Capital Costs, Reinsurance, and the Price of Climate Risk

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Abstract

In catastrophe-exposed insurance markets, a large share of what homeowners pay reflects the cost of correlated tail risk. Local insurers cannot diversify these losses on their own and instead transfer them to globally diversified reinsurers, but reinsurance is expensive and volatile. We study a regulatory reform that decreased the capital cost of reinsuring tail risk. After the cost decrease, reinsurance use expanded by 25%, the reinsurance market became less concentrated, and the price of reinsurance fell by over 29%. We show this dramatically impacted the primary insurance market in hurricane-exposed areas of Florida: additional insurers entered and the cost of insuring wind risk fell sharply. To quantify this spatial incidence and analyze counterfactuals, we estimate a structural model of the Florida homeowners insurance market. Three-quarters of the reinsurance cost reduction reached consumers, generating a surplus of $200 per household annually, with gains concentrated in high-risk coastal counties. Our results imply that capital costs required to cover tail events, over and above average losses, are a primary threat to insurance affordability, and that policies that reduce those capital costs can improve pricing and availability for homeowners insurance.

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1 Introduction

The concentration and scale of natural catastrophes make them difficult to insure. In 2024 alone, 27 natural disasters in the U.S. each exceeded a billion dollars of damage (NOAA, 2026), often in a localized area. Insurers without national or international diversification do not have the capacity to pay billions of dollars of claims. Instead, insurers "purchase diversification" through the reinsurance market. Reinsurance - insurance for insurers - allows geographically concentrated insurers to offload tail risk to large, mostly foreign reinsurers that pool across countries and hazards. While reinsurance allows catastrophe risks to be insured by local insurers, it is a costly, volatile and opaque input. For example, reinsurance prices can more than triple year-on-year, and are the largest component of hurricane insurance premiums for homeowners in Florida, often four times larger than the expected loss (Boomhower et al., 2026). The capacity supplied by the reinsurance market, and the price at which it is supplied, are primary drivers of the ultimate cost homeowners pay to be protected against natural catastrophes.

Despite the central role of reinsurers in the U.S. property insurance market, we have remarkably little causal evidence for why reinsurance prices are so high, and the extent to which these high prices ultimately pass through to homeowners. Reinsurance premiums co-move with hurricane seasons, accumulated loss experience, and the balance sheets of global reinsurers, so simple regressions of price on any of these conflate supply shocks with demand shocks. Whether these price changes reflect updated risk assessments (Boomhower et al., 2026), shocks to reinsurer capital (Froot and O'Connell, 2008), or the exercise of market power (Froot, 2001) is hard to disentangle from observational data alone.

We provide such evidence by exploiting a policy reform that made foreign reinsurance less capital intensive. Reinsurers typically do not keep enough cash on hand to pay out 100% of potential claims, and instead rely on risk pooling. However, prior to 2009, foreign reinsurers were required to post 100% of potential liabilities as collateral for any reinsurance agreement entered into with a U.S. insurer. Domestic reinsurers were never subject to this collateral requirement. From 2009 to 2021, U.S. states adopted NAIC Model Law 785, which reduced the collateral that foreign reinsurers were required to post from 100% to as low as 20%.[1] Posting collateral is expensive: it ties up capital that could otherwise be invested and earn returns elsewhere. Cutting collateral requirements therefore lowers the effective capital cost of supplying reinsurance to U.S. insurers, without changing the physical risks being transferred. Because adoption was staggered across

[1] While insurance markets are regulated at the state level, the National Association of Insurance Commissioners (NAIC) is the organizing entity that seeks to standardize insurance policy across states through model laws. States then choose whether (and when) to adopt these laws.

states and primary insurers are assigned to treatment through their domicile state, even when doing business in other states, we can compare reinsurance prices and quantities-and, downstream, homeowner premiums and entry decisions-across otherwise similar insurers exposed to the same risk but facing different reinsurance capital costs.

We first examine how the reform, which lowered the collateral requirements for foreign reinsurers by as much as 80%, affected national reinsurance markets. Using regulatory, pair-level data on all U.S. reinsurance contracts and Borusyak et al.'s (2024) imputed difference-in-differences design, we find that limiting collateral requirements cuts foreign reinsurance prices roughly in half. This price reduction then increased the amount of foreign reinsurance that insurers use, with U.S. primary insurers purchasing 25% more foreign reinsurance post-reform. Both effects are concentrated entirely among insurers with substantial hurricane-corridor exposure, consistent with this group having the highest latent demand for catastrophe risk transfer. The reform also reduced concentration in the reinsurance market: state-level Herfindahl indices and (negative) Shannon entropy both declined, indicating that risk was reallocated across a broader set of reinsurers as the cost of accessing offshore capacity fell.

We then study whether the reduction in reinsurer capital costs reaches consumers in the primary market. We focus on wind insurance premiums in Florida, the most catastrophe-exposed state in the country. Wind insurance covers property against severe storms such as hurricanes and is separately priced in Florida rather than bundled with traditional homeowners insurance. We utilize an imputed triple-difference approach to isolate the catastrophe-risk channel, comparing the price of wind-inclusive coverage to non-wind coverage, by the same insurer and in the same county, before versus after reform. We find that the reform lowers the wind-inclusive rate by about \$0.50 per \$1,000 of insured exposure, which is roughly 12% of the pre-treatment average. This premium effect is about twice as large in high-wind-risk counties as in low-risk counties, consistent with cheaper catastrophe reinsurance driving the result. Lower reinsurance costs also expand availability: treated insurers gain roughly one percentage point of county total-insured-value market share and become about five percentage points more likely to write wind-inclusive coverage relative to non-wind coverage.

The reduced form establishes that the reform changed reinsurance prices, quantities and competition, primary-market premiums, and entry decisions. To speak to welfare effects and optimal policy design, we build an equilibrium model of wind-coverage products in Florida. Consumers' demand for homeowners' insurance follows a standard random-coefficients logit demand model (Berry et al., 1995). Multi-product home insurers set prices in Bertrand-Nash competition, with their marginal costs parameterized as a function of insured exposure, insurer and market iden-

tity, and an indicator for whether the insurer's domicile state has adopted Model Law 785. The reform indicator enters the cost function as a structural variable, with its coefficient measuring the average reduction in primary insurers' marginal cost of supplying wind coverage attributable to cheaper catastrophe reinsurance. We identify this object using a granular Bartik shift-share instrument constructed from each cedent's pre-reform reinsurer-domicile portfolio interacted with the staggered state-level adoption of Model Law 785 (Borusyak et al., 2022).

Model estimates imply that adoption of the collateral reform reduces treated insurers' marginal cost of supplying wind coverage in Florida by approximately 5%, and that around three-quarters of the marginal-cost reduction at the reinsurer level is passed through to homeowners as lower premiums. Combining the cost and pass-through estimates with the spatial incidence of the reform, our counterfactual quantifies that the reform reduced the cost of homeowners' insurance by roughly $200 per household per year in Florida, with the gains concentrated in the high-risk coastal counties where reinsurance constitutes the largest component of premiums. The pass-through rate is one central object of the paper: it characterizes the consumer incidence of any policy, technology, or entrant that reduces the cost of bearing catastrophe risk, and it is the magnitude that translates an upstream change in reinsurer capital costs into a downstream change in household welfare.

Our first contribution is to the literature on the costs of catastrophe risk in consumer insurance markets. Keys and Mulder (2024) document a near-doubling of the pass-through of disaster risk into homeowner premiums, Oh et al. (2026) study the incidence of natural disasters and rate regulation in homeowners insurance, Boomhower et al. (2024) show that coarse risk classification generates a winner's curse that pushes capital out of high-risk segments, and Sastry et al. (2024) show that climate losses destabilize insurer balance sheets with spillovers into mortgage markets. These papers take reinsurance costs as a fixed input to high insurance prices and study the broader implications of the prices households face. We complement them by isolating a clean, policy-driven shock to reinsurer capital costs themselves - the key mechanism that sits between disaster losses and consumer premiums - and measuring its pass-through to homeowner prices and its spatial incidence across risk levels.

Our second contribution is to the literature on market power, capacity, and entry in (re)insurance. Gron (1994), Winter (1994), and Froot (2001) argue that slow-moving capital and reinsurer market power generate high prices and restricted supply, and Koijen and Yogo (2016) show that regulation shapes how insurance liabilities are ultimately placed across captives and affiliated entities. We show that reinsurance collateral rules operate as barriers to entry that depress competition and misallocate risk. When these barriers are lowered, prices decline and competition increases

as risk moves to foreign reinsurers that can more efficiently bear it. This, in turn, expands the set of homes that are economical for primary insurers to cover.

Our third contribution is to the finance literature on how the cost of capital at financial intermediaries feeds through to the prices that end-users pay. Froot and Stein (1998) and Froot (2007) show theoretically that costly external capital at financial institutions- and especially at insurers and reinsurers-should be priced into the contracts they sell; Zanjani (2002) models how marginal capital requirements for insuring tail risk push catastrophe insurance prices above expected losses; and Koijen and Yogo (2015) estimate the shadow cost of statutory capital for U.S. life insurers during the financial crisis and tie it to observed markups. Reinsurers are capital-intensive financial intermediaries whose required return on capital shapes the price of the risk transfer they sell, and collateral requirements are effectively a tax on that capital. By tracing a quasi-experimental reduction in that capital tax from reinsurer cost functions to homeowners insurers' supply decisions to consumer premiums, we provide a direct estimate of the cost-of-capital channel in property insurance pricing. The magnitudes matter well beyond this particular reform: they say how much consumers stand to gain whenever a policy, a technology, or an entrant - such as the alternative-capital providers of Cummins and Weiss (2009) and Bloomberg News (2026) - lowers the cost of bearing catastrophe risk.

A direct policy implication is that the case for a government reinsurer of last resort for property catastrophe risk is stronger than the standard market-failure argument suggests. The usual case, going back to Lewis and Murdock (1996) and summarized by Kousky and Cooke (2012), rests on private reinsurers' inability to diversify correlated catastrophe losses and on capacity constraints in extreme events, while Cummins (2006) cautions that government provision can crowd out private and alternative-capital solutions. Solomon (2026) shows that public reinsurance provided at cost in Australia does substantially reduce prices and increase availability. Our estimates add a separate channel, rooted in Arrow and Lind (1970) and formalized recently by Jia et al. (2025): a government reinsurer would fund its risk-bearing at a lower cost of capital than private reinsurers face, and our pass-through numbers imply that a large share of that cost-of-capital difference would reach homeowners as lower premiums rather than being absorbed as rents upstream. This channel operates even in quiet years when private capacity is not binding, and it is concentrated in exactly the high-risk counties where property insurance is becoming unaffordable.

2 Institutional Details and Data

2.1 Institutional Details

2.1.1 Reinsurance

Reinsurance is insurance for insurers. It transfers risk between primary insurers ("cedents") and reinsurers: the cedent pays a premium and the reinsurer pays a contractually-specified share of incurred losses. Insurers purchase reinsurance for three primary reasons: capital relief, earnings smoothing, and access to capacity for tail risk that is too correlated to retain on their own balance sheet. For homeowners insurance exposed to natural catastrophes, the third is most important.

The United States is the largest single source of ceded premium in the global reinsurance market, and most of that premium is assumed by reinsurers domiciled outside the United States. In 2014, over 62% of premium ceded by U.S. insurers went to foreign-domiciled reinsurers (Federal Insurance Office, U.S. Department of the Treasury, 2014). Reinsurance supply is concentrated in a small set of large, mostly non-U.S. firms: Munich Re, Swiss Re, Hannover Re, SCOR, the Lloyd's market, Berkshire/Gen Re, and Bermuda specialists such as RenaissanceRe, Everest, Arch, and Axis. Bermuda alone is the largest single supplier of catastrophe reinsurance to U.S. insurers (Cummins, 2008).

The offshore concentration of catastrophe reinsurance supply is driven primarily by tax and regulatory incentives. First, prior to the 2017 Tax Cuts and Jobs Act, the U.S. combined federal and state corporate tax rate was approximately 39%. In contrast, Bermuda had no corporate income tax and European rates ranged from 12.5% (Ireland) to 38% (France) (Organisation for Economic Co-operation and Development, 2024), generating a substantial after-tax return differential on the equity capital reinsurers must hold against tail losses. Second, U.S. risk-based capital is calibrated primarily to traditional liability lines and gives limited credit for diversification across catastrophe zones, while Bermuda's Solvency Capital Requirement and the European Solvency II regime credit cross-zone diversification more generously through internal catastrophe models (CAS Risk-Based Capital Dependencies and Calibration Working Party, 2012).

Since catastrophe risk-bearing capital is most efficiently held internationally, the relevant question for U.S. insurers is the cost of transferring risk offshore. Prior to the reform we study, foreign reinsurers were required to post 100% collateral against ceded liabilities. That collateral ties up capital that could otherwise earn risk-adjusted returns elsewhere. This is the policy lever changed by NAIC Model Law 785.

2.1.2 Reinsurance Regulation and Reform

Insurance in the United States is regulated at the state level. State insurance departments oversee prices and policy forms, market conduct, and the capital adequacy of insurers domiciled in the state. Reinsurance is regulated as part of this framework, primarily through its effect on the ceding insurer's required capital. Whether a reinsurance contract reduces a cedent's required capital - the "credit for reinsurance" - is determined by the cedent's state insurance code, which in nearly all states tracks the NAIC's Credit for Reinsurance Model Law.

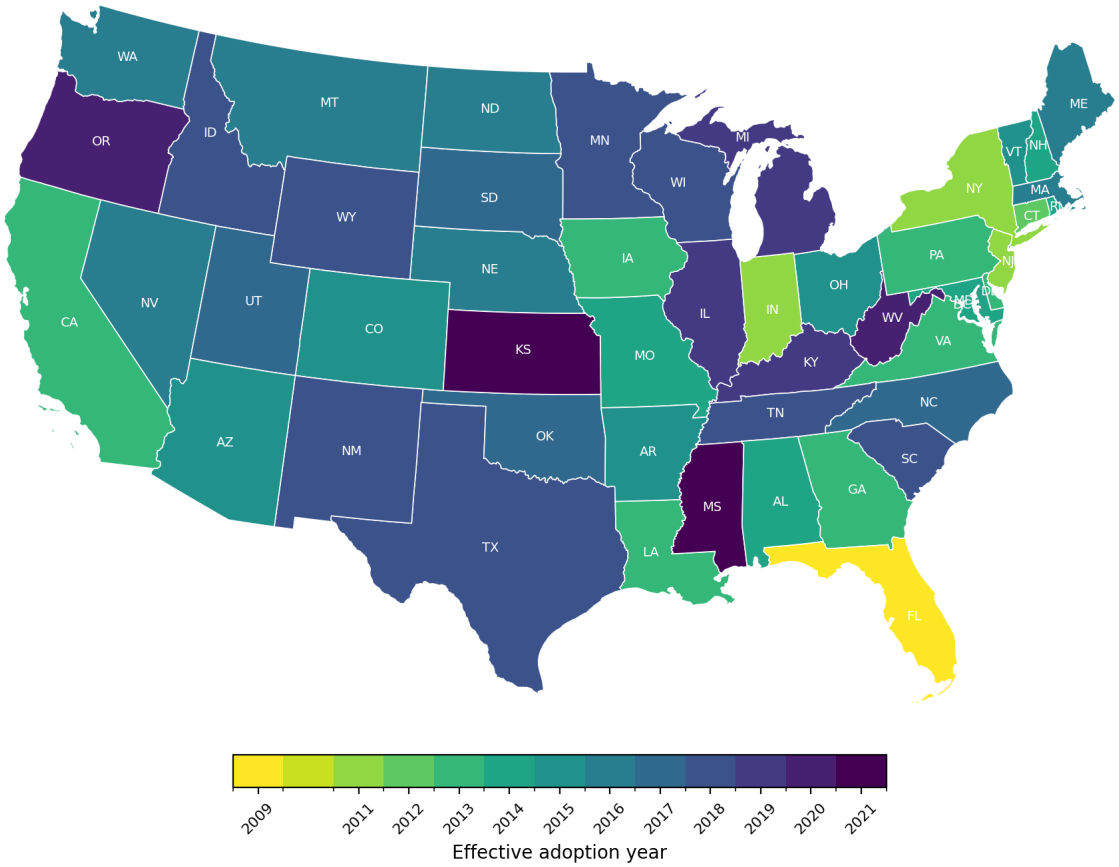
Authorized reinsurers - those licensed in the cedent's state - are subject to the same solvency regulation as primary insurers, and a primary insurer that cedes to an authorized reinsurer automatically gets credit against required capital for all the catastrophe risk transferred. Unauthorized reinsurers, in particular, foreign-domiciled reinsurers, fall outside any state regulator's direct authority. For decades, the credit-for-reinsurance rule required that reinsurance ceded to a foreign reinsurer be backed by collateral equal to 100% of the ceded liabilities, held in a U.S. trust in eligible high-quality, liquid, but low-return assets (Federal Insurance Office, U.S. Department of the Treasury, 2014). This functions as a cost wedge between reinsurance ceded to domestic and to foreign reinsurers: the latter must hold costly collateral, increasing the price for U.S. insurers to transfer risk offshore.

Policy Reform. We study a reform to this collateral requirement for foreign reinsurers. Starting in Florida in 2009, and proceeding across other states over the next decade[2], the collateral required to be posted by foreign reinsurers was reduced. Instead of 100%, foreign reinsurers now had to post collateral ranging from 0% (AAA) to 50% (A-) to 100% (BB and below) depending on their credit rating (National Association of Insurance Commissioners, 2019). This reduction in the cost of reinsurance was beneficial to all U.S. insurers, but particularly so for those writing policies in catastrophe-exposed regions such as Florida, where the correlation of risk makes reinsurance critical. Once the implementing state law was passed, foreign reinsurers had to get certified to be eligible to post reduced collateral. That certification process often took one to three years, meaning the impacts of the law were often not instant.

Treatment is assigned by domicile state - where the insurer is incorporated and subject to primary oversight. When a domicile state adopts Model Law 785, the insurer gains access to reduced-collateral reinsurance regardless of where it writes policies. For our Florida analysis, this creates

[2] A full timeline of adoption is provided in Appendix C.

Figure 1: Policy Reform Timing



Note: Effective date of state adoption of NAIC Model Law 785, which replaced the 100% collateral requirement on foreign reinsurers with a sliding scale (0–100%) tied to credit ratings. Source: hand-collected state administrative codes and statutes; see Appendix Table 4.

within-market variation: all sample insurers write Florida policies, but they are domiciled in different states with different adoption dates.

2.1.3 Florida Residential Property Insurance

We study the effects of reinsurance cost changes on home insurance in Florida. Florida is the most catastrophe-exposed residential insurance market in the United States. The state has roughly $2.9 trillion of insured property value in its coastal counties that regularly experience hurricane landfalls (AIR Worldwide, 2013). Average annual insured catastrophe losses in Florida exceed those of any other state by a wide margin.

The structure of the Florida market compounds the effects of this concentration. National insurance groups, particularly State Farm and Allstate, have in recent decades sharply curtailed their Florida residential business (Carrillo et al., 2022). The void was filled by small, Florida-domiciled "specialist" insurers (Grace et al., 2007), which today write roughly 54% of Florida residential premium (Florida Office of Insurance Regulation, 2024). These domestic specialists are undiversified and thinly capitalized relative to their concentrated tail exposure.

As a result, Florida is particularly reliant on reinsurance. Florida insurers cede roughly 40% of direct premium to reinsurers, compared with a national average of about 16% (Gallagher Re, 2026). While a narrow portion of reinsurance coverage is provided by the public Florida Hurricane Catastrophe Fund (FHCF), insurers still vitally need reinsurance coverage to offload their highly concentrated exposure to hurricanes. Cost shocks to reinsurance are, consequently, critical to the prices consumers face in the primary homeowners insurance market in Florida.

2.2 Data Sources

We combine three data sources: (1) reinsurance transaction data from NAIC Schedule F filings, (2) hand-collected and validated state-level adoption dates for NAIC Model Law 785, and (3) quarterly data on Florida homeowners insurance from the Florida Office of Insurance Regulation (QUASR).

2.2.1 Reinsurance Transaction Data

Schedule F Part 3 of NAIC statutory filings reports ceded reinsurance at the insurer-reinsurer-year level. From Schedule F we extract ceded premium (reinsurance volume), losses incurred and recovered (claim experience), and reinsurer classification (domestic versus foreign).

Sample Restrictions. The reinsurance panel is aggregated to the insurer-year level from NAIC Schedule F Part 3 cessions. We match to insurer balance sheet data, keeping filings with a non-missing insurer and reinsurer identifier, restrict to year ≥ 2000, and drop insurer-years with zero or missing direct premiums written (DPW). The balanced panel used for event-study estimation further restricts to insurers observed at least four years before and five years after their domicile-state's adoption, yielding 38,095 insurer-years across 2,225 unique insurers.

Summary statistics for the Schedule F data are in Table 1 below.

The proportion of insurers' DPW that is ceded to reinsurers rises from approximately 30% to 50% after treatment occurs. The dollars received back from reinsurers relative to premiums paid

Table 1: Reinsurance Summary Statistics: Pre vs Post Treatment

		Pre-treatment				Post-treatment			
Outcome	Unit	Mean	SD	P25	P75	Mean	SD	P25	P75
Direct premiums written (DPW)	$M	5,460.96	9,350.58	453.98	5,085.46	4,900.16	10,517.07	548.52	4,286.85
Premium ceded to reinsurance	$M	1,645.74	2,843.00	181.02	2,064.80	2,482.37	4,137.98	266.72	2,732.35
Claims received from reinsurers	$M	70.79	167.18	0.81	53.78	163.06	507.90	1.54	132.64
Number of reinsurers		56.50	91.29	3.00	67.00	62.92	103.80	2.00	79.00

Note: Observations are at the insurer-year level, aggregated from NAIC Schedule F Part 3 cessions and matched to insurer balance sheet data. The sample is restricted to filings with non-missing insurer and reinsurer identifiers, years $\geq$ 2000, and insurer-years with positive direct premiums written (DPW). The balanced panel further restricts to insurers observed at least four years before and five years after their domicile-state's adoption of the reinsurance collateral policy change, yielding 38,095 insurer-years across 2,225 unique insurers. Pre vs post defined by whether the insurer's domicile-state reinsurance collateral policy change adoption date has been reached. Premium ceded to reinsurance and claims received from reinsurers aggregate across all reinsurer counterparties (domestic and foreign). Number of reinsurers is the count of distinct reinsurer counterparties on Schedule F Part 3 in the insurer-year. Dollar amounts are in millions. Statistics are DPW-weighted within each period.

rise from approximately 4% to 7%. The number of reinsurers contracted with additionally rises from 57 to about 63. These summary statistics are consistent with, and foreshadow, the causal results we obtain in the rest of the paper: after the cost of foreign reinsurance falls, the quantity of reinsurance rises, the price of reinsurance falls (more dollars of claims received per dollar of premium ceded) and the market becomes more competitive.

2.2.2 Florida Homeowners Insurance Data

The Quarterly Supplemental Report (QUASR) from the Florida Office of Insurance Regulation covers all 67 Florida counties from 2010 Q1 through 2020 Q4. We aggregate to the insurer-county-quarter level. The data include policy counts (total policies in force, with wind/non-wind breakdowns), premiums (total and by wind coverage status), exposures (total insured value), and policy flows (new policies, cancellations, nonrenewals, transfers).

Sample Restrictions. We restrict to standard personal residential homeowners policies (PR-HO). All "wind-only" standalone products (typically written by Citizens or the Florida Hurricane Catastrophe Fund) are dropped at the aggregation stage so that the unit of observation is a single bundled homeowners contract. Within the retained rows, premiums are decomposed into wind

and non-wind components based on whether the policy itself includes wind coverage; this is the split reported in the "Wind share of DPW" row of Table 2.

We correct a small set of insurer-quarters where per-policy premiums appear mis-scaled by a factor of 100, drop observations with non-finite log premium or log rate per $1,000 of exposure, and winsorize the top and bottom 1% of rate per $1,000 (cutoff ≈ 9.83). We then restrict to insurers whose domicile state has a known reinsurance collateral policy change adoption date within the QUASR years of observation (2010 through 2020). Most importantly, this removes Florida-domiciled insurers, who were treated in 2009. Since they are likely the most reliant on reinsurance, our results are plausibly conservative. Summary statistics for the Florida QUASR data are in Table 2 below.

Table 2: Florida Homeowners Insurance Summary Statistics (DPW-weighted): Pre vs Post Treatment

		Pre-treatment				Post-treatment			
Outcome	Unit	Mean	SD	P25	P75	Mean	SD	P25	P75
Policies in force	policies	2,471.55	2,226.76	797.00	3,357.00	11,460.52	20,195.28	1,518.00	11,931.00
Total direct premium written (DPW)	$M	9.30	11.51	2.04	11.65	28.06	54.48	3.11	26.78
Avg. premium per policy	$	4,053.87	3,920.08	1,700.74	4,122.17	2,557.00	2,071.85	1,548.93	2,811.13
Total insured exposure	$M	2,503.69	3,541.40	530.47	2,666.84	4,773.87	7,076.41	758.92	5,301.12
Rate per $1,000 of exposure	$	4.13	1.41	3.15	4.93	4.89	1.92	3.41	6.11
Wind share of DPW		0.92	0.16	0.90	1.00	0.97	0.10	0.98	1.00
New policies written	policies	35.46	133.77	2.00	31.00	795.24	2,171.92	31.00	496.00
Net new policies written	policies	-41.20	172.04	-68.00	-4.00	164.95	1,906.59	-109.00	126.00
Insurers per county-quarter	insurers	24.94	10.71	17.00	32.00	59.89	9.56	52.00	68.00

Note: Observations are at the insurer-county-quarter level except "Insurers per county-quarter" (county-quarter level). Pre vs post defined by whether the insurer's domicile-state reinsurance collateral policy change adoption date has been reached. Average premium per policy is winsorized at the 1st and 99th percentiles to remove data-coding outliers (e.g., misreported exposure leading to implausible rates). Net new policies written = new policies written − policies canceled − policies nonrenewed − policies transferred out + policies received from other insurers. Statistics are DPW-weighted within each period.

As their states of domicile are treated, more insurers begin writing business in Florida. Those that do write more policies, charge lower premiums, and move toward wind-heavy policies. This is consistent with the effects of a reinsurance price decrease passed through to lower homeowners

insurance prices specifically in hurricane-exposed policies, and the offering of new policies that were previously uneconomical.

3 National Reinsurance Market Effects

This section examines the broader impacts of reinsurance regulatory reforms across the United States, focusing on market participation, concentration, and pricing dynamics.

3.1 Empirical Strategy

3.1.1 Two-Stage Imputation Difference-in-Differences

The natural reduced-form specification for the pass-through of the collateral reform onto reinsurance outcomes is the two-way fixed-effects (TWFE) event study:

$$Y_{it} = \alpha_i + \lambda_t + \sum_{\tau \neq -1} \gamma_\tau \, \mathbf{1}\{\mathrm{RelTime}_{it} = \tau\} + \varepsilon_{it}, \tag{1}$$

where Y_{it} is the outcome of interest for insurer i in year t, α_i is an insurer fixed effect, λ_t is a calendar-year fixed effect, and $\mathrm{RelTime}_{it} = t - t^{\text{adopt}}_{s(i)}$ is years since the insurer's domicile state $s(i)$ adopted the reinsurance collateral policy change. The reference period is $\tau = -1$. Under parallel trends, no anticipation, and homogeneous treatment effects, γ_τ identifies the average treatment effect on the treated (ATT) at event time τ.

Applied directly, equation (1) is unreliable in our setting. The literature on staggered-adoption designs has shown that when treatment timing varies across units and treatment effects are heterogeneous over event time-both of which apply here-earlier-treated insurers enter as controls in comparisons of later-treated insurers, and the estimated $\{\gamma_\tau\}$ become a contaminated weighted average of cohort-specific effects, sometimes with negative weights (de Chaisemartin and D'Haultfœuille, 2020; Goodman-Bacon, 2021; Borusyak et al., 2024). Pre-trends estimated from the same regression inherit the same contamination, making the test for parallel trends unreliable.

To avoid these issues, we use a two-stage imputation estimator following Gardner (2022) and Borusyak et al. (2024). In the first stage, we estimate

$$Y_{it} = \alpha_i + \lambda_t + \varepsilon_{it} \tag{2}$$

using only observations with $D_{it} = 0$ (years before insurer i's domicile state adopted the reinsurance collateral policy change). Insurer fixed effects absorb time-invariant differences across insurers; year fixed effects absorb common shocks to the reinsurance market, including hurricane seasons, accumulated loss experience, and aggregate movements in global reinsurer capital.

In the second stage, we use these estimates to predict counterfactual outcomes $\hat{Y}_{it}(0)$ for all observations, including treated insurer-years. The residual $Y_{it} - \hat{Y}_{it}(0)$ is the treatment effect for treated observations and noise for controls. Regressing these residuals on the treatment indicator,

$$Y_{it} - \hat{Y}_{it}(0) = \tau \cdot D_{it} + \eta_{it}, \tag{3}$$

yields τ, which consistently estimates the ATT under parallel trends. Standard errors are clustered at the insurer level.

3.1.2 Insurer-Level Slope Difference-in-Differences

While most outcomes we analyze are levels, several reinsurance outcomes in Section 3 are most naturally interpreted as ratios-for example, the dollars of reinsurance ceded relative to direct premiums written, or claims recovered relative to premiums ceded. We adapt the methodology of Section 3.1.1 to estimate how these ratios change with treatment.

The naive TWFE analog is

$$Y_{it} = \beta_0 X_{it} + \beta_1 (X_{it} \times D_{it}) + \alpha_i + \lambda_t + \varepsilon_{it}, \tag{4}$$

where Y_{it} is the numerator (e.g., reinsurance ceded), X_{it} is the denominator (e.g., DPW), D_{it} is the treatment indicator, and β_1 captures the post-treatment change in the slope. The event-study analog replaces D_{it} with $\sum_\tau \mathbf{1}\{\mathrm{RelTime}_{it} = \tau\}$. This specification suffers from the same staggered-adoption pathologies as equation (1).

We therefore implement the imputation analog. In the first stage, using only untreated observations ($D_{it} = 0$), we estimate

$$Y_{it} = \beta_0 X_{it} + \alpha_i + \lambda_t + \varepsilon_{it}. \tag{5}$$

In the second stage, we construct counterfactuals $\hat{Y}_{it}(0)$ and regress residuals on event-time-interacted denominators:

$$Y_{it} - \hat{Y}_{it}(0) = \sum_{\tau=-L}^{R} \gamma_\tau \cdot X_{it} \cdot \mathbf{1}\{\mathrm{RelTime}_{it} = \tau\} + \nu_{it}, \tag{6}$$

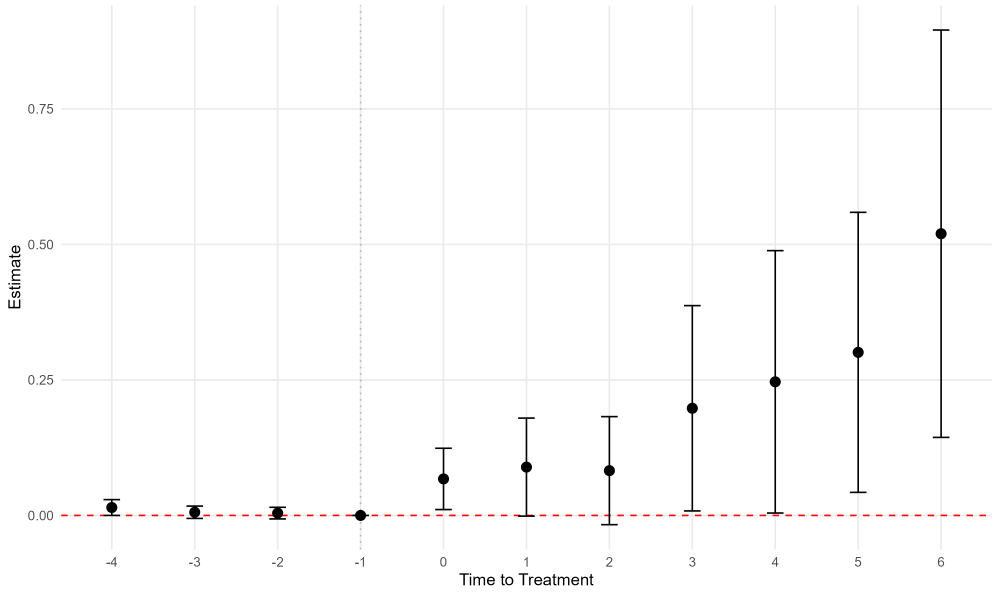
where $\text{RelTime}_{it} = t - t^{\text{adopt}}_{s(i)}$ and $\tau = -1$ is the reference period. The slope coefficients $\{\gamma_\tau\}$ capture how the marginal relationship between Y and X shifts in event time. In both stages we weight by insurer-year direct premiums written. Standard errors are clustered at the insurer level.

3.2 Results

3.2.1 Reinsurance Quantity

We first analyze how the regulatory changes affected ceding behavior to foreign reinsurers-the category most directly affected by collateral and credit requirements under the reinsurance collateral policy change. Figure 2 displays the impact on reinsurance ceded to foreign reinsurers as a function of insurer size.

Figure 2: Quantity of Reinsurance Ceded: Foreign Reinsurers

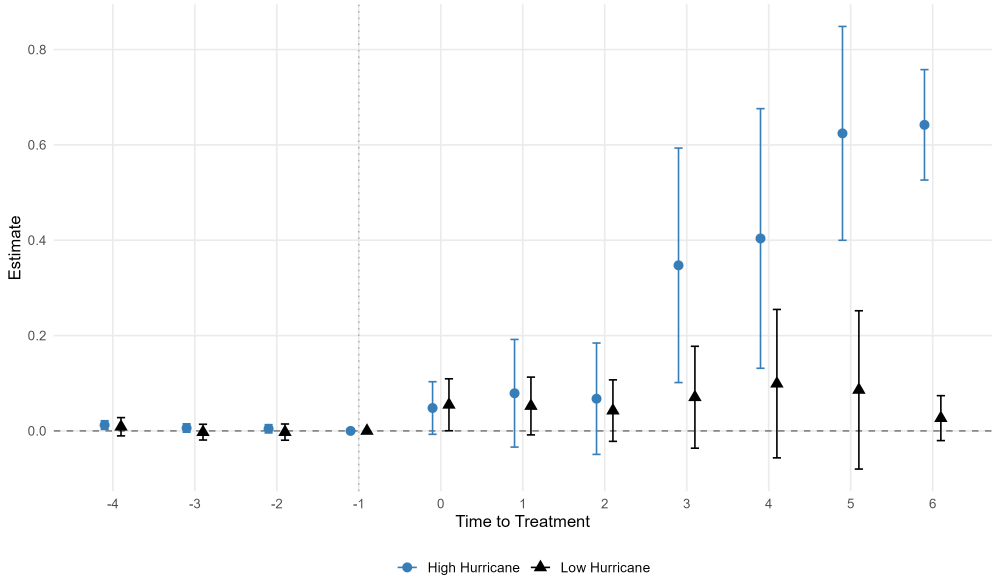


Notes: The figure reports an event study where the outcome is dollars of reinsurance ceded to foreign reinsurers; the exposure variable is direct premiums written (DPW). Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{\gamma_\tau\}$ are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. The event window is $\tau \in [-5, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

The results show that treated insurers substantially increased reinsurance ceding to foreign reinsurers following the regulatory reform. Since the cost of doing so was directly reduced by the reform, this is intuitive.

To understand where the latent demand for reinsurance was highest, we split the sample of insurers into those that were above or below median in the share of their business, prior to treatment, that was written in hurricane-exposed states[3]. The results are in Figure 3.

Figure 3: Quantity of Reinsurance Ceded: High vs. Low Hurricane Corridor Exposure



Notes: The figure reports a slope event study where the outcome is dollars of reinsurance ceded to foreign reinsurers; the exposure variable is direct premiums written (DPW). Insurers are split into high and low hurricane exposure groups based on their pre-treatment DPW-weighted average share of premiums written in hurricane corridor states (FL, TX, LA, MS, AL, SC, NC, GA), with the split at the DPW-weighted median. The high-hurricane-exposure estimates are in blue, the low-hurricane-exposure estimates are in black.

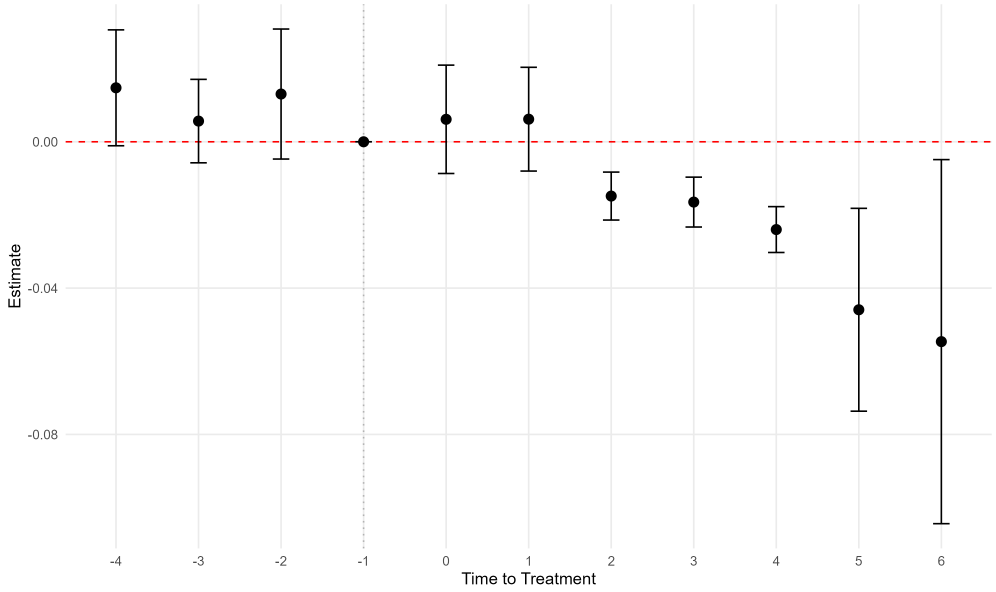
We see that the increase in reinsurance was driven entirely by insurers with high pre-treatment exposure to hurricane corridor states. This shows that reinsurance is most critical for correlated natural catastrophes. Consequently, reductions to the cost of offloading that tail risk through reinsurance are most helpful to insurers who operate in hurricane-exposed areas.

[3]The states are: Florida, Texas, Louisiana, Mississippi, Alabama, South Carolina, North Carolina, and Georgia.

3.2.2 Reinsurance Prices

We analyze how reinsurance pricing relationships changed following the regulatory reform. We analyze this using the BJS-slope specification (equations 5–6). On the LHS is losses reimbursed by the reinsurer to the insurer. On the RHS - the exposure variable - is premiums ceded from the insurer to the reinsurer. The coefficients of interest, γ_τ per specification (equations 5–6), measure how many dollars are received by the insurer per dollar of premium ceded. We report the negative of these coefficients so that a reinsurance contract that leads to more dollars reimbursed to the insurer per dollar ceded is coded as a decline in this 'price' measure. The results are in Figure 4.

Figure 4: Reinsurance Prices: Foreign Reinsurers



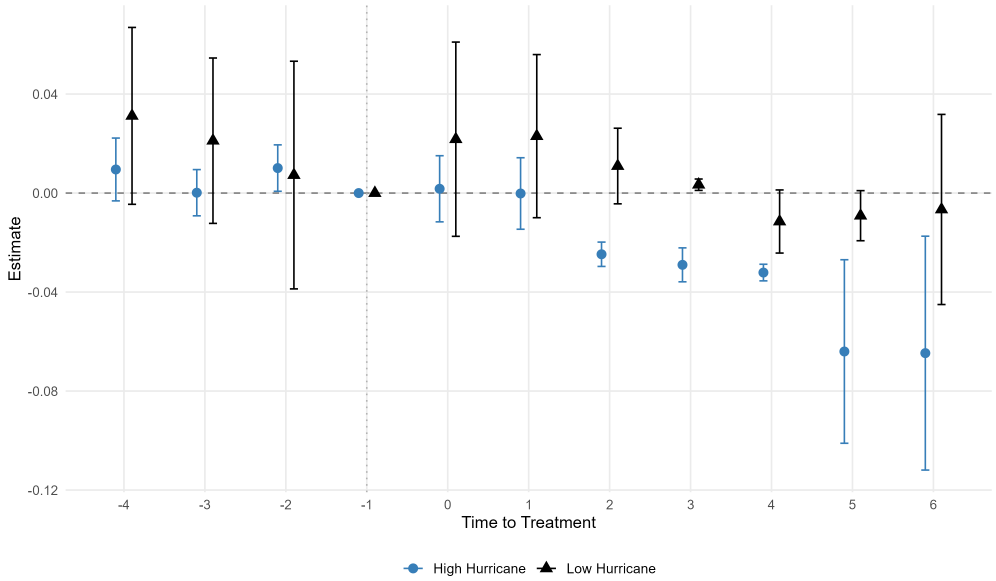
Notes: The figure reports a slope event study where the outcome is losses plus loss adjustment expenses (LAE) incurred on reinsurance ceded to foreign reinsurers; the exposure variable is premiums ceded to foreign reinsurers. The sample is restricted to insurer-years with positive ceded premiums to foreign reinsurers. Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{-\gamma_\tau\}$ (sign-flipped) are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. Negative coefficients indicate lower loss ratios (cheaper reinsurance) post-treatment. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

Following treatment with a reinsurance cost decrease, the ex-post observed price of reinsurance declined. For every dollar of premium ceded, insurers receive 2 to 5 cents back on average.

Per Table 1, at baseline insurers receive approximately 7 cents back per dollar ceded. Hence, the reinsurance collateral policy change makes reinsurance approximately 29% to 71% cheaper.

We further decompose the change in reinsurance price based on pre-treatment insurer exposure to hurricane-risk states, analogously to Section 3.2.1. The results are in Figure 5.

Figure 5: Reinsurance Prices: High vs. Low Hurricane Corridor Exposure



Notes: The figure reports a slope event study where the outcome is losses plus loss adjustment expenses (LAE) incurred on reinsurance ceded to foreign reinsurers; the exposure variable is premiums ceded to foreign reinsurers. Insurers are split into high and low hurricane exposure groups based on their pre-treatment DPW-weighted average share of premiums written in hurricane corridor states (FL, TX, LA, MS, AL, SC, NC, GA), with the split at the DPW-weighted median. Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{-\gamma_\tau\}$ (sign-flipped) are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. Negative coefficients indicate lower loss ratios (cheaper reinsurance) post-treatment. The high-hurricane-exposure estimates are in blue, the low-hurricane-exposure estimates are in black.

Figure 5 shows that the reinsurance price declines are strongest among insurers that were more active in hurricane-exposed states prior to treatment. In line with the quantity results in the prior section, this implies that those with the highest latent demand for reinsurance, and those most constrained by previously high prices, are insurers who write policies in hurricane-exposed states.

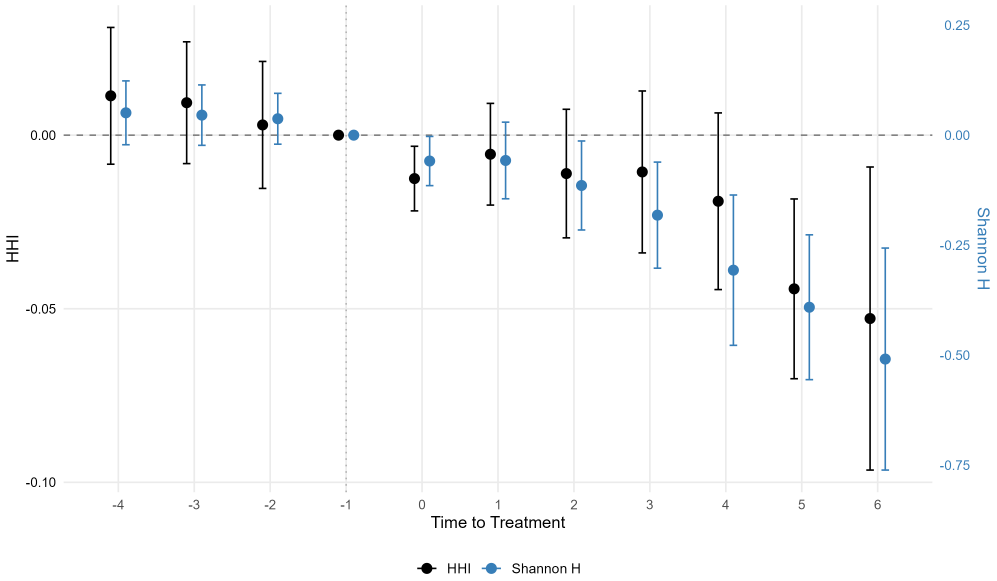
3.2.3 Market Concentration

To assess whether the regulatory reform affected market structure, we examine reinsurer concentration at the state-of-domicile level. Unlike the insurer-level analyses in Sections 3.2.1 and 3.2.2, which examine individual insurer ceding behavior, here we aggregate across all insurers domiciled in a given state to measure overall market concentration. This aggregation captures whether the reform changed the competitiveness of the reinsurance market accessible to insurers in treated states, as opposed to individual portfolio diversification patterns.

We measure concentration using two standard indices. The Herfindahl-Hirschman Index (HHI) is computed as $\sum_j s_j^2$ where s_j is reinsurer j's share of total ceded premiums in a state-year; higher values indicate greater concentration. Shannon entropy, computed as $H = -\sum_j s_j \log(s_j)$, naturally increases with market dispersion. For consistency of interpretation with HHI, we analyze the negative of Shannon entropy ($-H$) so that higher values indicate greater concentration and lower values indicate more competitive markets for both measures.

These are outcome specifications following the two-stage framework in Section 3.1.1 (equations 2 and 3), adapted to the state-year level with state-of-domicile and year fixed effects. Figure 6 shows that reinsurer concentration declined following adoption of the reinsurance collateral policy change. Both measures indicate that reinsurance markets became less concentrated-equivalently, more competitive-in treated states post-reform.

Figure 6: Reinsurance Market Concentration: HHI and Shannon Entropy



Notes: This figure reports a state-level event study where the outcomes are two measures of market concentration. For each state-year, we aggregate ceded premiums across all insurers domiciled in that state and compute concentration measures from the resulting distribution of premiums across reinsurers. Lower HHI (left axis) and (negative) Shannon entropy (right axis) indicate less concentrated (more competitive) markets. The sample includes only state-years constructed from insurers in the balanced panel (observed continuously from 4 years before through 5 years after their state's adoption). Event time τ is relative to state adoption. Coefficients $\{\beta_\tau\}$ are from the two-stage specification described in Section 3.1.1, adapted to the state-year context with state and year fixed effects in Stage 1 (equations 2 and 3), with reference period $\tau = -1$. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses state-level aggregate DPW weights and clusters standard errors by state of domicile.

4 Florida Home Insurance Market Effects

4.1 Empirical Strategy: Triple-Difference with Wind vs. Non-Wind Coverage

The Florida QUASR panel is at the insurer-county-quarter level, which enables two extensions to the imputation framework of Section 3.1.1. First, we replace the year fixed effect λ_t with a county-by-quarter fixed effect λ_{ct}, absorbing any shock common to all insurers operating in a given Florida county-quarter (local hurricane realizations, housing-market conditions, regulatory actions). We use this specification for the TIV market-share results in Section 4.2.2.

Second, QUASR separately reports wind-inclusive and wind-excluded policies within the same cell. Because the reinsurance collateral policy change relaxes collateral specifically for catastrophe-backing capital, it should primarily affect wind-exposed policies. For two outcomes we use the within-cell wind-minus-non-wind contrast directly. For pricing (Section 4.2.1),

$$\Delta^{r}_{ict} = \log r^{\text{wind}}_{ict} - \log r^{\text{nonwind}}_{ict}, \tag{7}$$

where r^{wind}_{ict} and r^{nonwind}_{ict} are the insurer's rate per \$1,000 of exposure. For entry (Section 4.2.3),

$$\Delta^{e}_{ict} = \mathbf{1}\{\text{wind present}\}_{ict} - \mathbf{1}\{\text{non-wind present}\}_{ict} \in \{-1, 0, +1\}. \tag{8}$$

Differencing within cell subtracts off any shock hitting wind and non-wind equally-common demand movements, firm-wide scale adjustments, local loss experience unrelated to reinsurance cost-leaving the wind-specific response on which the reform should load. Identification therefore requires parallel trends in the wind-minus-non-wind gap rather than in each level separately, a weaker requirement than in Section 3.1.1.

We estimate equations (7) and (8) using the same two-stage imputation procedure as before: Stage 1 fits $\Delta^{\bullet}_{ict} = \alpha_i + \lambda_{ct} + \varepsilon_{ict}$ for $\bullet \in \{r, e\}$ on not-yet-treated observations; Stage 2 regresses the residuals on event-time dummies. We weight by direct premiums written and cluster standard errors by insurer.

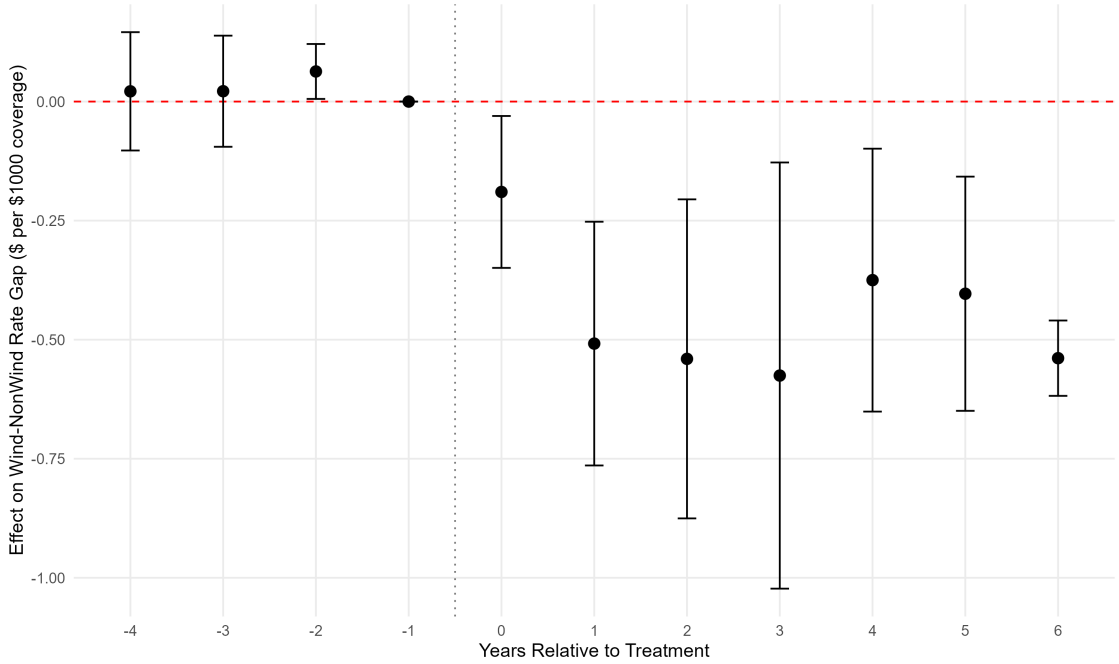
4.2 Results

4.2.1 Intensive Margin: Premium

We examine effects on wind premium coverage using Florida QUASR data. This analysis observes catastrophe exposure directly (wind coverage) and exploits treatment variation from insurer domicile state. Since QUASR covers Florida policies only, variation comes from insurers headquartered in different states with different reinsurance cost policy change adoption timing.

We estimate a triple-difference comparing wind-included versus wind-excluded policy pricing. For each insurer-year, we calculate the rate per \$1,000 of coverage separately for each type and take the difference-the *wind premium gap*. A negative coefficient indicates the reinsurance cost policy change narrowed this gap, consistent with improved catastrophe reinsurance access reducing the cost of wind coverage. The results are in Figure 7.

Figure 7: Policy Pricing: Wind-Included vs. Wind-Excluded Coverage



Notes: The figure reports a triple-difference event study estimated on insurer-county-quarter observations from Florida QUASR data. The outcome is the *wind premium gap*-the within-insurer-county-quarter difference in the rate per $1,000 of coverage between wind-inclusive and wind-excluded policies, following the structure of equation (7). Differencing wind from non-wind within insurer-county-quarter nets out any insurer- or market-level shock common to both coverage types, so identification requires parallel trends in the wind-minus-non-wind gap rather than in each level separately. Event time τ is relative to the adoption of the reinsurance collateral policy change by the insurer's state of domicile. Coefficients are estimated using the two-stage imputation procedure described in Section 4.1: Stage 1 fits insurer and county-by-quarter fixed effects on not-yet-treated observations, and Stage 2 regresses the imputed residuals on event-time dummies with reference period $\tau = -1$. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Negative coefficients indicate that wind-inclusive coverage became cheaper relative to wind-excluded coverage post-treatment. Estimation uses insurer direct-premiums-written weights and clusters standard errors by insurer.

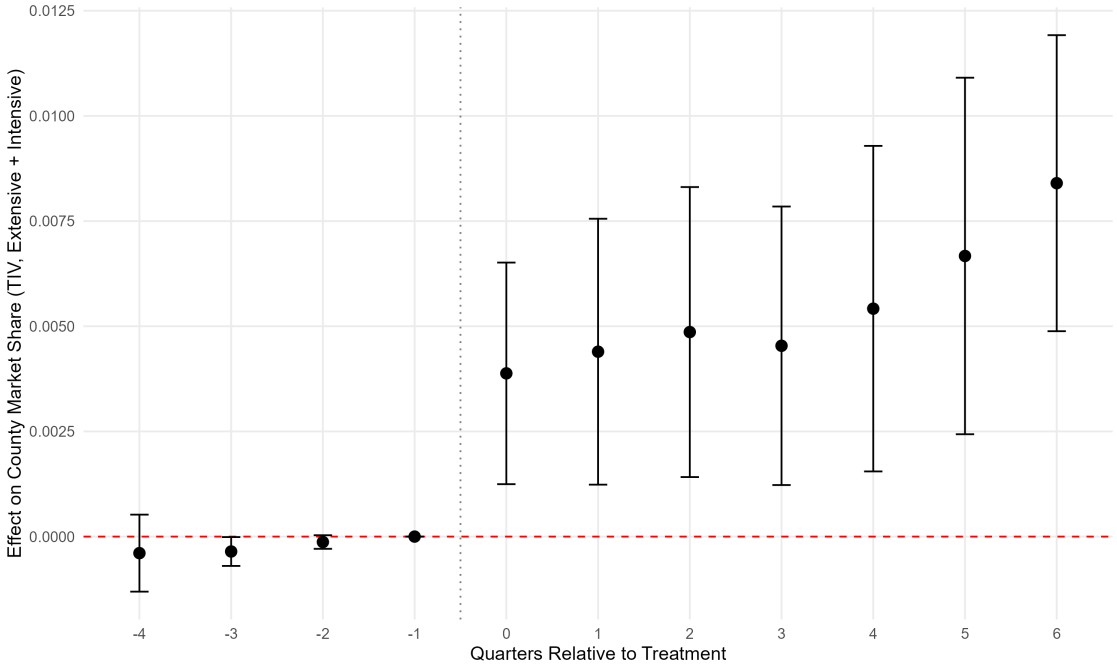
We see a clear drop in the pricing of wind-exposed homeowners insurance policies after treatment, relative to non-wind-exposed policies. The baseline rate per $1,000 of exposure is approximately 4.13 (per Table 2). Hence, a drop of 0.5 equates to a rate decrease of approximately 12%.

Moreover, in Appendix B.1, we estimate heterogeneous treatment effects based on the average wind-risk in each county. The triple-difference estimates are about twice as large in high-wind-risk counties relative to low. This confirms the mechanism: reinsurance price decreases are passed through to insurance price decreases specifically in hurricane-exposed locations.

4.2.2 Insurance Coverage

We next examine whether the reinsurance cost policy change shifted the quantity of insurance sold, not just prices. For each insurer-county-quarter we compute the insurer's share of total insured value (TIV) in that county. This TIV-based share captures both the extensive margin (number of policies written) and the intensive margin (coverage depth per policy): if treated insurers expand by writing more policies, by raising coverage limits per policy, or both, market share will rise. The event study in Figure 8 plots the reduced-form effect of the reinsurance cost policy change on the TIV market share of an insurer whose domicile state has adopted the reform, relative to insurers from not-yet-adopting states.

Figure 8: Insurance Market Share: Total Insured Value



Notes: The figure reports an event study estimated on an insurer-county-quarter panel constructed from Florida QUASR data. For each cell, the outcome is the insurer's share of total insured value (TIV) in the county-quarter, which co-moves with both the extensive margin (number of policies written) and the intensive margin (coverage depth per policy). Event time τ is relative to the adoption of the reinsurance collateral policy change by the insurer's state of domicile. Coefficients $\{\beta_\tau\}$ are from the two-stage specification in equations (2) and (3), with insurer fixed effects α_i and county-by-quarter fixed effects λ_{ct} in Stage 1, and reference period $\tau = -1$. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Positive coefficients indicate that treated insurers expanded their share of county TIV post-reform. Standard errors are clustered by insurer.

Treated insurers' share of county-level TIV expands post-reform. The post-period coefficients correspond to roughly a one-percentage-point gain in county TIV share for the average treated

insurer. Because TIV share co-moves with both the number of policies and the size of each policy, the effect is consistent with entry into new county-quarter markets, within-market expansion among incumbent firms, and upward adjustment of coverage limits - all symptoms of capacity expansion that one would expect if the reinsurance cost policy change reduced the marginal cost of supplying wind-risk coverage. We study the extensive margin - entry into new areas - below.

4.2.3 Extensive Margin: Insurance Offerings

Cheaper reinsurance means that certain areas that were previously uneconomical to insure might become viable. We analyze whether insurers began writing wind-exposed policies in counties that they previously did not operate in. We define an indicator for whether the insurer is present in wind-inclusive coverage and an indicator for whether it is present in non-wind coverage, and then take the difference: $\Delta^{e}_{ict} = \mathbf{1}\{\text{wind present}\}_{ict} - \mathbf{1}\{\text{non-wind present}\}_{ict} \in \{-1, 0, +1\}$. This is the entry analogue of the pricing triple difference - it differences out any common entry/exit shock that affects both coverage types and any firm- or market-level scale changes. Figure 9 reports the event-study estimates.

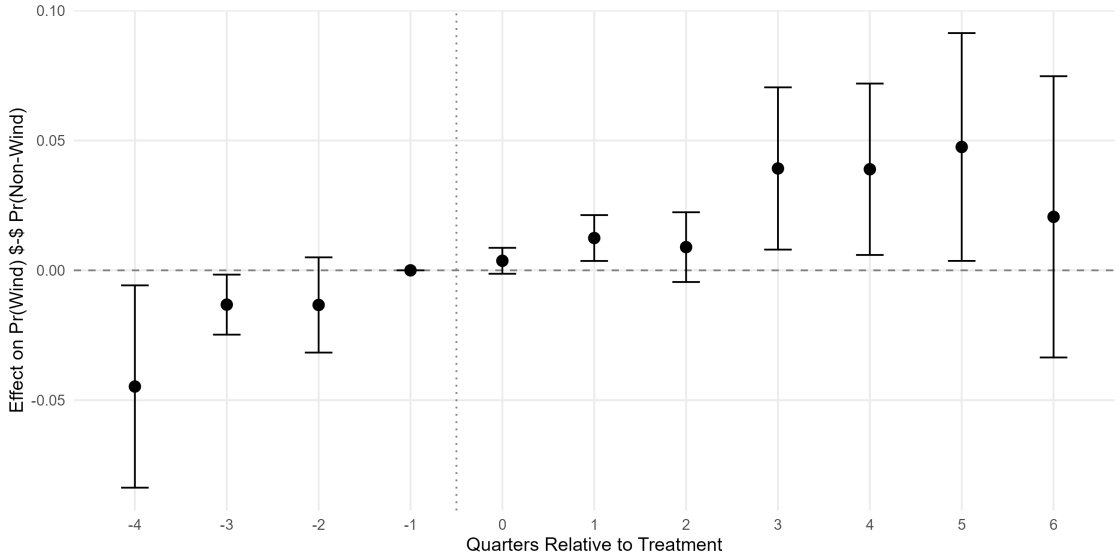
With imperfect pre-trends, the probability of insurers writing wind-exposed policies increases by approximately five percentage points after treatment. Combined with the intensive-margin pricing triple difference in Section 4.2.1 and the TIV market-share result in Section 4.2.2, these findings point to a coherent picture: the reinsurance collateral policy change lowered the cost of catastrophe reinsurance, and treated insurers responded both by cutting the price of wind coverage and by selectively expanding their presence in exactly those segments where the catastrophe-reinsurance channel matters most.

5 An Equilibrium Model of the Wind Insurance Market

In the previous sections, we document how the reinsurance collateral policy change affected insurers' reinsurance purchases, product offerings, and homeowners' insurance premiums in Florida. Building on these findings, we develop a structural model of demand and pricing in the Florida wind insurance market. The goal is to quantify the share of premium variation attributable to reinsurance costs and enhanced competition, and subsequently, evaluate the welfare effects of the reform.

Our model is a simple equilibrium demand and supply framework. Homeowners in Florida counties choose among wind-coverage products based on heterogeneous preferences over premi-

Figure 9: Extensive Margin Triple Difference: Presence in Wind − Presence in Non-Wind



Notes: The figure reports a triple-difference event study estimated on an insurer-county-quarter panel constructed from Florida QUASR data. The outcome is the within-cell difference between an insurer's presence in wind-inclusive coverage and its presence in non-wind coverage, $\Delta^{e}_{ict} = \mathbf{1}\{\text{wind present}\}_{ict} - \mathbf{1}\{\text{non-wind present}\}_{ict} \in \{-1, 0, +1\}$, as defined in equation (8). Differencing within insurer-county-quarter removes any common entry or exit shock affecting both coverage types and any firm- or market-level scale change, so identification requires parallel trends in the wind-minus-non-wind entry gap rather than in each margin separately. Event time τ is relative to the adoption of the reinsurance collateral policy change by the insurer's state of domicile. Coefficients are estimated using the two-stage imputation procedure described in Section 4.1: Stage 1 fits insurer and county-by-quarter fixed effects on not-yet-treated observations, and Stage 2 regresses the imputed residuals on event-time dummies with reference period $\tau = -1$. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Positive coefficients indicate treated insurers became relatively more likely to write wind-inclusive coverage post-treatment. Standard errors are clustered by insurer.

ums and other product characteristics. Insurers simultaneously set premiums for their products at the county level, taking into account demand, marginal claims costs, and the cost of ceding risk to reinsurers. In each period, insurers move first, followed by consumers making their product choices. We analyze the Nash-Bertrand equilibrium of this game.

Our focus on pricing is informed by the reduced-form findings in Section 4. In our primary specification, we hold market structure fixed and do not model insurer entry or exit.[4] We treat the reinsurance market as exogenous and do not model reinsurer pricing or contract design. This is plausible because Florida-focused primary insurers are typically small relative to global reinsurers, and are better described as price-takers in the reinsurance market than as Nash bargainers.

[4]In ongoing work, we extend the framework to include a supply-side entry stage, in which insurers decide whether to operate in a given county-year based on expected variable profits net of a fixed operating cost. The counterfactuals reported hold the set of active insurers fixed.

5.1 Model Set-up

Consumer Choices. Let i denote consumers, f denote insurers, $j \in \mathcal{J}_{ft}$ denote products of f in period t, m denote counties, and t denote year-quarters. A market is a county-quarter pair. We focus on wind-peril homeowner products, which are the products most directly exposed to reinsurance costs. Market size M_{mt} equals the number of owner-occupied housing units in county m at time t.

The demand for insurance products follows a standard Berry et al. (1995) framework. Consumer i chooses product j that maximizes her flow utility, which is

$$u_{ijmt} = -\alpha_i \, p_{jmt} + \beta_i^0 + \mathbf{x}'_{jmt}\boldsymbol{\beta} + \xi_{jmt} + \varepsilon_{ijmt}, \quad j \neq 0, \tag{9}$$

$$\alpha_i = \bar{\alpha} + \exp(\sigma_\alpha \, \nu_i^\alpha), \quad \nu_i^\alpha \sim N(0,1), \tag{10}$$

$$\beta_i^0 = \bar{\beta}_0 + \sigma_0 \, \nu_i^0, \quad \nu_i^0 \sim N(0,1), \tag{11}$$

where p_{jmt} is the annual premium (in \$1,000s), ξ_{jmt} is unobserved product quality, and ε_{ijmt} is an i.i.d. type-I extreme value error. The price coefficient α_i is lognormally distributed, with $\bar{\alpha}$ governing the mean disutility of premiums and σ_α governing the dispersion of price sensitivity across the population. A separate normally distributed random coefficient β_i^0 on the inside constant allows for heterogeneous valuations of the inside option relative to the outside option. The set of covariates $\mathbf{x}_{jmt}$ controls for firm, county, and year-quarter fixed effects.[5] The outside option is not purchasing a wind-coverage product, and we normalize $u_{i0mt} = \varepsilon_{i0mt}$.[6]

Insurers' Pricing. Insurer f simultaneously sets premiums to maximize variable profits,

$$\max_{\{p_{jmt}\}_{j \in \mathcal{J}_{ft}}} \sum_{j \in \mathcal{J}_{ft}} \sum_{m} \underbrace{(p_{jmt} - mc_{jmt})}_{\text{margin}} \cdot \underbrace{M_{mt} \cdot s_{jmt}(\mathbf{p}_t; \boldsymbol{\theta})}_{\text{quantity}}, \tag{12}$$

where $s_{jmt}(\cdot)$ is the predicted market share implied by the demand system in equation (9). Nash-Bertrand pricing yields the familiar first-order conditions

$$\mathbf{p}_t = \mathbf{mc}_t + \boldsymbol{\Delta}_t^{-1}\mathbf{s}_t, \tag{13}$$

where $\boldsymbol{\Delta}_t$ is the matrix of share derivatives with off-diagonal blocks zeroed out across firms.

[5] Empirically, we implement the high-dimensional fixed effects using Mundlak-Chamberlain group means of premiums by firm, county, and year-quarter. Including these group means as linear regressors is econometrically equivalent to absorbing firm, county, and year-quarter fixed effects (Mundlak, 1978; Chamberlain, 1984).

[6] We model Florida's state-sponsored product, Citizens Property Insurance, as an inside good with regulated prices.

We parameterize marginal costs as:

$$\ln(mc_{jmt}) = \gamma_0 + \gamma_r \,\text{post785}_{ft} + \gamma_c \,\mathbb{1}[\text{Citizens}]_{jt} + \bar{\mathbf{w}}'_{fmt}\boldsymbol{\gamma}_m + \omega_{jmt}. \tag{14}$$

post785_{ft} is an indicator for whether insurer f's state of domicile has adopted the reinsurance collateral policy change by period t; its coefficient γ_r is the parameter of central interest, summarizing how reinsurance-market reform passes through to insurers' marginal costs. The Citizens indicator absorbs the fact that Florida's government-sponsored residual-market insurer operates under a distinct cost structure. $\mathbf{w}_{fmt}$ includes log exposure per policy, which proxies for the scale of insured structures, county-by-year fixed effects, which control for the riskiness level of the geographic market, and firm fixed effects. ω_{jmt} is the cost residual.

Explicitly modeling the marginal cost function, rather than backing it out solely from the pricing FOCs, is essential for our identification strategy: the reduced-form cost shifter post785_{ft} delivers exogenous variation in marginal costs that, combined with demand-side instruments, allows us to separately identify movements in marginal costs from movements in markups.

5.2 Estimation and Identification

The primitives to be estimated include consumers' price sensitivity $\bar{\alpha}, \sigma_\alpha$, preferences for wind-product and other product characteristics $\bar{\beta}_0, \sigma_0, \boldsymbol{\beta}$, and insurers' cost components $\boldsymbol{\gamma}$. We estimate these primitives with a generalized method of moments estimator, jointly using demand-side and supply-side moments:

$$\mathbb{E}\Big[\xi_{jmt}(\boldsymbol{\theta}) \cdot \mathbf{z}^d_{jmt}\Big] = \mathbf{0}, \qquad \mathbb{E}\big[\omega_{jmt}(\boldsymbol{\theta}) \cdot \mathbf{z}^s_{jmt}\big] = \mathbf{0}. \tag{15}$$

We estimate the model on 192,018 product-market observations spanning 2,931 county-quarter markets and 137 insurers active in the Florida wind-coverage segment between 2010 and 2020.

Demand Instruments. Premiums are endogenous because insurers observe preference shocks ξ_{jmt} when setting prices, inducing correlation between p_{jmt} and ξ_{jmt}, which is unobservable to the econometrician. We address this endogeneity problem with three complementary instruments. First, we construct standard Berry et al. (1995) instruments: the number and summed characteristics of competing wind-coverage products in each market. The identifying assumption is that the density of nearby rivals shifts equilibrium markups without directly affecting demand for a given product, conditional on firm, county, and year-quarter fixed effects. Second, we add Gandhi and Houde (2019) differentiation instruments, which measure the degree of local isolation of each

product in characteristic space and provide additional identifying variation when BLP-style sums are nearly collinear.

Third, we exploit variation in insurers' loss experience outside Florida. Specifically, we use the lagged logarithm of non-Florida homeowners and non-homeowners losses, and contemporaneous inverse loss ratios outside Florida. The identifying assumption is that a multi-state insurer's losses in, e.g., Texas, shift its financial position and reinsurance demand, and hence its Florida premiums, but are mean-independent of the unobserved quality of its Florida products. This is plausible because homeowners' insurance demand is highly local. Following Borusyak and Hull (2023), we recenter these shocks by subtracting within-market means to avoid biases from mechanical correlation between own and rival shares of the same shock.

Supply Instruments. The challenge in identifying the cost function is to find an excluded instrument that shifts reinsurance exposure without directly shifting homeowners' claims costs. We use a granular Bartik shift-share constructed from the pre-reform composition of each cedent's reinsurance portfolio interacted with the staggered state-level adoption of the reinsurance collateral policy change,

$$Z_{ft}^{\text{Bartik}} = \sum_s \underbrace{\text{share}_{fs}^{\text{pre}}}_{\substack{\text{firm } f\text{'s pre-period share} \\ \text{of ceded premiums to reinsurers in state } s}} \cdot \underbrace{\text{post785}_{st}}_{\substack{\text{state } s \text{ adopted} \\ \text{the policy change by time } t}} . \tag{16}$$

Pre-period shares are computed over 2009–2012 using NAIC Schedule F Part 3. The exogeneity of this Bartik instrument comes from the granularity of firm-level reinsurer portfolios (Borusyak et al., 2022): different primary insurers are exposed to different combinations of reinsurer-domicile states for reasons unrelated to Florida-specific cost shocks. We include rival sums of the Bartik instrument as additional supply moments, as well as BLP and differentiation instruments built from log exposure per policy, to discipline the remaining cost parameters.

Identification. Consumers' mean price preference, $\bar{\alpha}$, is identified by the correlation between the BLP, differentiation, and loss-based cost-shifter instruments and market shares: markets in which rival markups are higher or in which multi-state insurers face larger out-of-state losses see higher equilibrium prices, and the share response to these price shifts pins down mean price sensitivity. The dispersion of the price random coefficient, σ_α, is identified by second-moment variation: substitution patterns that deviate from the IIA pattern implied by a pure logit-in particular, differential within-market substitution between similarly priced and differently priced wind products-identify dispersion in price sensitivity (Berry et al., 1999; Berry and Haile, 2014). The

dispersion of the inside good random coefficient, σ_0, is identified by variation in the total inside share relative to what the mean utility alone would predict.

The effect of the reinsurance collateral policy change on marginal costs, γ_r, is identified by the correlation between the Bartik shift-share and insurers' recovered marginal costs, net of the demand-side markups implied by equation (13). Intuitively, conditional on the implied markup, the Bartik-induced variation in reinsurance exposure traces out movements in mc_{jmt}, and the average slope pins down γ_r. The remaining cost parameters $(\gamma_0, \gamma_e, \gamma_c, \boldsymbol{\gamma}_\tau, \boldsymbol{\gamma}_m)$ are identified by standard variation in log exposure per policy, the Citizens indicator, year fixed effects, and Mundlak group means, all of which are treated as predetermined.

5.3 Estimation Results

Consumer Preferences and Elasticities. Panel (a) of Table 3 reports consumer preference estimates. The mean price coefficient $\bar{\alpha}$ is -0.88 (in \$1,000s), confirming that consumers dislike increases in the annual premiums. Price sensitivity varies substantially across the population: the lognormal standard deviation of price, σ_α, is 1.36, resulting in a long right tail of highly price-sensitive consumers who drive substitution toward the uninsured option. In contrast, the random coefficient on the inside constant is small and statistically indistinguishable from zero (σ_0 = 0.09), indicating that, after conditioning on observed product characteristics and the Mundlak controls, there is little additional dispersion in the inside-share valuation.

We report two additional statistics to characterize the substitution patterns implied by these estimates. First, at the intensive margin, we calculate own-price elasticities at the status quo. The mean and median are -3.44 and -2.72, respectively, with an interquartile range of -3.62 to -2.18. This is within the range of estimates in the literature: Oh et al. (2026) report own-price elasticities between -1 and -3 for Florida homeowners, and Ge (2022) report similar magnitudes.

Second, on the extensive margin, we calculate the partial-equilibrium response of the insured rate $(1 - s_0)$ to a uniform shock applied to the premium of every inside product. A proportional 10% price decrease raises take-up from 60.7% to 65.6%, implying an arc elasticity of take-up with respect to price of -0.75; a 10% price increase implies an elasticity of -0.89. In additive terms, a \$100 reduction in annual premiums raises take-up by roughly 2.4 percentage points, while a \$500 reduction raises it by 11.9 points. These magnitudes imply a meaningful extensive margin: the 5% cost reduction from the reinsurance collateral policy change, combined with the 78% structural pass-through rate, would lift take-up on the order of 2–3 percentage points in partial equilibrium, even before accounting for entry and Bertrand repricing responses.

Table 3: Joint BLP Estimates: Demand and Cost Function

	Joint RC Logit (supply_log_reduced)
(a). Demand: Linear Parameters and Random Coefficients	
Mean price disutility ($\bar{\alpha}$)	-0.882^{***}
	(0.006)
Dispersion of price random coefficient σ_{price}	1.362^{***}
	(0.006)
Dispersion of insured random coefficient σ_{constant}	0.091
	(0.173)
(b). Cost Function ($\log mc_{jmt} = \mathbf{w}'_{jmt}\boldsymbol{\gamma} + \omega_{jmt}$)	
Constant (γ_0)	-3.560^{***}
	(0.274)
$\log$(exposure/policy) (γ_e)	0.775^{***}
	(0.018)
Citizens indicator (γ_c)	0.385^{***}
	(0.008)
Post Model Law 785 (γ_r)	-0.052^{***}
	(0.005)
Mundlak controls (firm, county $\times$ year)	Yes

Notes: Standard errors in parentheses are clustered at the firm level; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$. Prices are in \$1,000s of annual premiums. The price coefficient is specified as $\alpha_i = -(\bar{\alpha} + \exp(\sigma_\alpha \nu_i^\alpha))$ with $\nu_i^\alpha \sim N(0,1)$. Mundlak controls include firm-, county-, year-quarter-, and county-by-year group means of prices and log exposure per policy; coefficients on these controls and on year dummies are reported in the full estimation log. Demand moments use Berry et al. (1995), differentiation (Gandhi and Houde, 2019), and recentered other-state loss instruments; supply moments additionally include a granular Bartik shift-share instrument built from pre-period reinsurer-domicile portfolio shares interacted with staggered state-level Model Law 785 adoption.

Marginal Costs and Pass-Through. Panel (b) of Table 3 reports the estimates of the cost function. The baseline log marginal cost of a wind product $\hat{\gamma}_0$ is estimated to be -3.56, which, evaluated at sample means of the covariates, implies an average marginal cost of roughly \$0.7–\$0.8 per thousand dollars of annual premium, consistent with claims-cost ratios in industry filings. The log exposure coefficient $\hat{\gamma}_e$ is equal to 0.77, indicating that a 10% increase in the insured value per policy raises marginal cost by roughly 7.7%, close to but below the unitary elasticity that would arise if claims scaled linearly with insured values. The Citizens indicator $\hat{\gamma}_c$ is positive, indicating that the residual-market insurer operates on thinner margins and has higher implied unit costs, consistent with its statutory mandate to cover risks that private carriers decline to cover. The reinsurance-reform coefficient, $\hat{\gamma}_r$, is of central interest. It implies that adoption of the reinsurance

collateral policy change by an insurer's state of domicile reduces its marginal cost of selling wind coverage in Florida by approximately 5.1%.[7]

The implied markups (Lerner indices) average 29%, consistent with a highly concentrated market with meaningful product differentiation across wind carriers.

We further calculate the structural pass-through rates implied by equation (13). The average is 78% under a uniform 1% cost shock, and is nearly identical (77.6%) when the shock is restricted to firms treated by the reinsurance collateral policy change. Multiplying the -5.1% cost reduction by this pass-through rate implies that the reform reduces equilibrium premiums on treated products by roughly 3–4%.

5.4 Welfare Effect of the Collateral Reform

With the model and its estimates, we quantify the welfare effects of the reinsurance collateral policy change. At the moment, we hold the set of insurers operating in the market fixed and quantify how the reinsurance collateral policy change affects home insurers' marginal costs through the reinsurance channel, thereby lowering home insurance prices and benefiting consumers. We re-simulate the pricing equilibrium pre- and post-reform, using different marginal cost functions that turn on and off the reinsurance collateral policy change indicator.

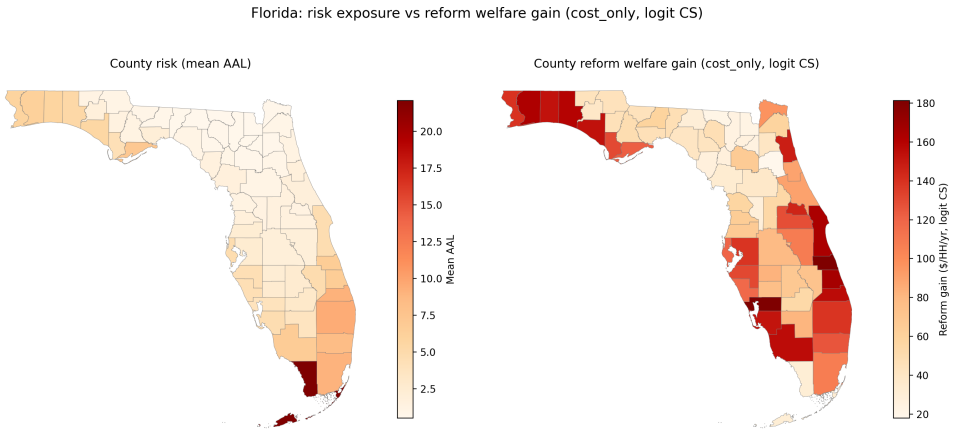
Figure 10 reports the simulated consumer surplus gains by geographic market. On average, a household experiences a $202 gain due to reduced home insurance costs and prices. Higher-risk areas, on average, experience larger surplus gains than lower-risk areas, as insurers in those areas might benefit more from cheaper reinsurance products. Our ongoing analysis will further examine the spatial incidence of the reform, quantify the gains from reform by separately quantifying the cost and markup components, and simulate counterfactual premiums and consumer surplus under alternative reinsurance-market regimes.

5.5 Work in Progress

Beyond the baseline simulations, we are extending our analysis along several dimensions. First, we will microfound the marginal-cost function by explicitly incorporating a reinsurance channel. In our current specification, the post-reform indicator enters the cost function as a reduced-form shifter, and its coefficient summarizes the average effect of adoption on insurers' marginal costs. We are replacing this object with a structural decomposition in which marginal cost is the sum

[7] Using the exact transformation, $\exp(-0.052) - 1 \approx -5.1\%$.

Figure 10: Simulated welfare gains from the Reinsurance Collateral Policy Change



of expected claims and a reinsurance loading that depends on the cedent's utilization rate and a cedent-specific reinsurance price index, with the reinsurance collateral policy change instrumenting the price index. This refinement provides a tighter mapping between the first-stage results in Section 4 and the supply-side cost effects we estimate. It also generates testable cross-sectional restrictions: cedents with higher pre-period reinsurance utilization should experience proportionally larger cost reductions, providing an over-identifying check on the cost-of-capital interpretation.

Second, we will reconcile the reduced-form and structural magnitudes. The reduced-form intensive-margin estimates imply that wind-coverage premiums fell by approximately 12 percent in treated insurer-county-quarter cells, while the structural model attributes roughly 4 percent to the cost-of-capital channel under fixed market structure. The remaining gap reflects margins not currently endogenized: the entry of treated insurers into new county-quarters, shifts in the wind/non-wind product mix, and changes in market concentration that re-equilibrate Bertrand markups. We are constructing a formal decomposition that allocates the reduced-form effect to each channel using a sequence of partial-equilibrium counterfactuals that incrementally activate the cost reduction, the markup re-equilibration, and post-reform product composition.

Third, we will decompose the estimated pass-through into the demand curvature, market concentration, and multi-product internalization components, and compare it to theoretical benchmarks (Weyl and Fabinger, 2013). We will report pass-through heterogeneity by county risk decile and market concentration. We will further extrapolate the Florida pass-through estimate to other

catastrophe-exposed states using state-level expected-loss measures, providing a national lower bound on the household welfare gains from the reform.

6 Conclusion

Reinsurance is a critical input to insuring homes against severe climate risks. While reinsurers diversify globally, they cannot fully smooth the large catastrophe risks in the U.S. market, and bearing those risks is capital-intensive. We study a regulatory reform that lowered the capital cost of accessing offshore reinsurance, exploiting the staggered adoption of the reinsurance collateral policy change across states. Because treatment is assigned by an insurer's state of domicile, we can compare otherwise similar insurers competing in the same markets but facing different effective costs of ceding catastrophe risk.

We find that the reform cut foreign reinsurance prices roughly in half, increased the quantity of foreign reinsurance ceded by 25%, and reduced concentration in the reinsurance market. These effects are concentrated among insurers with substantial hurricane-corridor exposure, consistent with a binding latent demand for catastrophe risk transfer. These reinsurance-market changes pass through to the primary market: in Florida, wind premiums fell roughly 12% in treated insurer-county-quarter cells, treated insurers gained county market share, and they became more likely to write wind-inclusive coverage. A structural model of the Florida wind market implies that the reform reduced treated insurers' marginal cost of supplying wind coverage by about 5%, with three-quarters of that reduction reaching homeowners as lower premiums. The aggregate consumer-surplus gain is roughly $200 per household per year, concentrated in the high-risk coastal counties where reinsurance is the largest component of premiums.

Two implications follow. First, the capital costs required to hold catastrophe risk, not just the expected losses themselves, are a first-order driver of homeowners insurance prices in disaster-prone markets. Policies that reduce those capital costs, whether through collateral reform, alternative-capital vehicles, or public reinsurance of last resort, can deliver meaningful affordability gains and should be evaluated against the cost-of-capital channel we identify, not only against the expected-loss channel that has dominated the policy discussion. Second, the pass-through rate we recover is itself useful beyond this particular reform: it characterizes how any future shock to the cost of bearing catastrophe risk, including new entrants and risk-transfer technologies, should translate into household premiums. Our estimates imply that most of any such cost reduction reaches consumers rather than being absorbed as rents upstream.

Several limitations are worth noting. Our structural welfare estimates are identified from Florida and from variation generated by the reinsurance collateral policy change, and external validity to other catastrophe-exposed states or to alternative cost-of-capital interventions is not guaranteed. Our counterfactuals also hold the set of insurers operating in each county-quarter fixed, so the reported gains likely understate the full benefit of the reform once entry is allowed to respond. Finally, we also drop Florida-domiciled insurers from the QUASR analysis, since Florida adopted in 2009 before our QUASR window begins; because these insurers are the most reinsurance-reliant in the state, our Florida estimates are plausibly conservative.

Several extensions are already in progress. We are microfounding the marginal-cost function by replacing the reduced-form post-reform indicator with a structural reinsurance loading instrumented by the reinsurance collateral policy change, which generates testable cross-sectional restrictions on the cost-of-capital interpretation. We are also reconciling the reduced-form and structural magnitudes through a sequence of partial-equilibrium counterfactuals that incrementally activate the cost reduction, markup re-equilibration, and post-reform product composition, and decomposing the estimated pass-through into demand-curvature, concentration, and multi-product internalization components.

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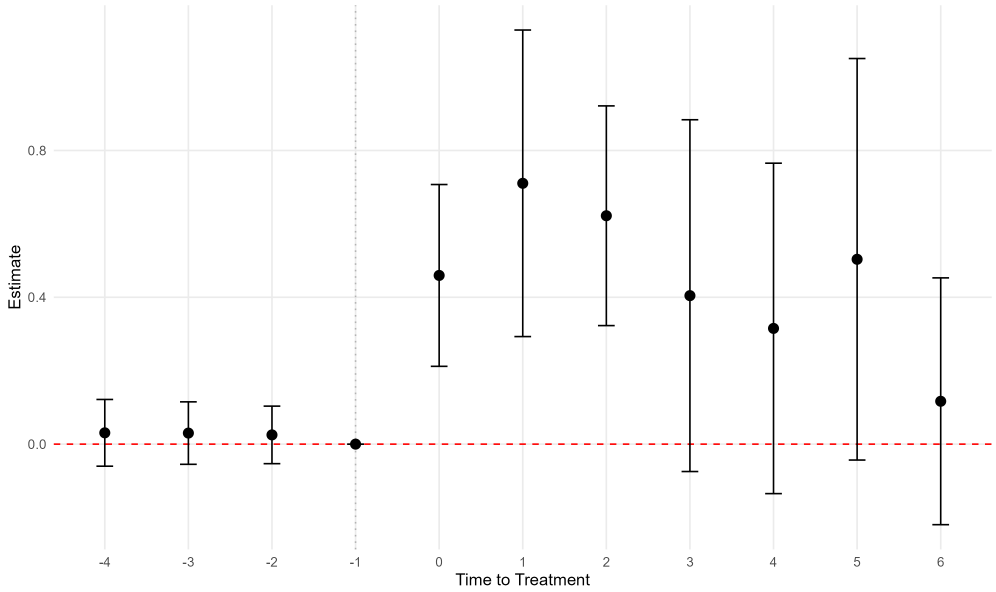
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A Additional National Reinsurance Market Results

A.1 Domestic Reinsurer Results

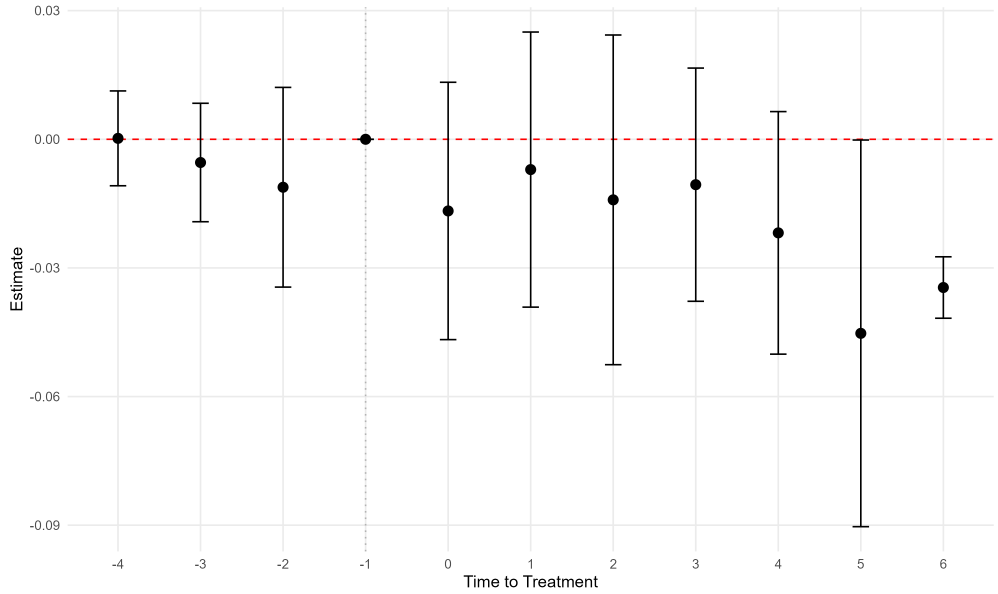
This appendix presents the national reinsurance market results for domestic reinsurers, complementing the foreign reinsurer results in Section 3.2.1.

Figure 11: Quantity of Reinsurance Ceded: Domestic Reinsurers



Notes: The figure reports a slope specification event study estimated on an insurer-by-year balanced panel restricted to insurer DPW > 0. The outcome is dollars of reinsurance ceded to domestic reinsurers; the exposure variable is direct premiums written (DPW). Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{\gamma_\tau\}$ are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. The event window is $\tau \in [-5, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

Figure 12: Reinsurance Prices: Domestic Reinsurers

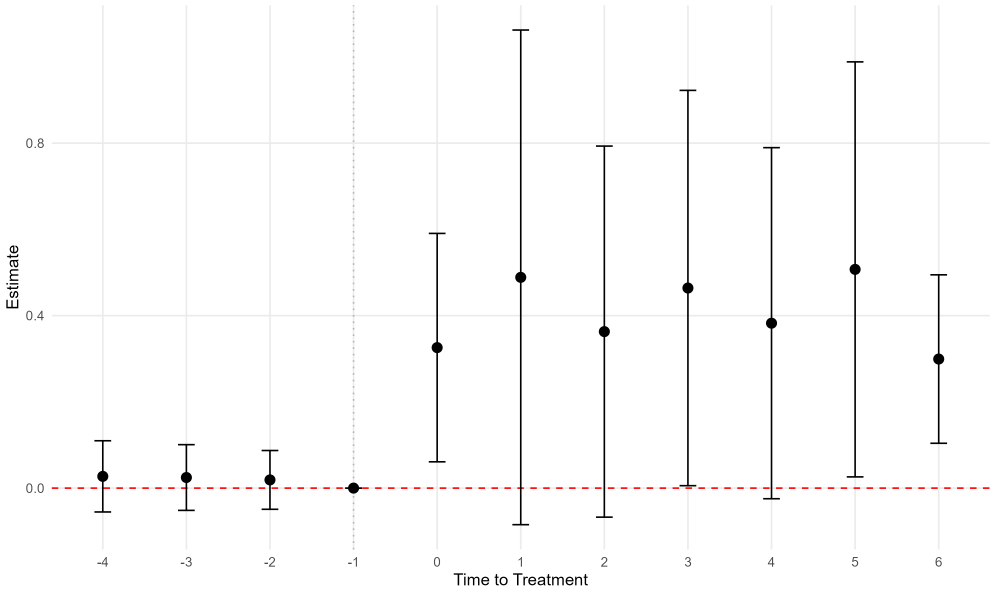


Notes: The figure reports a price slope specification event study estimated on an insurer-by-year balanced panel. The outcome is losses plus loss adjustment expenses (LAE) incurred on reinsurance ceded to domestic reinsurers; the exposure variable is premiums ceded to domestic reinsurers. The sample is restricted to insurer-years with positive ceded premiums to domestic reinsurers. Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{-\gamma_\tau\}$ (sign-flipped) are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. Negative coefficients indicate lower loss ratios (cheaper reinsurance) post-treatment. The event window is $\tau \in [-4, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

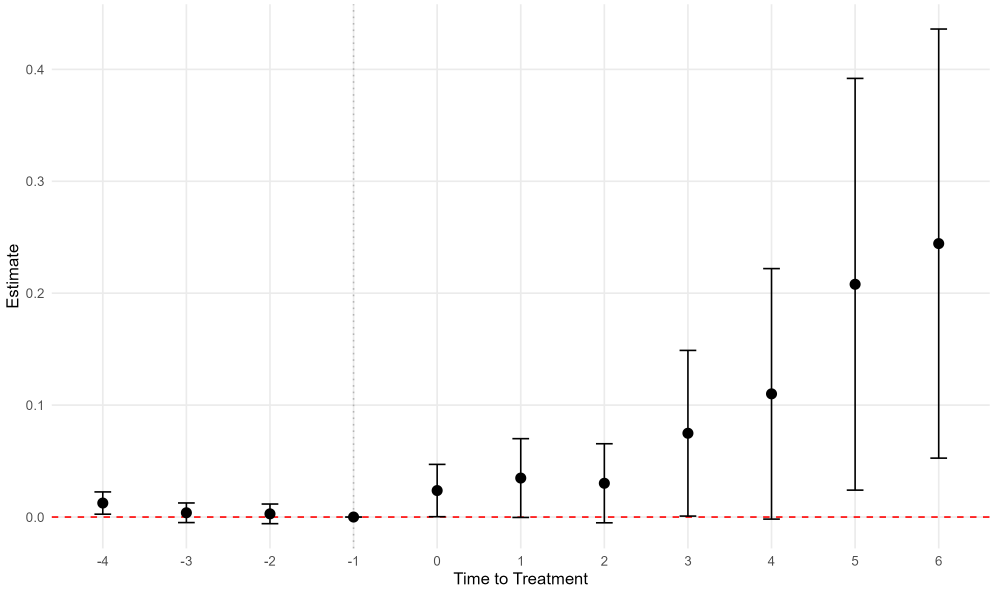
A.2 Affiliated Reinsurer Decomposition

To understand the economic nature of the reinsurance quantity effects documented in Section 3.2.1, we decompose reinsurance flows by whether the reinsurer is affiliated (a captive entity created primarily to reinsure its parent or affiliated companies) versus non-affiliated (a traditional commercial reinsurer). Figure 13 reveals that the increase in reinsurance flows entirely to non-affiliated reinsurers. Ceding to affiliated reinsurers actually declined modestly post-reform, suggesting the regulatory change facilitated access to arm's-length commercial reinsurance markets rather than within-group risk transfer arrangements.

Figure 13: Quantity of Reinsurance Ceded: Affiliated vs. Non-Affiliated Reinsurers



(a) Premiums ceded to affiliated reinsurers as a function of DPW

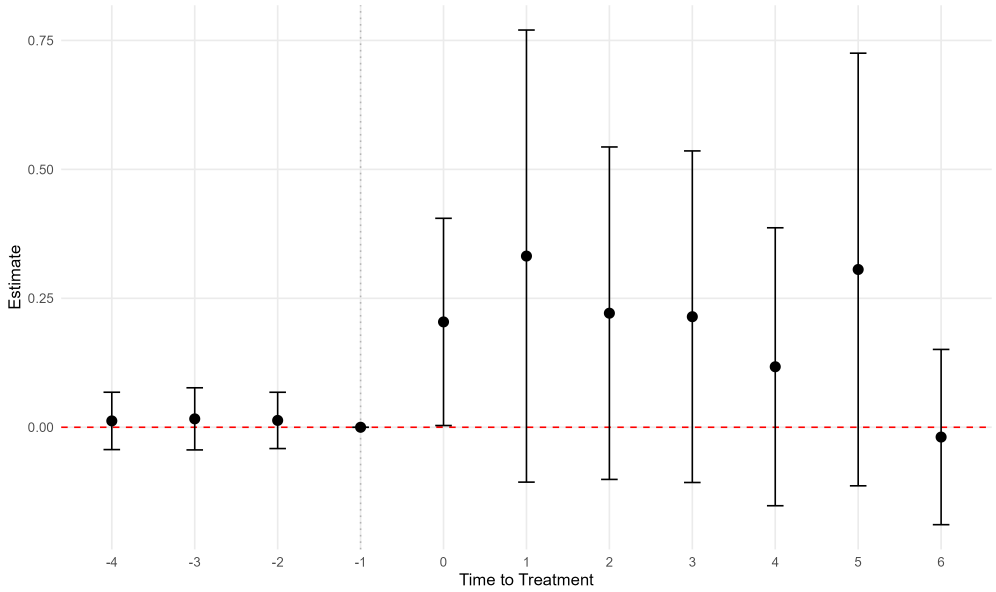


(b) Premiums ceded to non-affiliated reinsurers as a function of DPW

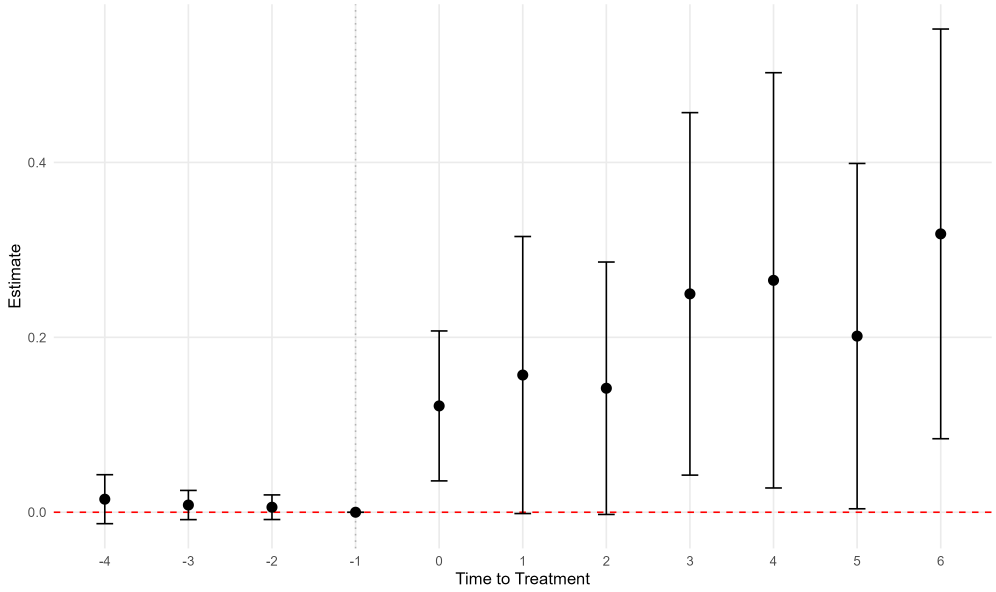
Notes: Each panel reports a slope specification event study estimated on an insurer-by-year balanced panel restricted to insurer DPW > 0. The outcome is dollars of reinsurance ceded to affiliated (panel a) or non-affiliated (panel b) reinsurers; the exposure variable is direct premiums written (DPW). Affiliated reinsurers are entities created primarily to reinsure affiliated companies; non-affiliated reinsurers are traditional commercial reinsurance companies. Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{\gamma_\tau\}$ are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. The event window is $\tau \in [-5, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

Within affiliated reinsurance, we further examine whether the dollars ultimately end up onshore or offshore.

Figure 14: Quantity of Reinsurance Ceded: Affiliated Onshore vs. Offshore Reinsurers



(a) Premiums ceded to onshore affiliated reinsurers as a function of DPW



(b) Premiums ceded to offshore affiliated reinsurers as a function of DPW

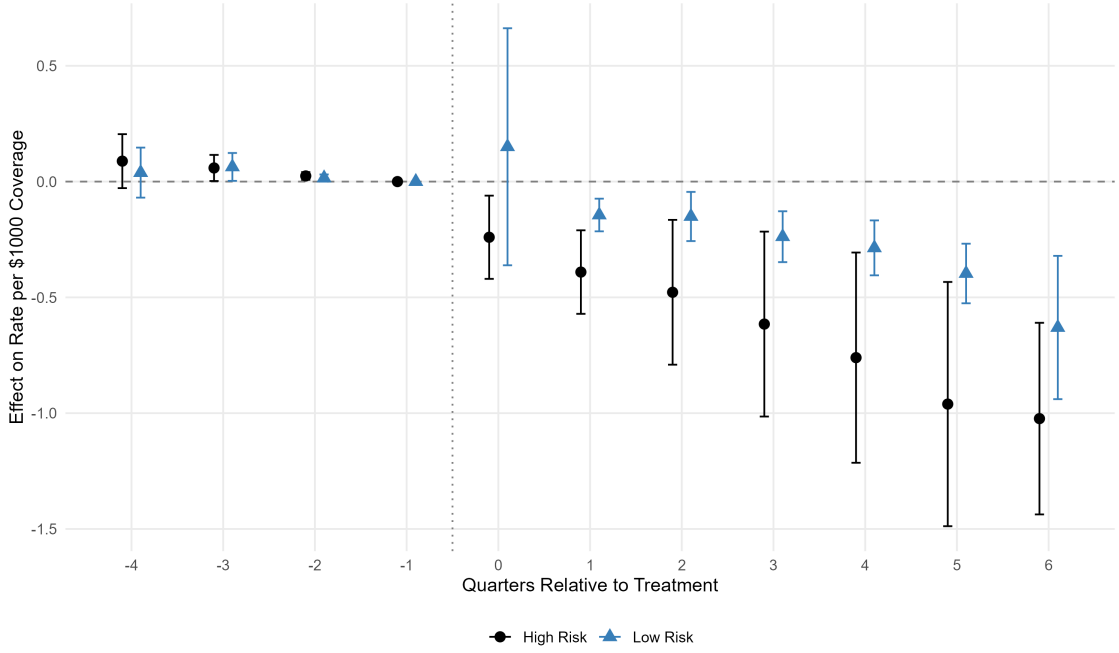
Notes: Each panel reports a slope specification event study estimated on an insurer-by-year balanced panel restricted to insurer DPW > 0. The outcome is dollars of reinsurance ceded to affiliated reinsurers whose group is entirely domestic (panel a) or affiliated reinsurers whose group has some foreign element (panel b); the exposure variable is direct premiums written (DPW). Event time τ is relative to the insurer's domicile state adoption. Coefficients $\{\gamma_\tau\}$ are from the two-stage specification in equations (5) and (6), with reference period $\tau = -1$. The event window is $\tau \in [-5, 6]$ with observations beyond $\tau = 5$ binned to $\tau = 6$. Estimation uses insurer DPW weights and clusters standard errors by insurer. State-of-domicile and year fixed effects are included in Stage 1.

B Additional Florida Results

B.1 Hurricane Exposure Heterogeneity

This appendix presents additional Florida results examining heterogeneity in the effects of the reinsurance collateral policy change on policy pricing across risk categories, complementing the main wind premium results in Section 4.2.1.

Figure 15: Policy Pricing: High vs. Low Risk



C Model Law 785 Treatment Timing Details

Table 4: NAIC Model Law 785 Effective Adoption Dates by State

State	Effective Date	Citation
Florida	Jan 1, 2009	Florida Administrative Code Rule 69O-144.007 "Credit for Reinsurance from Certified Reinsurers."

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State	Effective Date	Citation
New York	Jan 1, 2011	https://www.law.cornell.edu/regulations/new-york/11-NYCRR-125.4
Indiana	Apr 6, 2011	https://www.law.cornell.edu/regulations/indiana/760-IAC-1-56-7.5
New Jersey	Jun 20, 2011	https://www.law.cornell.edu/regulations/new-jersey/N-J-A-C-11-2-28-3
Connecticut	Oct 1, 2012	Public Act 12-139
California	Jan 1, 2013	SB 1216
Virginia	Jan 1, 2013	https://law.lis.virginia.gov/admincode/title14/agency5/chapter300/section95/
Georgia	Jun 12, 2013	Rule 120-2-78-.05. Credit for ReinsuranceAccredited Reinsurers
Pennsylvania	Jun 24, 2013	https://www.pacodeandbulletin.gov/Display/pabull?file=%2Fsecure%2Fpabulletin%2Fdata%2Fvol43%2F43-21%2F950.html
Louisiana	Jul 1, 2013	https://www.law.cornell.edu/regulations/louisiana/La-Admin-Code-tit-37-SS-XIII-3510
Delaware	Aug 11, 2013	18 DE Admin. Code 1003 "Credit for Reinsurance"
Iowa	Oct 30, 2013	https://www.legis.iowa.gov/docs/aco/arc/1111C.pdf
Alabama	Jan 1, 2014	Ala. Admin. Code 482-1-156
Missouri	Jan 1, 2014	https://www.law.cornell.edu/regulations/missouri/20-CSR-200-2-100
New Hampshire	Jan 1, 2014	https://isiteplus.naic.org/crin-report/crinReportPublic.xhtml
Maryland	Aug 18, 2014	https://www.law.cornell.edu/regulations/maryland/COMAR-31-05-08-24
Rhode Island	Sep 2, 2014	https://risos-apa-production-public.s3.amazonaws.com/DBR/7794.pdf
Colorado	Jan 1, 2015	https://law.justia.com/codes/colorado/title-10/regulation-of-insurance-companies/article-3/part-7/section-10-3-701/
Hawaii	Jan 1, 2015	Act 234, Session Laws of Hawaii 2014
Arkansas	Jul 4, 2015	SB881
Vermont	Aug 27, 2015	https://www.law.cornell.edu/regulations/vermont/21-038-Code-Vt-R-21-020-038-X
Arizona	Oct 23, 2015	Ariz. Admin. Register Vol. 21, Issue 43

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State	Effective Date	Citation
Ohio	Nov 6, 2015	https://dam.assets.ohio.gov/image/upload/insurance.ohio.gov/Company/Documents/ORA/Assuming_insurers%20A-5%20list.pdf
North Dakota	Jan 1, 2016	https://www.insurance.nd.gov/companies/company-licensing/certified-reinsurers
Washington	Jan 2, 2016	https://lawfilesext.leg.wa.gov/law/wsr/2015/24/15-24-126.htm
Maine	Jan 24, 2016	https://www.maine.gov/pfr/insurance/sites/maine.gov.pfr.insurance/files/inline-files/740-adopted-amendment.pdf
Nebraska	Feb 15, 2016	https://doi.nebraska.gov/rules-regulations-and-guidance-document-index
Massachusetts	Oct 1, 2016	https://www.law.cornell.edu/regulations/massachusetts/department-211-CMR/title-211-CMR-130.00
Nevada	Nov 2, 2016	https://regulations.justia.com/states/nevada/chapter-681a/certified-reinsurers/section-681a-440/
Montana	Nov 26, 2016	https://www.law.cornell.edu/regulations/montana/Mont-Admin-r-6.6.3848
Utah	Jan 10, 2017	https://www.law.cornell.edu/regulations/utah/Utah-Admin-Code-R590-173-8
North Carolina	Jul 20, 2017	https://lrs.sog.unc.edu/bill/naic-modelsorsa-credit-reinsurance-ab-new
Oklahoma	Sep 15, 2017	https://www.law.cornell.edu/regulations/oklahoma/OAC-365-25-7-73
South Dakota	Oct 23, 2017	https://dlr.sd.gov/insurance/companies/reinsurers.aspx
Texas	Jan 1, 2018	https://www.legis.state.tx.us/tlodocs/85R/billtext/html/SB01070F.HTM
Wisconsin	Jan 1, 2018	https://oci.wi.gov/Pages/Companies/CertifiedReinsurers.aspx
Wyoming	Feb 21, 2018	https://doi.wyo.gov/companies/certified-reinsurers
Idaho	Mar 23, 2018	IDAPA 18.01.75 "Credit for Reinsurance Rules"
Minnesota	May 10, 2018	https://www.revisor.mn.gov/laws/2017/0/Session+Law/Chapter/6/
South Carolina	May 25, 2018	https://services.statescape.com/ssu/Regs/ss_8586743245995961190.pdf

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State	Effective Date	Citation
Tennessee	May 31, 2018	https://publications.tnsosfiles.com/rules/0780/0780-01/0780-01-63.20180531.pdf
New Mexico	Jul 24, 2018	https://www.srca.nm.gov/wp-content/uploads/attachments/13.002.0008.pdf
Kentucky	Jan 1, 2019	https://apps.legislature.ky.gov/record/18rs/hb464.html
Michigan	Jan 2, 2019	https://www.michigan.gov/difs/industry/insurance/certified-reinsurers/certified-reinsurers
Illinois	Nov 19, 2019	https://www.law.cornell.edu/regulations/illinois/Ill-Admin-Code-tit-50-SS-1104.45
Alaska	Dec 26, 2019	https://www.commerce.alaska.gov/web/Portals/11/Pub/RA19-02.pdf
Oregon	Jan 1, 2020	https://www.law.cornell.edu/regulations/oregon/Or-Admin-Code-SS-836-012-0046
West Virginia	Jan 1, 2020	https://apps.sos.wv.gov/adlaw/csr/ruleview.aspx?document=16966
Mississippi	Jan 1, 2021	https://www.mid.ms.gov/wp-content/uploads/2023/04/20201208ref.pdf
Kansas	Jul 1, 2021	https://www.kslegislature.gov/li_2022/b2021_22/measures/documents/sb78_enrolled.pdf

Figure 16: Policy Pricing: High vs. Low Expected Loss Counties

