# The Effect of Rising Insurance Premiums on Mortgage Delinquency and Household Relocation *

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**Abstract**

Homeowners' insurance premiums in the U.S. have risen dramatically. Using household-level microdata and employing a novel instrumental variable, we document three main findings. First, consistent with mitigating the impact of higher premiums, households experiencing larger premium hikes are more likely to relocate and tend to move to areas with lower insurance costs. Homes experiencing larger premium hikes are also more likely to be acquired by corporate buyers, who obtain lower premium rates. Second, for households unable to mitigate effectively, higher premiums increase mortgage delinquencies. Third, the relocation effect is stronger among less financially constrained households, who can better afford the upfront costs of moving, while the delinquency effect is concentrated among more constrained households. Our findings reveal how rising insurance costs—increasingly driven by climate change—can threaten household financial resilience, while highlighting an adaptation mechanism through relocation.

**JEL Classification:** G21, G22, G5, G52, G53, R21, Q54, D14, R3

**Keywords:** climate risk, insurance, mortgage, delinquency, relocation

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# 1 Introduction

Rising insurance premiums have become a major financial concern for U.S. households in recent years, with average annual premiums exceeding $5,000 in some states. As premiums continue to rise, they can push households toward costly adaptation strategies or trigger negative financial outcomes. Understanding these effects is important for assessing the broader impacts of climate change, which has been widely attributed as a main driver of recent drastic premium increases and is projected to drive further increases.

As premiums rise, homeowners can mitigate the financial pressure through various strategies that may be costly. They may shop more aggressively across insurers. They may also relocate to areas or properties with lower insurance costs. According to a Redfin survey, 10% of homeowners planning to move cite lowering insurance costs as a reason.[1] For marginal households, the present value of insurance savings can shift the cost-benefit calculation of whether to move or stay, while some buyers may have advantages in holding their vacated homes. Understanding this relocation response sheds light on a key adaptation mechanism to climate change.

For households unable to mitigate through these strategies, premium increases can strain financial resilience. The impact on mortgages warrants particular attention given their dominance on household balance sheets, accounting for 73% of total household debt.[2] Since mortgage payments typically take priority in household budgets, mortgage performance provides important insights into household financial health. Rising insurance premiums reduce the available liquidity for mortgage payments, potentially increasing delinquency rates and creating ripple effects across the financial sector, given the systemic importance of mortgages.

We study how homeowners' insurance costs trigger household adaptation, including through relocation, and how they affect household financial outcomes. Despite important

[1] See `https://www.redfin.com/news/moving-reasons-safety-survey-2024/`.

[2] See `https://www.newyorkfed.org/microeconomics/hhdc`. The number is as of 12/2/2025.

implications for understanding the effects of climate change, these questions have been largely unexplored. We study these questions using a newly available dataset that links detailed insurance policy information with household-level mortgage and credit report outcomes in the U.S. between 2015 and 2023.

To identify the causal effect of premium increases, we construct a novel instrumental variable for insurance premium increases. We argue that our instrument is exogenous to other forces that can independently affect household outcomes, including climate risk. Although we use variation unrelated to climate risk, our analyses are the first step towards understanding the effect of climate risk through the insurance market. To the extent that households cannot distinguish idiosyncratic shocks to insurance premiums from those driven by climate risk, the effect of premium increases attributable to climate risk may be similar.

We document three main findings. First, consistent with efforts to mitigate the impact of higher premiums, households facing larger premium increases are more likely to relocate and to move to areas with lower insurance costs. Homes experiencing larger premium hikes are also more likely to be acquired by corporate buyers, who obtain lower premium rates. Second, higher premiums lead to increased mortgage delinquencies for households unable to mitigate their impact. Our estimates indicate that the average premium increases in 2022 caused more than 26,000 mortgages to be 60 days past due. Third, the relocation effect is stronger among financially less constrained households, who can better afford the upfront costs of moving, while the delinquency effect is concentrated among more constrained households.

To establish causality, we employ an instrumental variable approach. To construct our instrument, we compute, for each household-policy-year, the average premium rate increase among policies renewing in the same month with the same insurer in distant ZIP codes within the same state. We define distant ZIP codes as those whose distance from the focal ZIP code exceeds the median pairwise ZIP code distance in the state. To

mitigate concerns about endogenous renewal timing and insurer-switching, we use each policy's expiration month and insurer from the previous year rather than the actual renewal month and the new insurer.

The relevance of our instruments stems from two mechanisms. First, premium increases follow location-level trends driven by insurers' risk assessments of that location (Keys and Mulder, 2024) and state regulator approvals of insurers' rate change requests (Oh, Sen and Tenekedjieva, 2022). Therefore, a property's premium change should correlate strongly with the same insurer's premium changes implemented elsewhere in the state in the same month, making our instrument relevant.

Our instrument is also plausibly exogenous. Since our regressions include ZIP-by-renewal month fixed effects, we effectively compare borrowers within the same ZIP code who renew their insurance policies in the same month. The within-ZIP-by-renewal month variation in average premium changes stems from different insurers, their rate-setting models, and the timing of their rate changes, which are subject to state regulatory approvals. Since we use the insurance policy expiration month and the insurer determined in the previous policy year,[3] the instrument is unlikely to be subject to households' manipulation. Given these arguments, our instrument likely satisfies the exclusion restriction: it is unlikely to affect individual borrowers' mortgage performance or relocation outcomes through channels other than insurance costs.

Moreover, we control for each borrower's credit risk score from the month preceding their insurance policy renewal to further mitigate endogeneity concerns. We also control for house-level climate risk and climate risk bin-by-renewal month fixed effects to remove both fixed and time-varying effects of climate risk.

Given its implications for financial stability, we first present the delinquency analysis. We demonstrate that rising insurance premiums are associated with higher probabilities

[3]Since households usually receive renewal notices with premium information before the actual renewal time, they could switch insurers before renewal. Indeed, we find that households increase their probability of switching insurers in response to our instrument, both measured at the same policy renewal year. See Table A3.

of mortgage delinquency within 12 months after premium changes at policy renewals. With ZIP-by-renewal month fixed effects, we compare households within the same ZIP code who renewed insurance policies in the same month, which controls for local economic factors correlated with mortgage delinquencies. When annual premiums increase by $1,000, the probability of 60-day delinquency rises by 0.34 percentage points, representing a 20% increase relative to the mean probability (1.7%). Our delinquency sensitivity is similar to that in Wong (2024), who studies the effect of property tax changes on mortgage delinquencies. We also compare our magnitude with the magnitudes found in other studies and discuss potential explanations for the difference.

In addition, we find that the delinquency effects are stronger for borrowers with lower credit scores. Similarly, we find that larger premium increases also lead to higher rates of mortgage modifications and foreclosures, imposing severe consequences on affected households. Additionally, higher premiums increase credit card utilization. These results demonstrate that rising insurance premiums have broad negative effects across multiple dimensions of household finances, suggesting that the mortgage delinquency effects reflect genuine financial stress rather than a mechanical relationship between insurance and mortgage payments.

In the second part of the paper, we examine various strategies that households use to mitigate the effects of rising premiums. We find that households experiencing larger premium increases are more likely to switch insurers, which reduces their premiums. The switching response varies sharply by financial constraints: households with higher credit scores are more likely to adopt these strategies in response to premium increases.

Importantly, we find that households are more likely to relocate in response to rising insurance premiums. Consistent with trying to mitigate the effects of premium increases, larger premium increases drive households to relocate to areas with substantially lower premium rates and reduce their post-relocation insurance costs. Our evidence is consistent with the idea that the majority of the cost savings likely come from relocating to safer

areas.

A $1,000 increase in premium rates corresponds to a 0.54 percentage point increase in relocation probability (16% of the mean). This magnitude is comparable to the mortgage lock-in effect on household relocation documented by Fonseca and Liu (2024). The same pre-move premium increases result in a further $327 increase for non-movers and a $1,037 savings in annual premiums for movers relative to non-movers. Assuming a discount rate of 6% (Giglio, Maggiori, Rao, Stroebel and Weber, 2021), the present value of the movers' premium savings amounts to around $14,274 over 30 years. Households likely perceive insurance premium savings from relocation as enhancing the overall benefits of moving, effectively shifting their decision-making in favor of relocation.

The effect of insurance costs on relocation is comparable to the mortgage lock-in effect documented by Fonseca and Liu (2024). We also find stronger relocation responses to premium increases among households with higher origination mortgage rates relative to contemporaneous market averages. Notably, mortgage rates have risen in recent years alongside drastic increases in insurance premiums, potentially limiting the relocation response to premium increases due to the mortgage "lock-in" effect. We expect the relocation effect to strengthen as mortgage rates fall, making it financially more favorable to purchase a new home with a mortgage.

Our third finding reveals that as movers vacate their previous homes, those houses that experienced larger premium increases are more likely to be purchased by a corporate buyer subsequently. We find that corporate buyers pay lower insurance premium rates. This pattern likely reflects the competitive advantages that institutional investors possess. They may have greater market power or lower search costs in negotiating or shopping for lower insurance premiums. We also find that corporate buyers are much more likely to use cash when purchasing a property, thereby freeing them from the traditional insurance requirements imposed by mortgage lenders.

Fourth, premium increases also trigger mortgage prepayment among non-relocating

households. This can be explained by at least two mechanisms. On one hand, households may prepay mortgages to escape lender-imposed insurance requirements, allowing them to reduce coverage. However, this increases their exposure to disaster risk. Because our insurance policy data cover only households with mortgages, we present indirect evidence using the American Community Survey. We find that counties experiencing larger insurance premium increases show greater declines in insurance take-up. On the other hand, rising premiums can prompt behavioral "optimization" responses, in which households reassess their finances and eliminate mortgage interest payments, consistent with evidence that households focus on reducing explicit expenses rather than maximizing returns.

Our mortgage delinquency results carry significant implications for household financial resilience and broader financial stability. While consistent with the literature on cash-flow shocks triggering mortgage defaults,[4] our findings reveal a distinct channel through which climate change can affect households and the financial system. As disasters become more severe and frequent, they push insurance rates higher, placing financial strain on even those who do not directly experience them. This mechanism poses an emerging threat to both the financial sector and the federal government, as we find delinquency effects in GSE and non-GSE mortgages alike. The magnitude is substantial—projected premium increases would lead to an additional 173,000 mortgages per year becoming delinquent by 2055.[5] These results also speak directly to the heated policy debate over insurance affordability as policymakers consider interventions such as means-tested insurance subsidies.[6]

Our relocation findings have important implications for the long term. We find that financially better-off households are more likely to relocate in response to premium in-

[4]See, for example, Gupta (2019); Ganong and Noel (2023); Indarte (2023).

[5]This calculation uses the insurance premium projection by First Street Foundation, which estimates that premiums will rise by 29.4% by 2055 on average in the U.S. See `https://www.realtor.com/news/trends/biggest-home-insurance-premium-hikes/`.

[6]For related policy proposals, see, `https://www.cbo.gov/publication/59918`.

creases, while constrained households remain in place despite higher costs. If premiums continue to rise in high-risk areas over the coming decades, this pattern may drive substantial demographic shifts, with wealthier households migrating away and lower-income households becoming increasingly concentrated in areas with elevated climate risk. Over time, this sorting mechanism could exacerbate existing inequalities, as financially constrained households face both higher disaster exposure and a reduced capacity to absorb climate-related shocks.

The increased presence of corporate buyers in properties experiencing large premium increases also has significant long-term implications for housing markets in risky areas. Corporate buyers obtain substantially lower premiums and purchase less coverage than individual homeowners, giving them a competitive advantage in high-risk markets. As climate risks intensify and premiums continue to rise over the long term, this advantage may accelerate a structural shift away from individual homeownership toward corporate ownership in vulnerable areas. Given extensive evidence that homeownership facilitates wealth accumulation and generates positive community externalities, such a transition could have profound implications for household wealth inequality and community stability in climate-exposed regions over the coming decades.

To the best of our knowledge, we are among the first to identify the effect of property insurance premiums on households' financial distress and relocation decisions. Our work contributes to several related bodies of literature. First, we extend research on insurance and mortgage markets. Sastry, Sen, Tenekedjieva and Scharlemann (2024) find that financially less constrained households borrow more through purchase mortgages in response to increases in homeowners' insurance premiums. Sastry (2022) shows that lenders require higher down payments from borrowers who under-insure, potentially due to post-disaster default concerns. Sastry, Sen and Tenekedjieva (2023) find higher mortgage defaults in areas with greater insurer insolvency following disasters. We demonstrate that premium increases alone—independent of actual disasters—can also elevate default risk.

This mechanism may explain Ge, Lam and Lewis (2024)'s finding that buyers of homes facing exogenous flood insurance premium increases are less likely to obtain mortgages, as lenders may anticipate higher default risks from elevated insurance costs. By highlighting the important effect of insurance premiums, we also contribute to a growing literature on insurance pricing and market dynamics.[7] Beyond insurance pricing, Kalda, Sharma, Soni and Wenning (2025) and Jotikasthira, Kartasheva, Lundblad and Ramadorai (2025) uncover that insurers deny and delay claim payments as another response to losses.

In addition, our study contributes to the growing body of literature examining the intersection of climate change, natural disasters, and mortgage markets. Prior papers explore the impact of disasters on mortgage delinquencies (Gallagher and Hartley, 2017; Kousky, Palim and Pan, 2020; Billings, Gallagher and Ricketts, 2022; Issler, Stanton, Vergara-Alert and Wallace, 2024; Biswas, Hossain and Zink, 2023), the pricing of mortgage-related securities (Gete, Tsouderou and Wachter, 2024; Dice, Hossain and Rodziewicz, 2024), and securitization (Ouazad and Kahn, 2022). We highlight a different channel—insurance costs—through which disaster and climate risks can affect mortgage outcomes. In so doing, we also complement recent work on climate/environmental risk in housing markets (Bernstein, Gustafson and Lewis, 2019; Baldauf, Garlappi and Yannelis, 2020; Murfin and Spiegel, 2020; Keys and Mulder, 2020; Giglio et al., 2021; Lopez and Tzur-Ilan, 2023; Ge et al., 2024; An, Gabriel and Tzur-Ilan, 2024; Van Binsbergen, Cocco, Grotteria and Naaraayanan, 2025).

Our paper also contributes to the literature on how physical climate risk affects financial markets. Acharya, Berner, Engle, Jung, Stroebel, Zeng and Zhao (2023) summarize in

[7] Cookson, Gallagher and Mulder (2024) uncover coverage neglect in the homeowners insurance market. Liao and Mulder (2021) study the effect of home equity on flood insurance demand. A few papers study the effect of insurance premiums on the housing market, including Ge et al. (2024), Georgic and Klaiber (2022), Gibson and Mullins (2020), and Bakkensen and Barrage (2021). Papers on home insurance pricing include Keys and Mulder (2024), Boomhower, Fowlie, Gellman and Plantinga (2024), Oh et al. (2022), Sastry et al. (2023), and Blonz, Hossain and Weill (2024). Papers on the National Flood Insurance Program pricing include Wagner (2022a), Weill (2022), Mulder and Kousky (2023), and Mulder (2021). Marcoux and Wagner (2023) and Wagner (2022b) study insurance market design. Jung, Engle, Ge and Zeng (2023) measure insurers' exposure to climate risk. See Sastry and Sen (2025) for a review.

their review of the literature that physical risks, such as rising sea levels, extreme weather events, and heat stress, can cause direct damage to assets and disrupt business operations, potentially leading to loan defaults and losses for banks. We highlight a new channel, i.e., insurance premiums, through which climate change can impose substantial risks on the financial market.

# 2 Institutional background

## 2.1 Background

Homeowners' insurance is a critical component of the U.S. housing market. According to the American Community Survey, around 86% of homeowners held such policies in 2023 and 2024. This high adoption rate is likely driven by mortgage lenders requiring insurance coverage as a precondition for loans. Around 30% of homeowners reported being affected by weather events in the last five years, highlighting the importance of such coverage.[8]

The most common policy for owner-occupied residences is the "HO-3" policy, which provides comprehensive coverage for the structure, contents, and temporary living expenses if the home becomes uninhabitable due to damage. These multi-peril policies typically have one-year terms with automatic renewal, subject to potential rate or term changes communicated through annual statements. However, it's crucial to note that standard policies often exclude certain perils, such as floods and earthquakes. Specialized policies are available to cover these excluded risks.[9] In areas where private insurance is difficult to obtain, homeowners may resort to state-sponsored "insurers of last resort," such as Citizens Property Insurance in Florida or the California FAIR plan.

[8]See Homeowners Perception of Weather Risks 2023 Q2 Consumer Survey, https://www.iii.org/sites/default/files/docs/pdf/2023_q2_ho_perception_of_weather_risks.pdf.

[9]See https://content.naic.org/sites/default/files/publication-hoi-pp-consumer-homeowners.pdf.

## 2.2 Coverage

Homeowners' insurance policies typically include several key components that define the scope and extent of coverage.

First, coverage types in a standard policy usually include dwelling coverage (for the structure of the home), personal property coverage (for belongings), liability protection, and additional living expenses.[10] In terms of structure coverage, there are two dominant types: "Actual Cash Value" (ACV) and "Replacement Cost Value" (RCV). ACV reimburses policyholders for the depreciated value of damaged property, meaning it deducts for age and wear. For example, if a 10-year-old roof is damaged and needs to be replaced, ACV would pay the current market value of that roof, which approximates the cost of a new one minus the accumulated depreciation of the old roof. In contrast, RCV covers the full cost to repair or replace the damaged property without depreciation deductions. This means that a policyholder would receive enough to replace the old roof with a new one of similar quality. Overall, RCV typically provides higher payouts but comes with higher premiums compared to ACV policies.

Second, deductibles are the amount the policyholder must pay out-of-pocket before insurance coverage kicks in. In our data, many policyholders choose a deductible of 0.5% of the coverage limit. The coverage limit represents the maximum amount the insurer will pay in the event of a total loss, typically set to the estimated cost to rebuild the home. Homeowners can often customize their policies by adjusting coverage limits, adding endorsements for specific valuables, or opting for higher deductibles to lower premiums.

## 2.3 Pricing

The cost of homeowners' insurance is primarily determined by location-specific risks, with states prone to natural disasters such as hurricanes, tornadoes, and wildfires typ-

[10] See `https://content.naic.org/sites/default/files/publication-hmr-zu-homeowners-insurance.pdf`.

ically having higher premiums. For instance, Florida and Louisiana have some of the highest average annual premiums, exceeding $5,700, while states like Hawaii and Vermont have much lower average costs, around $500 to $800 per year.[11] Other factors affecting pricing include the home's age, construction materials, proximity to fire stations, and the homeowner's claims history and credit score. Insurance companies use complex actuarial models to assess risk and set premiums, leading to variations in pricing among different insurers (Boomhower et al., 2024). Homeowners' insurance rates in the United States are subject to regulatory oversight and approval processes, which vary by state (Oh et al., 2022). Insurance companies typically must submit rate change requests to state insurance departments or commissions for review and approval before implementing new premiums.

# 3 Data

## 3.1 Residential Mortgage Servicing (ICE McDash Analytics)

The Residential Mortgage Servicing Database contains information from ICE McDash data. The data mainly comprise the servicing portfolios of the largest residential mortgage servicers in the US. It covers approximately two-thirds of installment-type loans in the residential mortgage servicing market. Loan-level attributes include borrower characteristics (credit scores, owner occupancy, documentation type, and loan purpose); collateral characteristics (LTV, property type, ZIP code); and loan characteristics (product type, loan balance, and loan status). We restrict our sample to loans secured by single-family homes with non-missing ZIP code, occupancy, origination date, LTV, DTI, and credit score. We obtain this data for 2015-2023.

We rely on this data for the dependent variable of whether a mortgage is delinquent for at least 30, 60, or 90 days. This measure does not include foreclosures. We drop

[11] See https://www.bankrate.com/insurance/homeowners-insurance/home-insurance-statistics/.

loans that were transferred to a different servicer during our sample period or that were terminated for an unknown reason. Voluntary prepayment also includes refinancing.

To include a loan in our sample, we need to be able to compute the change in premium between policy renewals. As the insurance data are provided along with December loan performance data, a loan that was prepaid, for example, in June after a premium increase in March, would be dropped from the dataset because we do not have its latest insurance information before it was prepaid. Figure A2 plots the share of mortgages that are prepaid by the calendar month of the insurance policy expiration date. The share is approximately 7% for policies renewing in January, dropping down to around 1% for February renewals, and then rises monotonically to more than 6% for December renewals. It is unlikely that these patterns are due to actual prepayment ratios changing with the insurance renewal month. Thus, we interpret the pattern in Figure A2 as being due to under-reporting of prepayment that is more severe between February and August. Therefore, in our empirical analyses, we report the results using samples with different policy renewal months and choose those with Sep-Jan renewal month as our main sample for the prepayment analysis.[12] Figure A1 plots the share of mortgages that are delinquent by the calendar month of the insurance policy expiration date. Note that delinquency reporting does not have this issue.

## 3.2 ICE McDash Property Insurance Module

We obtain data on insurance at the loan level from ICE McDash between 2015 and 2023. The property insurance module contains a loan identifier allowing insurance information to be matched with ICE McDash Residential Mortgage Servicing Data. Insurance data are obtained from a subset of mortgage servicers who agreed to participate and cover around three-quarters of mortgages in the servicing data.

If insurance coverage is not maintained, the servicer is liable for any damages that

[12] In a previous draft, we do not make this sample restriction.

may result. Because of these legal responsibilities and liability risks, servicers maintain detailed data on insurance coverage and enter these data into the servicing system. When a mortgage is closed, and every year thereafter, borrowers must submit proof of homeowners' insurance.

The ICE McDash Property Insurance data include the following variables: coverage amount per loan, deductible amount, the date when the policy expires, and "Replacement Cost Value" coverage flag, which indicates the primary insurance coverage type. We restrict our sample to loans with annual insurance policies that also appeared in the ICE McDash sample in the previous calendar year. We further require that the loan is current in the month before the insurance policy expires.

### 3.3 ICE McDash Credit Risk Insights Servicing Module (CRISM)

This dataset merges anonymized mortgage servicing records with borrower credit outcomes. Equifax matches the aforementioned ICE McDash mortgage servicing records to its credit bureau data. This merger adds other credit market outcomes for borrowers, such as their credit card utilization. Equifax also uses multiple data sources to determine whether a borrower has moved their residence. The data offer Risk Scores (different from credit scores), which are generated from Equifax's proprietary credit risk model that predicts the likelihood of a borrower becoming delinquent on credit obligations.

### 3.4 CoreLogic Solutions Real Estate Data

We use CoreLogic's tax assessor and transaction data (Deeds and Tax Data). In addition, we also use CoreLogic Climate Risk Data, which contains structure-level data on measures of current and future climate risk for properties in the U.S. CoreLogic uses its proprietary climate model to generate measures of climate risk on nine perils. For each structure within a parcel or property, the data include a measure of Average Annual Loss (AAL) at various return periods. AAL is the expected annual loss to structure and con-

tents generated by simulating many possible iterations of a given year and then calculating the average loss across all iterations. Thus, AALs account for the magnitude of damage resulting from events of different severity as well as the likelihood of events of different severity occurring. CoreLogic reports AALs as a share of the coverage limit, which can be understood as the replacement cost of the structure (Wylie, Amornsiripanitch, Heilbron and Zhao, 2025).

## 3.5 Matching Loan-Level Data with CoreLogic

We merge our loan-level insurance data with CoreLogic's property-level data. This provides us with additional information about the property and its transaction history. We first identify a potential set of candidate properties by requiring an exact match on the 5-digit ZIP code, as well as a mortgage with the same month of origination and a loan amount rounded to the nearest thousand dollars.

We then compute a measure of match quality based on the following criteria: the dollar loan amounts match exactly; origination dates match exactly; loans have the same purpose (i.e., purchase, refinance); the loan type matches (FHA, VA or conventional). We rank potential matches based on the number of these criteria that are satisfied. As a tiebreaker, we use a distance measure based on loan amount and origination date. For each loan, we use the property with the highest quality match. 85% of loans have a property match. 56% have an exact match on all the criteria. 80% of matches have at most one of the additional criteria not met.

We use the matched data to measure the climate risk exposure (proxied by AAL) at the household level. When property-level AAL is not available due to failed matching or missing information, we use the ZIP-level average AAL. We sort households into three bins based on the AAL measure of their location prior to each insurance renewal. We then use climate risk bin-by-year fixed effects in our regression analyses.

# 4 Climate Risk Associated with Larger Premium Increases

In Figure 1, we examine how premiums have evolved in recent years. We estimate the following regression at the ZIP-by-year level.

$$\Delta(Premium\ Rate)_{z,2015\ to\ t} = \gamma_z + \delta_{c,t} + \sum_{t=2016}^{2023} \beta_t ClimateRisk_z + \alpha_t Controls_z + \epsilon_{z,t},$$

where $z$ denotes ZIP code, $c$ denotes the county, and $t$ the year. The dependent variable is the cumulative change relative to 2015 in premium rate (total premiums relative to the coverage limit, in percentages), averaged at the ZIP-year level. The main independent variable is CoreLogic's average measure of climate risk (AAL) at the ZIP level.[13] We control for ZIP and county-by-year fixed effects. We use only policies with a 0.5% deductible in this analysis, so that changes in deductibles do not drive the results. Figure 1 plots the estimates of $\beta_t$. The figure suggests that insurance premiums have grown faster in areas with higher climate risk, consistent with Keys and Mulder (2024).

# 5 Instrumental Variables for Premium Increase

Before proceeding to the household-level analysis of the effect of premium increases, we describe our instrumental variable approach. One may be concerned that any observed OLS relationship between higher insurance premiums and household outcomes could be due to omitted variables. For instance, households experiencing financial distress may be more likely to have homes in disrepair and exhibit lower credit scores. These factors could potentially lead insurers to charge such households higher insurance premiums. At the same time, households' financial distress may also independently contribute to mortgage delinquency. We mitigate such endogeneity concerns in our OLS regressions by controlling for credit scores in the month preceding insurance policy renewal, as well as fixed effects, including ZIP-by-renewal month and origination LTV and DTI bin fixed effects.

[13] We take the average of the climate risk measure across the primary structures in a ZIP code.

To further address the identification challenge, we instrument for premium changes.

To construct our instrument, for each borrower, we first calculate the average premium rate increase at renewal across policies that renew in the same month by the same insurer in distant ZIP codes within the same state. We define distant ZIP codes as those whose distance from the focal ZIP code exceeds the median pairwise ZIP code distance in the state. Rather than using the actual renewal month and insurer, we use each policy's expiration month and insurer from the previous year to reduce concerns about endogenous renewal timing and insurer-switching. These averages at the insurer-ZIP-by-renewal month level form our instrument.

Next, we residualize the instrument with respect to its 12- and 24-month lagged values, as well as month fixed effects. Table A1 presents the regression results. The coefficients on the lagged values are both positive and statistically significant. The magnitudes of the estimates are 0.56 and 0.23, respectively, indicating substantial serial correlation. By residualizing with respect to lagged values, we isolate the premium changes related to the instrument in the concurrent period.

Our instrument should satisfy the relevance restriction for the following reasons. Premium increases follow location-level trends driven by insurers' risk assessments (Keys and Mulder, 2024) and state regulatory approvals (Oh et al., 2022). Since premium changes only affect homeowners at renewal, a property's premium change should correlate with premium adjustments implemented by insurers in the same local area since the previous policy renewal.

Our instrument likely satisfies the exclusion restriction for two reasons. Our instrumental variable regressions include ZIP-by-renewal month fixed effects, effectively comparing borrowers within the same ZIP code who renew their insurance policies in the same month. The within-ZIP-by-renewal month variation in average premium changes stems from different insurers, including their timing of premium changes and regulatory approvals, rather than from factors related to individual borrowers' mortgage delin-

quency and other outcomes we examine. These arguments suggest our instrument likely satisfies the exclusion restriction. Moreover, we control for each borrower's credit risk score in the month preceding their insurance policy renewal to further mitigate endogeneity. We also control for climate risk bin-by-renewal month fixed effects to remove the time-varying effect of climate risk on households' outcomes.

# 6 Effect of Premiums on Mortgage Delinquencies

We begin our analyses by examining the effect of premiums on mortgage delinquencies. Columns (1)-(3) of Table 2 estimate the following OLS regression by regressing the mortgage outcome in the 12 months following the insurance renewal.

$$Delinquency_{i,t \text{ to } t+12} = \beta \times Premium\ Rate\ Increase_{i,t} + Controls + FE_{ZIP,t} + OtherFEs + \epsilon_i,$$

where $i$ indexes households, $t$ indexes the insurance renewal month, and $ZIP$ indexes the ZIP code. The dependent variable is an indicator of whether the household is delinquent on the mortgage for at least 30 days in Column (1), 60 days in (2), and 90 days in (3). The main independent variable, *Premium Rate Increase*, is defined as the change in the premium rate at policy renewal relative to the previous policy year, with a value of zero when the premium rate decreases.

Importantly, we control for the borrowers' credit scores in the month prior to the insurance renewal. In addition, we control for households' climate risk exposure at their residence. By controlling for ZIP-by-renewal month fixed effects, we effectively compare households within the same ZIP code who renewed their insurance policies in the same month. We also control for a battery of other fixed effects: climate risk bin-by-insurance renewal month, mortgage origination year, loan-to-value ratio bin, credit score at origination bin, and debt-to-income ratio bin. The coefficients on premium changes are consistently positive, suggesting that when premiums increase, households are more likely

to be delinquent on their mortgages.

One may be concerned that certain insurers are matched to households who are more likely to become delinquent on their mortgages. Such insurers may also increase premiums further. To mitigate such concerns about insurer-household endogenous matching, in Table A2, we repeat Column (2), adding insurer-year or insurer-state-year fixed effects. The results remain similar.

Figure 2 presents bin-scatter plots illustrating the relationship between the 60-day mortgage delinquency probability and changes in premium. The figure shows a positive relationship between delinquency probability and changes in premiums, supporting our regression results.

Column (4) of Table 2 presents the first-stage results, where the dependent variable is *Premium Rate Increase*, the same as the main independent variable in the OLS regression. Our instrument predicts premium increases, with a positive, statistically significant coefficient very close to one, as one would expect. The results indicate that households face larger premium increases when their insurers increase premiums more in distant ZIP codes in the same state. In addition, households facing higher climate risks experience larger premium increases than their peers in other ZIP codes in the same state. The large Kleibergen-Paap Wald F-statistic suggests that the instruments are sufficiently strong.

Column (5) presents the second-stage results. The dependent variable is an indicator for 60-day mortgage delinquency. The coefficients on the instrumented premium increases are positive and statistically significant, suggesting that premium increases are associated with higher mortgage delinquency rates. The instrumental variable estimate indicates that a $1,000 increase in premium (or a 0.2 increase in premium rates) corresponds to a 0.34 percentage point increase in the 60-day delinquency rate, which corresponds to a 20% increase relative to the sample mean. The corresponding OLS coefficient is larger in absolute magnitude (Column 2) than the instrumental-variable estimate, consistent with endogeneity bias. For example, households experiencing financial difficulties are likely to

face both larger premium increases—owing, for instance, to deferred maintenance—and elevated delinquency rates.

Our instrumental-variable estimate is similar to that in Wong (2024) who studies tax changes, using 30-day delinquencies (untabulated) to match what he reports. However, our sensitivity is 7 times that reported by Di Maggio, Kermani, Keys, Piskorski, Ramcharan, Seru and Yao (2017), who found that a $940 decrease in monthly mortgage payments reduced delinquency rates by 0.5 percentage points. The difference in magnitudes likely stems from the asymmetric effects between payment increases and decreases. Di Maggio et al. (2017) studied borrowers who qualified for mortgages at higher interest rates, suggesting these households could already afford the higher payments absent negative income shocks. Consequently, substantial reductions in payments had little effect on their delinquency rates. In contrast, our study examines borrowers who initially qualified for mortgages with lower insurance payments. For these households, insurance payment increases could potentially push total monthly obligations beyond some borrowers' payment capacity. Supporting this interpretation, our analysis below shows that delinquency effects are more pronounced among borrowers with smaller financial buffers to absorb increased insurance payments. This asymmetry could explain the heightened sensitivity observed in our setting compared to Di Maggio et al. (2017).[14]

## 6.1 Delinquency Effect Across Investors

A natural question is whether the effect of insurance premiums on mortgage delinquencies is present for FHA and GSE loans. This would imply a risk for the federal government, particularly if insurance premiums keep rising. We are also interested in whether the delinquency effect exists in private-label MBS and banks' portfolios, exposing in-

[14]Similar to our paper, Mello (2024) also shows that even small unexpected fines can increase financial distress, especially among financially fragile Households, and find that receiving fines for traffic violations averaging $195 is associated with a $34 increase in unpaid bills in collections. Gallagher, Gopalan and Grinstein-Weiss (2019) find that receiving health insurance subsidies is associated with a roughly 25% decline in the delinquency rate. Their mechanism differs from ours, as it operates through reduced exposure to out-of-pocket medical expenditure risk rather than through direct insurance cost burdens.

vestors and banks to associated risks. We investigate these questions in the following analysis.

In Table A10, we repeat our instrumental variable analysis on mortgage delinquencies across different types of mortgages. We use mortgages guaranteed by Ginnie Mae in Column (1), by Fannie Mae in (2), by Freddie Mac in (3), private mortgages that are securitized in (4), and those that remain in banks' portfolios in (5). In Columns (6) and (7), we further split conventional mortgages by whether they have private mortgage insurance or not, i.e., whether the GSEs are ultimately exposed to credit risks. The results suggest that the effect of premiums on delinquency holds across subsamples, although it is not statistically significant for privately securitized mortgages, potentially due to a smaller sample size.

## 6.2 Delinquency Effect Not Driven by Disasters

A potential concern is that households in disaster-affected areas may experience larger insurance premium increases alongside higher delinquency rates, all as direct consequences of natural disasters. In our analyses so far, we effectively compare borrowers within the same ZIP codes who renew their insurance policies within the same month, making disasters an unlikely explanation.

Regardless, we address this concern directly in Table A5, separately analyzing ZIP codes that experienced natural disasters within the current or preceding two calendar years and those that did not, using First Street Foundation's Climate Data. The results provide reassuring evidence that disaster experiences do not drive our main findings, as the main results are closer to those using the non-disaster sample.

### 6.3 The Delinquency Effect is Robust When Households Are Attentive to Premium Changes

One concern is that delinquency effects arise not from financial strain but from borrowers' inattention: households may fail to notice premium increases and consequently underfund their escrow accounts, leading to missed payments. To address this, Table A4 restricts the sample to households that were likely attentive to premium changes—specifically, those that switched insurers, adjusted their deductible percentages, or changed between Replacement Cost Value and Actual Cash Value coverage around the time of the premium increase. These active policy adjustments suggest awareness of the premium change.

The estimated coefficient on *Premium Rate Increase* remains positive and statistically significant, with a magnitude of 0.031—similar to the full-sample estimate of 0.033 in Column (2) of Table 2. This result indicates that the delinquency effect is not driven by inattention to premium increases.

### 6.4 Mortgage Modification, Foreclosure, and Credit Card Usage

In Table 3, using the instrumental variable approach, we also find that increases in premiums also lead to an increase in mortgage modification and foreclosure probabilities. The estimate suggests that a $1,000 increase in premiums leads to a 0.042 and 0.016 percentage point increase in the probability of modification and foreclosure, respectively.

In Columns (3)-(4), we examine credit card outcomes. Column (3) suggests that a $1,000 increase in premiums leads to a 0.2 percentage point increase in credit card utilization. Column (4) replaces the endogenous variable with the dollar premium increases, while keeping the instrument the same. The estimate suggests that for a $1,000 increase in insurance premiums, the credit card balance increases by $87.

These results demonstrate that rising insurance premiums have broad negative effects

across multiple dimensions of household finances, and indicate that the mortgage delinquency effects reflect financial stress rather than mechanical relationships.

# 7 Households Switch Insurers

As premiums increase, households can mitigate the negative financial impact by switching to lower-cost insurers. In Table 4, we examine the effect of premium increases at insurance renewal on insurer switching in the following 12 months, following the regression specification of Table 2.

The estimated OLS and 2SLS coefficients on *Premium Rate Increase* are both positive and statistically significant, indicating that following exogenous premium increases, households are more likely to switch insurers. The 2SLS estimate suggests that when premiums increase by $1,000 more, the probability of switching insurers increases by 14.8 percentage points, which is 3.2 times the unconditional mean. The OLS estimate is smaller, consistent with endogeneity bias. Households that are less price-sensitive may face larger premium increases, as they are less likely to adjust their coverage (e.g., by raising deductibles) in response. These same households are also less likely to switch insurers.

Table A6 examines how premiums evolve following insurer switching. Column (1) indicates that switching reduces the premium rate change by 0.028 percentage points, or 38% of the standard deviation. Column (2) interacts the switching indicator with the prior premium increase, yielding a negative and statistically significant coefficient. The estimates imply that following a $1,000 premium increase, non-switchers experience an additional $124 increase in the subsequent year, whereas switchers see a $414 reduction.

# 8 Effect of Premiums on Relocation

One way for households to mitigate the effects of rising insurance costs is to relocate to lower-risk areas to reduce future insurance costs. If house prices fully capitalize on premium changes, relocating in response to premium increases may not have a positive

present value. However, some market frictions can induce households to move in response to premium increases. For example, some buyers may have a larger advantage in holding properties that have experienced larger increases in premiums, as we discuss in Section 10.3. Table 5 tests the relocation hypothesis using the matched ICE McDash–Equifax Credit Risks Insight Servicing (CRISM) sample. Because we require movers to have prepaid their mortgage, we restrict the sample in this exercise to borrowers whose home insurance renews between September and January, as prepayment is more accurately identified for these borrowers.

Column (1) presents the OLS regression examining whether larger premium increases trigger more households to relocate. The dependent variable equals one if borrowers changed addresses within 12 months of insurance renewal, based on credit bureau data. The primary independent variable is the premium rate increase for each borrower, consistent with our main specification. The estimated coefficient on *Premium Rate Increase* is positive and statistically significant, indicating that households are significantly more likely to relocate when experiencing larger premium increases. Column (2) presents the first-stage result of the instrumental variable regression. Our instruments remain highly relevant in this smaller sample. Column (3) presents the second-stage result.

The estimated coefficients on *Premium Rate Increase* are highly similar between the OLS and the instrumental variable regression in Column (3). Based on Column (3), a $1,000 increase in premium corresponds to a 0.54 percentage point increase in relocation probability, equivalent to 16% of the mean. This magnitude is comparable to the mortgage lock-in effect on household relocation documented by Fonseca and Liu (2024).[15]

Table A7 suggests that the relocation effects are not driven by households experiencing disasters and are smaller in magnitude for this subsample. To mitigate concerns about

[15]To compare effects in equivalent dollar terms, premium rate changes must be scaled by the ratio of loan amount to coverage amount (mean of 1/3.3 in our sample). A 1 percentage point increase in mortgage rates is thus comparable to a 0.3 percentage point increase in premium rates. Based on our 2SLS estimates, a 0.3 percentage point premium rate increase raises moving probability by 0.8 percentage points. For comparison, Fonseca and Liu (2024) find that a 1 percentage point increase in mortgage rate deltas raises the moving rate by 0.69 percentage points.

insurer-household endogenous matching, in Table A2, we repeat Column (2), adding insurer-year or insurer-state-year fixed effects. The results remain similar.

# 9 Heterogeneous Effects on Delinquency, Insurer Switching, and Relocation

We now examine how the effects of premium increases on mortgage delinquency, insurer switching, and relocation vary with household financial constraints, using credit scores as a proxy. The theoretical predictions differ across outcomes. For mortgage delinquency, if premium increases represent negative liquidity shocks, the effect on delinquency should be concentrated among financially constrained households. For insurer switching, the prediction is ambiguous. Constrained households have stronger incentives to seek lower premiums, but they may also be less financially sophisticated and face higher search costs—potentially offsetting any heightened motivation to switch. For relocation, competing forces are again at play. Although constrained households may benefit more from escaping high-premium areas, relocation entails substantial upfront costs that may be prohibitive for liquidity-constrained households. Moreover, less constrained households may find relocation easier to execute if they have greater flexibility to change jobs or work remotely.

To test these predictions, Table 6 sorts households into terciles by credit score and replicates Column (2) of Table 5, adding interactions between *Premium Rate Increase* and indicators for the second and third terciles. The outcome variables are mortgage delinquency (60-day past due) in Column (1), insurer switching in Column (2), and relocation in Column (3).

The coefficient on *Premium Rate Increase* remains positive and statistically significant across all columns, indicating that the baseline effects documented earlier are present among households in the lowest credit score tercile. For mortgage delinquency (Column

1), both interaction terms are negative and statistically significant, with magnitudes that largely offset the main effect. These results suggest that households in the second and third credit score terciles exhibit little delinquency response to premium increases, consistent with the view that financially flexible households can absorb these shocks without falling behind on mortgage payments.

For insurer switching (Column 2), both interaction terms are positive and statistically significant. The interaction coefficients for the second and third terciles are 9% and 14% larger than the main effect, respectively. This pattern suggests that households with higher credit scores—who are likely more financially sophisticated and face lower search costs—are more responsive to premium increases in seeking alternative insurers.

For relocation (Column 3), both interaction terms are again positive and statistically significant, with magnitudes 44% and 61% larger than the main effect for the second and third credit score terciles, respectively. This finding supports the hypothesis that less constrained households are better positioned to act on relocation incentives, whether due to greater liquidity to cover moving costs or greater flexibility in employment arrangements.

# 10 More Relocation Outcomes

## 10.1 Relocation Effect Depends on Mortgage Rate "Lock-In"

Table 7 repeats the analysis above with the addition of an interaction term between *the Premium Rate Increase* and the difference between mortgage rates at origination and the average mortgage rates in the month of insurance rate renewal. The interaction term exhibits a positive, statistically significant coefficient in both OLS and instrumental-variable regressions, suggesting that households with higher origination mortgage rates relative to contemporaneous mortgage rates are more likely to relocate following premium increases.

This finding aligns with Fonseca and Liu (2024), who demonstrate that elevated mort-

gage rates reduce household mobility. Notably, mortgage rates have risen in recent years alongside drastic increases in insurance premiums, potentially limiting the relocation response to premium increases due to the mortgage "lock-in" effect. We expect the relocation effect to strengthen as mortgage rates fall, making it financially more favorable to purchase a new home with a mortgage.

## 10.2 Premium Increases Drive Relocation to Lower Premiums

If households move due to premium increases, they should achieve premium savings after moving. We next examine how premium rate increases affect households' subsequent premium changes and how this effect differs between movers and stayers. Table 8 presents the second-stage results, showing changes in premium rates from policy year $t$ to $t+1$, measured 12 months after the insurance renewal, when we observe *Premium Rate Increase* on the right-hand side.

In Column (1), we use the full sample and add an interaction term between the initial *Premium Rate Increase* and an indicator for moving within 12 months after renewal.[16] The positive coefficients on *Premium Rate Increase*, 0.191, indicate that for non-movers, larger premium increases in policy year $t-1$ are associated with subsequent premium increases in policy year $t$. This pattern can emerge despite our ZIP-by-renewal year fixed effects when households exhibit sticky insurer choice and certain insurers implement consecutive rate increases more often than others.

The results differ markedly for movers. Larger premium increases in $t-1$ are associated with subsequent premium reductions in $t$: the estimated coefficient on *Premium Rate Increase* $\times$ *Moved* is negative and statistically significant, -1.801; these interaction effects more than offset the positive main effect of *Premium Rate Increase*, resulting in a net negative relationship for movers.

[16] As a result, in the instrumental variable approach, we have two endogenous variables and two first stages. We also add an interaction term between our instrument and the indicator for moving as the second instrument in both first stages.

Columns (2) and (4) repeat the specification from Column (1) without the interaction term, estimating the effects separately for movers and stayers. The results reinforce the same pattern. Among stayers, households that faced larger premium increases in the prior year continue to experience higher premium growth. Among movers, by contrast, larger past premium increases predict larger subsequent premium reductions, consistent with relocation allowing households to reset their insurance costs. Because many ZIP codes do not have more than one mover in a year, in Columns (3) and (5), we repeat the analysis, relaxing the fixed effects, replacing ZIP-by-renewal month with ZIP and replacing climate risk bin-by-renewal month with -by-renewal year.

Based on the difference between the key coefficients in Columns (2) and (4), a $1,000 increase in premium is associated with a 0.223 (= (0.927+0.188) $\times$ 0.2) percentage point premium rate reduction for movers. Scaling by a coverage limit of $465,000 in 2023, movers' premium savings translate to $1,037 compared to non-movers. If this saving remains the same, assuming a discount rate of 6% (Giglio et al., 2021), the present value of the premium savings amounts to $14,274 within 30 years.[17] Results are highly similar in Columns (3) and (5) using looser fixed effects. Households likely perceive these savings from relocation as enhancing the overall benefits of moving, effectively shifting their decision-making in favor of relocation.

### 10.2.1 Explaining Premium Savings for Movers With Larger Pre-move Premium Increases

How are movers with larger pre-move premium increases able to achieve such large premium savings? It is possible that they move to safer areas. In Table 9, we examine whether larger insurance premium increases lead households to move to less risky locations. The dependent variable is the change in climate risk, defined as the difference between the average risk level in the destination ZIP code and the original property-specific risk. The

[17] In our data, the probability that a household moves in a year is 0.033, implying that the average borrower stays in a house for 33 years.

specification restricts the sample to movers and includes ZIP, climate risk-bin-by-renewal-year fixed effects, along with controls for origination year, credit score, LTV, and DTI.[18] The coefficient on *Premium Rate Increase* is statistically insignificant.

Our measure of climate risk can be noisy. For example, it does not account for the age and condition of each property, while poorly maintained houses are more exposed to climate risk. An alternative proxy for movers' change in climate risk exposure is the change from their pre-move premium rate to the average in their new ZIP code, assuming that premium rates largely reflect insurers' assessments of local risks and average house quality. Using average premiums reduces the measure's sensitivity to factors such as lower teaser rates for new home buyers. In Column (2), we repeat Column (1), using this measure as the outcome variable.

In Column (2), the coefficient on *Premium Rate Increase* is negative and statistically significant. The magnitude suggests that for movers who experience a $1,000 larger increase in premiums before moving, the average premium rate in the new ZIP code is 0.17 percentage points lower than their old premium rate, which is 36% of the average premium rate.

Movers can also achieve savings by switching insurers. In Column (3), we replace the dependent variable with an indicator for insurer switching. The coefficient on *Premium Rate Increase* is positive and statistically significant. The magnitudes suggest that a $1,000 increase in premiums raises movers' switching probability by 40 percentage points, 73% of the average switching rate of the mover sample.

Do movers with larger pre-moving premium increases switch to "cheaper" insurers to save on insurance costs? Column (4) examines this by replacing the dependent variable with changes in insurers' average premium rates in other ZIP codes within the same state. For non-switchers, this measures the same insurer's rate change year-over-year; for

[18] Because the mover sample is much smaller, many ZIP–year cells contain very few observations; therefore, we do not include ZIP-by-time fixed effects. However, the climate risk-bin–by–renewal-year fixed effects provide controls along the time dimension.

switchers, it measures the difference in other-ZIP average rates between the new insurer in year $t$ and the old insurer in year $t-1$. (Note that among movers, the sample used here, the average switching probability is 55%.) The coefficient on *Premium Rate Increase* is negative, but statistically insignificant.

Movers with larger pre-moving premium increases can also reduce insurance costs by moving to areas with a more competitive insurance market. In Column (5), we test this hypothesis by replacing the dependent variable with the change in insurer Herfindahl index (HHI) from the old to the new ZIPs. The estimated coefficient on *Premium Rate Increase* is negative and statistically significant. The magnitude suggests that a $1,000 increase in premiums leads households to move to ZIPs with a 7.7% reduction in insurer HHI.

What can explain the larger post-move premium savings for movers experiencing larger pre-move premium increases? We investigate this question in Table 10 using the instrumental variable approach with the mover samples. Column (1) repeats Column (3) of Table 8 and serves as the comparison benchmark. We use the change in the premium rate from before to after moving as the dependent variable. The main independent variable is the pre-move *Premium Rate Increase*. In the subsequent columns, we add independent variables to assess whether they absorb some of the effect of the pre-move *Premium Rate Increase* on the post-move premium changes.

In Column (2), we control for movers' pre-to-post change in their climate risk exposure. If the changes in climate risk exposure can explain the premium savings for movers with larger pre-move premium increases, then the coefficient on the pre-move *Premium Rate Increase* should shrink in absolute magnitude. However, the magnitude of the coefficient declines only slightly, from $-0.926$ to $-0.901$.

In Column (3), we instead control for an alternative proxy for movers' change in climate exposure: the change from their pre-move premium rate to their post-move ZIP-average premium rate. The coefficient on the pre-move *Premium Rate Increase* shrinks

drastically in absolute magnitude, from $-0.926$ to $-0.374$, a 60% drop. This result suggests that changes in climate risk exposure can potentially explain the larger post-move premium savings for movers with larger pre-move premium increases.

In Column (4), we control for an indicator of whether the mover also switched insurers. The switching can mean more active shopping, which could potentially explain post-move premium changes. In Column (5), we control for changes in insurers' average premium rates in other ZIP codes within the same state, as explained earlier in this subsection. If households move to areas with more competitive insurance markets, that can drive down the ZIP-average premium rates and their own premiums. In Column (6), we control for the change in insurer concentration, measured by the Herfindahl-Hirschman Index (HHI), from the mover's old to new ZIP codes. If households relocate to a new ZIP code with a more competitive insurance market, they may also see lower insurance premiums as a result. Among Columns (4)-(6), the estimated coefficient on *Premium Rate Increase* does not meaningfully decline. This suggests that the channels represented by the additional controls do not explain the relationship between the pre-move and post-move premium rates.

In conclusion, Table 10 suggests that movers with larger pre-move premium increases can achieve larger post-move premium reductions, largely because they moved to ZIP codes with much lower average premiums than their previous premium rate. This is not explained by the new ZIP codes having "cheaper" insurers or a more competitive insurance market. This is consistent with the idea that movers with larger pre-move premium increases are, on average, moving to safer ZIP codes, as proxied by a larger reduction from their old premiums to new ZIP averages.

## 10.3 Corporate Buyers

As households move due to higher premiums, who are the buyers of those vacated homes? We hypothesize that buyers are more likely to be corporations when the increase in the

insurance premium is larger. Corporate buyers may have greater market power or lower search costs in negotiating or shopping for lower insurance premiums.

In Table 11, we examine whether the buyers of vacated homes are more likely to be corporations when properties face larger premium increases. Column (1) presents OLS estimates using an indicator for whether the buyer is a corporation as the dependent variable and *Premium Rate Increase* as the independent variable. The coefficient on *Premium Rate Increase* is positive and statistically significant. The magnitude suggests that a $1,000 increase in premiums raises the probability that the buyer is a corporation by 0.56 percentage points—a 7.8% increase relative to the sample mean.

Columns (2)-(3) present 2SLS results using an earlier version of our instrument that uses all other ZIPs in the same state without residualization. The second stage confirms the OLS findings with a smaller magnitude for the main coefficient. Columns (4)-(5) repeat the analysis using the main instrument in this current version. The main coefficient for the second stage is statistically insignificant. This contrast between Columns (3) and (5) suggests that the instrument-identified premium variation affects the corporate buyer and accumulates over several years. We will delve into this in the next draft.

Table 12 explores whether corporate buyers make different insurance choices. The dependent variable measures the change from the previous owner to the buyer in the premium rate in Column (1) and in log premiums in Column (2). The results suggest that corporate buyers obtain lower premium rates and total premiums. This pattern likely reflects corporate buyers' greater market power or lower search costs in negotiating or shopping for lower insurance premiums. In untabulated results, we find that corporate buyers do not reduce coverage limits.

Column (3) replaces the dependent variable with an indicator for cash purchases of the property. The coefficient on the corporate indicator is 0.48, suggesting that the probability of an all-cash purchase is 48.8 percentage points higher for corporate buyers, which is 2.9 times more than the average rate of 16.6%. Using cash allows buyers to avoid the

traditional insurance requirements imposed by mortgage lenders.

# 11 Effect of Premium Increases on Mortgage Prepayment without Relocation

We hypothesize that premium increases may drive mortgage prepayment even among households that do not relocate, as homeowners seek to either escape mandatory insurance requirements or reduce explicit monthly expenses in response to rising costs. Table A8 examines this hypothesis by analyzing the relationship between premium increases and non-relocation mortgage prepayment. Column (1) presents OLS estimates with an indicator for households prepaying mortgages without relocating as the dependent variable and *Premium Rate Increase* as the independent variable. Columns (2) and (3) present instrumental variable results for robustness.

The results confirm our hypothesis. A $1,000 increase in premiums corresponds to a 0.2 percentage point increase in non-relocation prepayment probability, representing a 6% increase relative to the sample mean. This finding suggests two potential mechanisms underlying this behavior.

The first mechanism involves households paying off mortgages to escape lender-imposed insurance requirements. By prepaying their mortgages, homeowners eliminate the mandatory coverage requirement and gain the option to reduce or cancel insurance; however, this strategy exposes them to greater financial risk from potential disasters.

The second mechanism reflects a behavioral response in which rising insurance costs prompt households to seek relief by reducing other monthly expenses. When faced with higher premiums, households may choose to prepay their mortgages to eliminate mortgage interest payments. However, this behavior may reflect suboptimal decision-making: households overlook the opportunity costs of forgoing the returns from investing their savings to pay off mortgages. This mechanism aligns with research showing that house-

holds often overlook opportunity costs in financial decision-making, focusing on eliminating explicit expenses while ignoring potential investment returns on capital (Liebersohn, Jambulapati and Fitzpatrick, 2024).

## 11.1 Effect of Premium Increases on Insurance Take-Up

If households experiencing large insurance premium increases prepay their mortgages to avoid insurance requirements, we would expect insurance take-up to decrease as premiums rise. Unfortunately, our data do not allow us to test this hypothesis at the household level because our insurance data come from mortgage servicers. Once a household pays off its mortgage, it disappears from our dataset. All households in our sample have mortgages with insurance enforced by their servicers. Even if enforcement is imperfect, we cannot determine whether missing insurance information reflects dropped coverage or servicers' decisions not to provide data.[19]

Given this data limitation, we turn to the American Community Survey (ACS), which provides relevant county-level information for 2023 and 2024.[20] For each county, we measure the insured household share as the number of households reporting annual insurance premiums exceeding $100 divided by the total number of households surveyed. The average insured share is 86%, consistent with other survey estimates. We calculate the year-over-year change for each county and use it as the dependent variable in Table A9.

Column (1) regresses the change in the insured share from 2023 to 2024 on changes in county-level average premium rates from 2022 to 2023 in our McDash data using OLS. We include county-level controls and Combined Statistical Area (CSA) fixed effects. The estimated coefficient on premium rate changes is negative and statistically significant, indicating that counties experiencing larger premium increases exhibit greater declines in insurance take-up. The estimate suggests that a $1,000 average premium increase is

[19] Several servicers opted out of allowing McDash to sell their insurance data.

[20] ACS one-year tables are only available for high-population counties. More granular geographic data are available only in the five-year tables.

associated with a 5.4 percentage point or 6.3% drop in insured shares.

Column (2) employs an alternative strategy by replicating Column (1) with state border fixed effects, restricting the sample to border counties. This approach reduces cross-county variation in disaster risk, rebuilding costs, and other characteristics, amplifying the component of premium variation attributable to differences in state rate regulation. While this limits our sample to 314 counties, the estimated coefficient remains similar to that in Column (1).

In Columns (3)-(4), we apply our instrumental variable approach to this setting by modifying the instrument to reflect county-level average changes. We first calculate each insurer's average premium increase in other counties within the same state, then average these values across all insurance policies at the county level. In the first stage, the instrument yields a t-statistic exceeding 15. The second-stage coefficient on premium increases is again negative, with a magnitude approximately twice that of the OLS estimate.

The OLS estimate is smaller than the 2SLS estimate, consistent with endogeneity bias analogous to that discussed in Section 7: counties where households are less price-sensitive may face larger premium increases, as residents are less likely to adjust coverage in response (e.g., by raising deductibles). These same counties are also likely to exhibit lower rates of insurance dropout.

These results provide indirect evidence supporting the hypothesis that households facing larger premium increases are more likely to prepay their mortgages to avoid insurance requirements.

# 12 Conclusion

This paper examines how rising homeowners' insurance premiums affect household financial outcomes. Using household-level microdata and a novel instrumental variable strategy, we document three main findings. First, households facing larger premium increases are more likely to relocate to areas with lower insurance costs, and homes ex-

periencing larger hikes are more likely to be acquired by corporate buyers, who obtain lower premium rates and purchase less coverage. Second, households unable to mitigate the financial pressure experience higher rates of mortgage delinquency. Third, these responses vary systematically with financial constraints: relocation is concentrated among financially less constrained households who can afford moving costs, while delinquency effects are concentrated among more constrained households.

Our findings on mortgage delinquency reveal a distinct channel through which climate change can affect households and the broader financial system. As disasters become more severe and frequent, they push insurance rates higher, placing financial strain on even those who do not directly experience them. This mechanism poses an emerging threat to both the private financial sector and the federal government, as delinquency effects appear in GSE and non-GSE mortgages alike. These results speak directly to the heated policy debate over insurance affordability, as policymakers consider interventions such as means-tested insurance subsidies.

Our results on household relocation also carry important long-term implications. If premiums continue to rise in high-risk areas, the differential relocation response we document may drive substantial demographic shifts, with wealthier households migrating away while lower-income households become increasingly concentrated in climate-exposed regions. Meanwhile, corporate buyers' competitive advantage in high-risk markets—stemming from lower premiums—may accelerate a structural shift away from individual homeownership. Given evidence that homeownership facilitates wealth accumulation and generates positive community externalities, these dynamics could exacerbate inequality and erode community amenities in vulnerable areas over the coming decades.

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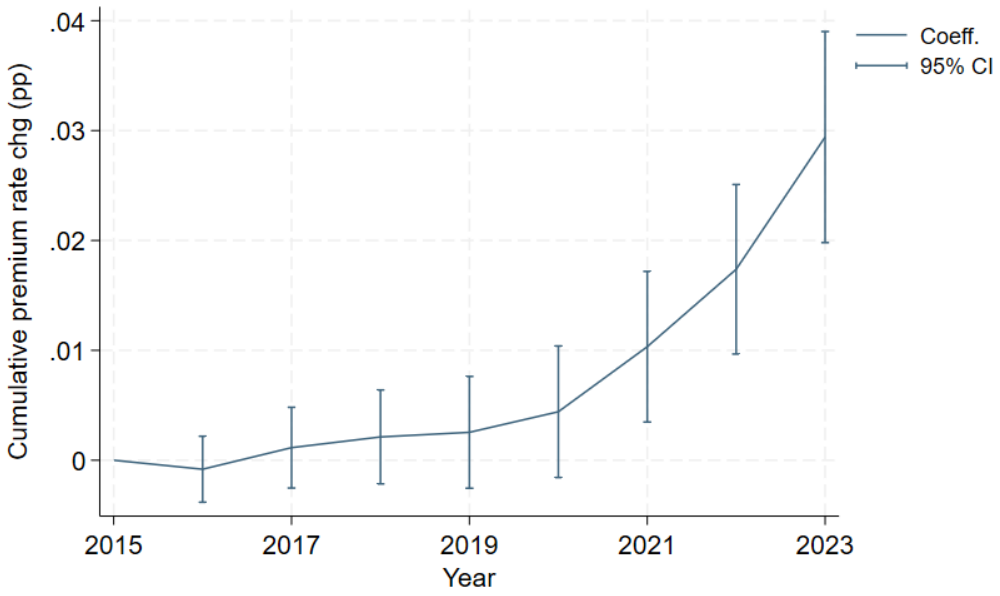
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**FIGURE 1**

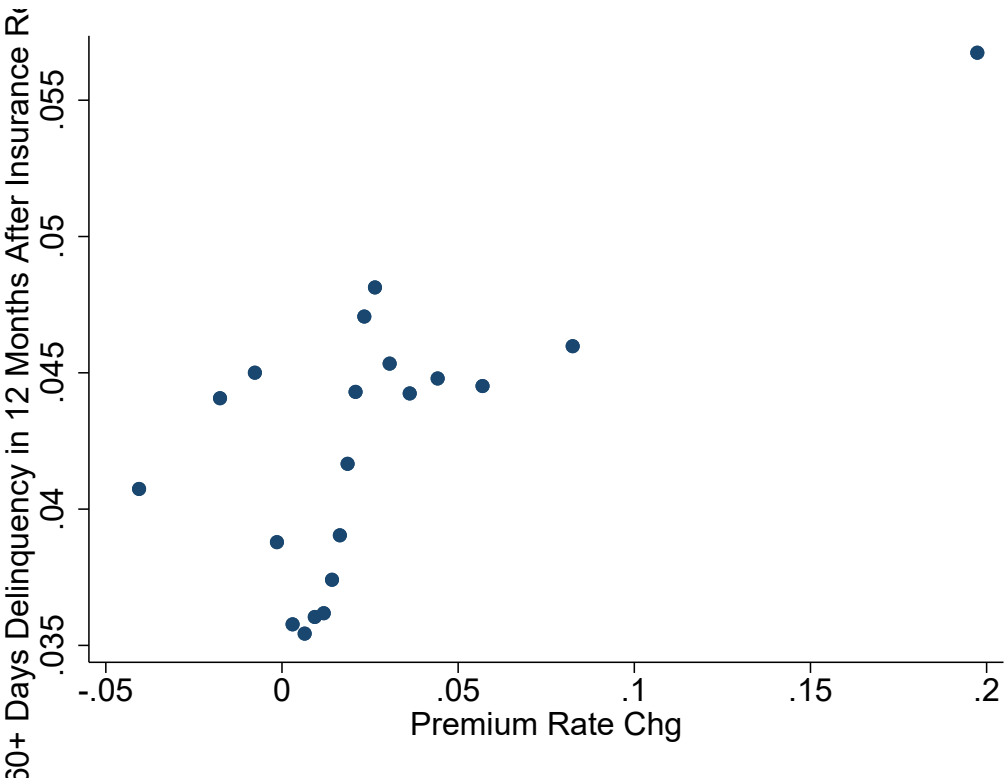
PREMIUMS HAVE INCREASED MORE IN HIGH-CLIMATE-RISK AREAS




NOTES: Source: ICE McDash, decennial census (controls).
In Figure 1, we examine how premiums have evolved in recent years. We estimate the following regression at the ZIP-by-year level. $\Delta(Premium\ Rate)_{z,2015\ to\ t} = \gamma_z + \delta_{c,t} + \sum_{t=2016}^{2023} \beta_t ClimateRisk_z + \alpha_t Controls_z + \epsilon_{z,t}$, where $z$ denotes ZIP code, $c$ denotes the county, and $t$ the year. The dependent variable is the cumulative change relative to 2015 in premiums relative to the coverage limit (in percentages), averaged at the ZIP-year level. The main independent variable is CoreLogic's average measure of climate risk (AAL) at the ZIP level. We use only policies with deductibles being 0.5% of the coverage limit in this analysis so that changes in deductibles do not drive the results. The figure plots the estimates of $\beta_t$ and the corresponding 95% confidence interval. We also require the coverage type (ACV or replacement cost) do not change. This measure is constructed using within-loan changes in premium only.

**FIGURE 2**

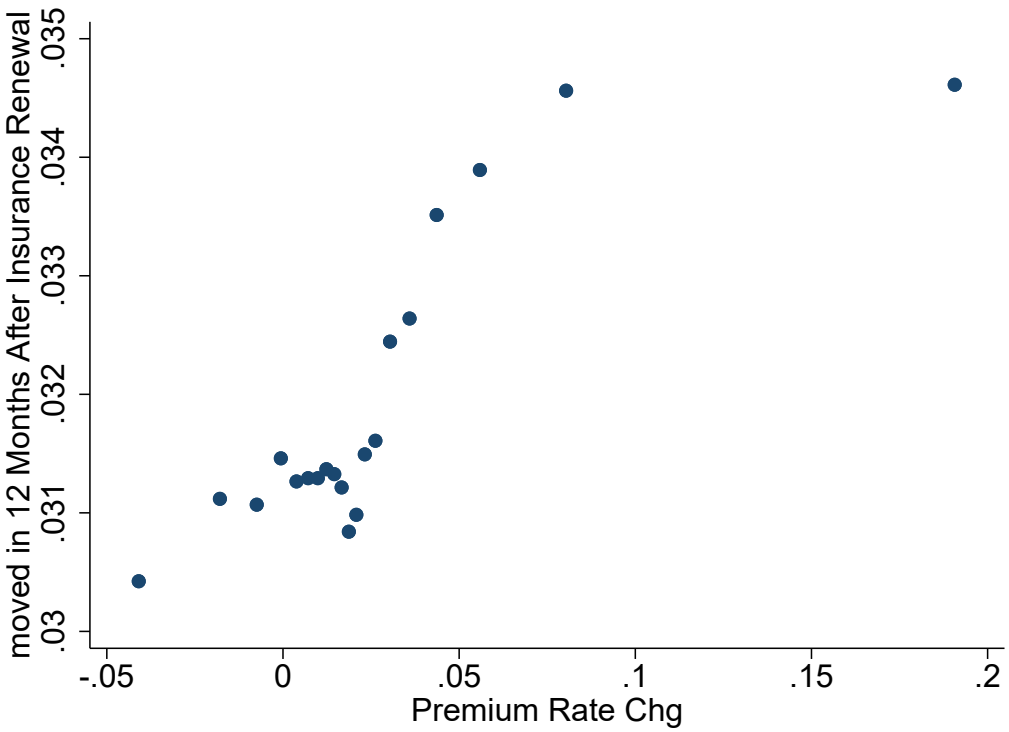
MORTGAGE DELINQUENCY AND PREMIUM RATE INCREASES




NOTES: Source: ICE McDash.

This figure is a bin-scatter plot of 60-day mortgage delinquency against changes in annual insurance premium rate (insurance premiums as a percentage of the coverage limit). We control for credit score in the month preceding insurance renewal, and the following fixed effects (FE): insurance policy start month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE, 5-digit ZIP FE. We drop loans where the servicing is transferred within a year of policy reset and where the loan was not current as of the reset month.

**FIGURE 3**
MOVING AND PREMIUM RATE INCREASES




NOTES: Source: ICE McDash and CRISM.
This figure is a bin-scatter plot of probability of household moving against changes in annual insurance premium rate (insurance premiums as a percentage of the coverage limit). We control for credit score in the month preceding insurance renewal, and the following fixed effects (FE): insurance policy start month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE, 5-digit ZIP FE. We drop loans where the servicing is transferred within a year of policy reset and where the loan was not current as of the reset month. We only keep loans with insurance renewals occurring between September and January.

TABLE 1
SUMMARY STATISTICS

| | Mean | SD | 25 Pctl | Median | 75 Pctl |
|---|---|---|---|---|---|
| 30-Day Delinquent | 0.05 | 0.22 | 0.00 | 0.00 | 0.00 |
| 60-Day Delinquent | 0.02 | 0.13 | 0.00 | 0.00 | 0.00 |
| 90-Day Delinquency | 0.01 | 0.10 | 0.00 | 0.00 | 0.00 |
| Number of Insurers | 231.00 | 0.00 | 231.00 | 231.00 | 231.00 |
| Jumbo | 0.03 | 0.18 | 0.00 | 0.00 | 0.00 |
| Zip Had Recent Disaster | 0.23 | 0.42 | 0.00 | 0.00 | 0.00 |
| Premium Rate Increase | 0.03 | 0.06 | 0.00 | 0.00 | 0.03 |
| Premium Rate Change | 0.01 | 0.07 | -0.01 | 0.00 | 0.03 |
| Insurer Other-Zip Avg Prem Increase | 0.02 | 0.03 | 0.01 | 0.02 | 0.03 |
| Premium Rate | 0.48 | 3.96 | 0.28 | 0.39 | 0.57 |
| Credit Score Before Renewal (MacDash) | 760.68 | 70.57 | 724.00 | 780.00 | 812.00 |
| Climate Risk ($\times$1M) | 1,642.57 | 2,474.67 | 799.00 | 1,124.90 | 1,750.20 |
| Climate Risk (Standardized) | 0.00 | 1.00 | -0.57 | -0.07 | 0.58 |
| DTI | 33.24 | 11.09 | 25.00 | 34.00 | 42.00 |
| FICO at Origination | 738.19 | 68.19 | 701.00 | 752.00 | 787.00 |
| LTV | 73.53 | 19.52 | 61.75 | 77.41 | 89.55 |
| Premium $ Changes | 111.63 | 438.30 | 12.00 | 60.00 | 156.00 |
| Annual Premium $ | 1,529.06 | 1,280.21 | 864.00 | 1,224.00 | 1,800.00 |
| Coverage Limit | 374,242.49 | 531,526.67 | 214,000.00 | 297,400.00 | 424,000.00 |
| Credit Score before Renewal (CRISM) | 771.11 | 66.05 | 742.00 | 794.00 | 821.00 |
| Orig Mtg Rate - Current Avg | -0.24 | 1.67 | -0.89 | 0.05 | 0.81 |
| Premium as % of P&I Payment | 15.50 | 29.77 | 7.66 | 11.90 | 18.83 |
| Moved | 0.03 | 0.18 | 0.00 | 0.00 | 0.00 |
| Prepaid without Moving | 0.04 | 0.20 | 0.00 | 0.00 | 0.00 |
| Prepaid | 0.12 | 0.33 | 0.00 | 0.00 | 0.00 |
| Cash-Out Refinance | 0.02 | 0.13 | 0.00 | 0.00 | 0.00 |
| No-Cash-Out Refinance | 0.03 | 0.16 | 0.00 | 0.00 | 0.00 |
| Credit Utilization | 11.29 | 15.99 | 1.65 | 6.50 | 15.94 |
| Any Line Delinquent | 0.11 | 0.32 | 0.00 | 0.00 | 0.00 |
| Change in Credit Risk Score | -16.52 | 33.60 | -20.00 | -7.00 | -1.00 |
| Share of Lines Delinquent | 0.03 | 0.11 | 0.00 | 0.00 | 0.00 |
| Credit Card delinquent | 0.06 | 0.23 | 0.00 | 0.00 | 0.00 |
| Any First Mortgage Delinquent | 0.02 | 0.14 | 0.00 | 0.00 | 0.00 |
| Climate Risk Change | 0.01 | 0.12 | 0.00 | 0.00 | 0.00 |
| Premium Rate Change | 0.01 | 0.10 | -0.01 | 0.01 | 0.03 |
| New Zip Avg Premium Rate minus Old Own | 0.03 | 0.22 | -0.05 | 0.04 | 0.13 |
| Moved to Lower Climate Risk | 0.01 | 0.09 | 0.00 | 0.00 | 0.00 |
| Moved to Higher Climate Risk | 0.02 | 0.14 | 0.00 | 0.00 | 0.00 |
| Change in Log Premium | 0.07 | 0.17 | 0.01 | 0.06 | 0.13 |
| Mortgage Rate Change | -0.09 | 1.31 | -0.75 | 0.00 | 0.38 |
| Change in Log P&I Payments | 0.01 | 0.09 | 0.00 | 0.00 | 0.00 |
| Change in Log P&I Payments + Premium | 0.01 | 0.08 | 0.00 | 0.01 | 0.02 |
| Insurer Premium Share | 0.46 | 1.72 | 0.01 | 0.05 | 0.21 |
| Insurer HHI | 682.52 | 215.27 | 595.96 | 611.07 | 644.02 |
| Insurer Premium Share (State) | 1.62 | 3.73 | 0.02 | 0.25 | 1.21 |
| Insurer HHI (State) | 987.39 | 323.33 | 773.11 | 933.29 | 1,153.14 |
| CovLmt/Mtg Balance | 3.31 | 316.41 | 1.41 | 1.97 | 3.02 |

NOTES: Source: ICE McDash, CRISM, CoreLogic, First Street, Census ACS.

TABLE 2
EFFECT OF PREMIUM INCREASES ON MORTGAGE DELINQUENCIES

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Mortgage Delinquency | | | Premium Rate | Delinqueny |
| | 30-Day | 60-Day | 90-Day | Increase | 60-Day |
| Premium Rate Increase | 0.074*** | 0.033*** | 0.022*** | | 0.017*** |
| | (71.71) | (53.01) | (46.16) | | (9.50) |
| Insurer Far-ZIP Avg Prem Increase | | | | 0.716*** | |
| | | | | (174.97) | |
| Lag Premium Rate | 0.000 | 0.000 | 0.000 | 0.005*** | 0.000*** |
| | (1.46) | (1.57) | (1.44) | (4.82) | (4.38) |
| Credit Score/1k before Renewal | -0.896*** | -0.369*** | -0.222*** | -0.042*** | -0.357*** |
| | (-348.52) | (-253.65) | (-225.81) | (-91.96) | (-231.04) |
| Climate Risk (standardized)/1k | 0.576*** | 0.220*** | 0.187*** | 0.349*** | 0.174*** |
| | (6.53) | (4.49) | (4.85) | (7.70) | (3.11) |
| OLS/2SLS Stage | OLS | OLS | OLS | 1st Stage | 2nd Stage |
| Sample | All | All | All | All | All |
| ZIP-by-Renewal Month FE | Y | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y | Y | Y | Y |
| Y Mean | 0.050 | 0.017 | 0.011 | 0.024 | 0.017 |
| Y SD | 0.219 | 0.130 | 0.102 | 0.050 | 0.128 |
| X Mean | 0.026 | 0.026 | 0.026 | -0.001 | 0.024 |
| X SD | 0.055 | 0.055 | 0.055 | 0.021 | 0.050 |
| N | 46595860 | 46595860 | 46595860 | 34677055 | 34677055 |
| Kleibergen-Paap Wald F stat | | | | | 30616 |

NOTES: Source: ICE McDash and CRISM.
This table presents the relationship between premium rate increases and mortgage delinquencies. The dependent variable is an indicator of whether the household is delinquent on the mortgage for at least 30 days in Column (1), 60 days in (2) and (5), 90 days in (3), and *Premium Rate Increase* in (4). Columns (1)-(3) present OLS estimates, where the main independent variable is the change in the premium rate at policy renewal relative to the previous policy year, set to zero when the premium rate decreases. Column (4) presents the first-stage result and (5) the second-stage of instrumental variable estimates. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 3
EFFECTS OF PREMIUM INCREASES ON OTHER MORTGAGE AND CREDIT OUTCOMES

| | (1) Mortgage Modification | (2) Mortgage Foreclosure | (4) Credit Utilization (%) | (5) Credit Card Balance ($) |
|---|---|---|---|---|
| Premium Rate Increase | 0.0021*** | 0.0008** | 1.062*** | |
| | (5.09) | (2.01) | (4.37) | |
| Premium Chg ($) | | | | 0.087*** |
| | | | | (2.85) |
| Lag Premium Rate | -0.0000*** | 0.0001*** | 0.017** | 51.835*** |
| | (-3.72) | (4.64) | (2.37) | (4.80) |
| Credit Score/1k before Renewal | -0.0135*** | -0.0258*** | 7.961*** | 12546.188*** |
| | (-80.17) | (-96.47) | (90.57) | (216.93) |
| Climate Risk/1k | 0.0176 | 0.0119 | 19.664* | 714.150 |
| | (1.46) | (1.03) | (1.73) | (0.20) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | All | All | All | All |
| Zip-by-Renewal Month FE | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y | Y |
| Y Mean | 0.0007 | 0.0008 | 10.949 | 239.938 |
| Y SD | 0.0266 | 0.0282 | 15.993 | 6,819.670 |
| X Mean | 0.025 | 0.025 | 0.024 | 107.141 |
| X SD | 0.051 | 0.051 | 0.049 | 327.787 |
| N | 35,872,842 | 35,872,842 | 30,171,427 | 29,549,562 |
| Kleibergen-Paap Wald F stat | 30,772 | 30,772 | 29,428 | 17,557 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents results analyzing the effect of premium increases on mortgage foreclosure and other credit outcomes, presenting the second stage of instrumental variable regressions. The dependent variables are: (1) an indicator for mortgage foreclosure in the 12 months after insurance renewal; (2) an indicator for mortgage modification in the 12 months after insurance renewal ; (3) an indicator for credit card delinquency in the 12 months after insurance renewal; (4) the change in credit card utilization, measured as peak utilization percentage in 12 months post-renewal minus pre-renewal utilization; (5) the change in credit card balance. The independent variable is *Premium Rate Increase* in Columns (1)-(4) and *Premium Chg ($)*, i.e. the change in insurance premium at policy renewal relative to the previous policy year, in Column (5). We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residences. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 4
EFFECTS OF PREMIUM INCREASES ON INSURER SWITCHING

| | (1) 1(Switch Insurer) | (2) Premium Rate Increase | (3) 1(Switch Insurer) |
|---|---|---|---|
| Premium Rate Increase | 0.460*** | | 0.738*** |
| | (187.37) | | (81.72) |
| Insurer Far-ZIP Avg Prem Increase | | 0.644*** | |
| | | (146.15) | |
| Lag Premium Rate | 0.000 | 0.003*** | -0.000 |
| | (0.19) | (3.89) | (-1.49) |
| Credit Score/1k before Renewal | -0.013*** | -0.037*** | 0.006*** |
| | (-14.33) | (-91.25) | (6.03) |
| Climate Risk (standardized)/1k | -0.690*** | 0.273*** | -0.648*** |
| | (-5.98) | (6.46) | (-5.65) |
| OLS/2SLS Stage | OLS | 1st Stage | 2nd Stage |
| Sample | All | All | All |
| ZIP-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y | Y |
| Y Mean | 0.058 | 0.021 | 0.046 |
| Y SD | 0.234 | 0.043 | 0.210 |
| X Mean | 0.023 | -0.001 | 0.021 |
| X SD | 0.047 | 0.017 | 0.043 |
| N | 33759786 | 24956259 | 24956259 |
| Kleibergen-Paap Wald F stat | | | 21361 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents the effect of premium rate increases on insurance choices. The dependent variable in OLS and the second stage is an indicator for insurer switching. Column (1) presents OLS, (2) the first-stage, and (3) the second-stage instrumental-variable regression results. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 5
EFFECTS OF PREMIUM INCREASES ON MOVING PROBABILITIES

| | (1) Moved | (2) Premium Rate Increase | (3) Moved |
|---|---|---|---|
| Premium Rate Increase | 0.023*** | | 0.027*** |
| | (22.76) | | (6.69) |
| Insurer Far-ZIP Avg Prem Increase (residualized) | | 0.748*** | |
| | | (170.67) | |
| Lag Premium Rate | -0.000* | 0.005*** | -0.001* |
| | (-1.80) | (3.59) | (-1.91) |
| Credit Score/1k before Renewal | 0.019*** | -0.041*** | 0.016*** |
| | (22.07) | (-55.98) | (15.67) |
| Climate Risk/1k | -0.907*** | 0.223*** | -0.926*** |
| | (-5.99) | (2.93) | (-5.09) |
| OLS/2SLS Stage | OLS | 1st Stage | 2nd Stage |
| Sample | Sep-Jan | Sep-Jan | Sep-Jan |
| ZIP-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y | Y |
| Y Mean | 0.033 | 0.025 | 0.033 |
| Y SD | 0.178 | 0.051 | 0.178 |
| X Mean | 0.026 | -0.001 | 0.025 |
| X SD | 0.055 | 0.021 | 0.051 |
| N | 15331083 | 10955113 | 10955113 |
| Kleibergen-Paap Wald F stat | | | 29129 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents the effect of premium rate increases on relocation probability. The dependent variable is an indicator for whether the household relocates in Columns (1) and (3), and *premium rate increase* in (2). Columns (1) presents OLS estimates. The main independent variable is the increase in premium rate, i.e., change in premium as a percentage of the coverage limit. Column (2) presents the first stage of an instrumental variable regression, while Column (3) presents the corresponding second stage. In Columns (4) and (5), we repeat the instrumental variable analysis with an alternative instrument. This instrument residualizes the original instrument by regressing it on its 12-month and 24-month lags, as well as on insurance renewal-month fixed effects. By using the residual from this regression, we essentially only use the component of the instrument that is orthogonal to its trend in the past two years. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. We restrict the sample to borrowers whose home insurance renews between September and January. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 6
HETEROGENEOUS EFFECTS OF PREMIUM INCREASES

| | (1) Delinq. | (2) 1(Switch Ins.) | (3) Moved |
|---|---|---|---|
| Premium Rate Increase | 0.056*** | 0.438*** | 0.018*** |
| | (56.57) | (168.99) | (14.72) |
| Premium Rate Increase × Credit Score Tercile 2 | -0.046*** | 0.038*** | 0.008*** |
| | (-40.40) | (11.19) | (3.80) |
| Premium Rate Increase × Credit Score Tercile 3 | -0.053*** | 0.062*** | 0.011*** |
| | (-49.48) | (16.75) | (5.31) |
| Previous Premium Rate | 0.000 | 0.000 | -0.000* |
| | (1.57) | (0.29) | (-1.80) |
| Credit Score/1k before Renewal | -0.368*** | -0.014*** | 0.019*** |
| | (-253.56) | (-14.80) | (21.90) |
| Climate Risk (standardized)/1k | 0.223*** | -0.693*** | -0.714*** |
| | (4.54) | (-6.01) | (-6.49) |
| OLS/2SLS Stage | OLS | OLS | OLS |
| Sample | All | All | Sep–Jan |
| Zip-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr, FICO, LTV, DTI FE | Y | Y | Y |
| Y Mean | 0.017 | 0.058 | 0.033 |
| X Mean | 0.026 | 0.023 | 0.026 |
| X SD | 0.055 | 0.047 | 0.055 |
| N | 46,595,860 | 33,759,786 | 15,346,660 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents the effects of premium rate increases on mortgage delinquency, insurance switching, and residential mobility. The dependent variables are, respectively, an indicator for 60-day mortgage delinquency, an indicator for switching insurers, and an indicator for moving. We allow for heterogeneity by credit score by interacting *Premium Rate Increase* with tercile indicators for credit score groups. All columns report OLS estimates. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit old ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 7
EFFECT ON PREMIUM INCREASES ON MOVING DEPENDS ON MORTGAGE RATE LOCK-IN

| | Moved | |
|---|---|---|
| | (1) | (2) |
| Premium Rate Increase | 0.025*** | 0.032*** |
| | (21.71) | (5.82) |
| Premium Rate Increase × (Orig Mtg Rate - Current Avg)/100 | 0.285*** | 0.363** |
| | (6.65) | (2.07) |
| OLS/2SLS Stage | OLS | 2nd Stage |
| Sample | Sep–Jan | Sep–Jan |
| ZIP-by-Renewal Month FE | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y |
| Y Mean | 0.033 | 0.033 |
| Y SD | 0.178 | 0.178 |
| X Mean | 0.026 | 0.025 |
| X SD | 0.055 | 0.051 |
| (Orig Mtg Rate - Current Avg)/100 Mean | -0.002 | -0.003 |
| (Orig Mtg Rate - Current Avg)/100 SD | 0.017 | 0.017 |
| N | 15,303,247 | 10,936,000 |
| Kleibergen-Paap Wald F stat | | 9,729 |

NOTES: Source: ICE McDash, CRISM
This table presents analysis on how the effect of premium increases on moving depends on the degree of mortgage lock in. The independent variables are the change in premium as a percentage of the coverage limit and an additional interaction term between *Premium Rate Increase* and the difference between mortgage rates at origination and average mortgage rates in the month of insurance rate renewal. Columns (1) presents OLS estimates. Column (2) presents the second stage of an instrumental variable regression. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal year FE, climate risk bin by insurance policy renewal year FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. We restrict the sample to borrowers whose home insurance renews between September and January. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 8
THE EFFECT OF INSURANCE PREMIUM INCREASES ON MOVERS' PREMIUM CHANGES

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | Δ Premium Rate (subsequent policy) | | |
| Premium Rate Increase × Moved | -1.801*** | | | | |
| | (-20.19) | | | | |
| Premium Rate Increase | 0.191*** | -0.927*** | -0.926*** | 0.188*** | 0.336*** |
| | (33.42) | (-6.31) | (-9.86) | (32.81) | (72.52) |
| Moved | -0.032*** | | | | |
| | (-13.87) | | | | |
| Previous Premium Rate | -0.008*** | -0.343*** | -0.298*** | -0.008*** | -0.009*** |
| | (-3.61) | (-21.42) | (-33.90) | (-3.61) | (-6.68) |
| Credit Score/1k before Renewal | -0.043*** | -0.133*** | -0.121*** | -0.042*** | -0.036*** |
| | (-33.98) | (-3.96) | (-5.13) | (-35.07) | (-45.85) |
| Climate Risk/1k | 0.271** | 0.433 | -1.944 | 0.252** | 0.053 |
| | (2.39) | (0.11) | (-0.64) | (2.27) | (0.73) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | Sep–Jan | Movers | Movers | Stayers | Stayers |
| ZIP-by-Renewal Month FE | Y | Y | | Y | |
| ZIP FE | | | Y | | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | | Y | |
| Climate Risk Bin-by-Renewal Year FE | | | Y | | Y |
| Orig: Yr, CreditScore, LTV, DTI FE | Y | Y | Y | Y | Y |
| Y Mean | 0.012 | -0.062 | -0.064 | 0.013 | 0.012 |
| Y SD | 0.092 | 0.216 | 0.221 | 0.091 | 0.091 |
| X Mean | 0.024 | 0.023 | 0.023 | 0.024 | 0.024 |
| X SD | 0.050 | 0.040 | 0.041 | 0.050 | 0.049 |
| N | 9,722,926 | 39,464 | 55,784 | 9,663,933 | 26,395,463 |
| Kleibergen-Paap Wald F stat | 3,375 | 702 | 1,293 | 30,552 | 29,733 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents the effect of premium rate increases on mover outcomes, presenting the second-stage results. The dependent variable is the change in premium rates from policy year $t$ to $t+1$, measured as the change from 12 months after the insurance renewal. The main independent variable is the increase in premium rate, i.e., change in premium as a percentage of the coverage limit. In Column (1), we use the full sample and we add an interaction term between the initial *Premium Rate Increase* and an indicator for moving within 12 months after renewal. In Columns (2)-(3), the sample is restricted to movers. In Columns (4)-(5), the sample is restricted to stayers. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the borrowers' old residence. We control for the following fixed effects in Column (1)-(3): mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Addtionally, we control for 5-digit old ZIP by insurance policy renewal month FE and climate risk bin by insurance policy renewal month FE in Column (1), (2), (4); 5-digit old ZIP FE and climate risk bin by insurance policy renewal year FE in Column (3) and (5). Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 9
EFFECT OF PREMIUMS ON OTHER MOVER OUTCOMES

| | (1) Δ Climate Risk × 1k | (2) Δ Premium Rate to New ZIP Avg | (3) 1(Switch Insurer) | (4) Δ to Ins-Other -ZIP Avg | (5) Δ Insurer HHI /1k |
|---|---|---|---|---|---|
| Premium Rate Increase | 0.141 | -0.827*** | 2.099*** | -0.053 | -0.262*** |
| | (1.04) | (-24.20) | (10.86) | (-0.58) | (-2.64) |
| Lag Premium Rate | -0.000 | -0.380*** | 0.001*** | -0.000 | 0.000 |
| | (-0.32) | (-92.65) | (9.36) | (-0.76) | (0.17) |
| Credit Score/1k before Renewal | -0.288*** | 0.044*** | -0.362*** | -0.007 | -0.082*** |
| | (-8.46) | (4.79) | (-6.61) | (-0.34) | (-3.42) |
| Climate Risk/1k | -1227.517*** | -1.609 | -7.244 | -3.248 | 2.551 |
| | (-121.89) | (-1.17) | (-1.12) | (-1.27) | (0.74) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | Movers | Movers | Movers | Movers | Movers |
| ZIP FE | Y | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Yr FE | Y | Y | Y | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y | Y | Y | Y |
| Y Mean | 0.146 | 0.057 | 0.549 | 0.010 | 0.039 |
| Y SD | 1.130 | 0.271 | 0.498 | 0.181 | 0.653 |
| X Mean | 0.026 | 0.026 | 0.024 | 0.023 | 0.024 |
| X SD | 0.050 | 0.049 | 0.044 | 0.044 | 0.047 |
| N | 351,305 | 347,579 | 57,371 | 58,209 | 326,361 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table examines whether larger insurance premium increases lead households to move to less risky locations. The dependent variable is the change in climate risk, defined as the difference between the average risk level in the destination ZIP code and the origin property-specific risk in Column (1); the change from their pre-moving premium rate to the average in their new ZIP code in (2); an indicator for insurer switching in (3); changes in insurers' average premium rates in other ZIP codes within the same state in (4); the change in insurer Herfindahl index (HHI) from the old to the new ZIPs in (5). The main dependent variable is the increase in premium rate, i.e., the change in premium as a percentage of the coverage limit. The sample is restricted to movers. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal and the standardized climate risk of the households' old residence. We also control for the following fixed effects (FE): 5-digit old ZIP FE, climate risk bin by insurance policy renewal year FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE 10

EXPLAINING THE RELATIONSHIP BETWEEN PRE-MOVE PREMIUM INCREASE AND POST-MOVE PREMIUM REDUCTION

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Δ Premium Rate (post-move) | | | | | |
| Premium Rate Increase | -0.926*** | -0.901*** | -0.374*** | -0.951*** | -0.900*** | -0.918*** |
| | (-9.86) | (-9.77) | (-4.76) | (-9.94) | (-10.36) | (-9.61) |
| Δ Climate Risk | | 39.786*** | | | | |
| | | (30.61) | | | | |
| Δ Premium Rate to New Zip Avg | | | 0.645*** | | | |
| | | | (95.47) | | | |
| 1(Switch Insurer) | | | | 0.011*** | | |
| | | | | (5.67) | | |
| Δ to Ins-Other-Zip Avg | | | | | 0.494*** | |
| | | | | | (77.67) | |
| Δ Insurer HHI/1000 | | | | | | 0.042*** |
| | | | | | | (12.57) |
| Lag Premium Rate | -0.298*** | -0.300*** | -0.066*** | -0.298*** | -0.280*** | -0.298*** |
| | (-33.90) | (-33.59) | (-14.44) | (-33.89) | (-33.13) | (-33.56) |
| Credit Score/1k before Renewal | -0.121*** | -0.123*** | -0.212*** | -0.117*** | -0.103*** | -0.116*** |
| | (-5.13) | (-5.28) | (-11.89) | (-4.97) | (-4.71) | (-4.91) |
| Climate Risk/1k | -1.944 | 45.353*** | 0.835 | -1.893 | -0.127 | -1.722 |
| | (-0.64) | (11.68) | (0.37) | (-0.62) | (-0.05) | (-0.56) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | Movers | Movers | Movers | Movers | Movers | Movers |
| Zip FE | Y | Y | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Yr FE | Y | Y | Y | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y | Y | Y | Y |
| Y Mean | -0.064 | -0.064 | -0.064 | -0.064 | -0.064 | -0.063 |
| Y SD | 0.221 | 0.220 | 0.220 | 0.221 | 0.221 | 0.221 |
| X Mean | 0.023 | 0.023 | 0.023 | 0.023 | 0.023 | 0.022 |
| X SD | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| N | 55,784 | 55,133 | 55,580 | 55,783 | 55,756 | 55,432 |
| Kleibergen-Paap Wald F stat | 1,293 | 1,275 | 1,227 | 1,255 | 1,293 | 1,263 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).

This table examines what explains the larger post-moving premium savings for movers experiencing larger pre-moving premium increases. The dependent variable is the change in premium rates from policy year $t$ to $t+1$. The main independent variable is the increase in premium rate, i.e., change in premium as a percentage of the coverage limit. The sample is restricted to the movers. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the borrowers' old residence in Columns (1)-(6). Addtionally, we control for movers' pre-to-post change in their climate risk exposure in Column (2), changes from their pre-moving premium rate to their post-moving ZIP-average premium rate in Column (3), an indicator for whether the mover also switched insurers in Column (4), changes in insurers' average premium rates in other ZIP codes within the same state in Column (5) and the change in insurer concentration, measured by the Herfindahl-Hirschman Index (HHI), from the mover's old to new ZIP codes in Column (6). We also control for the following fixed effects (FE): 5-digit old ZIP FE, climate risk bin by insurance policy renewal year FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit

TABLE 11
THE EFFECT OF INSURANCE PREMIUM INCREASES ON BUYER CORPORATE INDICATOR

| | (1) Corporate Buyer | (2) Prem Rate Increase | (3) Corporate Buyer | (4) Prem Rate Increase | (5) Corporate Buyer |
|---|---|---|---|---|---|
| Premium Rate Increase | 0.041*** | | 0.028** | | 0.007 |
| | (6.49) | | (2.03) | | (0.34) |
| Insurer Other-Zip Avg Prem Increase | | 0.969*** | | | |
| | | (172.84) | | | |
| Insurer Far-Zip Avg Prem Increase (residualized) | | | | 0.763*** | |
| | | | | (106.01) | |
| Lagged / Previous Premium Rate | 0.013 | 0.005 | 0.012 | 0.007 | 0.011 |
| | (1.54) | (1.42) | (1.35) | (1.28) | (1.21) |
| Credit Score before Renewal | -0.307*** | -0.059*** | -0.302*** | -0.061*** | -0.298*** |
| | (-51.39) | (-35.13) | (-48.29) | (-27.23) | (-43.64) |
| Climate Risk | 0.002*** | 0.001*** | 0.002*** | 0.000*** | 0.002*** |
| | (4.38) | (4.19) | (3.60) | (3.28) | (2.84) |
| OLS/2SLS Stage | OLS | 1st Stage | 2nd Stage | 1st Stage | 2nd Stage |
| Sample | Buyers | Buyers | Buyers | Buyers | Buyers |
| Zip FE | Y | Y | Y | Y | Y |
| Climate Risk Bin-by-Year FE | Y | Y | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y | Y | Y |
| Y Mean | 0.073 | 0.029 | 0.072 | 0.028 | 0.074 |
| Y SD | 0.260 | 0.056 | 0.258 | 0.056 | 0.262 |
| X Mean | 0.030 | -0.001 | 0.029 | 0.000 | 0.028 |
| X SD | 0.060 | 0.029 | 0.056 | 0.021 | 0.056 |
| N | 1,239,487 | 1,112,295 | 1,112,295 | 924,035 | 924,035 |
| Kleibergen-Paap Wald F stat | | | 29,872.447 | | 11,238.296 |

NOTES: Source: ICE McDash, Equifax Credit Risks Insight Servicing (CRISM), and CoreLogic.
This table presents results analyzing the effect of premium increases on whether buyers of transacted homes are corporate buyers, as indicated in CoreLogic data. The dependent variable is an indicator for whether the buyer is a corporate buyer or not in Columns (1), (3), and (5). The dependent variable is *Premium Rate Increase* in Columns (2) and (4). Column (1) presents OLS estimates, while Columns (2) and (4) present the first-stage result and Columns (3) and (5) present the second-stage of the instrumental variable regression. Columns (2) and (3) use an earlier version of our instrument that uses all other ZIPs in the same state without residualization. Columns (4)-(5) repeat the analysis using the main instrument in this current version. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the borrowers' old residence. We also control for the following fixed effects (FE): 5-digit ZIP, climate risk bin by insurance policy renewal year FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

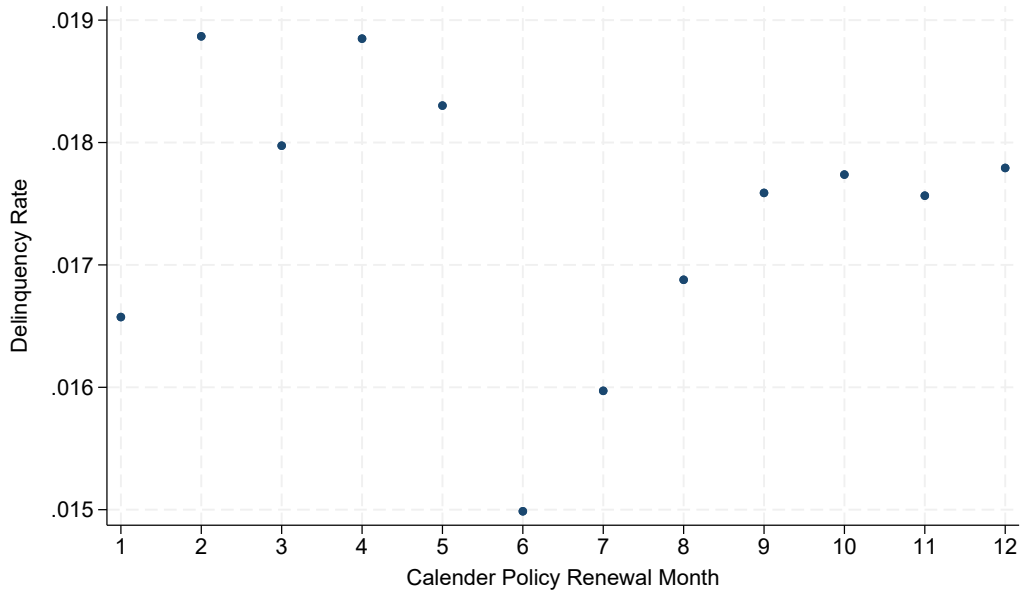
TABLE 12
THE EFFECT OF CORPORATE BUYERS ON INSURANCE OUTCOMES AND CASH PURCHASE

| | (1) Δ Prem Rate | (2) Δ log Premium | (3) Cash Purchase |
|---|---|---|---|
| Corporate | -0.011*** | -0.040*** | 0.480*** |
| | (-2.83) | (-4.02) | (32.94) |
| Climate Risk | -0.001 | 0.002 | 0.005*** |
| | (-0.79) | (0.88) | (3.42) |
| Sample | Buyers | Buyers | Buyers |
| Zip FE | Y | Y | Y |
| Climate Risk Bin-by-Year FE | Y | Y | Y |
| Orig: Yr Credit score LTV DTI FE | Y | Y | Y |
| Y Mean | -0.050 | -0.038 | 0.168 |
| Y SD | 0.214 | 0.447 | 0.374 |
| X Mean | 0.027 | 0.027 | 0.030 |
| X SD | 0.054 | 0.054 | 0.061 |
| N | 394,699 | 395,282 | 1,551,270 |

NOTES: Source: ICE McDash, Equifax Credit Risks Insight Servicing (CRISM), and CoreLogic.
This table examines whether corporate buyers make different insurance choices. The dependent variable measures the change from the previous owner to the buyer in the premium rate in Column (1) and in log premiums in Column (2). The dependent variable is an indicator for using cash to purchase the property in Column (3). The main independent variable is an indicator for whether the buyer is a corporate buyer or not. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of borrowers' old residence. We also control for the following fixed effects (FE): 5-digit ZIP, climate risk bin by insurance policy renewal year FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

**FIGURE A1**

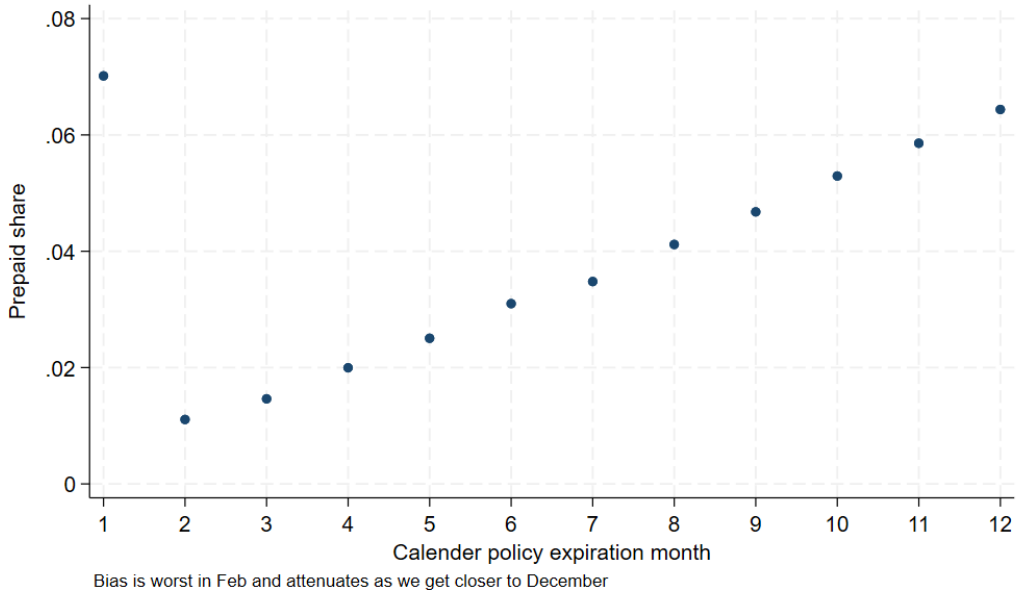
SHARE OF DELINQUENT MORTGAGES REPORTED BY INSURANCE RENEWAL MONTH




NOTES: Source: ICE McDash.
This figure plots the share of mortgages that are delinquent reported by the calendar month of the insurance policy expiration date.

**FIGURE A2**

PROBABILITIES OF MORTGAGE PREPAYMENT REPORTED BY INSURANCE RENEWAL MONTH




NOTES: Source: ICE McDash and CRISM.
This figure plots the share of mortgages that are prepaid by the calendar month of the insurance policy expiration date.

TABLE A1
RESIDUALIZING THE INSTRUMENTAL VARIABLE

| | (1)<br>Insurer Far-ZIP Avg Prem Rate Increase |
|---|---|
| 12-Month Lag Insurer Far-ZIP Avg Prem Rate Increase | 0.564*** |
| | (0.000) |
| 24-Month Lag Insurer Far-ZIP Avg Prem Rate Increase | 0.234*** |
| | (0.000) |
| Renewal Month FE | Yes |
| Y Mean | 0.033 |
| Y SD | 0.040 |
| N | 15358133 |
| R-squared | 0.457 |

NOTES: Source: ICE McDash.
This table presents the regression used to residualize the initial values of the instrumental variable. The dependent variable is $\Delta$ *Insurer Far-ZIP Avg Prem Rate*. The independent variables are its 12-month and 24-month lagged values. We also include month fixed effects. ***p<0.01, **p<0.05, *p<0.1.

TABLE A2
CONTROLLING FOR INSURER-YEAR OR INSURER-STATE-YEAR FIXED EFFECTS

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | 60-Day Delinquency | | Moved | |
| Premium Rate Increase | 0.033*** | 0.035*** | 0.020*** | 0.020*** |
| | (51.32) | (51.53) | (19.73) | (18.43) |
| Previous Premium Rate | 0.000 | 0.000 | -0.000* | -0.000* |
| | (1.62) | (1.62) | (-1.78) | (-1.74) |
| Credit Score/1k before Renewal | -0.366*** | -0.366*** | 0.018*** | 0.018*** |
| | (-253.95) | (-253.90) | (20.76) | (20.53) |
| Climate Risk (standardized)/1k | 0.202*** | 0.206*** | -0.869*** | -0.859*** |
| | (4.12) | (4.20) | (-5.75) | (-5.69) |
| Sample | All | All | Sep-Jan | Sep-Jan |
| Insurer-Year FE | Y | | Y | |
| Insurer-State-Year FE | | Y | | Y |
| Zip-by-Renewal Month FE | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y | Y |
| Y Mean | 0.017 | 0.017 | 0.033 | 0.033 |
| X Mean | 0.026 | 0.026 | 0.026 | 0.026 |
| X SD | 0.055 | 0.055 | 0.055 | 0.055 |
| N | 46,595,814 | 46,592,884 | 15,331,018 | 15,328,562 |

NOTES: Source: ICE McDash.
This table presents the effect of premium increases on mortgage delinquencies and relocation probability. The dependent variable is an indicator of whether the household is delinquent on the mortgage for at least 60 days within the 12 months after insurance policy renewal in Column (1)-(2) and an indicator for whether the household relocates in Columns (3)-(4). The main independent variable is the increase in premium rate, i.e., change in premium as a percentage of the coverage limit. We use the full sample in Column (1)-(2) while restrict the sample to borrowers whose home insurance renews between September and January in Column (3)-(4). We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. In addition, we control for insurer by insurance policy renewal year FE in Column (1) and (3). We control for insurer by state by insurance policy renewal year FE in Column (2) and (4). Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A3
EFFECT OF PREMIUM INCREASES ON PROBABILITY OF CHANGING INSURER

| | (1)<br>1(Switch Insurer at Renewal) |
|---|---|
| Insurer Far-ZIP Avg Prem Increase | 0.302***<br>(0.003) |
| OLS/2SLS Stage | OLS |
| Sample | All |
| Renewal Month FE | No |
| ZIP FE | No |
| ZIP-by-Renewal Month FE | Yes |
| Climate Risk Bin FE | No |
| Climate Risk Bin-by-Renewal Month FE | Yes |
| Orig: Yr & FICO & LTV & DTI FE | Yes |
| Y Mean | 0.023 |
| Y SD | 0.151 |
| X Mean | -0.001 |
| X SD | 0.021 |
| N | 43522948 |
| R-squared | 0.038 |

NOTES: Source: ICE McDash.
This table presents results testing whether households are more likely to switch insurers when their previous insurers increase premiums. We use the instrumental variable as the independent variable. The dependent variable is an indicator of whether the switch-insurer occurs in policy year $t$, measured at the same time as the independent variable. The main independent variable is the instrument constructed in policy year $t$. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A4

DELINQUENCY EFFECT WHEN HOUSEHOLDS ARE ATTENTIVE TO PREMIUM CHANGES

| | 60-day Delinquent |
|---|---|
| Premium Rate Increase | 0.031*** |
| | (27.19) |
| Lag Premium Rate | 0.000* |
| | (1.80) |
| Credit Score/1k before Renewal | -0.356*** |
| | (-156.73) |
| Climate Risk (standardized)/1k | 0.126 |
| | (1.05) |
| OLS/2SLS Stage | OLS |
| Sample | Attentive |
| ZIP-by-Renewal Month FE | Y |
| Climate Risk Bin-by-Renewal Month FE | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y |
| Y Mean | 0.017 |
| X Mean | 0.032 |
| X SD | 0.072 |
| N | 6,386,113 |

NOTES: Source: ICE McDash.

This table presents results testing whether the effect of premium increases on mortgage delinquency exists among households that were likely attentive to premium changes—specifically, those that switched insurers, adjusted their deductible percentages, or changed between Replacement Cost Value and Actual Cash Value coverage around the time of the premium increase. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residences. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A5
DELINQUENCY EFFECT AND RECENT DISASTERS

| | (1) | (2) | (3) |
|---|---|---|---|
| | 60-Day Mortgage Delinquency | | |
| Premium Rate Increase | 0.024*** | 0.014*** | 0.013*** |
| | (6.73) | (6.71) | (6.49) |
| Premium Rate Increase × Disaster | | | 0.013*** |
| | | | (3.08) |
| Lag Premium Rate | -0.000 | 0.001*** | 0.000*** |
| | (-0.82) | (3.69) | (4.38) |
| Credit Score/1k before Renewal | -0.376*** | -0.350*** | -0.357*** |
| | (-147.18) | (-200.10) | (-231.00) |
| Climate Risk (standardized)/1k | 0.222* | 0.163*** | 0.172*** |
| | (1.96) | (2.65) | (3.08) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | Disaster | No Disaster | All |
| Zip-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y |
| Y Mean | 0.020 | 0.016 | 0.017 |
| X Mean | 0.028 | 0.023 | 0.024 |
| X SD | 0.057 | 0.048 | 0.050 |
| N | 8,479,740 | 26,194,121 | 34,673,862 |
| Kleibergen-Paap Wald F stat | 9,422 | 32,193 | 4,658 |

NOTES: Source: ICE McDash and First Street.
This table presents results testing whether the effect of premium increases on mortgage delinquency are driven by borrowers who experience recent disasters. The dependent variable is an indicator of whether the household is delinquent on the mortgage for at least 60 days within the 12 months after insurance policy renewal. The main independent variable is the change in premium as a percentage of the coverage limit. Column (1) uses households in zip codes that experienced natural disasters within the current calendar year or preceding two years according to First Street Foundation's Climate Data. Column (2) uses households in the remaining non-disaster-affected zip codes. Columns (3) uses the full sample. We add an indicator for recently disaster-affected zip codes and its interaction term with *Premium Rate Increase* in Column (3). We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A6
EFFECT OF INSURER SWITCHING ON PREMIUM RATE CHANGES

| | Δ Premium Rate (Subsequent) | |
|---|---|---|
| | (1) | (2) |
| 1(Switch Ins.) | -0.028*** | -0.007*** |
| | (-85.91) | (-38.65) |
| Premium Rate Increase × 1(Switch Ins.) | | -0.543*** |
| | | (-139.77) |
| Premium Rate Increase | 0.053*** | 0.133*** |
| | (33.76) | (69.34) |
| Lag Premium Rate | -0.000 | -0.000 |
| | (-1.41) | (-1.41) |
| Credit Score/1k before Renewal | -0.037*** | -0.036*** |
| | (-98.73) | (-99.33) |
| Climate Risk (standardized)/1k | 0.154*** | 0.134*** |
| | (3.15) | (2.76) |
| OLS/2SLS Stage | OLS | OLS |
| Sample | All | All |
| ZIP-by-Renewal Month FE | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y |
| Orig: Yr, FICO, LTV, DTI FE | Y | Y |
| Y Mean | 0.013 | 0.013 |
| Y SD | 0.073 | 0.073 |
| N | 33,726,543 | 33,726,543 |

NOTES: Source: McDash and Corelogic.
This table presents results examining how premiums evolve following insurer switching using OLS estimation. The dependent variable is the change in premium rate from policy year *t* to *t+1*. 1(Switch Ins.) is an indicator of whether the household switches insurers between *t* and *t+1*. *Premium Rate Increase* is measured as the change (with a floor of 0) from *t-1* to *t*. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, and credit score bin FE. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A7
RELOCATION EFFECT AND RECENT DISASTERS

| | (1) | (2) Moved | (3) |
|---|---|---|---|
| Premium Rate Increase | 0.026*** | 0.017*** | 0.026*** |
| | (20.81) | (9.49) | (20.92) |
| Prem Rate Increase × Disaster | | | -0.009*** |
| | | | (-4.33) |
| Lag Premium Rate | -0.000* | -0.000 | -0.000* |
| | (-1.71) | (-0.69) | (-1.79) |
| Credit Score/1k before Renewal | 0.019*** | 0.019*** | 0.019*** |
| | (19.60) | (10.92) | (22.33) |
| Climate Risk/1k | -0.976*** | -0.786*** | -0.915*** |
| | (-5.53) | (-2.72) | (-6.00) |
| Sample | Sep-Jan No Disaster | Sep-Jan Disaster | Sep-Jan |
| Zip-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr, FICO, LTV, DTI FE | Y | Y | Y |
| Y Mean | 0.032 | 0.034 | 0.033 |
| X Mean | 0.024 | 0.031 | 0.026 |
| X SD | 0.050 | 0.064 | 0.054 |
| N | 11,744,357 | 3,434,131 | 15,178,489 |

NOTES: Source: ICE McDash and First Street.
This table presents results testing whether the effect of premium increases on relocation probability are driven by borrowers who experience recent disasters. The dependent variable is an indicator for whether the household relocates. The main independent variable is the change in premium as a percentage of the coverage limit. We restrict the sample to borrowers whose home insurance renews between September and January. Column (1) uses households in zip codes that experienced natural disasters within the current calendar year or preceding two years according to First Street Foundation's Climate Data within the restricted sample. Column (2) uses households in the remaining non-disaster-affected zip codes within the restricted sample. Columns (3) uses the full restricted sample. We add an indicator for recently disaster-affected zip codes and its interaction term with *Premium Rate Increase* in Column (3). We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A8
THE EFFECT OF PREMIUM INCREASES ON MORTGAGE PREPAYMENT WITHOUT MOVING

| | (1) Prepay Mtg w/o Moving | (2) Premium Rate Increase | (3) Prepay Mtg w/o Moving |
|---|---|---|---|
| Premium Rate Increase | 0.011*** | | 0.010** |
| | (11.44) | | (2.43) |
| Insurer Far-ZIP Avg Prem Increase (residualized) | | 0.748*** | |
| | | (170.67) | |
| Lag Premium Rate | -0.000* | 0.005*** | -0.001*** |
| | (-1.92) | (3.59) | (-3.59) |
| Credit Score/1k before Renewal | 0.061*** | -0.041*** | 0.063*** |
| | (75.22) | (-55.98) | (63.28) |
| Climate Risk/1k | 0.224* | 0.223*** | 0.413** |
| | (1.70) | (2.93) | (2.48) |
| OLS/2SLS Stage | OLS | 1st Stage | 2nd Stage |
| Sample | Sep-Jan | Sep-Jan | Sep-Jan |
| ZIP-by-Renewal Month FE | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y |
| Orig: Yr & FICO & LTV & DTI FE | Y | Y | Y |
| Y Mean | 0.032 | 0.025 | 0.033 |
| Y SD | 0.176 | 0.051 | 0.178 |
| X Mean | 0.026 | -0.001 | 0.025 |
| X SD | 0.055 | 0.021 | 0.051 |
| N | 15331083 | 10955113 | 10955113 |
| Kleibergen-Paap Wald F stat | | | 29129 |

NOTES: Source: ICE McDash and Equifax Credit Risks Insight Servicing (CRISM).
This table presents the effect of premium rate increases on the probability of prepaying mortgage without relocation. The dependent variable is an indicator for whether the household paid off mortgage without relocating in Columns (1) and (3), and premium rate increase in (2). Columns (1) presents OLS estimates. The main independent variable is the increase in premium rate, i.e., change in premium as a percentage of the coverage limit. Column (2) presents the first stage of an instrumental variable regression, while Column (3) presents the corresponding second stage. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit ZIP by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the ZIP code level. ***p<0.01, **p<0.05, *p<0.1.

TABLE A9
THE EFFECT OF PREMIUM INCREASES ON INSURANCE TAKE-UP USING ACS DATA

| | (1) Δ Insured % | (2) Δ Insured % | (3) Premium Rate Increase | (4) Δ Insured % |
|---|---|---|---|---|
| Premium Rate Increase | -27.150** | -20.483* | | -49.987** |
| (county avg) | (-2.07) | (-1.69) | | (-2.20) |
| Insurer Other-County Avg | | | 1.229*** | |
| Premium Rate Increase (residualized) | | | (15.56) | |
| Median Household Income | -0.000 | -0.000 | -0.000 | -0.000 |
| | (-0.77) | (-0.03) | (-1.14) | (-0.83) |
| Median Age | 0.074* | 0.063 | 0.000 | 0.078* |
| | (1.79) | (1.13) | (1.65) | (1.89) |
| Median Rent | 0.001 | 0.003* | 0.000 | 0.001 |
| | (1.31) | (1.67) | (0.22) | (1.39) |
| Median Home Value | -0.000 | -0.000 | -0.000*** | -0.000 |
| | (-0.88) | (-0.92) | (-2.67) | (-1.07) |
| Median Home Year Built | -0.010 | -0.053** | -0.000* | -0.013 |
| | (-0.59) | (-2.27) | (-1.90) | (-0.74) |
| Share with Bachelor | 0.000 | -0.000 | 0.000 | 0.000 |
| | (0.47) | (-0.83) | (0.42) | (0.56) |
| OLS/2SLS Stage | OLS | OLS | 1st Stage | 2nd Stage |
| Location FE | CSA | Border | CSA | CSA |
| Y Mean | -0.761 | -0.770 | 0.047 | -0.761 |
| Y SD | 2.657 | 2.746 | 0.036 | 2.657 |
| X Mean | 0.065 | 0.060 | -0.004 | 0.047 |
| X SD | 0.035 | 0.030 | 0.020 | 0.036 |
| N | 602 | 314 | 602 | 602 |
| Cragg-Donald Wald F statistic | | | | 242 |

NOTES: Source: ICE McDash and ACS.
This table presents the effect of premium rate increases on changes in insurance take-up from 2023 to 2024 in ACS. The dependent variable is the change in insured share from 2023 to 2024 in Column (1), (2) and (4), and premium rate increase in Column (3). We identify households as uninsured if they report insurance premiums as missing or less than $100. Columns (1)-(2) present OLS estimates. The main independent variable is *Premium Rate Increase*, which is changes in county-level average premium rates from 2022 to 2023. Column (3) presents the first stage of an instrumental variable regression, while Column (4) presents the corresponding second stage. We include county-level controls and Combined Statistical Area (CSA) fixed effects in Column (1), (3) and (4). We include county-level controls and state border fixed effects, restricting the sample to border counties in Column (2). ***p<0.01, **p<0.05, *p<0.1.

TABLE A10
MORTGAGE DELINQUENCY EFFECT ACROSS INVESTOR TYPES

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | | 60-Day Mortgage Delinquency | | | |
| Premium Rate Increase | 0.016*** | 0.013*** | 0.008*** | 0.042 | 0.025*** | 0.013*** | 0.009*** |
| | (3.01) | (5.47) | (3.03) | (1.16) | (3.45) | (3.08) | (5.20) |
| Lag Premium Rate | 0.003*** | 0.000 | 0.000 | 0.007*** | 0.000** | -0.000 | 0.000*** |
| | (3.59) | (0.81) | (1.12) | (3.88) | (2.25) | (-0.52) | (3.48) |
| Credit Score/1k before Renewal | -0.436*** | -0.247*** | -0.229*** | -0.364*** | -0.483*** | -0.340*** | -0.228*** |
| | (-203.45) | (-163.76) | (-161.34) | (-48.59) | (-82.90) | (-142.17) | (-211.19) |
| Climate Risk (standardized)/1k | 0.141 | 0.155* | 0.161* | 0.575 | -0.096 | 0.281 | 0.172*** |
| | (0.73) | (1.92) | (1.93) | (0.88) | (-0.55) | (1.55) | (3.19) |
| OLS/2SLS Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage | 2nd Stage |
| Sample | GNMA | FNMA | FHLMC | Private Securitized | Portfolio | Cnvtnl w/ PMI | Cnvtnl w/o PMI |
| Zip-by-Renewal Month FE | Y | Y | Y | Y | Y | Y | Y |
| Climate Risk Bin-by-Renewal Month FE | Y | Y | Y | Y | Y | Y | Y |
| Orig: Yr, Credit score, LTV, DTI FE | Y | Y | Y | Y | Y | Y | Y |
| Y Mean | 0.030 | 0.012 | 0.010 | 0.025 | 0.021 | 0.018 | 0.010 |
| X Mean | 0.030 | 0.023 | 0.023 | 0.021 | 0.021 | 0.028 | 0.022 |
| X SD | 0.058 | 0.048 | 0.048 | 0.048 | 0.047 | 0.054 | 0.046 |
| N | 5,816,823 | 13,209,190 | 10,773,704 | 336,078 | 3,151,520 | 5,071,381 | 22,932,931 |

NOTES: Source: ICE McDash.
This table presents the effect premium increases on mortgage delinquency across investor types. The dependent variable is an indicator of whether the household is delinquent on the mortgage for at least 60 days within the 12 months after insurance policy renewal. The main independent variable is the change in premium as a percentage of the coverage limit. We use mortgages guaranteed by Ginnie Mae in Column (1), by Fannie Mae in (2), by Freddie Mac in (3), private mortgages that are securitized in (4), and those that remain in banks' portfolios in (5). In Columns (6) and (7), we further split conventional mortgages by whether they have private mortgage insurance or not, i.e., whether the GSEs are ultimately exposed to credit risks. We control for the borrower's credit risk score in the month prior to the insurance renewal, the premium rate before the renewal, and the standardized climate risk of the households' residence. We also control for the following fixed effects (FE): 5-digit zip by insurance policy renewal month FE, climate risk bin by insurance policy renewal month FE, mortgage origination year FE, LTV bin FE, DTI bin FE, credit score bin FE. Standard errors are corrected for clustering at the zip code level. ***p<0.01, **p<0.05, *p<0.1.