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Uneven Adaptation: Insurance Pricing and Household Climate Resilience

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Abstract

We investigate how home insurance pricing affects household investment in climate adaptation. Using policy-level data from Florida's largest homeowners insurance provider, we exploit plausibly exogenous variation in insurance premiums, which alter the value of adaptation discounts since these discounts are calculated as a percentage of premiums. Wealthier households and those facing lower adaptation costs respond to higher premiums by increasing adaptation. In contrast, lower-income households and those facing higher adaptation costs reduce adaptation as premiums rise, consistent with tightening financial constraints. Taken together, these results suggest that as climate risks intensify and insurers raise premiums, market-based pricing may catalyze adaptation among some households while discouraging it among others—widening the gap in climate resilience.

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1 Introduction

The economic toll of climate-related disasters has grown dramatically over the past two decades. While some of this cost is unavoidable, a substantial share could be mitigated through investments in household-level resilience. Yet despite the availability of such measures, adoption rates remain low. Policymakers have turned to a range of tools to close this gap: stricter building codes for new construction, grant programs for retrofits, and—increasingly—reliance on insurance markets to transmit price signals that reward adaptation.[1] However, whether insurance pricing effectively incentivizes household adaptation remains an open and increasingly urgent question.

In this paper, we examine how insurance premiums, which have risen sharply over the past few years (Keys and Mulder, 2024), affect household investment in climate resilience measures. Ex-ante, the effect is theoretically ambiguous. On one hand, higher premiums raise the dollar value of insurers' adaptation discounts, as such discounts are typically calculated as a percentage of premiums, strengthening financial incentives for resilience investments. On the other hand, higher premiums strain household budgets, potentially crowding out the upfront investments needed to claim those discounts. Which effect dominates—and for whom—is an empirical question with increasing urgency as insurers reprice climate risk.

We study this question using policy-level data from Citizens Insurance, one of Florida's largest homeowners insurance provider and insurer of last resort. Our data cover over 18 million policy observations from 2002 through 2023 and include detailed information on five types of climate adaptation features, spanning roof-to-wall attachments, roof covering materials, roof deck attachments, secondary water resistance, and opening protection. Citizens' discount structure for mitigation efforts is representative of the broader Florida market. This consistency arises because Florida law requires all insurers to offer such discounts, and the Florida Office of Insurance Regulation provides a standardized discount schedule based on engineering studies that insurers may adopt. Insurers who deviate from this template must submit actuarial studies justifying their alternative discount structures. The discounts offered for roof improvements are substantial, amounting to hundreds to over a thousand dollars a year in premium discounts in our sample.

We exploit plausibly exogenous variation in insurance premiums that mechanically alters the value of adaptation discounts since these discounts are calculated as a percentage of premiums. Our findings show that premium increases have heterogeneous effects on adaptation behavior. Wealthier households respond to higher premiums—and thus larger potential savings—by increasing their adaptation investments, while lower-income households reduce their adaptation efforts as premiums rise, consistent with tightening financial constraints. Households facing higher adaptation costs similarly reduce investment in resilience measures.

Empirically, we examine how households' probability of investing in wind-resistant roof features and water-resistant adaptations responds to changes in insurance premium rates (premiums divided by the coverage limit). We then test whether this response varies with proxies for wealth, adaptation costs, and the baseline premium level. To identify the causal effect of rising insurance premiums, we employ an instrumental variable approach that isolates exogenous variation in premium rates.

Specifically, for each policy renewal, we calculate the leave-one-out average change in premium rates among other policies in the same ZIP code and renewal month. We include ZIP-by-quarter fixed effects in our regressions, meaning the identifying variation in the instrument comes from within the same ZIP code but across months within a quarter. We also control for roof age and house-age-bin fixed effects. The

[1] For example, Florida's My Safe Florida Home program provides matching grants for hurricane retrofits (Florida Legislature, 2022). On building codes, see Baylis and Boomhower (2024). On the role of insurance pricing in incentivizing adaptation, see OECD (2023) and EIOPA (2021).

instrument is highly relevant, as evidenced by a strong first stage, likely because Citizens implements rate changes at the ZIP code level at discrete times. It is also plausibly exogenous given our tight fixed effects structure: within a ZIP-quarter, other factors that could drive mitigation investment, such as construction costs and beliefs about climate risks, are unlikely to correlate with monthly variation in premium rates.

The effect of premium increases on adaptation is theoretically ambiguous and depends on household characteristics. Higher premiums raise the dollar value of adaptation discounts (the incentive effect), but also strain household budgets (the constraint effect). Which effect dominates depends on a household's financial slack, the cost of adaptation, and the potential savings from discounts. Consistent with this ambiguity, we find that the average effect of premium rate changes on adaptation is statistically insignificant in our instrumental variable regressions, despite a positive OLS correlation that likely reflects endogeneity bias. For example, households experiencing larger premium increases may be those whose roofs are in greater need of repair. Deteriorating roof conditions would both trigger larger premium increases and raise the probability of roof replacement, independent of any behavioral response to price changes.

The null effect in the instrumental variable regression likely masks important heterogeneity. First, we predict that less financially constrained households are more likely to respond to the increased financial incentives embedded in premium increases, since higher premiums raise the dollar value of adaptation discounts. Because these households have slack in their budgets, the larger discount pushes the net present value (NPV) of adaptation into positive territory for more of them without straining their finances. In contrast, more financially constrained households face a binding budget constraint that rising premiums tighten further, leading them to reduce their adaptation efforts even as the dollar value of the discount grows.

Second, we hypothesize that households facing lower adaptation costs will respond more to premium increases, as smaller upfront investments make positive NPVs more attainable when dollar discounts rise.

We test these hypotheses by adding three interaction terms simultaneously to our instrumental variable regressions: the change in premium rates interacted with (1) Zillow's home price index at the ZIP-by-year level, which proxies for financial constraints; (2) the square footage of the house, which proxies for adaptation costs; and (3) the lagged log premium level as a control. All three variables are standardized at the mean, allowing us to interpret the coefficient on premium rate changes as the response of households with mean values across these dimensions.

We find that average households respond negatively to exogenous changes in premium rates, suggesting they reduce their adaptation efforts when premiums rise. However, we estimate consistently positive and statistically significant coefficients on the interaction between premium rate changes and the home price index, indicating that households in more expensive areas are more likely to respond to premium increases by making their homes more disaster-resilient. We also find that households with lower adaptation costs (proxied by smaller square footage) are more likely to respond to premium increases by investing in adaptation. Taken together, these findings support our central predictions: household responses to insurance premium increases depend on financial constraints and the cost of adaptation.

These results carry important implications for climate policy: as climate risks intensify and insurers raise premiums while reducing their risk exposure, the effects on household adaptation will be uneven, catalyzing protective investments among some households while creating greater obstacles for others facing binding financial constraints. Our findings suggest that market-based incentives embedded in insurance pricing—while effective for some segments of the population—may inadvertently widen the gap in climate resilience across the wealth distribution. Wealthier households, who are less financially constrained, can leverage rising premiums as a catalyst for adaptation. Meanwhile, financially constrained households face a compounding burden: higher premiums strain their budgets while the upfront costs of adaptation remain prohibitive, leaving them more vulnerable to future climate shocks.

These distributional consequences highlight the need for complementary policies that address the barriers faced by lower-income households. Potential interventions include targeted subsidies for adaptation investments, low-interest financing for resilience upgrades, or means-tested premium assistance programs that preserve incentives for mitigation while alleviating financial strain. Our finding suggests that policies, which close the gap between upfront adaptation costs and the present value of discount savings (such as matching grants for resilience upgrades or low-interest financing for adaptation investments), may be particularly effective for financially constrained households. Means-tested premium assistance programs could further preserve incentives for mitigation while alleviating financial strain. Without such measures, the current trajectory risks creating a two-tiered system of climate resilience, where the benefits of adaptation disproportionately miss those who most need protection from financial loss. More broadly, our findings underscore that relying solely on insurance markets to drive climate adaptation may be insufficient as a policy strategy, as climate risks continue to escalate.

We contribute to the literature on household-level adaptation to climate risk through physical investments in building resilience. A central question in this literature is why households underinvest in cost-effective protective measures despite rising disaster risk (Bubeck et al., 2012; Kousky, 2014). Recent work has identified financing constraints (Bellon et al., 2025), regulation (Baylis and Boomhower, 2024; Clara et al., 2023), incentive design (Baylis et al., 2024), information about climate risk (Agarwal et al., 2025), behavioral biases (Meyer and Kunreuther, 2017), and government disaster aid (Kousky et al., 2018) as key determinants of household adaptation in real estate. We add to this literature by providing the first causal evidence that insurance pricing itself shapes adaptation decisions—positively for some households and negatively for others—through the interaction of premium-linked discounts and household budget constraints.

Our paper also contributes to the rapidly expanding literature on the homeowners' insurance market. Recent work has examined the causes and consequences of rising insurance costs for household finances and the housing market (Eastman et al., 2024; Ge et al., 2025a,b; Jotikasthira et al., 2025; Kalda et al., 2025; Keys and Mulder, 2024; Sastry et al., 2023), as well as how insurers are repricing and reclassifying climate risk (Boomhower et al., 2024; Weill and Gourevitch, 2026). We add to this literature by examining whether and how insurance market forces alter incentives for household adaptation. A common refrain among industry practitioners and policymakers is that the solution to the so-called "insurance crisis"—the persistent escalation of premiums—lies in encouraging households to adapt and reduce the risk profile of their properties. Our findings guide this policy discourse by highlighting that while rising premiums can motivate adaptation among financially less constrained households, they may actually hinder adaptation among financially constrained households, for whom higher premiums exacerbate rather than alleviate barriers to investment.

2 Data & Framework

We exploit unique variation in Florida's Citizens Property Insurance Corporation, the state's insurer of last resort, which provides an ideal natural experiment. Citizens offers substantial premium discounts for roof improvements, with additional discounts for wind-resistant features. The discounts can be as high as 47% of total premium dollars, amounting to hundreds to over a thousand dollars a year in premium discounts for the average premium in our sample. Figure A-2 in the Appendix shows an example discount schedule from a Citizens rate filing, and Table A-1 reports the distribution of potential discounts (in ratios of premiums or thousands of dollars) across adaptation features in our sample. Note that the discount for each feature depends on other features of the house and varies over time.

2.1 Policy level data

We obtain individual policy-level homeowners insurance data from Citizens Property Insurance Corporation, one of Florida's largest residential property insurer. The dataset covers all policies written by Citizens from 2002 through 2023 and contains detailed contract-level information, including premiums, coverage limits, and deductibles. In addition, the data include rich property-level characteristics, such as street address, year of construction, total building area, number of units, number of stories, roof type, and year of roof replacement.

Additionally, the dataset provides granular information on roof-related mitigation features, including roof-to-wall attachment type, roof deck type, opening protection, secondary water resistance, and roof covering material. Table 1 reports summary statistics for the key policy and property variables in our estimation sample.

The central source of variation we exploit is the sharp rise in homeowners insurance premiums over our sample period. Figure 1 plots the distribution of annual premium dollars across Citizens policies by year. After remaining roughly flat through the mid-2010s, premiums climb steeply beginning around 2019, with the increase evident throughout the distribution rather than confined to its tails. To confirm that this pattern reflects a broad Florida-wide repricing of risk rather than an artifact of Citizens, Figure A-1 in the Appendix reproduces the same time series using county-level homeowners premiums for Florida constructed from mortgage escrow data by Keys and Mulder (2024). The two series move together—both roughly flat through about 2017 and then climbing sharply—with the statewide mean rising somewhat faster after 2017 (roughly 82% through 2023, versus about 63% for Citizens), indicating that the premium increases in our sample are representative of, and if anything milder than, the wider market.

Comparing the levels in the two figures, policies in the Citizens data carry lower premiums, consistent with the eligibility rule under which a household can obtain a Citizens policy only when private coverage is unavailable or priced more than 20% above the Citizens quote. The gap is reinforced by Florida's statutory "glide path," which caps the annual rate increase Citizens may impose on an individual policyholder—historically at 10% per year and raised only gradually since—so that Citizens premiums adjust toward actuarially sound levels more slowly than those in the private market.

2.2 House price data

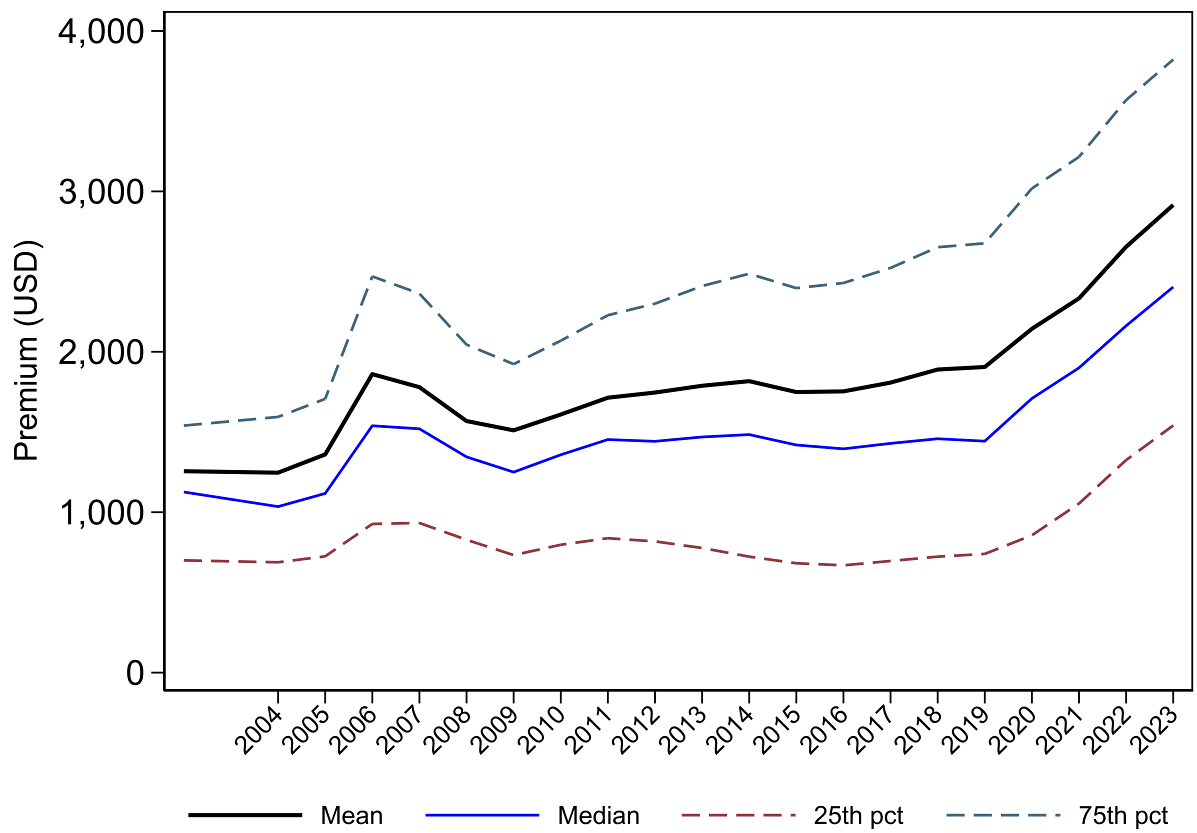
To proxy for local wealth conditions, we obtain ZIP code–level home price indices from Zillow. We merge these datasets with the policy-level insurance data at the ZIP code level.

2.3 Adaptation measures

We start by defining a measure to determine whether a house has implemented any adaptation-related features. To this end, we define the following five measures, one each for different types of adaptation-related retrofit households can implement.

Roof to wall attachments: One of the key retrofits for climate adaptation is how the roof is connected to the walls. There are different ways, some better suited to withstand the high wind speeds observed during storms and hurricanes. The roof can be connected to the walls using Toe Nails, Clips, or Wraps. Wraps are better suited to handle high wind speeds, followed by clips and Toe Nails. We define the measure to capture

Figure 1. Distribution of Insurance Premiums Over Time (Citizens)
The figure plots the cross-sectional distribution of annual premium dollars across Citizens Property Insurance policies by year. The solid black line is the mean, the solid blue line the median, and the dashed lines the 25th and 75th percentiles.



the presence of roof-to-wall attachments as follows:

$$\mathbb{1}_{h,t}^{\textit{Wall Attach}} = \begin{cases} 0 & \text{if roof to wall attachment is of type Toe Nail or Clips} \\ 1 & \text{if roof to wall attachment is of type Double Wraps or Single Wraps} \end{cases}$$

We also create an alternative measure of the adaptation of roof-to-wall attachments, where we consider clips as an adaptation retrofit. We define the measure as follows:

$$\mathbb{1}_{h,t}^{\textit{Wall Attach (Alt)}} = \begin{cases} 0 & \text{if roof to wall attachment is of type Toe Nail} \\ 1 & \text{if roof to wall attachment is of type Clips, Double Wraps, or Single Wraps} \end{cases}$$

Roof covering type: Another retrofit that households can implement for climate adaptation is the material of the roof. The roof can be made of Florida Building Code (FBC) equivalent, non-FBC equivalent, or reinforced concrete, with reinforced concrete and FBC equivalent materials being more resilient to wind. We define the measure as follows:

$$\mathbb{1}_{h,t}^{\textit{Cover Type}} = \begin{cases} 0 & \text{if roof to wall attachment is of type non-FBC equivalent} \\ 1 & \text{if roof to wall attachment is of type FBC equivalent or reinforced concrete} \end{cases}$$

Roof to deck attachments: Another important retrofit for climate adaptation is how the roof is connected to the deck. There are different ways, including wood, metal, or concrete, with concrete being the strongest. We define the measure to capture the presence of climate-adapted roof-to-deck attachments as follows:

$$\mathbb{1}_{h,t}^{\textit{Deck Attach}} = \begin{cases} 0 & \text{if the attachment is of type level A (wood or other deck) or level B (metal deck)} \\ 1 & \text{if the attachment is of type level C (reinforced concrete roof deck)} \end{cases}$$

Water resistance: Households can also install an extra waterproof layer under the roof, which prevents water intrusion if the roof covering is damaged, as a measure of climate adaptation. We define the measure as follows:

$$\mathbb{1}_{h,t}^{\textit{Water Resist}} = \begin{cases} 0 & \text{if a waterproof layer under the roof is not present} \\ 1 & \text{if a waterproof layer under the roof is present} \end{cases}$$

Opening protection: The adaptation measures described above are related to the roof. However, there is one non-roof-related option of installing retrofits that protect doors and windows from flying debris, for example, hurricane shutters or impact windows. Such retrofits are classified into three categories: Class A, Class B, and Class C. Class A provides the most protection. We define the measure as follows:

$$\mathbb{1}_{h,t}^{\textit{Prot Type}} = \begin{cases} 0 & \text{if the installed opening protection is of type Class B or C} \\ 1 & \text{if the installed opening protection is of type Class A} \end{cases}$$

Opening protection has a higher share of missing values than other adaptation measures. These missing values are unlikely to reflect actual implementation: completing this adaptation would qualify households for premium discounts, giving them a clear incentive to report it. We therefore construct an alternative measure, $\mathbb{1}_{h,t}^{\textit{Prot Type (Alt)}}$, that codes missing values as zero. We define the measure as follows:

$$\mathbb{1}_{h,t}^{\textit{Prot Type (Alt)}} = \begin{cases} 0 & \text{if the installed opening protection is of type Class B or C, or it is missing} \\ 1 & \text{if the installed opening protection is of type Class A} \end{cases}$$

Panel A of Figure 2 provides descriptive evidence on the prevalence and evolution of the adaptation measures defined above, plotting the cumulative share of houses in our sample that have adopted each adaptation feature between 2003 and 2023. Adoption rates increase over time for most roof-related measures, including roof-to-wall attachments, roof covering type, and roof-to-deck attachments, while secondary water resistance and opening protection remain less prevalent throughout the sample period. Panel B of Figure 2 plots the incremental adoption rate: among houses that had not yet installed a given feature as of the previous year, the share that install it during the current year. This flow measure conditions on being unadapted at the start of the year. In any given year only a small fraction of still-unadapted houses install a given feature, but these flows remain positive throughout the sample period, and their accumulation produces the upward trends in Panel A. Table A-3 in the Appendix reports the corresponding adoption rates by time period.

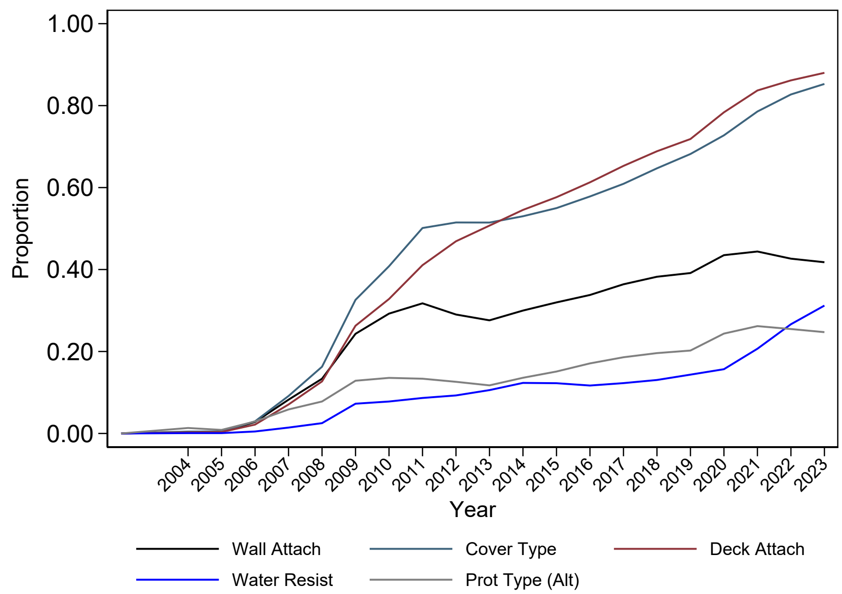
Adoption is low in the earliest sample years for two reasons. Our sample is dominated by the existing housing stock, which largely predates Florida's wind-resistance building requirements: the statewide Florida Building Code took effect on March 1, 2002, and the High-Velocity Hurricane Zone of Miami-Dade and Broward had already adopted a strengthened code in 1994 following Hurricane Andrew. Mitigation nonetheless enters the existing stock gradually: because Florida requires roof work itself to meet current code, each re-roof brings an older home's roof-deck attachment, secondary water resistance, and—subject to a cost cap—roof-to-wall connection up to code. Opening protection, by contrast, is not triggered by a re-roof; Florida mandates it only in new construction within the wind-borne-debris region, so for existing homes it remains a discretionary, stand-alone investment. Our ZIP-by-quarter fixed effects address concerns related to the time trend in adaptation.

It is worth emphasizing that the adaptation we measure is not merely mechanical compliance with the building code. First, the premium increase can accelerate households' re-roofing decisions and the accompanying upgrades. Second, even for the roof-related features a re-roof will bring up to standard, households still have discretion. Opening protection is not triggered by a re-roof and remains a discretionary, alone investment for existing homes. The mandated roof-to-wall connection upgrade is capped at 15% of the re-roofing cost under Fla. Stat. §553.844, so it need not reach the strongest, fully wrapped connection our primary measure requires. And our roof-deck measure counts a home as adapted only when it has a reinforced-concrete deck; although a deck can certainly be replaced or upgraded, code does not require a re-roof to install a concrete deck, so crossing this threshold reflects a discretionary choice rather than a code mandate. Reaching the adapted threshold for these features, therefore, captures household investment beyond what the code requires.

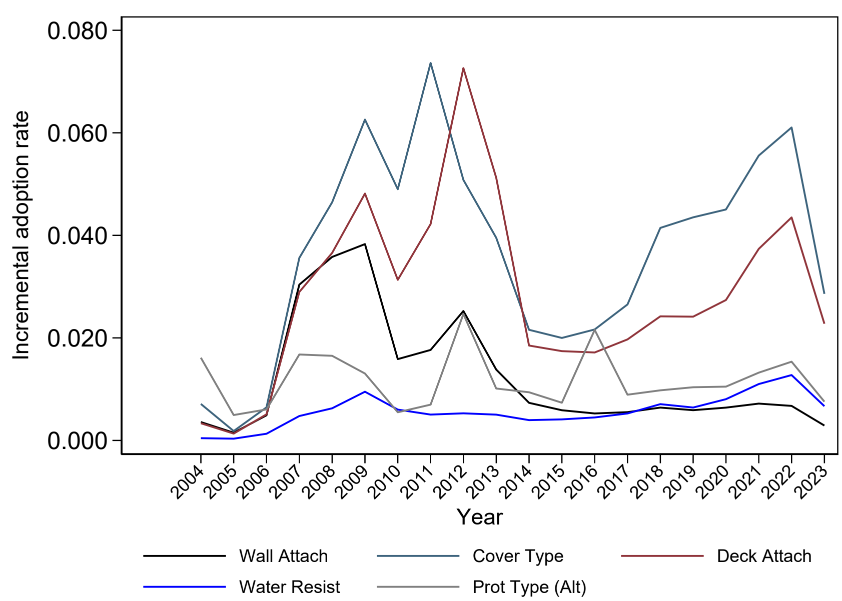
We further document heterogeneity in adoption patterns across socioeconomic characteristics at the ZIP-code level. Figure 3 compares adoption trends across areas with low and high average house prices. Houses located in ZIP codes with higher median prices exhibit higher adoption rates across all adaptation measures and throughout the sample period.

We analyze each adaptation measure in a separate regression, so the estimation sample differs across outcomes. For a given measure we exclude observations in which the feature has already been adopted, since adoption is an absorbing state and an already-adapted household can no longer respond, as well as observations in which the feature is unobserved. Because the adaptation measures differ both in baseline prevalence and in how completely they are documented at renewal, these exclusions leave a different number

Figure 2. Adoption of Adaptation Features
The figure shows the adoption of adaptation retrofits across time for each feature in our sample. **Panel A** plots the cumulative share of houses that have installed each retrofit as of a given year; this is the stock of adapted houses, and it is weakly increasing because a house that reports a retrofit is treated as retaining it in subsequent years. **Panel B** plots the incremental adoption rate, defined as the flow of newly adapted houses among those still at risk: in each year, among houses that had not yet installed a given retrofit as of the previous year, it is the proportion that install it during the current year. Property-years with a missing lagged adaptation status (for example, the first year a house appears in the sample) are excluded from the Panel B denominator.

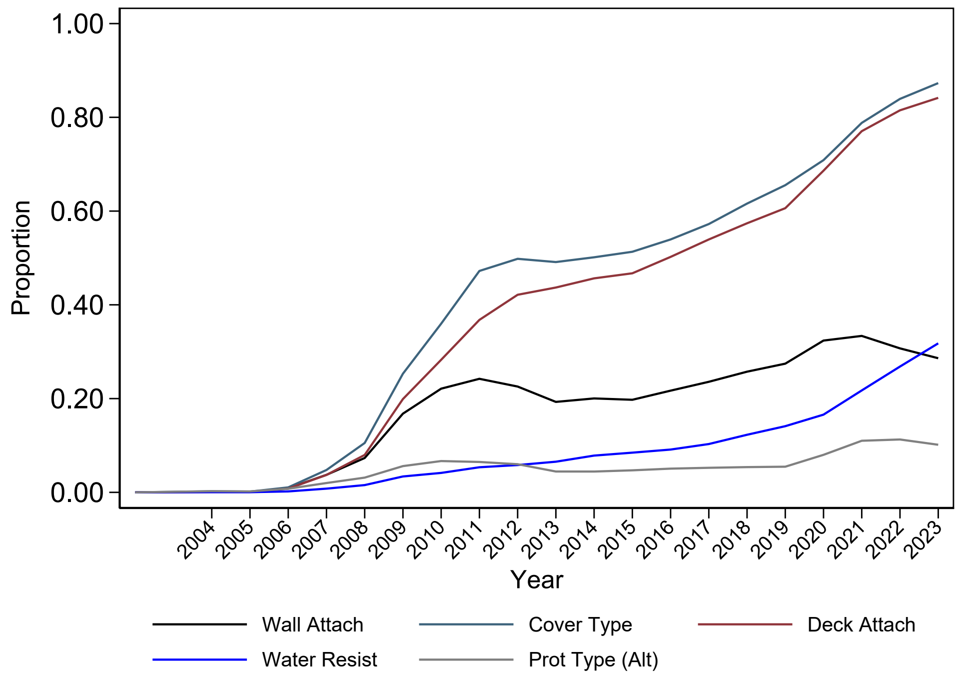


a Cumulative Share Adapted

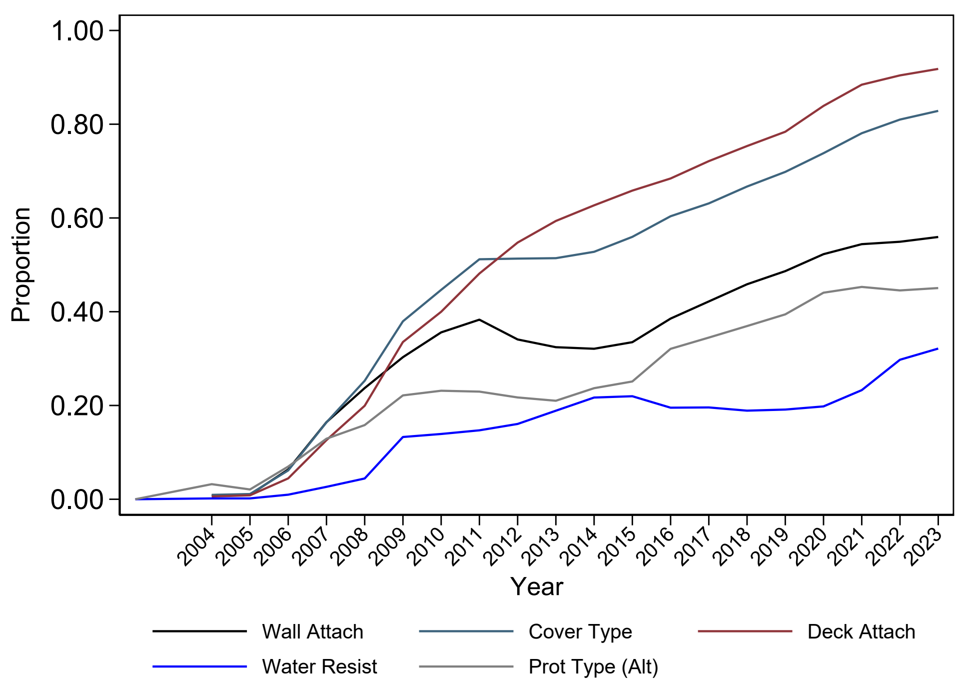


b Incremental Adoption Rate Among Previously Unadapted Houses

Figure 3. Adoption of Adaptation Features: By House Price
The figure shows how the proportion of houses with adaptation retrofits differs across areas (Zipcodes) with low or high average house prices. Panel A shows the proportion of houses in our sample that have installed adaptation retrofits over time in low-house-price areas. Panel B shows the same, but for high-house-price areas.



a Low House Price Areas



b High House Price Areas

of observations for each outcome, which accounts for the variation in sample size across the columns of our regression tables.

2.4 Conceptual framework

We illustrate the trade-off using a simple framework. Consider a household deciding whether to invest in climate adaptation. The household lives for two periods. In period 1, the household earns income Y, pays an insurance premium P, and decides whether to incur an adaptation cost C. In period 2, the household receives a payoff from its decisions. We interpret C as the *incremental* cost of adapting. Many features—most notably the roof cover and its underlayment—need to be replaced periodically regardless of any resilience motive, so for a household whose roof is already due for replacement the relevant cost of adopting a code-compliant, wind-resistant alternative is only the upgrade over what it would have installed absent the insurance-related incentives, which can be much smaller than the full installed cost. Two cases illustrate this. First, a household that instead accelerates a re-roof it would have undertaken later incurs only the time value of paying for the roof sooner. The effective incremental C is therefore lower for households nearing the end of a feature's service life. Second, a household replacing its roof on schedule pays only the incremental cost of the more resilient option; and because Florida requires the roof work itself to meet current code, a re-roof on an older home already brings several mitigation features—deck attachment, a secondary water barrier, and a roof-to-wall connection retrofit (capped at 15% of the re-roofing cost under Florida law)—up to code at little discretionary cost.

The household faces a budget constraint in period 1:

$$C \leq Y - P + B \tag{1}$$

where $B \geq 0$ represents the household's ability to borrow or draw on savings. Households with higher wealth have higher B; financially constrained households have B closer to zero.

Benefits of Adaptation

If the household invests, it receives benefits in each subsequent period that we group into two components. The first is a premium discount: Florida insurers offer discounts as a percentage of the premium, so the annual savings are $\delta \cdot P$, where $\delta \in (0, 1)$ is the discount percentage (e.g., typically 33–81% for wind mitigation features). The second is a bundle of *other* benefits, which we denote $\Omega \geq 0$ and which includes the reduction in expected uninsured storm losses (deductibles, uncovered damage, and the disruption of filing a claim), any increase in the home's resale value, and non-pecuniary gains such as safety and peace of mind. Assuming the household remains in the home for T periods and discounts future payoffs at rate r, the present value of benefits is:

$$PV(\text{benefits}) = \sum_{t=1}^{T} \frac{\delta \cdot P + \Omega}{(1+r)^t} = (\delta \cdot P + \Omega) \cdot \left(\frac{1 - (1+r)^{-T}}{r} \right) \tag{2}$$

For simplicity, we approximate this as $\frac{\delta \cdot P + \Omega}{r}$ when T is large.

A central limitation of our setting is that we observe only the discount component $\delta \cdot P$; the other benefits Ω cannot be measured in our data. Our empirical analysis therefore identifies how adaptation responds to the premium-linked discount channel and cannot capture the contribution of Ω. Because $\Omega \geq 0$, the discount-based magnitudes we report—including the present-value calculations in Table A-2—are lower bounds on the total private benefit of adaptation.

Investment Decision

The household invests if two conditions are satisfied:

1. **NPV condition (willingness):** The investment is worthwhile:

$$\frac{\delta \cdot P + \Omega}{r} - C > 0 \tag{3}$$

2. **Budget condition (ability):** The household can afford it:

$$C \leq Y - P + B \tag{4}$$

Effect of Premium Increases

An increase in P affects both conditions:

1. **NPV condition:** Higher P raises the dollar value of the discount ($\delta \cdot P$), making the NPV condition *easier* to satisfy. This is the **incentive effect**.
2. **Budget condition:** Higher P reduces disposable income ($Y - P$), tightening the budget constraint and making the affordability condition *harder* to satisfy. This is the **constraint effect**.

Formally:

$$\frac{\partial}{\partial P}\left(\frac{\delta \cdot P + \Omega}{r} - C\right) = \frac{\delta}{r} > 0 \quad \text{(incentive effect)} \tag{5}$$

$$\frac{\partial}{\partial P}(Y - P + B - C) = -1 < 0 \quad \text{(constraint effect)} \tag{6}$$

The net effect of a premium increase on adaptation investment depends on which condition is binding.

Heterogeneous Responses

This framework generates clear predictions about which households respond positively versus negatively to premium increases:

Prediction 1 (Wealth/Financial Slack): Households with higher wealth (larger B) have slack in their budget constraint. For these households, the budget condition is not binding, so the incentive effect dominates: premium increases raise the value of adaptation and induce investment. For households with low B, the budget constraint binds. A premium increase tightens this constraint further ($Y - P + B$ falls), potentially pushing previously feasible investments out of reach. For these households, the constraint effect dominates.

Prediction 2 (Adaptation Cost): Households facing higher adaptation costs (larger C) are less responsive to a given premium increase, because both channels point the same way. A premium increase shifts $\delta P/r$ up by $\delta \Delta P/r$, but high-C households start further below the NPV cutoff C, so the same shift is less likely to flip them into adapting. At the same time, the budget condition is tighter for them to begin with, so the same fall in $Y - P + B$ is more likely to push them past the binding threshold. Premium increases are therefore less likely to induce investment among high-C households and may crowd out marginal investments. A further consideration motivates our empirical design: because a larger home raises both the adaptation cost C and the premium P, our cost proxy—square footage—is positively correlated with the premium level. A larger home therefore implies a larger dollar discount δP, which strengthens the incentive effect, while at the same time placing more pressure on the budget constraint $Y - P + B$. To keep the square-footage interaction from absorbing these premium-level channels, we control for the lagged premium and its interaction with premium increases, so that each interaction isolates its own channel.

Prediction 3 (Baseline Premium Level): The baseline level matters only for households sitting close to one of the two thresholds before the shock, and the response can go either way. A household whose NPV was just below the cutoff may be pushed into adapting as $\frac{\delta \cdot P + \Omega}{r}$ crosses C. A household whose disposable income was just enough to cover the cost may instead be pushed out of adapting as $Y - P + B$ falls below C. Whether households with higher baseline premiums are, on average, more or less likely to adapt in response to a given premium increase therefore depends on the cross-sectional distribution of households near each threshold, and the framework does not yield a signed prediction.

To gauge the magnitude of the discount channel relative to the cost of adapting, Table A-2 operationalizes the NPV condition using our data. For each retrofit, we compute the present value of the stream of annual premium discounts—taking the mean and 90th-percentile potential dollar discount from Table A-1, Panel B, and discounting it over the measure's effective life at a 6% rate (Giglio et al., 2021). The cost side is harder to pin down: unlike the discount stream, which we observe directly from the rate filings, installed retrofit costs are not recorded systematically in any household-level source, so we assemble representative figures from a range of Florida contractor quotes and industry pricing guides. For a typical 1,500 ft^2 home, the central estimates span from roughly \$2,600 for a roof-to-wall attachment upgrade to about \$17,000 for Class A opening protection, with a wide range around each figure across sources and home sizes. Even with this measurement caveat, the comparison is informative. Two measures clear the break-even threshold most readily. Roof-to-wall attachment, the cheapest retrofit, has discounts whose present value exceeds its cost even for the average household. Opening protection, though far more expensive, attracts the largest dollar discounts and clears its upfront cost for high-discount households—those at the 90th percentile—that also face low-end installation costs. More broadly, because both the upfront cost and the dollar discount differ markedly across households—the discount scaling with the premium being reduced—the net present value of adaptation is positive for some measures and some households even where it is negative for the average household facing average costs.

One caveat is that because these calculations capture only the discount benefit δP and omit the other benefits Ω, they are lower bounds: the gap between the present value of discounts and the cost indicates how large the unobserved benefits Ω would need to be for each investment to be worthwhile on purely financial terms.

Another caveat is that, for a household that would re-roof anyway, the back-of-envelope calculation above overstates both the cost and the benefit. Adopting a code-compliant roof early does not add a full roof's cost or a full lifetime of discounts; it only moves both forward in time. The household bears only the present value of accelerating the expenditure—the gap between paying now and paying at the scheduled replacement date—rather than the roof's full cost, and because it would have earned the same discounts once it re-roofed on schedule, replacing early only brings that discount stream forward. The relevant comparison for these households is therefore the present value of accelerating the cost against the present value of accelerating the discounts.

Moreover, there is a lot of heterogeneity in how each feature is installed. For example, roof-to-wall attachment and opening protection are stand-alone retrofits; the roof-cover measure is itself a full re-roof; and roof-deck attachment and secondary water resistance can be installed only with the covering off. For many households, however—especially those whose roof cover and underlayment are nearing the end of their service life and would be replaced in the near term regardless—the economically relevant cost of adapting is only the incremental amount paid to choose a resilient version over what they would have installed absent the insurance-related incentives, which is substantially smaller; Table A-2 therefore overstates the true cost of adapting and understates how often the upgrade is justified.

3 Empirical strategy

Upon policy renewal, the data record the new premium, coverage limit, and information on roof and property characteristics relevant to discount eligibility. We examine how homeowners' adaptation behavior between policy renewals in year *t* and *t+1* responds to instrumented changes in insurance premiums from *t-1* to *t*. Our regressions include ZIP-by-quarter, roof age, and house-age-bin fixed effects. Our sample spans 2002 to 2023, a period short enough that households are unlikely to undertake the same adaptation more than once. Accordingly, when estimating the effect on a particular adaptation (e.g., roof-to-wall attachment), we exclude households that have already completed that adaptation as of *t*.

3.1 Instrumental Variable

Estimating the causal effect of insurance premiums on household adaptation behavior presents an endogeneity challenge. For example, households experiencing larger premium increases may be those whose roofs are in greater need of repair. Deteriorating roof conditions would both trigger larger premium increases and raise the probability of roof replacement, independent of any behavioral response to price changes.

To address this concern, we employ an instrumental variable approach that isolates exogenous variation in premium rates. Specifically, for each policy renewal, we calculate the leave-one-out average change in premium rates among other policies in the same ZIP code and renewal month. Formally, we run a 2SLS model where the first stage regresses the change in premium-to-coverage ratio on the leave-one-out average within the neighborhood (zip code):

$$\Delta PremiumRate_{i,z,t} = \pi \cdot \overline{\Delta PremiumRate}_{-i,z,m} + \gamma_{z,q} + \delta_r + \theta_a + \nu_{i,z,t}, \tag{7}$$

where $\Delta PremiumRate_{i,z,t}$ is the change in the premium-to-coverage ratio for household i in ZIP code z at renewal in year t, $\overline{\Delta PremiumRate}_{-i,z,m}$ is the leave-one-out average change in premium rates among other policies in ZIP code z and renewal month m, $\gamma_{z,q}$ are ZIP-by-quarter fixed effects, and δ_r and θ_a are roof age and house-age-bin fixed effects, respectively.

In the second stage, we estimate:

$$Adapt_{i,z,t+1} = \beta \cdot \Delta \widehat{PremiumRate}_{i,z,t} + \gamma_{z,q} + \delta_r + \theta_a + \varepsilon_{i,z,t}, \tag{8}$$

where $Adapt_{i,z,t+1}$ is an indicator for whether household i in ZIP code z adopts a climate-resilient feature between policy renewals, and $\Delta \widehat{PremiumRate}_{i,z,t}$ is the fitted value from the first stage.

Our instrument satisfies the relevance condition, as evidenced by a strong first stage reported in Table 3, likely because Citizens implements rate changes at the ZIP code level at discrete times.

The instrument is also plausibly exogenous given our fixed effects structure. We include ZIP-by-quarter fixed effects in our regressions, meaning the identifying variation in the instrument comes from within the same ZIP code but across months within a quarter. Within a ZIP-quarter, other factors that could drive mitigation investment, such as construction costs and beliefs about climate risks, are unlikely to correlate with monthly variation in premium rates. We cluster standard errors at the county level to account for potential spatial correlation in both premium setting and adaptation decisions across ZIP codes within the same county.

3.2 Heterogeneity

To test for heterogeneous responses along the dimensions suggested by our conceptual framework, we augment the baseline specification with interaction terms. We have four endogenous variables: $\Delta PremiumRate_{i,z,t}$ and its interactions with $Wealth_{z,t}$, $Cost_i$, and $LagPrem_{i,t-1}$. We instrument these using four instruments: the leave-one-out average premium rate change and its corresponding interactions with $Wealth_{z,t}$, $Cost_i$, and $LagPrem_{i,t-1}$.

In the second stage, we estimate:

$$\begin{aligned} Adapt_{i,z,t+1} = &\beta_1 \cdot \widehat{\Delta P}_{i,z,t} + \beta_2 \cdot (\widehat{\Delta P}_{i,z,t} \times Wealth_{z,t}) \\ &+ \beta_3 \cdot (\widehat{\Delta P}_{i,z,t} \times Cost_i) + \beta_4 \cdot (\widehat{\Delta P}_{i,z,t} \times LagPrem_{i,t-1}) \\ &+ \alpha_2 \cdot Cost_i + \alpha_3 \cdot LagPrem_{i,t-1} + \gamma_{z,q} + \delta_r + \theta_a + \varepsilon_{i,z,t} \end{aligned} \tag{9}$$

where $\widehat{\Delta P}_{i,z,t}$ denotes the fitted value of $\Delta PremiumRate_{i,z,t}$ from the first stage; $Wealth_{z,t}$ is measured using Zillow's home price index at the ZIP-by-year level; $Cost_i$ with the square footage of the house; and $LagPrem_{i,t-1}$ is the lagged log premium level. All three variables are standardized at the mean, allowing us to interpret β_1 as the response of households with mean values across these dimensions.

4 Results

4.1 Baseline Effect

We begin by presenting baseline estimates of how changes in premium rates affect adaptation efforts. The OLS regressions in Table 2 reveal a positive correlation between changes in premium rates and adaptation investment in three of the six columns, suggesting that households increase some types of adaptation efforts in the twelve months following large premium rate increases. Table A-4 re-estimates the OLS specification with ZIP code $\times$ year fixed effects in place of the ZIP code $\times$ quarter fixed effects and yields similar results. However, these estimates likely suffer from endogeneity bias. For example, households experiencing larger premium increases may be those whose roofs are in greater need of repair. Deteriorating roof conditions would both trigger larger premium increases and raise the probability of roof replacement, independent of any behavioral response to price changes. We therefore turn to our instrumental variable approach.

Table 3 presents the first-stage results. Across all specifications, the coefficient on the instrument is positive and statistically significant, with Kleibergen-Paap F-statistics exceeding 100, confirming the relevance of our instrument. Table 4 presents the second-stage results. The coefficient on premium rate changes is generally negative but statistically insignificant, consistent with the OLS estimates being positively biased by endogeneity, as described in the example above.

Tables A-5 and A-6 report the instrumental-variable estimates under ZIP code $\times$ year fixed effects. The second-stage coefficients are positive and statistically significant in five of the six columns, suggesting that larger premium increases encourage households to adapt. With ZIP-by-year fixed effects, however, the instrumental variable approach becomes vulnerable to endogeneity concerns. Within a given year, a ZIP code may experience disproportionate premium increases later in the year—driven, for instance, by rising hurricane risk assessments. Since the outcome variable captures household activity over the twelve months following policy renewal, households renewing later in the year face a longer exposure window after the risk shock and are therefore more likely to undertake roof upgrades. Results estimated under these looser fixed effects should accordingly be interpreted with caution.

The insignificant average effect is consistent with our conceptual framework, which predicts that premium increases simultaneously strengthen the incentive to adapt (through larger dollar discounts) and tighten budget constraints. If wealthier households respond positively while financially constrained households respond negatively, these opposing effects could offset in the aggregate, producing a null average coefficient. We investigate this possibility in the next section.

4.2 Heterogeneous Responses

The null effect in our baseline instrumental variable regression likely masks important heterogeneity in how households respond to premium changes. We have directional predictions for two sources of heterogeneity—financial constraints and adaptation costs—while the effect of a third, the baseline premium level, is theoretically ambiguous; we nonetheless control for it and its interaction with the premium-rate change.

First, we predict that less financially constrained households are more likely to respond to the increased financial incentives embedded in premium increases. Because adaptation discounts are calculated as a percentage of premiums, higher premiums raise the dollar value of these discounts, pushing the net present value of adaptation to be positive for some households. Wealthier households are less likely to see their budget constraint bind as premiums increase. In contrast, more financially constrained households may be further strained by rising premiums, leading them to reduce their adaptation efforts.

Second, we hypothesize that households facing lower adaptation costs will respond more to premium increases. Smaller upfront investments make positive net present values more attainable when dollar discounts rise.

Third, the response to a given premium increase among households with different baseline premium levels is theoretically ambiguous. A household whose NPV was just below the cutoff may be pushed into adapting as the discount value crosses the threshold, while a household whose budget slack was only marginally sufficient to cover the cost may instead be pushed out of adapting as the constraint becomes binding. Whether households with higher baseline premiums are on average more or less responsive to a given premium increase is therefore an empirical question.

We test these hypotheses by adding three interaction terms simultaneously to our instrumental variable regressions. We interact the change in premium rates with Zillow's home price index at the ZIP-by-year level, which proxies for financial constraints; the square footage of the house, which proxies for adaptation costs; and the lagged log premium level. All three variables are standardized at the mean, allowing us to interpret the coefficient on premium rate changes as the response of households with mean values across these dimensions. We include the lagged log premium interaction because square footage is correlated with the premium level: larger homes carry higher premiums, and hence both larger dollar discounts and greater pressure on the budget constraint. Controlling the two interactions simultaneously ensures that the square-footage interaction isolates the adaptation-cost channel rather than picking up these premium-level effects. The first stage includes four endogenous variables: the premium rate change and its interactions with home price index, square footage, and lagged premium levels. Correspondingly, we use four instruments: the leave-one-out ZIP-by-month average premium rate change and its interactions with the same three variables.

Table 5 presents the second-stage results. The coefficient on premium rate change is generally negative and statistically significant for two outcomes and indistinguishable from zero for the other four outcomes, indicating that households with mean values of the home price index, square footage, and lagged premium levels either reduce or do not change their adaptation efforts when premiums rise. This is consistent with premium increases causing the financial constraints to bind more and reducing adaptation investment as a result. Taking Column (2) as an example, when households experience a one-standard-deviation increase in premium rates (0.2 pp), the probability of adaptation decreases by 1.0 percentage point (-0.051×0.2), corresponding to 41% of the mean. Note that a 0.2-pp increase in premium rates corresponds to $355 each year based on the average coverage. Using a discount rate of 6% or 2.6% (Giglio et al., 2021), such a perpetuity corresponds to a present value of $5,917 or $13,654.

However, we consistently estimate positive and statistically significant coefficients on the interaction between premium rate changes and the home price index, indicating that households in more expensive areas are more likely to respond to premium increases by investing in disaster resilience. Based on Column (2), households with a home price index one standard deviation above the mean experience an increase of 0.9 percentage points ($(0.094 - 0.051) \times 0.2$), or 36% of the mean. In contrast, households with a home price index one standard deviation below the mean experience a decrease of 2.9 percentage points ($(-0.094 - 0.051) \times 0.2$).

The estimated coefficient on the interaction between premium rate changes and square footage is negative and statistically significant in all the specifications. This finding is consistent with the prediction that households facing lower adaptation costs, proxied by smaller square footage, are more responsive to premium increases. Based on Column (2), houses with square footage one standard deviation below the mean experience an increase of 4.6 percentage points ($(0.281 - 0.051) \times 0.2$) in response to a one-standard-deviation increase in premium rates.

Finally, the prediction for the interaction between premium rate changes and the lagged log premium is ambiguous: a higher base premium means a larger dollar discount when rates rise, strengthening the incentive to adapt, but also a heavier cost burden that tightens financial constraints. Consistent with these offsetting forces, the estimated interaction coefficient is positive but statistically significant in only three of the six specifications. We therefore interpret it as weak, suggestive evidence that households with larger potential savings are somewhat more likely to respond to premium increases by investing in adaptation, rather than as decisive support for the potential-savings channel.

Taken together, these findings support our central predictions: household responses to insurance premium increases depend on financial constraints and the cost of adaptation, while the baseline premium level—for which the framework yields no signed prediction—enters only as a control.

Table A-7 repeats the heterogeneity exercise using ZIP code $\times$ year fixed effects in place of ZIP code $\times$ quarter. The key implications on the wealth effects remain similar.

We also assess whether these heterogeneity patterns reflect differences in physical storm exposure rather than the wealth and adaptation-cost channels we emphasize. Table A-8 adds a fourth interaction between the change in premium rate and the household's standardized distance to the coast (Exposure), instrumented analogously to the other interactions and with distance to coast included as a level control. The wealth and cost interactions are essentially unchanged—the home price index interaction remains positive and statistically significant and the square footage interaction negative and significant across most outcomes—while the distance-to-coast interaction is statistically insignificant for all outcomes except roof deck attachment. This suggests that the wealth and adaptation-cost channels are not simply proxying for coastal storm exposure.

5 Conclusion

This paper investigates the effect of insurance pricing on household investment in climate adaptation. Using policy-level data from one of Florida's largest homeowners insurer and an instrumental variable strategy that exploits exogenous variation in premium rates, we find that the effect of premium increases on adaptation is heterogeneous—positive for some households, negative for others. The net effect depends on whether the incentive channel (higher premiums raise the value of discounts) or the constraint channel (higher premiums strain budgets) dominates.

Wealthier households and those facing lower adaptation costs respond to premium increases by investing more in climate-resilient building features. For these households, the larger dollar value of adaptation discounts outweighs any budget strain. In contrast, lower-income households and those facing higher adaptation costs reduce their investments when premiums rise—premium increases tighten an already binding budget constraint, crowding out the upfront expenditures required for adaptation. The average household in our sample responds negatively to premium increases, suggesting that the constraint effect dominates for a substantial share of the population.

These findings have direct implications for climate policy: as premiums continue to increase, financially unconstrained households may increase their adaptation efforts; however, the gap in climate resilience across the wealth distribution may widen. Means-tested premium assistance programs could further preserve incentives for mitigation while alleviating financial strain. Our findings underscore that rising insurance premiums can increase adaptation, but only if paired with policies that target financial constraints for low-income and low-wealth households.

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I Tables

Table 1. Summary Statistics

	Observations	Mean	StDev	P10	P25	Median	P75	P90
Premium (USD)	18,150,744	1,857.86	1,513.45	461.00	839.00	1,486.00	2,435.00	3,667.00
Coverage (USD)	18,150,744	177,469.34	144,680.11	25,000.00	75,000.00	160,000.00	239,000.00	336,200.00
Premium to coverage	18,150,744	1.61	2.03	0.51	0.74	1.12	1.72	2.75
House size (Sq. feet)	18,041,877	1,536.41	15,111.62	860.00	1,087.00	1,400.00	1,812.00	2,342.00
House age (Years)	18,150,744	36.06	18.49	12.00	23.00	35.00	48.00	60.00
Roof age (Years)	5,687,037	11.01	6.54	3.00	6.00	10.00	16.00	20.00
Wall Attach	12,069,274	0.26	0.44	0.00	0.00	0.00	1.00	1.00
Wall Attach (Alt)	12,069,274	0.45	0.50	0.00	0.00	0.00	1.00	1.00
Cover Type	12,876,930	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Deck Attach	13,677,311	0.43	0.49	0.00	0.00	0.00	1.00	1.00
Water Resist	12,986,810	0.09	0.29	0.00	0.00	0.00	0.00	0.00
Prot Type (Alt)	18,150,791	0.14	0.34	0.00	0.00	0.00	0.00	1.00

Table 2. OLS: Effect of Premium-to-Coverage Changes on Climate Adaptation

This table reports OLS estimates of the association between changes in premium and climate adaptation outcomes. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. All regressions include ZIP code × quarter, roof age, and house age fixed effects. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	0.005***	0.009***	0.002	-0.006***	-0.000	0.004***
	(7.209)	(7.513)	(1.355)	(-3.387)	(-1.156)	(5.720)
Zipcode × Quarter FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,199,455	1,434,180	1,288,082	1,376,104	2,667,901	3,166,329
Dep. Var. Mean	0.0119	0.0248	0.0500	0.0515	0.0069	0.0128
Indep. Var. Mean	0.0395	0.0483	0.0497	0.0434	0.0432	0.0441
Indep. Var. SD	0.1971	0.2112	0.2041	0.1931	0.1980	0.2383

Table 3. First Stage: Effect of Leave-One-Out Mean on Own Premium Change

This table reports first stage estimates. The dependent variable is the change in premium-to-coverage ratio. The instrument is the leave-one-out average change in premium-to-coverage ratio among other policies in the same ZIP code and renewal month. All regressions include ZIP code × quarter, roof age, and house age fixed effects. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Leave-One-Out Avg Δ Premium Rate	0.081***	0.080***	0.083***	0.070***	0.087***	0.288***
	(13.753)	(11.039)	(11.811)	(11.759)	(13.901)	(15.608)
Zipcode × Quarter FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,198,773	1,433,796	1,287,747	1,375,684	2,667,136	3,163,541
Dep. Var. Mean	0.0395	0.0483	0.0497	0.0434	0.0432	0.0442
Instrument Mean	0.0406	0.0384	0.0404	0.0365	0.0473	0.0426
Instrument SD	0.1160	0.1229	0.1247	0.1242	0.1153	0.1208
Kleibergen-Paap F	189.16	121.87	139.51	138.28	193.23	243.62

Table 4. Second Stage IV: Effect of Premium-to-Coverage Changes on Climate Adaptation

This table reports second stage IV estimates of the effect of changes in premium on climate adaptation outcomes. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. The instrument is the leave-one-out average change in premium-to-coverage ratio among other policies in the same ZIP code and renewal month. All regressions include ZIP code × quarter, roof age, and house age fixed effects. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	-0.004	-0.025	-0.053	-0.022	0.002	0.000
	(-0.200)	(-0.746)	(-1.219)	(-0.449)	(0.210)	(0.086)
Zipcode × Quarter FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,198,773	1,433,796	1,287,747	1,375,684	2,667,136	3,163,541
Dep. Var. Mean	0.0119	0.0249	0.0500	0.0515	0.0069	0.0129
Indep. Var. Mean	0.0395	0.0483	0.0497	0.0434	0.0432	0.0442
Indep. Var. SD	0.1972	0.2112	0.2042	0.1931	0.1980	0.2383

Table 5. Second Stage IV: Effect of Premium-to-Coverage Changes on Climate Adaptation

This table reports second-stage IV estimates of the effect of changes in premium rates on climate adaptation outcomes, allowing for heterogeneous responses. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. We interact the change in premium-to-coverage ratio with three variables: Zillow's home price index at the ZIP-by-year level (Wealth), square footage of the house (Cost), and lagged log premiums (Lag Prem). All three moderators are standardized to mean 0 and standard deviation 1. We instrument the change in premium-to-coverage ratio and its three interactions using the leave-one-out zipcode-by-renewal-month mean change in the premium-to-coverage ratio and its corresponding interactions. All regressions include ZIP code × quarter, roof age, and house age fixed effects. Level controls are the lagged log coverage limit and the standardized home price index, square footage, and lagged log premium. Sample excludes observations where the adaptation indicator already equals 1 or is missing. Standard errors are clustered at the county level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	-0.015	-0.051**	-0.070*	-0.014	-0.002	0.008*
	(-1.151)	(-2.332)	(-1.697)	(-0.486)	(-0.273)	(1.856)
Δ Premium Rate ×	0.020**	0.094***	0.131***	0.098*	0.028***	0.012*
Home Price Index (Wealth)	(2.291)	(6.041)	(5.605)	(1.733)	(2.949)	(1.658)
Δ Premium Rate ×	-0.044*	-0.281***	-0.139*	-0.122**	-0.019**	-0.065**
Sqft (Cost)	(-1.741)	(-3.284)	(-1.757)	(-2.070)	(-2.140)	(-2.208)
Δ Premium Rate ×	0.013**	0.025	0.018	0.007	-0.005	0.015***
Lagged Log Premium (Lag Prem)	(1.995)	(1.264)	(0.737)	(0.571)	(-0.999)	(6.681)
Zipcode × Quarter FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,155,951	1,410,576	1,263,149	1,343,684	2,605,931	3,100,470
Dep. Var. Mean	0.0119	0.0247	0.0500	0.0513	0.0069	0.0127

Appendix

A-1 Additional tables and figures

Figure A-1. Distribution of Insurance Premiums Over Time (Florida, Mortgage Escrow Data)
The figure plots the distribution of homeowners insurance premiums across Florida counties by year, using county-level premiums constructed from mortgage escrow data by Keys and Mulder (2024). The solid black line is the mean premium, weighted by each county's number of observations; the solid blue line is the median, and the dashed maroon and dashed dark-blue lines are the 25th and 75th percentiles. All percentiles are observation-weighted across county mean premiums.

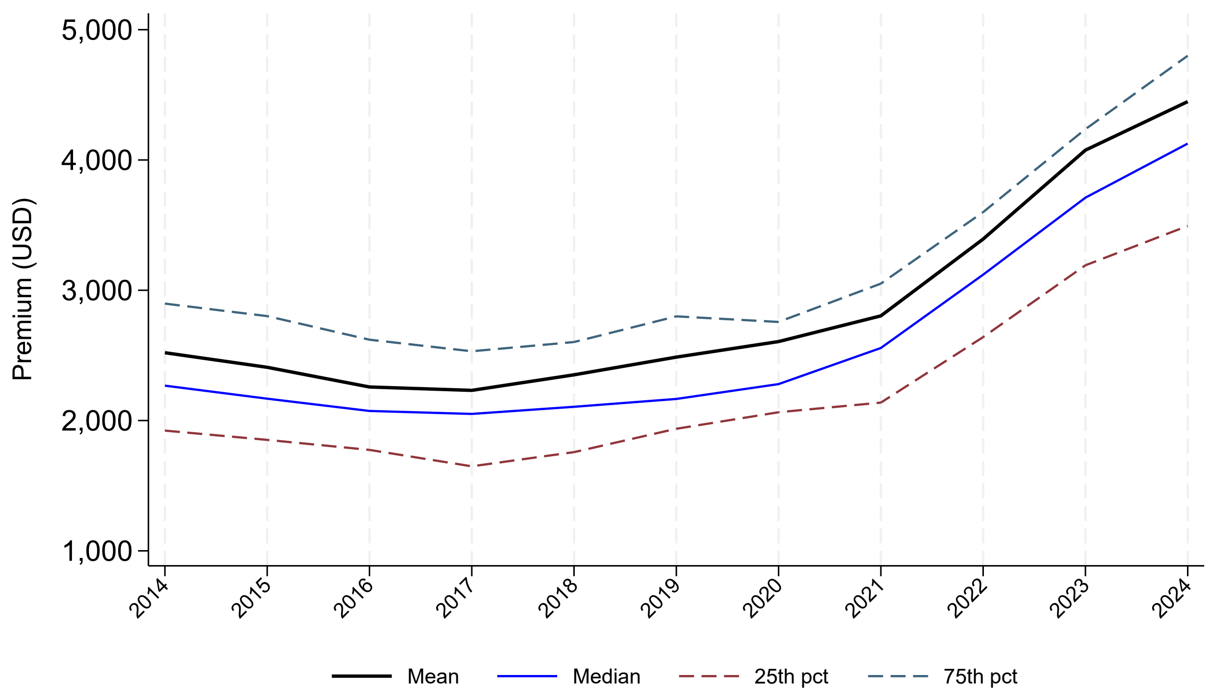

Figure A-2. Discount Table Example

The figure shows an example of the discount table. Source: Florida Office of Insurance Regulation's IRFS Forms & Rates Filing Search system.

CITIZENS PROPERTY INSURANCE CORPORATION | HOMEOWNERS

Loss Mitigation Credits for 1 to 4 units - Multi-Peril

(This chart is not applicable to renter contents and condominium unit owner in a building with 5 or more units or mobile homes.)

YEAR BUILT BEFORE JANUARY 1, 2002

				Roof Shape and Opening Protection							
				Other Roof Shape				Hip Roof Shape			
Roof Cover	Roof Deck Attachment	Roof-Wall Connection	Secondary Water Resistance	None	Class C	Class B	Class A	None	Class C	Class B	Class A
Non-FBC Equivalent	A. (6d @ 6"/12")	Toe Nails	No SWR	0.00	0.09	0.18	0.22	0.23	0.27	0.31	0.33
			SWR	0.03	0.12	0.21	0.26	0.25	0.29	0.32	0.35
		Clips	No SWR	0.17	0.20	0.23	0.25	0.31	0.32	0.34	0.35
			SWR	0.21	0.24	0.27	0.29	0.33	0.35	0.36	0.37
		Single Wraps	No SWR	0.18	0.21	0.24	0.25	0.31	0.32	0.34	0.35
			SWR	0.22	0.24	0.27	0.29	0.33	0.35	0.36	0.37
		Double Wraps	No SWR	0.18	0.21	0.24	0.25	0.31	0.32	0.34	0.35
			SWR	0.22	0.24	0.27	0.29	0.33	0.35	0.36	0.37
	B. (8d @ 6"/12")	Toe Nails	No SWR	0.04	0.14	0.23	0.28	0.24	0.28	0.31	0.34
			SWR	0.07	0.16	0.25	0.31	0.26	0.29	0.33	0.36
		Clips	No SWR	0.29	0.31	0.32	0.33	0.34	0.35	0.36	0.37
			SWR	0.32	0.34	0.35	0.36	0.36	0.37	0.38	0.38
		Single Wraps	No SWR	0.30	0.32	0.33	0.34	0.34	0.35	0.36	0.37
			SWR	0.34	0.35	0.36	0.37	0.36	0.37	0.38	0.38
		Double Wraps	No SWR	0.30	0.32	0.33	0.34	0.34	0.35	0.36	0.37
			SWR	0.34	0.35	0.37	0.37	0.36	0.37	0.38	0.38
	C. (8d @ 6"/6")	Toe Nails	No SWR	0.05	0.14	0.23	0.28	0.24	0.28	0.31	0.34
			SWR	0.07	0.16	0.26	0.31	0.26	0.29	0.33	0.36
		Clips	No SWR	0.29	0.31	0.33	0.34	0.34	0.35	0.36	0.37
			SWR	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.38
		Single Wraps	No SWR	0.31	0.32	0.34	0.34	0.34	0.35	0.36	0.37
			SWR	0.35	0.36	0.37	0.37	0.37	0.38	0.38	0.38
		Double Wraps	No SWR	0.31	0.33	0.34	0.34	0.34	0.35	0.36	0.37
			SWR	0.35	0.36	0.37	0.37	0.37	0.38	0.38	0.39
FBC Equivalent	A. (6d @ 6"/12")	Toe Nails	No SWR	0.05	0.14	0.23	0.28	0.27	0.31	0.35	0.38
			SWR	0.07	0.16	0.24	0.29	0.28	0.32	0.35	0.38
		Clips	No SWR	0.24	0.27	0.30	0.31	0.36	0.37	0.39	0.40
			SWR	0.25	0.28	0.31	0.32	0.36	0.38	0.39	0.40
		Single Wraps	No SWR	0.24	0.27	0.30	0.32	0.36	0.37	0.39	0.40
			SWR	0.25	0.28	0.31	0.32	0.36	0.38	0.39	0.40
		Double Wraps	No SWR	0.24	0.27	0.30	0.32	0.36	0.37	0.39	0.40
			SWR	0.25	0.28	0.31	0.32	0.36	0.38	0.39	0.40
	B. (8d @ 6"/12")	Toe Nails	No SWR	0.09	0.18	0.28	0.33	0.28	0.32	0.35	0.38
			SWR	0.10	0.19	0.28	0.34	0.29	0.32	0.36	0.38
		Clips	No SWR	0.35	0.36	0.38	0.39	0.39	0.40	0.41	0.41
			SWR	0.35	0.37	0.38	0.39	0.39	0.40	0.41	0.41
		Single Wraps	No SWR	0.36	0.38	0.39	0.39	0.39	0.40	0.41	0.41
			SWR	0.37	0.38	0.40	0.40	0.39	0.40	0.41	0.41
		Double Wraps	No SWR	0.36	0.38	0.39	0.39	0.39	0.40	0.41	0.41
			SWR	0.37	0.39	0.40	0.40	0.39	0.40	0.41	0.41
	C. (8d @ 6"/6")	Toe Nails	No SWR	0.09	0.18	0.28	0.33	0.28	0.32	0.35	0.38
			SWR	0.10	0.19	0.28	0.34	0.29	0.32	0.36	0.38
		Clips	No SWR	0.35	0.36	0.38	0.39	0.39	0.40	0.41	0.41
			SWR	0.36	0.37	0.38	0.39	0.39	0.40	0.41	0.41
		Single Wraps	No SWR	0.37	0.38	0.39	0.40	0.39	0.40	0.41	0.41
			SWR	0.38	0.39	0.40	0.40	0.40	0.41	0.41	0.41
		Double Wraps	No SWR	0.37	0.38	0.39	0.40	0.39	0.40	0.41	0.41
			SWR	0.38	0.39	0.40	0.40	0.40	0.41	0.41	0.41
Reinforced Concrete Roof Deck				0.41	0.42	0.42	0.42	0.41	0.42	0.42	0.42

YEAR BUILT AFTER JANUARY 1, 2002

				Other Roof Shape				Hip Roof Shape			
	FBC WIND SPEED	FBC WIND DESIGN	Secondary Water Resistance	None	Class C	Class B	Class A	None	Class C	Class B	Class A
Other Roof Deck or Dimensional Lumber Deck	100	≥100	No SWR	0.34	0.37	0.37	0.37	0.39	0.41	0.41	0.41
			SWR	0.34	0.37	0.37	0.37	0.39	0.41	0.41	0.41
	110	≥110	No SWR	0.36	0.39	0.39	0.39	0.39	0.41	0.41	0.41
			SWR	0.36	0.39	0.39	0.39	0.39	0.41	0.41	0.41
	≥120	≥120	No SWR	0.37	0.39	0.39	0.39	0.39	0.41	0.41	0.41
			SWR	0.38	0.40	0.40	0.40	0.39	0.41	0.41	0.41
	≥120 and WBDR	≥120	No SWR	0.38	0.41	0.41	0.41	0.41	0.43	0.43	0.43
			SWR	0.40	0.42	0.42	0.42	0.41	0.43	0.43	0.43
Reinforced Concrete Roof Deck				0.41	0.42	0.42	0.42	0.41	0.42	0.42	0.42

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Table A-1. Summary Statistics of Potential Dollar Discounts

Panel A: Potential discount ratio	Mean	StDev	P10	P25	Median	P75	P90
FBC Cover	0.10	0.02	0.05	0.09	0.11	0.11	0.11
Clips	0.28	0.13	0.06	0.17	0.35	0.35	0.38
Single Wrap	0.29	0.13	0.08	0.18	0.35	0.35	0.38
Double Wrap	0.29	0.13	0.08	0.18	0.35	0.35	0.38
Deck Level B	0.09	0.04	0.04	0.09	0.09	0.09	0.14
Deck Level C	0.09	0.04	0.05	0.09	0.09	0.09	0.16
Secondary Water Resistance	0.04	0.02	0.01	0.03	0.05	0.06	0.06
Opening Protection Class C	0.09	0.01	0.09	0.09	0.09	0.09	0.09
Opening Protection Class B	0.23	0.13	0.05	0.10	0.35	0.35	0.35
Opening Protection Class A	0.30	0.16	0.07	0.15	0.44	0.44	0.44
Hip Roof	0.29	0.18	0.05	0.10	0.37	0.47	0.47
Panel B: Potential dollar discount ($000)	Mean	StDev	P10	P25	Median	P75	P90
FBC Cover	0.16	0.14	0.03	0.06	0.12	0.21	0.33
Clips	0.43	0.44	0.08	0.15	0.30	0.56	0.94
Single Wrap	0.45	0.46	0.09	0.16	0.31	0.57	0.96
Double Wrap	0.45	0.46	0.09	0.16	0.31	0.57	0.96
Deck Level B	0.13	0.15	0.03	0.04	0.09	0.17	0.29
Deck Level C	0.14	0.16	0.03	0.05	0.09	0.17	0.30
Secondary Water Resistance	0.07	0.07	0.02	0.03	0.05	0.10	0.16
Opening Protection Class C	0.10	0.07	0.04	0.06	0.08	0.12	0.17
Opening Protection Class B	0.36	0.37	0.07	0.12	0.23	0.47	0.80
Opening Protection Class A	0.46	0.47	0.08	0.15	0.30	0.61	1.02
Hip Roof	0.45	0.46	0.07	0.14	0.30	0.61	1.02

Table A-2. Present Value of Premium Discounts by Adaptation Measure

Adaptation measure	Effective life (yr)	PV of mean discount ($)	PV of P90 discount ($)
FBC-equivalent roof cover	20	1,835	3,785
Roof-to-wall attachment (wrap)	30	6,194	13,214
Roof deck attachment (Level C)	30	1,927	4,129
Secondary water resistance	20	803	1,835
Opening protection (Class A)	25	5,880	13,039

Notes. The table reports the present value of the stream of annual premium discounts earned from each retrofit. Annual discounts are the mean and 90th-percentile potential dollar discounts from Table A-1, Panel B, discounted over each measure's effective life at an annual rate of 6% (Giglio et al., 2021) using $PV = \text{discount} \times \left[1 - (1+r)^{-T}\right]/r$. Effective lives reflect that structural connectors (roof-to-wall and roof-deck attachments) last the life of the structure, opening protection roughly 25 years, and roof cover together with its secondary water-resistant underlayment the 15–20 year life of an asphalt-shingle roof in Florida. The discount measure used for each row follows the paper's adaptation definitions (wraps for roof-to-wall attachment, Level C for roof-deck attachment, Class A for opening protection). These present values capture only the insurance-discount benefit (δP in the conceptual framework) and omit the other benefits (Ω)—avoided uninsured losses, resale value, and safety—so they are lower bounds on the total private benefit of adaptation.

Table A-3. Adaptation Over Time

	Observations	Mean	StDev	P10	P25	Median	P75	P90
2002-2007								
Wall Attach	2,641,864	0.04	0.20	0.00	0.00	0.00	0.00	0.00
Wall Attach (Alt)	2,641,864	0.05	0.21	0.00	0.00	0.00	0.00	0.00
Cover Type	2,699,476	0.04	0.21	0.00	0.00	0.00	0.00	0.00
Deck Attach	2,816,079	0.03	0.18	0.00	0.00	0.00	0.00	0.00
Water Resist	2,844,911	0.01	0.08	0.00	0.00	0.00	0.00	0.00
Prot Type (Alt)	3,629,615	0.03	0.16	0.00	0.00	0.00	0.00	0.00
2008-2012								
Wall Attach	4,441,620	0.26	0.44	0.00	0.00	0.00	1.00	1.00
Wall Attach (Alt)	4,441,620	0.43	0.50	0.00	0.00	0.00	1.00	1.00
Cover Type	4,760,253	0.39	0.49	0.00	0.00	0.00	1.00	1.00
Deck Attach	5,118,786	0.33	0.47	0.00	0.00	0.00	1.00	1.00
Water Resist	5,177,084	0.07	0.26	0.00	0.00	0.00	0.00	0.00
Prot Type (Alt)	6,298,007	0.12	0.33	0.00	0.00	0.00	0.00	1.00
2013-2017								
Wall Attach	2,193,467	0.31	0.46	0.00	0.00	0.00	1.00	1.00
Wall Attach (Alt)	2,193,467	0.59	0.49	0.00	0.00	1.00	1.00	1.00
Cover Type	2,412,630	0.54	0.50	0.00	0.00	1.00	1.00	1.00
Deck Attach	2,607,300	0.56	0.50	0.00	0.00	1.00	1.00	1.00
Water Resist	2,601,588	0.12	0.32	0.00	0.00	0.00	0.00	1.00
Prot Type (Alt)	3,736,381	0.14	0.35	0.00	0.00	0.00	0.00	1.00
2017-2023								
Wall Attach	2,792,323	0.42	0.49	0.00	0.00	0.00	1.00	1.00
Wall Attach (Alt)	2,792,323	0.73	0.45	0.00	0.00	1.00	1.00	1.00
Cover Type	3,004,571	0.79	0.41	0.00	1.00	1.00	1.00	1.00
Deck Attach	3,135,146	0.82	0.38	0.00	1.00	1.00	1.00	1.00
Water Resist	2,363,227	0.23	0.42	0.00	0.00	0.00	0.00	1.00
Prot Type (Alt)	4,486,788	0.24	0.43	0.00	0.00	0.00	0.00	1.00
Total								
Wall Attach	12,069,274	0.26	0.44	0.00	0.00	0.00	1.00	1.00
Wall Attach (Alt)	12,069,274	0.45	0.50	0.00	0.00	0.00	1.00	1.00
Cover Type	12,876,930	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Deck Attach	13,677,311	0.43	0.49	0.00	0.00	0.00	1.00	1.00
Water Resist	12,986,810	0.09	0.29	0.00	0.00	0.00	0.00	0.00
Prot Type (Alt)	18,150,791	0.14	0.34	0.00	0.00	0.00	0.00	1.00

Table A-4. OLS Alternative: ZIP × Year Fixed Effects

This table reports OLS estimates of the association between changes in premium and climate adaptation outcomes. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. This alternative specification replaces the paper's ZIP code × quarter fixed effects with ZIP code × year fixed effects; roof age and house age fixed effects are unchanged. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	0.005***	0.009***	0.003*	-0.004***	-0.000	0.004***
	(7.567)	(7.955)	(1.905)	(-2.798)	(-0.693)	(5.749)
Zipcode × Year FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,206,595	1,441,964	1,295,720	1,383,428	2,674,977	3,172,223
Dep. Var. Mean	0.0119	0.0248	0.0499	0.0513	0.0069	0.0128
Indep. Var. Mean	0.0393	0.0481	0.0495	0.0432	0.0431	0.0440
Indep. Var. SD	0.1971	0.2110	0.2040	0.1930	0.1979	0.2383

Table A-5. First Stage Alternative: ZIP × Year Fixed Effects

This table reports first stage estimates. The dependent variable is the change in premium-to-coverage ratio. The instrument is the leave-one-out average change in premium-to-coverage ratio among other policies in the same ZIP code and renewal month. This alternative specification replaces the paper's ZIP code × quarter fixed effects with ZIP code × year fixed effects; roof age and house age fixed effects are unchanged. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Leave-One-Out Avg Δ Premium Rate	0.223***	0.259***	0.274***	0.249***	0.217***	0.414***
	(14.230)	(12.805)	(14.040)	(13.730)	(14.862)	(23.930)
Zipcode × Year FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,205,415	1,441,208	1,294,958	1,382,606	2,673,725	3,168,681
Dep. Var. Mean	0.0394	0.0481	0.0495	0.0432	0.0431	0.0441
Instrument Mean	0.0405	0.0382	0.0402	0.0363	0.0472	0.0425
Instrument SD	0.1162	0.1232	0.1250	0.1244	0.1155	0.1209
Kleibergen-Paap F	202.50	163.98	197.12	188.53	220.87	572.63

Table A-6. Second Stage IV Alternative: ZIP × Year Fixed Effects

This table reports second stage IV estimates of the effect of changes in premium on climate adaptation outcomes. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. The instrument is the leave-one-out average change in premium-to-coverage ratio among other policies in the same ZIP code and renewal month. This alternative specification replaces the paper's ZIP code × quarter fixed effects with ZIP code × year fixed effects; roof age and house age fixed effects are unchanged. Standard errors are clustered at the zipcode level; t-statistics are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	0.015***	0.025***	0.034***	0.063***	0.005	0.006***
	(2.651)	(2.881)	(3.127)	(4.851)	(1.617)	(3.219)
Zipcode × Year FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,205,415	1,441,208	1,294,958	1,382,606	2,673,725	3,168,681
Dep. Var. Mean	0.0119	0.0249	0.0499	0.0514	0.0069	0.0128
Indep. Var. Mean	0.0394	0.0481	0.0495	0.0432	0.0431	0.0441
Indep. Var. SD	0.1971	0.2110	0.2040	0.1930	0.1979	0.2383

Table A-7. Alternative – Triple Heterogeneity IV With ZIP × Year FE

This table reports second-stage IV estimates of the effect of changes in premium rates on climate adaptation outcomes, allowing for heterogeneous responses. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. We interact the change in premium-to-coverage ratio with three variables: Zillow's home price index at the ZIP-by-year level (Wealth), square footage of the house (Cost), and lagged log premiums (Lag Prem). All three moderators are standardized to mean 0 and standard deviation 1. We instrument the change in premium-to-coverage ratio and its three interactions using the leave-one-out zipcode-by-renewal-month mean change in premium-to-coverage ratio and its corresponding interactions. Each regression replaces the paper's ZIP × quarter fixed effects with ZIP × year fixed effects, and also includes roof age and house age fixed effects. Level controls are the lagged log coverage limit and the standardized home price index, square footage, and lagged log premium. Sample excludes observations where the adaptation indicator already equals 1 or is missing. Standard errors are clustered at the county level; t-statistics in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	0.017***	0.030***	0.061***	0.093***	0.012**	0.014***
	(2.590)	(2.919)	(3.974)	(3.183)	(2.407)	(5.432)
Δ Premium Rate ×	0.004	0.029***	0.040***	0.032	0.009**	0.008**
Home Price Index (Wealth)	(1.621)	(3.555)	(3.698)	(1.584)	(2.496)	(2.229)
Δ Premium Rate ×	-0.025	-0.241***	-0.075	-0.061	-0.008	-0.057*
Sqft (Cost)	(-1.009)	(-3.671)	(-1.387)	(-1.146)	(-0.776)	(-1.913)
Δ Premium Rate ×	0.004	0.002	-0.017*	-0.019	-0.010*	0.015***
Lagged Log Premium (Lag Prem)	(0.985)	(0.235)	(-1.836)	(-1.560)	(-1.788)	(7.123)
Zipcode × Year FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,162,468	1,417,867	1,270,243	1,350,472	2,612,405	3,105,424
Dep. Var. Mean	0.0119	0.0247	0.0499	0.0512	0.0069	0.0127

Table A-8. Robustness – Second Stage IV with Four Heterogeneity Interactions

This table reports second-stage IV estimates of the effect of changes in premium rates on climate adaptation outcomes, allowing for heterogeneous responses along four dimensions. The dependent variable in each column is an indicator for whether the household adopts the specified climate-resilient feature. We interact the change in premium-to-coverage ratio with four variables: Zillow's home price index at the ZIP-by-year level (Wealth), square footage of the house (Cost), lagged log premiums (Lag Prem), and distance to coast (Exposure). All four moderators are standardized to mean 0 and standard deviation 1. We instrument the change in premium-to-coverage ratio and its four interactions using the leave-one-out zipcode-by-renewal-month mean change in premium-to-coverage ratio and its corresponding interactions. All regressions include ZIP code × quarter, roof age, and house age fixed effects. Level controls are the lagged log coverage limit and the standardized home price index, square footage, lagged log premium, and distance to coast. Sample excludes observations where the adaptation indicator already equals 1 or is missing. Standard errors are clustered at the county level; t-statistics in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Wall Attach	(2) Wall Attach (Alt)	(3) Cover Type	(4) Deck Attach	(5) Water Resist	(6) Prot Type (Alt)
Δ Premium Rate	-0.005	-0.024	-0.033	0.042	0.004	0.009*
	(-0.227)	(-0.522)	(-0.580)	(0.869)	(0.489)	(1.908)
Δ Premium Rate ×	0.021**	0.096***	0.128***	0.093	0.027***	0.013*
Home Price Index (Wealth)	(2.327)	(6.021)	(5.452)	(1.616)	(2.763)	(1.664)
Δ Premium Rate ×	-0.043	-0.274***	-0.129*	-0.108**	-0.019**	-0.064**
Sqft (Cost)	(-1.551)	(-3.465)	(-1.725)	(-2.036)	(-1.966)	(-2.193)
Δ Premium Rate ×	0.012*	0.022	0.015	0.002	-0.005	0.015***
Lagged Log Premium (Lag Prem)	(1.793)	(1.227)	(0.629)	(0.184)	(-1.026)	(6.677)
Δ Premium Rate ×	0.029	0.068	0.106	0.166**	0.023	0.005
Distance to Coast (Exposure)	(0.779)	(0.689)	(0.935)	(2.079)	(1.501)	(1.451)
Zipcode × Quarter FE	Y	Y	Y	Y	Y	Y
Roof Age FE	Y	Y	Y	Y	Y	Y
House Age FE	Y	Y	Y	Y	Y	Y
N	2,155,951	1,410,576	1,263,149	1,343,684	2,605,931	3,100,470
Dep. Var. Mean	0.0119	0.0247	0.0500	0.0513	0.0069	0.0127

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