to forms that the insured requests be added to their policy.

Applicable Form		Source of Form			Coverage Change Reflects		Coverage Change Includes	
Title	Type	Source	CDI File #[1]	Category[3]	Restriction?[2]	Broadening?	Rate Impact?	% Impact
California Deluxe Mobilehome Amendatory Endorsement	2	3	ALSE-132961952	7	N	N	N	0%

With this filing we are withdrawing our Mobilehome Policy and its forms.

No premium determination changes, customers will be nonrenewed at the end of their policy term.

There will be no rate impact as customers will be nonrenewed at the end of their policy term.

California Standard Mobilehome Amendatory Endorsement	2	3	ALSE-132961952	7	N	N	N	0%

With this filing we are withdrawing our Mobilehome Policy and its forms.

Instructions | 1.General | 3.Filing Type and Checklist | 4.Proposed Impact | 5.Reconciliation | 6.Program Detail | 7.Statutory Data | 8.Miscellaneous Fees | 9.Forms | 10.Rules