

Wind Hail Insurance Market Incentives Study

Final Report

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Wind Hail Insurance Market Incentives Study

Executive Summary

Texas A&M University of Galveston (TAMUG) was contracted by the Texas Department of Insurance (TDI) to conduct a study of market incentives for writing windstorm and hail insurance in the 14 first tier coastal counties of Texas and parts of Harris County. The study was conducted in accordance with Texas Insurance Code Section 2210.015.

Broadly, the study included a voluntary survey of insurers, aggregate analyses of homeowners insurance market performance, and analyses of state residual market mechanisms. Highlights of the study and its results are summarized below.

Insurer Survey

The voluntary survey consisted of two stages: online surveys of residential and commercial property insurers; and interviews of selected insurers for deeper understanding about significant aspects identified in the first stage.

Preliminary Analysis – State of the Homeowners Insurance Market

TAMUG performed an analysis of homeowners insurance market dynamics in the Texas coastal area, using company-specific secondary data from 2010-2020 with the aim of profiling companies by their exposure growth patterns. The analysis helped ensure that companies selected for interviews were a good representation of the market. Key summaries are below:

- The number of private companies writing homeowners policies has been increasing steadily in all coastal territories (Tier 1, Tier 2, and parts of Harris County outside Tier 1).
 - 249 companies corresponding to 99 groups have written at some point during this decade.
 - On average, 149 (of which 138 provided wind and hail coverage) companies wrote homeowners insurance in Tier 1; 154 wrote in Tier 2; and 155 wrote in Harris County.
- The total amount of inflation-adjusted homeowners exposure, premiums, and policies written that included wind and hail coverage have all been trending upward, thereby **indicating overall expansion of the private insurance market** from 2010 to 2020.
 - Exposure increased an estimated 45% in all coastal territories and 88% in Tier 1.
 - Policy counts and premiums in Tier 1 rose approximately 53% and 54%, respectively.
 - Using company specific data, we estimated that the overall upward trend of policy counts and premiums was not statistically significant. This **indicates that that the market expansion was likely driven by the increasing number of companies, rather than by the growth within a company on average.**
- At the company-level, there were significant fluctuations in exposure in Tier 1.
 - We identified 41 insurers that wrote policies with wind and hail coverage throughout 2010-2020. **TWIA depopulation does not seem to have affected**

these companies' market share; rather, the depopulated risks are being picked up by new companies entering the market.

- Only eight insurers wrote wind-only policies for the voluntary market.
- Overall, among insurers that wrote policies with wind and hail coverage, 52% experienced long-term decline (from 2010 to 2020) in exposure in Tier 1 while the rest collectively experienced explosive growth.

Survey Administration

The voluntary survey was widely distributed. Fifty-five residential insurers and 45 commercial property insurers responded. Of the residential insurers, 53% wrote policies with wind and hail in Tier 1, 18% wrote in Tier 1 without wind and hail, and 29% did not write in Tier 1 at all. Of the commercial insurers, 33% wrote policies with wind and hail in Tier 1, 22% wrote in Tier 1 without wind and hail, and 47% did not write in Tier 1 at all.

Survey Results: Homeowners Market Incentives for Writing Wind and Hail in Tier 1

- Insurers writing homeowners policies in Tier 1, on average, selected more incentives options than insurers not writing in Tier 1.
- The three most selected incentives were:
 - The insurer charging rates that it believes are actuarially sound in Tier 1
 - Reduce reinsurance costs or improve accessibility to reinsurance
 - Create a statutory backstop to reinsure wind/hail losses above a specified amount
- The proportion of insurers preferring those three incentives options was significantly higher for the insurers writing in Tier 1 compared to the insurers not writing in Tier 1.
- A significantly higher proportion of insurers not writing in Tier 1 indicated that “[t]here does not exist an incentive(s) that will prompt us to write windstorm/hail insurance,” compared to those insurers who wrote in Tier 1.
- If their preferred incentives existed, insurers currently writing wind and hail would increase Tier 1 exposure by 25%, on average.

Survey Results: Incentives for the Commercial Market

- The four most selected incentives were:
 - Improve and enforce building codes, standards, and construction requirements
 - The insurer charging rates that it believes are actuarially sound in Tier 1
 - Mandate higher deductibles / Expand use of wind/hail deductibles
 - Fewer or no restrictions on underwriting guidelines
- 53% of insurers indicated that “There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance”.
- If their preferred incentives existed, insurers that write wind and hail in Tier 1 indicated they would increase Tier 1 exposure by 17%, on average.

Survey Results: General Concerns

Companies identified concerns that prompted them to make market adjustments in the past, including:

- Expected loss and loss adjustment expenses
- (In)ability to compete with TWIA rates

- Reinsurance accessibility and cost
- Volatility of wind and hail risk

Commercial property insurers also noted changes in their expertise in underwriting and claims.

Survey Results: Mandatory Writing or Increased Assessments

Insurers were asked to indicate whether certain scenarios would change how much they write in Tier 1 or in Texas. The hypothetical scenarios were:

1. All insurers required to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas
2. Wind and hail coverage required in every Tier 1 property policy
3. Increasing the amount of funding TWIA receives through assessments

Homeowners insurers:

- Scenario 1 - Overall, the responses indicated not much change would be expected
- Scenarios 2 and 3 - Would prompt reductions and complete exits from Tier 1 and Texas.

Commercial property insurers:

- Scenario 1 - Would prompt reductions and complete exits from Tier 1 and Texas.
- Scenarios 2 and 3 - Overall, the responses indicated not much change would be expected

Survey Results: TWIA and its Depopulation Programs

- While a majority of those that responded to the questions on TWIA did not perceive TWIA as a competitor, a majority also thought TWIA rates were inadequate and not higher than market rates.
- Companies that perceived TWIA as a competitor all wrote homeowners or commercial property policies with wind and hail coverage in Tier 1.
- Many respondents did not know what TWIA’s rates were.
- Most respondents indicated that there should not be changes in the TWIA assessment formula.
- Only one respondent (a homeowner insurer) participated in a TWIA depopulation program – the assumption reinsurance program.
- Comments on specific improvements to the depopulation programs related to adequate pricing, segmentation of risks in Tier 1, an assessment recoupment opportunity, and a formalized inspection process for wind mitigation.

Interview Results

Surveys were followed by interviews with 11 selected residential (7) and commercial (4) property insurers. Discussion topics broadly covered: (a) Underwriting philosophy in Texas; (b) Challenges in the Texas insurance market; (c) Insurance incentives in the Texas insurance market; and (d) Reasons for long-term company success. Findings are summarized below.

- Building codes and “poor” construction regulations were indicated as number one challenge in Texas. Insurers cannot reliably verify the quality of structural improvements and repairs because there are no certification requirements for repair companies in Texas.
- Environmental issues such as the 2021 winter storm, climate change, and increase in frequency and severity in catastrophic wind and hail events were another major concern across all insurers.

- Small residential carriers indicated an inability to compete with larger, national companies.
- All companies indicated rising reinsurance cost as another challenge.
- Residential property insurers attributed long term success to the regulatory environment in Texas.
- Commercial property insurers attributed their long-term success to improved modeling and geographic diversification.

Overall, commercial property insurers tend to take a conservative approach to writing new risks in coastal areas in response to estimated risk and reinsurance costs. In the residential market, large, national companies with diversified risk portfolios and sophisticated risk rating abilities at the individual property level appear better poised to underwrite policies with wind and hail coverage in Tier 1.

Aggregate ZIP Code Level Analyses

Statistical analyses of aggregate (ZIP code level) private market homeowners insurance policies with wind and hail coverage were performed. The objective was to understand how private insurance uptake correlates with ZIP code level socioeconomic, demographic, and hazard risk factors. Key findings of statistical regression results are summarized below:

- Policy uptake, exposure, and premiums, on average, increase in large ZIP codes as well as ZIP codes with a higher per capita income, percentage of females, or population educated with a bachelor's degree or higher.
- Demand for private insurance increases with recent hurricanes and storms.
- Insurance uptake is lower in ZIP codes with higher poverty and unemployment rates, and it declines in ZIP codes with high proportions of mobile homes (proxy for structurally poor-quality housing stock).
- More federally-funded hazard mitigation activities are associated with lower exposure and premiums per policy holders.

Similar relationships were found when analyzing the sample of only Tier 1 ZIP codes.

Analyses of Residual Market Mechanisms

State-level residual market mechanisms (RMM) in selected Atlantic and Gulf of Mexico states were reviewed for recent legislative and operational developments. Statistical analyses were performed to understand the dynamic evolution of RMMs in response to damaging storms and hail incidents, changes in economic and market forces, and depopulation efforts. In addition, interviews were performed with state regulators.

Summary of RMM Findings

- Windstorm and beach plan exposures and policy counts were found to be significantly lower in states with depopulation programs (FL, TX, LA) in the period 2013-2020 relative to states that lagged behind in terms of their depopulation advancements.

- Increasing frequencies of major landfalling hurricanes were associated with declining exposures (both total exposure and the exposure per policyholder) and rising premiums in a subsequent year.
- RMM total value of exposure and policy counts were found to rise with the growth of new building permits and the value of single-family development in coastal areas.
- RMM policy counts and exposure values increased in states with high unemployment rates while premiums declined, thereby supporting affordability considerations of RMM plans.
- The states in which RMMs experienced financial distress had higher policy counts, greater exposure to loss and higher total premiums, on average. Considering reverse causation – financial distress, in turn, depends on policy counts, exposure and premium – these effects should be taken with caution.
- Limited empirical evidence indicated that with a longer inactive period between major hurricanes, the RMM exposure grew and subsequently average premiums declined, suggesting likely risk adjustment of state residual programs during low storm activity periods.

Summary of Interviews with State Insurance Regulators

Interviews were conducted with coastal states besides Texas to understand how they manage residual insurance markets. Questions focused residual market history, depopulation efforts, and preparations for future conditions. Five states agreed to participate. A summary of interview findings is below:

- State regulators unanimously highlighted the impact of catastrophic storms on their residual insurance markets. In general, there is an influx of policies into residual and surplus markets following catastrophic losses as smaller companies withdraw or reduce their portfolios within the impacted area.
- Although most states expressed intentions to depopulate their residual markets, regulators generally attribute the total number of policies to the overall state of the market and recent catastrophic losses. In general, regulators feel that their residual markets are working as they should in times of need.
- Four of the five states maintain their residual market premiums above the local average market rate.
- Each state highlighted the importance of improved building codes (particularly roof designs) in reducing risk.
- Some concerns regarding future conditions centered around age of construction, slow implementation of newer building standards, and financial risk management through surplus and reinsurance.
- Some other successful depopulation strategies included assessments for not writing policies within the coastal areas, regulating deductibles and nonrenewal clauses, and maintaining an accurate policy database for efficient depopulation.

1. Introduction

Private insurers operating in a market exposed to property losses due to natural catastrophes face a fundamental dilemma of how to handle the host of interrelated problems that arise when dealing with such catastrophic risks (Jaffee and Russell, 1997). To address these concerns, insurers have sought to employ a more rigorous risk-modeling approach to adequately price policies, reduce their catastrophic exposure and avoid uninsurable losses, while further seeking various risk-diversification strategies, including reinsurance and financial markets.

Low probability-high consequence events are hard to insure because they increase the cost of insurance, ultimately potentially leading to such high prices that buyers are not willing to pay (Kousky, 2011). Furthermore, markets are constrained by various state regulatory mandates imposed on insurers in terms of pricing, policy terms, capital, and solvency (Kousky and Kunreuther, 2018). These regulations, while intended to increase the availability and affordability of insurance and protect insureds from insolvent insurers, are believed to substantially distort market incentives and undermine market responses to make appropriate adjustments and adequately manage catastrophic risk (Grace, Klein and Kleindorfer, 1999). Notably, regulatory restrictions have been complemented by state residual markets as the vehicle to supply affordable insurance in high-risk areas where private insurers are not willing to underwrite policies. These residual markets may create a suite of disincentives for private market developments; therefore, well-rationed depopulation strategies and/or general incentive mechanisms are important to encourage private insurers to assume more policies from state residual programs.

Texas A&M University of Galveston (TAMUG) was contracted by the Texas Department of Insurance (TDI) to conduct a study of market incentives for writing windstorm and hail insurance

in the 14 first tier coastal counties of Texas and parts of Harris County (collectively, Tier 1). The study was conducted in accordance with Texas Insurance Code Section 2210.015.

This report provides a comprehensive overview of the private insurance market and state-run residual market mechanisms (RMM) by employing both primary (through surveys and telephone interviews) and secondary data available from various state and national-level entities including TDI, Property Insurance Plans Service Office (PIPSO), National Association of Insurance Commissioners (NAIC), U.S. Census Bureau, National Oceanic and Atmospheric Association (NOAA), Federal Emergency Management Agency (FEMA) and more.

Specifically, in **Section 2**, focusing on residential insurers, we review private insurance market dynamics in Texas coastal territories over the recent decade (2010-2020). To contextualize the private market performance, we also investigate a few financial indicators of the Texas Windstorm Insurance Association (TWIA) during the same time period.

Section 3 describes primary data collection through an online survey to inform various incentives structures that would prompt private insurers to write more policies with wind and hail coverage in Tier 1. Our primary data collection included a two-stage process to gather feedback from Texas property insurers. As part of stage one, an online survey was administered in November and December 2021 for residential property carriers and in March and April 2022 for commercial property insurers. In addition to market incentives, the survey also aimed at understanding insurers' perception of TWIA, participation in and concerns associated with the two TWIA depopulation programs, and historical perspectives to inform reasons for market adjustments. The survey responses are summarized in **Section 3**. The section also covers stage two of the survey, entailing telephone interviews of selected insurers. The interviews were performed to provide more-in-depth understanding about the reasoning concerning several aspects identified

in the online survey. In addition, the interviews discussed various other aspects/issues that private insurers deem important in their risk-bearing capability against catastrophic disaster losses. Thematic analyses of the telephone interviews are summarized in Sections 3.3 and 3.5 for residential and commercial property carriers, respectively. In Section 3.6, we compare the survey results with those from the two prior rounds of surveys performed by TDI in 2016 and 2018, with our aim being to identify similarities and/or discrepancies in responses.

Section 4 provides aggregate level analyses employing ZIP code level data related to residential policies in Texas coastal territories and aims to understand overall association of various insurance indicators with socioeconomic and demographic features of ZIP codes, along with risk conditions and federal-level long-term hazard mitigation policy.

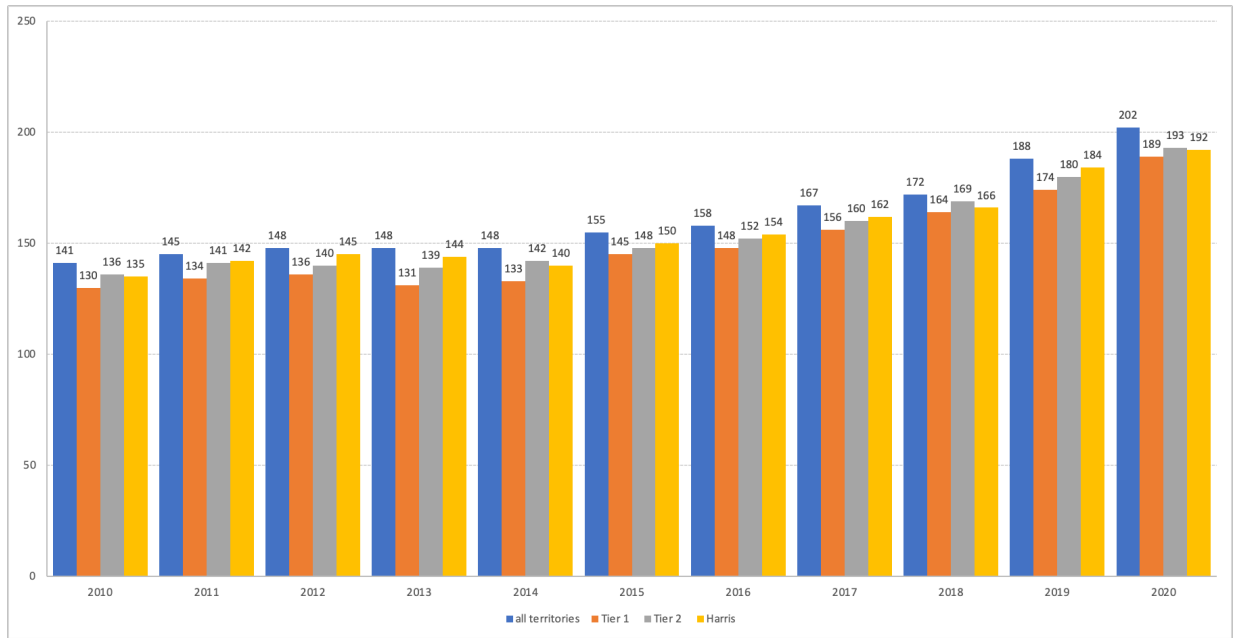
Last, **Section 5** comprehensively reviews RMMs in multiple Gulf and North-Atlantic States and further analyzes RMM performance as it relates to various state-level socioeconomic and risk conditions, along with depopulation initiatives. In this section, we also summarize data collected through telephone interviews with state regulators to gain a deeper understanding of challenges and opportunities faced by RMMs in different states, along with hearing regulators' perspectives for encouraging private market participation.

2. Overview of Private Insurance Market

In this section, private market dynamics of insurers writing homeowners policies in Texas Tier 1 (first tier coastal counties and parts of Harris County), Tier 2 (second tier coastal counties not including Harris County), and remaining parts of Harris County not included in Tier 1 are reviewed in the most recent 2010-2020 decade. In Figure 1, the numbers of insurers are presented for all three territories combined and each individual territory. These numbers include insurers that wrote policies both with and without wind and hail coverage. While within a territory certain ZIP codes were excluded from wind and hail coverage, 100% of the companies in Tier 2 and Harris County wrote policies with wind and hail coverage, and in Tier 1, on average, 93% of the companies wrote policies with wind and hail coverage (see Table 1).

As shown in Figure 1, over this decade, the number of companies has been increasing steadily in all territories. On average, 149 companies (including 138 that provided wind and hail coverage) wrote homeowners policies in Tier 1. The averages in Tier 2 and Harris County were 154 and 155, respectively, and the overall average in all territories combined was estimated at 161. We also note that a total of 249 companies corresponding to 99 groups have written in coastal territories at some point during this decade. In Table 2, we report the number of groups operating in these territories. In Table 3, we provide the number of stand-alone companies without any group affiliations.

Figure 1: Number of companies in all, Tier 1, Tier 2, and Harris County



Source: TDI; Authors' calculations

Table 1: Percent of companies writing policies that included wind and hail coverage

Year	all	Tier 1	Tier 2	Harris
2010	100%	96%	100%	100%
2011	100%	93%	100%	100%
2012	100%	89%	100%	100%
2013	99%	91%	100%	100%
2014	100%	92%	100%	100%
2015	100%	88%	100%	100%
2016	100%	88%	100%	100%
2017	100%	90%	100%	100%
2018	100%	96%	100%	100%
2019	99%	97%	100%	100%
2020	100%	97%	100%	100%

Source: TDI; Authors' calculations

Table 2: Number of groups

Year	all	Tier 1	Tier 2	Harris
2010	64	59	63	64
2011	62	59	62	61
2012	62	59	61	61
2013	62	57	61	60
2014	61	55	59	58
2015	59	56	58	58
2016	59	58	58	58
2017	64	63	63	63
2018	66	64	64	65
2019	70	67	68	68
2020	74	73	72	72

Source: TDI; Authors' calculations

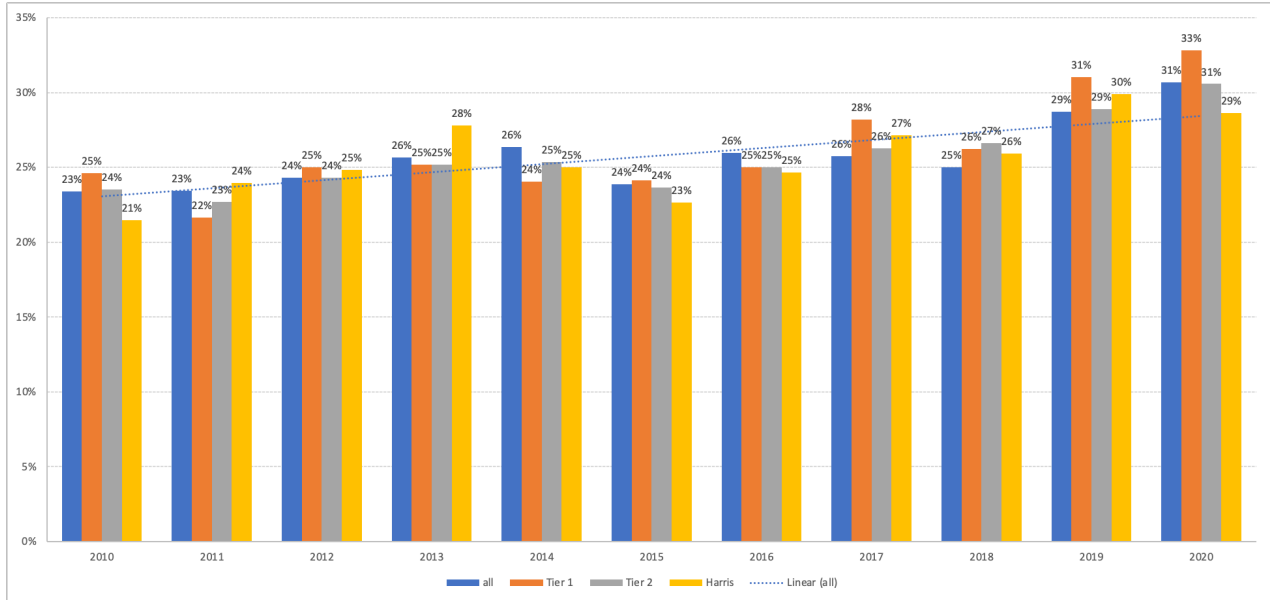
Table 3: Number of standalone companies without group-affiliations

Year	All	Tier 1 (all)	Tier 1 (hail & wind)	Tier 2	Harris
2010	13	10	10	12	13
2011	13	12	12	12	13
2012	14	13	9	12	14
2013	13	11	7	12	13
2014	13	12	7	12	13
2015	14	13	9	14	14
2016	16	16	12	16	16
2017	13	12	9	13	13
2018	14	13	12	14	12
2019	14	13	12	13	13
2020	15	14	14	14	14

Source: TDI; Authors' calculations

While overall growth has been upward trending, the percent of companies in any given year that wrote zero homeowners policies in coastal territories has also been increasing. As seen in Figure 2, on average over the 2010-2020, 26% of companies did not write policies in any of Tier 1, Tier 2, and Harris County.

Figure 2: Percent of companies (out of total) reporting zero homeowners policies



Source: TDI; Authors' calculations

Notably, the total amount of inflation-adjusted homeowners exposure (total amount of coverage for dwelling and content), premiums, and the number of policies written that included wind and hail coverage, have all been trending upward as well over the same time period, thereby indicating overall expansion of private insurance market. Specifically, decadal increase (difference between 2020 and 2010) in total exposure was estimated at 45% in all territories and 88% in Tier 1. Total policies and premiums in Tier 1 have risen by approximately 53% and 54%, respectively. Total exposure, policy counts, and premiums of homeowners policies that included wind and hail coverage, along with their distribution across Tier 1, Tier 2 and Harris County, are provided in Tables 4, 5, and 6, respectively.

Table 4: Exposure (\$B) and share

year	Total Exposure	Tier 1	Tier 2	Harris
2010	646	9.26%	23.53%	67.18%
2011	630	8.03%	23.97%	67.94%
2012	625	7.42%	24.48%	68.16%
2013	637	7.24%	24.80%	67.82%
2014	662	6.96%	25.98%	67.07%
2015	708	7.22%	26.69%	66.10%
2016	743	8.03%	26.65%	65.28%
2017	770	9.04%	26.62%	64.42%
2018	823	10.23%	26.25%	63.55%
2019	875	11.07%	26.17%	62.74%
2020	938	11.94%	26.23%	61.83%

Source: TDI; Authors' calculations

Table 5: Total number of HO policies (,000) and shares

year	all	Tier 1	Tier 2	Harris
2010	975	11.30%	25.05%	63.65%
2011	964	10.06%	25.58%	64.36%
2012	958	9.38%	26.09%	64.53%
2013	953	9.22%	26.75%	64.03%
2014	971	8.81%	27.86%	63.33%
2015	996	8.85%	28.67%	62.47%
2016	1,018	9.68%	28.69%	61.63%
2017	1,046	10.60%	28.64%	60.76%
2018	1,093	11.99%	28.09%	59.93%
2019	1,145	13.01%	28.13%	58.85%
2020	1,218	13.96%	27.96%	58.08%

Source: TDI; Authors' calculations

Table 6: Total Premiums on HO policies (\$B) and shares

year	All	Tier 1	Tier 2	Harris
2010	2.01	13%	22%	65%
2011	1.99	12%	23%	66%
2012	2.09	11%	23%	66%
2013	2.27	11%	24%	66%
2014	2.39	10%	25%	65%
2015	2.48	10%	25%	64%
2016	2.50	11%	26%	63%
2017	2.53	12%	26%	62%
2018	2.59	13%	26%	62%
2019	2.68	13%	26%	61%
2020	2.85	14%	25%	60%

Source: TDI; Authors' calculations

Upward trend in these indicators, in aggregate, could either be because more companies entered than exited the market annually (as seen by the growing number of companies operating in each of the territory annually), or it could also reflect growth at a company level. To explore the latter claim, we estimated multiple regression models in which dependent variables corresponded to company-specific exposure, policy counts and premiums at a ZIP code-level in a given year (all variables were log transformed to correct for skewness in the data). We regressed them on year-specific indicator variables, with the year 2010 being the omitted year serving as a reference year. The models included sets of company-, ZIP code-, and county-level dummy variables as a way of netting out various time invariant factors associated with the company, ZIP code or county that can potentially affect the private insurance market. Furthermore, we included year dummy variables interacted with county dummy variables to control for county-specific factors that are time varying and affect an insurer's market performance (e.g., county population and income

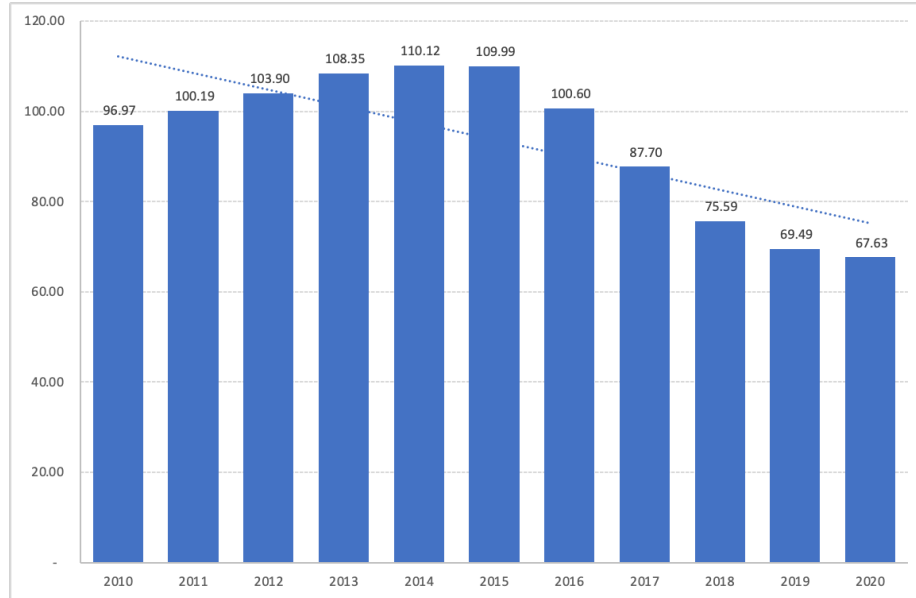
growth, county housing market dynamics, etc.). We estimated these models for Tier 1 and Tier 2 counties, and a sample which included both Tiers and the remaining Harris County.¹

As reported in the **Appendix A** Tables A1-A2, the changes over time for company-level exposure and policy at a ZIP code-level was not statistically significant. In terms of premiums, we estimated statistically higher premiums in the years 2019 and 2020 relative to 2010 in both the Tier 1 and Tier 2 samples. These statistically insignificant regression findings imply that the overall market expansion may not have been driven by the expansion of individual companies (descriptive raw data analysis also supports some companies grew, while others declined), but rather by the new entrants in the market.

It is important to also note that the overall expansion of private market in Tier 1 went in relation with a decline in state residual programs (TWIA and FAIR Plan), perhaps due to various past incentives and depopulation efforts of TWIA. In Figure 3, we report the total exposure value of TWIA and FAIR plans in Tier 1. In Figures 4 and 5, the total premiums and policy counts are presented. Noticeably, starting from the year 2015, all three measures have been declining, partially due to the two depopulation programs (Voluntary Market Depopulation Program and Reinsurance Depopulation programs), authorized by the Texas Legislature in 2015. Compared to 2015, the TWIA exposure in 2020 was 39% lower, while premiums have declined by 35% and the policy counts have dropped by approximately 39% during the same period.

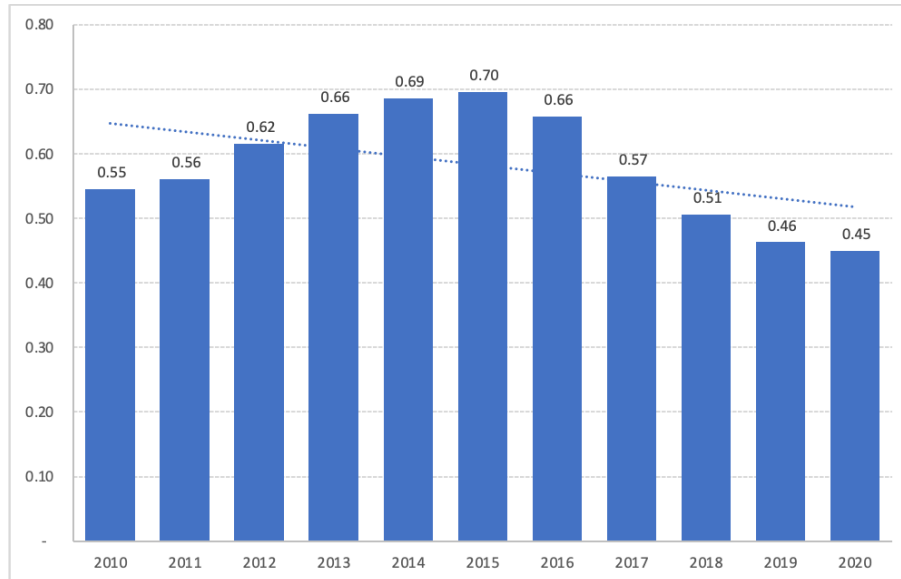
¹ We did not separately estimate regression for Harris County, because we cannot use county-by-year dummy variables to control for time-varying factors since the sample is bounded to one county only.

Figure 3: RMM exposure (TWIA and FAIR Plan)² (\$B)



Source: PIPSO

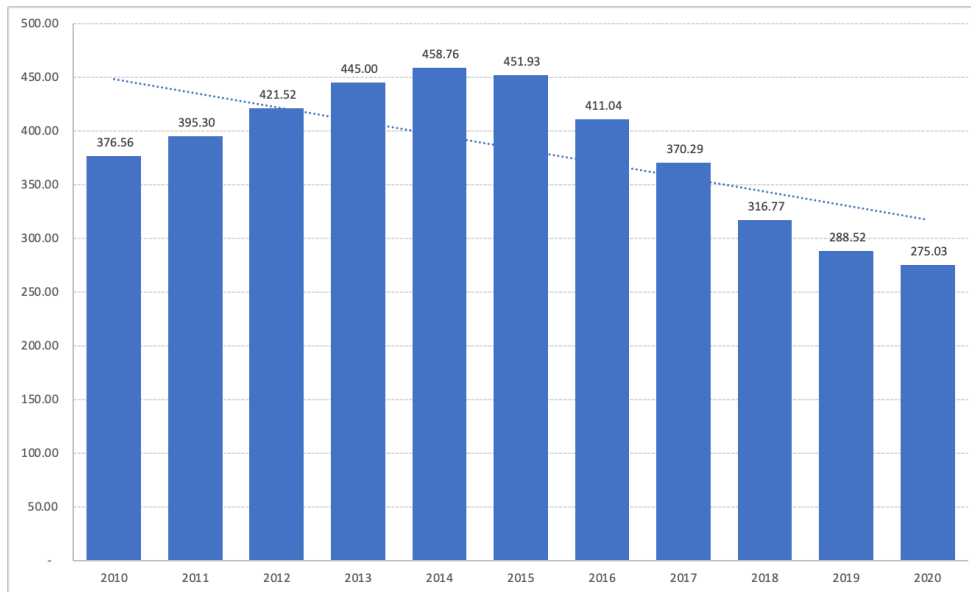
Figure 4: Premiums (\$B) TWIA and FAIR Plan



Source: PIPSO

² TWIA and FAIR Plan exposures combined. The exposures have some overlap because FAIR Plan cannot provide wind coverage in the catastrophe area where TWIA writes.

Figure 5: TWIA and FAIR Plan policies in Tier 1 (,000)



Source: PIPSO

In terms of composition of the private insurance market, we have identified the companies that always wrote homeowners policies (with or without wind and hail) over 2010-2020, these numbers are reported and the summary statistics of main variables (premiums, exposure and policies) are provided in Table 7.

Table 7: Summary statistics of companies consistently writing policies in Tier 1 during 2010-2020

Variable	# of companies	Mean	Std. Dev.
All territories			
policy count (,000)	66	13.266	29.214
written premium (\$B)	66	0.028	0.072
exposure (\$B)	66	9.037	18.261
Tier 1			
policy count (,000)	62	3.733	9.454
written premium (\$B)	62	0.006	0.02
exposure (\$B)	62	2.132	5.37
Tier 1 wind and hail coverage			
policy count (,000)	41	1.86	7.752
written premium (\$B)	41	0.005	0.023
exposure (\$B)	41	1.032	4.094
Tier 2			
policy count (,000)	65	3.096	7.178
written premium (\$B)	65	0.007	0.017
exposure (\$B)	65	1.985	4.308
Harris			
policy count (,000)	65	6.801	14.181
written premium (\$B)	65	0.017	0.038
exposure (\$B)	65	5.148	9.97

Source: TDI; Authors' calculations

In terms of their annual growth rates, for companies consistently writing in Tier 1 with wind and hail coverage, all indicators exhibit positive growth on average, albeit with substantial variation in growth rates (see Table 8). Specifically, as seen in Figure 6, there were dramatic decline in all indicators in 2013 relative to 2012. The growth slightly picked up in 2014 before it dropped again while remaining positive. In years 2016 and 2017, all indicators exhibited negative annual growth rates, which increased sharply and turned to positive in 2018, before dropping again.

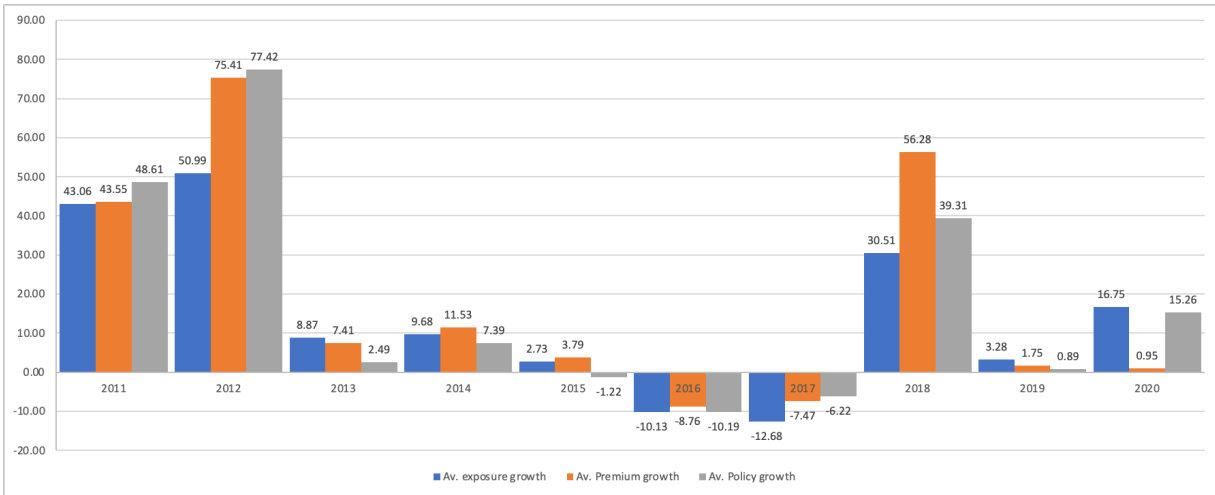
This seems to indicate that the consistently writing companies lost market share to the new entrants picking up the declining TWIA coverage.

Table 8: Summary statistics of consistent companies with WH in Tier 1

Variable	Mean	Std. Dev.	Min	Max
Policy growth	17.375	119.567	-102.181	1448.933
Premium growth	18.444	119.968	-101.738	1421.391
Exposure growth	14.305	100.388	-210.924	1302.137

Source: TDI; Authors' calculations; sample corresponds to 410 company-by-year observations.

Figure 6: Annual average growth in premiums, exposure value and the number of policies for consistent companies in Tier 1 with WH



Source: TDI; Authors' calculations

We were also able to identify companies that have written wind-only policies for the voluntary market (classified by TDI as residential dwelling insurance). Total annual exposure of residential dwelling and contents, premiums, and policy counts, along with the total number of companies are reported in Table 9 below. Looking at annual growth rates, the highest growth was estimated in

2018 – exposure grew by 65%, policies by 62% and premiums rose by 30%. In 2019, the annual growth was still positive but relatively conservative at 5%, 4%, and 3% for the three indicators, respectively. In 2020 relative to 2019, total exposure declined by 4%, premiums dropped by 1.4%, while the total number of wind-only policies were reduced by 7.5%.

Table 9: Wind-only policies

Year	Exposure, \$B	Premiums, \$M	Policies (,000)	Number of companies
2017	5.73	31.63	28.08	7
2018	9.48	51.22	36.63	8
2019	9.99	53.29	37.91	8
2020	9.55	52.52	35.08	8

Source: TDI; Authors' calculations

In addition to these two types of companies (consistently writing in the past decade, and the ones writing wind-only policies for the voluntary market), we also looked at the long-term growth of companies (i.e., comparing variables measured in the most recent year of the company's record on exposure with the earliest year they wrote homeowners insurance in Tier 1). Long-term dynamics provide a different perspective of market adjustments relative to annual changes in exposure and policies. Companies are more likely to make specific market adjustments in response to a policy or a catastrophic event considering their performance over a long-term period. Furthermore, because catastrophic windstorms and hail events are infrequent, it is logical to consider that their long-term growth projections largely influence insurers' market participation decisions. In Tier 1, among the insurers who wrote wind and hail throughout 2010-2020, there was explosive growth in terms of exposure with large deviation (see Table 10). The average growth

was approximately 3,203.9% (standard deviation 18,460.6%).³ It should be noted that exposure at the initial period was substantially smaller for these insurers relative to the exposure level at the end of the decade. Notably, the median was -25.35%, indicating that half of the companies have experienced decline in exposure by approximately 25% over a decade. Around 52% of the 123 companies considered (this number excludes companies for which data were available for single year only and the companies for which negative exposures were recorded) have experienced decline in long-term exposure (losers), while the remainder of them have experienced positive long term growth rate (winners).

Table 10: Summary Statistics of winners and losers

	Mean	St. dev.	Min	Max	N
Long-terms exposure change in Tier 1 (%)	3,203.91	18,460.56	-100	166,697.9	123
Long-terms exposure change for losers (%)	-74.96	29.86	-100	-2.39	64
Long-terms exposure change for winners (%)	7,339.771	27,223.61	.295	166,697.9	59

Source: TDI; Authors' calculations

³ If the initial year of exposure was recorded as zero, we used earliest year after that with positive exposure value, as the reference year, to compute long-term growth rates.

3. Survey structure and background

The survey for residential property (homeowners, HO) insurers was launched online using the SurveyMonkey platform on November 10, 2021. The insurers were given a month to complete it. For commercial property (CP) insurers, the survey was launched March 15, 2022. Again, insurers were given a month to complete it. The surveys were sent to all residential and commercial property insurers in Texas, a total of 179 residential and 172 commercial property insurers, the former consisting of 90 different insurer groups. From the initial distribution of emails and correspondences with insurers, the researchers identified that at least 16 of the 179 residential property insurers receiving the survey were not writing homeowners insurance, and at least 13 of the 172 commercial property insurers were in runoff or no longer wrote commercial properties in Texas.

The response rate for homeowners insurers was calculated out of total number of insurers assumed to write HO in Texas (163). The response rate for commercial property insurers was calculated out of total number of insurers assumed to write commercial properties in Texas (159).⁴ Overall, 55 and 45 individual company or group responses were received for residential and commercial property carriers, respectively. Therefore, the response rate for homeowners insurers was estimated at 33% and for commercial property carriers the response rate was estimated at 28%. Based on 2020 premiums, the respondent homeowners insurers made up 47.8% of the Texas residential property insurance market, while the respondent commercial property insurers made up 27.5% of the Texas commercial property insurance market.⁵ Seven residential carriers and only

⁴ It is highly likely that not all residential insurers and commercial property insurers communicated with the research team that they did not write policies in Texas.

⁵ We note that some of the respondent companies did not report their company name, NAIC company code, or NAIC group code, so their shares are not counted in these percentages.

one commercial carrier did not indicate the company or a group name. However, since they submitted responses to the survey, their responses are counted where available.

The survey was divided into multiple sections with the intent to cover various aspects of insurance markets including (1) incentives; (2) TWIA perceptions; (3) TWIA depopulation programs; (4) historical perspective; (5) three hypothetical scenarios in which Texas required specific changes for insurers; and, (6) underwriting processes for policy renewal/approval. Depending on whether the insurer wrote HO/CP in Tier 1 with and without hail and wind coverage, the companies were grouped into three categories: Group 1 – insurers writing HO/CP in Tier 1 with wind and hail; Group 2 -- Insurers writing HO/CP in Tier 1 but not wind and hail; and Group 3 -- insurers writing HO/CP in Texas but not in Tier 1. Subsequently some of survey questions were adjusted or skipped depending on which of the three groups the insurer fell into. Specifically, the insurers in Group 1 were presented with all 6 sections; while the insurers in Groups 2 and 3 skipped questions regarding underwriting processes related to policy renewal/approval, and the depopulation section was simplified for these two groups.⁶

Approximately 71% of homeowners insurers indicated that they wrote homeowners policies in Tier 1, while only 53% of commercial property insurers were present in Tier 1. Of those who wrote in Tier 1, 75% and 62% wrote wind and hail coverage with their homeowners and commercial policies, respectively (**Table 11**). Therefore, survey responses are likely to be skewed towards the companies present in Tier 1.

Table 11: Number of Insurers by type responding the survey

Company type	Description	Number responded	% out of total⁷
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⁶ Survey instrument is provided in the Appendix B.

⁷ Four of the homeowners insurers did not specify which of the three groups they belonged to.

<i>Panel A: Homeowners insurers</i>			
Group 1	Insurers writing HO in Tier 1 with wind and hail	27	53%
Group 2	Insurers writing HO in Tier 1 but not wind and hail	9	18%
Group 3	Insurers writing HO in Texas but not in Tier 1	15	29%
<i>Panel B: Commercial property insurers</i>			
Group 1	Insurers writing CP in Tier 1 with wind and hail	15	33%
Group 2	Insurers writing CP in Tier 1 but not wind and hail	9	20%
Group 3	Insurers writing CP in Texas but not in Tier 1	21	47%

Source: Authors

3.1. Incentives Structure

Both residential and commercial property insurers were asked to check as many incentives options as applied that would prompt them to write or increase wind and hail exposure in Tier 1, from the list of 15 incentives provided in the survey (see Table 12). The incentives were drafted based on TAMUG’s 2020 market incentives literature review for TDI as well as TDI’s two previous market incentives studies (in 2016 and 2018). In addition to the 15 incentives provided, respondents were given options to indicate if no incentives existed (Incentive 16: **There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance**) and to indicate other(s) not listed in the survey (Incentive 17: **Other incentives not indicated**).

Table 12: Incentive options

Incentives	Descriptions
Inc 1	Charge rates (your own, not TWIA) that you believe are actuarially sound in Tier 1
Inc 2	Lower minimum surplus and capital requirements
Inc 3	Reduce reinsurance cost or improve accessibility to reinsurance
Inc 4	Create a statutory backstop to reinsure wind/hail losses above a specified amount
Inc 5	Reduce taxes for premiums, license, and other fees in lieu of writing wind/hail risk
Inc 6	Give insurers writing in Tier 1 greater credit against TWIA assessments
Inc 7	Mandate higher deductibles/Expand use of wind/hail deductibles
Inc 8	Fewer or no restrictions on underwriting guidelines
Inc 9	Create property exposure database
Inc 10	Create comprehensive fraud database
Inc 11	Use different claims settlement processes
Inc 12	More TDI/state education of consumers about wind/hail risk and coverage options
Inc 13	Improve and enforce building codes, standards, construction requirements
Inc 14	Incentivize/finance retrofit measures; expand number of inspections
Inc 15	Improve CAT modeling
Inc 16	There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance
Inc 17	Other incentives not indicated

3.2. Survey Results – Residential Property Insurers

3.2.1. Preferences for incentives

Table 13 reflects the distribution of options selected by all survey participants. Approximately 27% of participants did not select any options, including options 16 and 17; 18 companies selected one option only, and the remaining 21 selected two or more options simultaneously. We should also note that the companies writing HO in Tier 1, on average, selected 1.5 more incentives options relative to those not writing in Tier 1 (this difference was statistically significant at the 5% significance level).⁸

Table 13: Distribution of selected options

	Freq.	Percent
0	15	27.27
1	18	32.73
2	2	3.64
3	3	5.45
4	4	7.27
6	6	10.91
7	4	7.27
8	2	3.64
9	1	1.82
Total	55	100.00

Among all insurers participating in the survey, the percentage distribution for each option is provided in Figures 7 and 8. Looking at them individually, the most selected preference was Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**), followed by Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**), and Incentive 4 (**Create a statutory backstop to reinsure wind/hail losses above a specified amount**).

⁸ Bivariate regression of count of options on an indicator variable for a Tier 1 presence with HO.

Incentive 6 (**Give insurers writing in Tier 1 greater credit against TWIA assessments**), Incentive 8 (**Fewer or no restrictions on underwriting guidelines**) and Incentive 13 (**Improve and enforce building codes, standards, construction requirements**) were supported by 23% of insurers.

Another 23% percent of insurers indicated that there were not any incentives that would prompt them to write HO with wind and hail coverage in Tier 1 (Incentive 16 - **There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance**). Notably among those selecting Incentive 16, half (six companies) were ones that did not write HO in Tier 1. Four of the remaining six companies that selected Incentive 16 currently write HO with wind and hail coverage.⁹

Among insurers who write homeowners in Tier 1, Incentive 3 (**reduction in reinsurance cost and access**) stood out as the number one incentive (47% selected Incentive 3, see Figure 7), followed by Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**) chosen by 44% of insurers. Among the group who write with wind and hail coverage in Tier 1, Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**) and Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**) were chosen by 48% of insurers each, and Incentive 4 (**Create a statutory backstop to reinsure wind/hail losses above a specified amount**) and Incentive 8 (**Fewer or no restrictions on underwriting guidelines**) by 33% each. Overall, preferences for the incentives were similar among all three groups, with Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**) and Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**) standing out as the most relevant, followed by Incentive 4 (**Create a statutory backstop to reinsure wind/hail losses above a**

⁹ Insurers that currently write HO with wind and hail coverage in Tier 1 were asked what would incentivize them to increase their current wind/hail exposure.

specified amount), Incentive 8 (**Fewer or no restrictions on underwriting guidelines**), Incentive 6 (**Give insurers writing in Tier 1 greater credit against TWIA assessments**) and Incentive 13 (**Improve and enforce building codes, standards, construction requirements**).

Importantly, 22% of all insurers who participated in the survey thought no incentives would encourage them to write more. Among those writing HO in Tier 1 this percent was 17%, and it was 15% among those who already write wind and hail in the Tier 1 (see Figure 8). As shown in Figure 9 and 10, 40% of the insurers not writing homeowners in Tier 1 indicated that there were no incentives that would lead them to write homeowners with wind and hail coverage. Individually, each of Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**), Incentive 5 (**Reduce taxes for premiums, license, and other fees in lieu of writing wind/hail risk**), Incentive 6 (**Give insurers writing in Tier 1 greater credit against TWIA assessments**), Incentive 10 (**Create comprehensive fraud database**) and Incentive 13 (**Improve and enforce building codes, standards, construction requirements**) were chosen by 13% of insurers.

In addition to basic summary statistics, two-sample proportion test was performed to identify if there were statistically significant differences between the proportion of insurers' preferences for different incentives among the groups of insurers writing HO in Tier 1 and not writing HO in Tier 1; and among the Tier 1 insurers with and without hail and wind coverage.¹⁰ The proportion of insurers supporting Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**), Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**) and Incentive 4 (**Create a statutory backstop to reinsure wind/hail losses above a specified amount**) were statistically higher for the insurers writing HO in Tier 1 compared to the insurers not writing in Tier 1 (see Table 14). Preference for Incentive 8 (**Fewer or no restrictions on underwriting**

¹⁰ Proportion comparison test assumes large sample properties, which maybe violated with the limited number of observations here.

guidelines) was marginally higher for Tier 1 carriers, while the proportion supporting option 16 **(There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance)** was higher among those not writing in Tier 1 (the difference was marginally significant at the 10 percent significance level).

Figure 7: Preferences for different incentives by insurer type

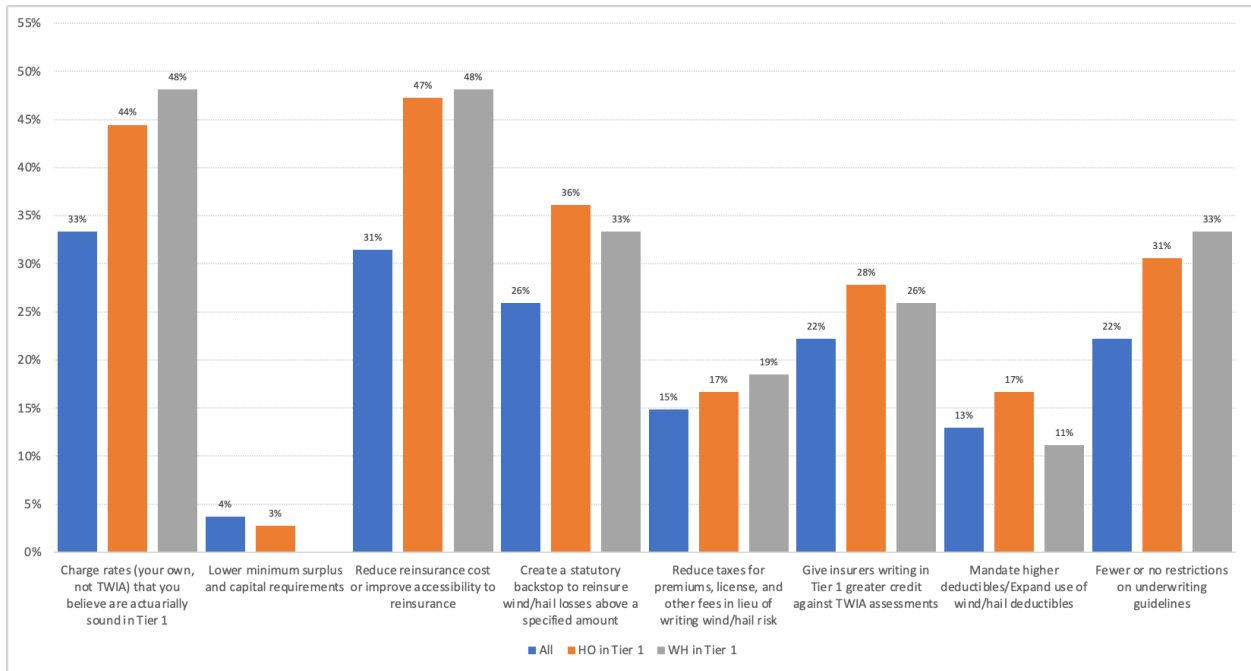


Figure 8: Preferences for different incentives by insurer type

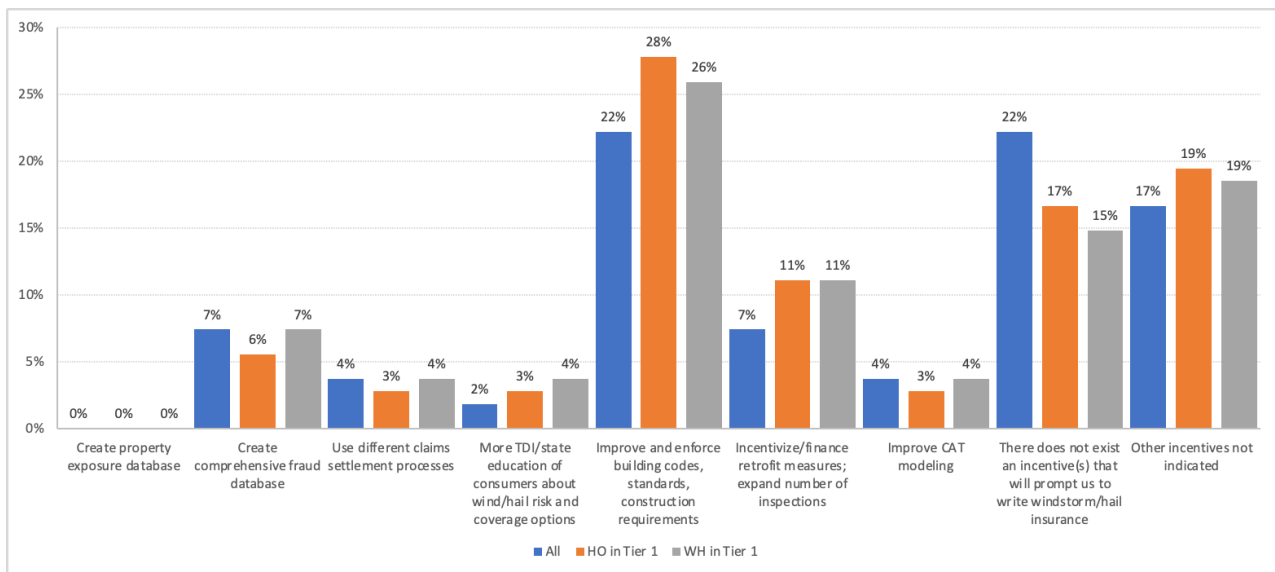


Figure 9: Incentives for insurers not writing in Tier 1

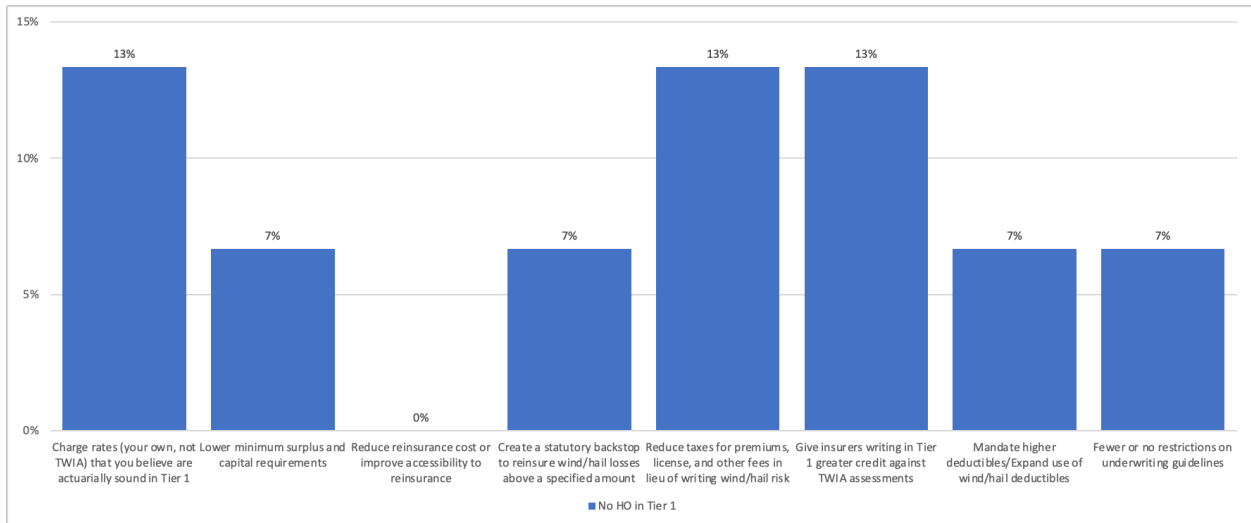


Figure 10: Incentives for insurers not writing in Tier 1

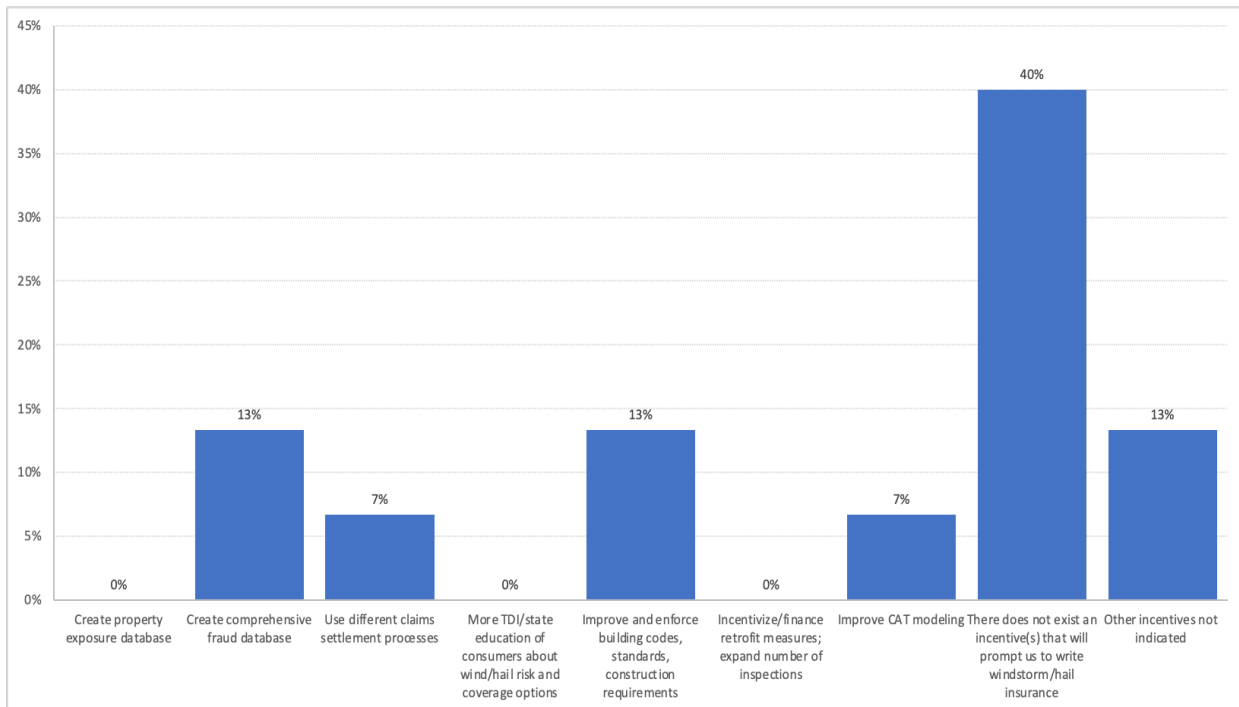


Table 14: Two sample proportion comparison test

		Tier 1: No	Tier 1: yes	Diff (no-yes)	z-value
inc 1	Charge rates (your own, not TWIA) that you believe are actuarially sound in Tier 1	0.133 (0.088)	0.429 (0.084)	-0.295 (0.121)	-2.02**
inc 2	Lower minimum surplus and capital requirements	0.067 (0.064)	0.029 (0.028)	0.038 (0.07)	0.63
inc 3	Reduce reinsurance cost or improve accessibility to reinsurance	0 0	0.457 (0.084)	-0.457 (0.084)	-3.18***
inc 4	Create a statutory backstop to reinsure wind/hail losses above a specified amount	0.067 (0.064)	0.371 (0.082)	-0.305 (0.104)	-2.20**
inc 5	Reduce taxes for premiums, license, and other fees in lieu of writing wind/hail risk	0.133 (0.088)	0.171 (0.064)	-0.038 (0.108)	-0.34
inc 6	Give insurers writing in Tier 1 greater credit against TWIA assessments	0.133 (0.088)	0.286 (0.076)	-0.152 (0.116)	-1.16
inc 7	Mandate higher deductibles/Expand use of wind/hail deductibles	0.067 (0.064)	0.171 (0.064)	-0.105 (0.091)	-0.98
inc 8	Fewer or no restrictions on underwriting guidelines	0.067 (0.064)	0.314 (0.078)	-0.248 (0.102)	-1.88*
inc 10	Create comprehensive fraud database	0.133 (0.088)	0.057 (0.039)	0.076 (0.096)	0.91
inc 11	Use different claims settlement processes	0.067 (0.064)	0.029 (0.028)	0.038 (0.07)	0.63
inc 12	More TDI/state education of consumers about wind/hail risk and coverage options	0 0	0.029 (0.028)	-0.029 (0.028)	-0.66
inc 13	Improve and enforce building codes, standards, construction requirements	0.133 (0.088)	0.286 (0.076)	-0.152 (0.116)	-1.16
inc 14	Incentivize/finance retrofit measures; expand number of inspections	0 0	0.114 (0.054)	-0.114 (0.054)	-1.37
inc 15	Improve CAT modeling	0.067 (0.064)	0.029 (0.028)	0.038 (0.07)	0.63
inc 16	There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance	0.4 (0.126)	0.171 (0.064)	0.229 (0.142)	1.72*

Notes: Standard errors are provided in parenthesis. The total number of insurers not in Tier 1 were 15 and the number of insurers in Tier 1 was 35. Asterisks correspond to the following probabilities (p): * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

A total of eight insurers commented on the open-ended incentives option (Incentive 17). Six of the insurers wrote in Tier 1 and two did not. Of the six in Tier 1, four wrote wind and hail coverage. Overall, those four insurers writing wind and hail coverage in Tier 1 indicated that their exposures have been declining. Several reasons were indicated:

1. TWIA-premiums were lower for the same level of risk, and unless adequately priced would be hard to compete with.¹¹
2. TWIA should use differential territorial rating systems to more accurately price different risks within a county.
3. Assurance from the regulator that the companies can charge adequate rates and underwrite exposure characteristics as they believe necessary.
4. Strengthening building codes for new and existing properties (e.g., IBHS Fortified - gold standards).
5. Using the state’s “rainy day fund” or another state vehicle to fund the statutory reinsurance backstop instead of the industry funding that backstop.
6. TWIA must lower the commission it pays to retail agents (“at 16%, it is as much as 60% over the market rate of 10%”).

3.2.2. Change in exposure and rates

Insurers were also asked to indicate an approximate increase in exposure (in terms of percentages), if the insurers’ preferred incentives existed. As indicated in Table 15, among those who wrote wind and hail in Tier 1 and with their desired incentives, the average exposure increase was indicated at 25%, with the minimum at 0% and the maximum 100%. For insurers not writing

¹¹ One company stated: “We partnered with a reinsurer that was willing to assist us in writing more Tier 1 exposure with windstorm and hail coverage, however, TWIA rates are so low that the reinsurer ultimately determined we would not be able to write additional business.”

in Tier 1 or writing homeowners insurance without wind and hail, the average indicated exposure increase was approximately 21%.

Table 15: Summary statistics (“If the incentives you indicated above existed, by how much would you increase your exposure?”)

Variable	# of observations	Mean	Std. Dev.	Min	Max
Exposure increase (%) Tier 1 with wind and hail	19	24.579	29.421	0	100
Exposure increase (%) others (no Tier 1 & no WH)	5	21	26.552	0	50

Companies writing wind and hail in Tier 1 were also asked to indicate how their current rates compared to TWIA rates. Distribution of these responses are provided in Table 16. Notably, the majority of insurers did not know what TWIA rates were, and those who knew indicated that they charged higher than TWIA rates.

Table 16: Summary of Rates (How does your current rates compare with TWIA rates?)

	Freq.	Percent
It is higher by 25-50%	3	14.29
It is higher by 50-75%	1	4.76
It is higher by less than 25%	2	9.52
We do not know what TWIA rates are	15	71.43
It is about the same	0	0
It is lower	0	0
Total	21	100.00

Importantly, among those who write in Tier 1 but do not write hail and wind coverage, the majority (four out of six who responded to this question) also did not know how much the TWIA rates were. The two who knew indicated they would charge rates at least 25% higher than the current TWIA rates. These results are summarized in Table 17.

Table 17: Summary of Rates (How will your rates compare with TWIA rates?)

	Freq.	Percent
I do not know what TWIA rates are	4	66.67
It will be 25-50% higher	1	16.67
It will be 50-75% higher	1	16.67
It will be higher by less than 25%	0	0
It will about the same	0	0
It will be lower	0	0
Total	6	100.00

The insures not writing homeowners in Tier 1 were not asked rate-related questions, as it was assumed that they would not have a good knowledge of TWIA rates and would provide inaccurate assessment of their own rates, given no or limited current experience in Tier 1.

3.2.3. TWIA perceptions

Given that currently wind and hail coverage in Tier 1 are primarily provided through TWIA, we also explored insurers’ perceptions about TWIA as a competitor in the market and its two depopulation programs. Details of the latter are provided in Section 3.2.4. The majority of the respondents (32 out of 37) did not perceive TWIA as a competitor (Table 18). Of those 32 insurers, 13 wrote wind and hail policies in Tier 1. Notably, the other five companies that indicated they perceived TWIA as the competitor all wrote wind and hail in the Tier 1 territories. This was somewhat expected, as those who do not write wind and hail logically would not consider TWIA as a competitor.

Table 18: TWIA Perception

Do you perceive TWIA as a competitor?	Freq.	Percent	Cum.
No	32	86.49	86.49
Yes	5	13.51	100.00
Total	37	100.00	

Interestingly, across all groups indicated in Table 19, a majority of insurers considered TWIA rates at least somewhat competitive. When asked whether TWIA’s assessment formula should be changed, the majority also indicated “No”, across all the insurer groups (Table 20). Notably, among those 9 insurers who highlighted Incentive 6 (**Give insurers writing in Tier 1 greater credit against TWIA assessments**) as a preferred incentive to increase market exposure in Tier 1, only four thought that TWIA assessment formula needed a change, while five indicated that no change was needed. If changes in TWIA’s assessment formula were implemented, those already writing wind and hail in Tier 1 indicated that they would increase exposure by approximately 20% on average (standard deviation 31%); five out of 11 who responded to this question indicated they would not increase the exposure and only one company indicated 100% increase (Table 21).

Table 19: TWIA rate perception

In your opinion, are TWIA rates competitive?	All insures	HO in Tier 1	No HO in Tier 1	Wind and hail in Tier 1	No wind and hail in Tier 1
No	28.12%	21.74	44.44	17.65	33.33
Somewhat	34.38%	30.43	44.44	29.41	33.33
Yes	37.50%	47.83	11.11	52.94	33.33
Number responded (total column %)	32 (100)	23 (100)	9 (100)	17 (100)	6 (100)

Table 20: TWIA assessment formula

Should there be any changes to TWIA's assessment formula?	All insures	HO in Tier 1	No HO in Tier 1	Wind and hail in Tier 1	No wind and hail in Tier 1
No	76.47	72.00	88.89	72.22	71.43
Yes	23.53	28.00	11.11	27.78	28.57
Number responded (total column %)	34 (100)	25 (100)	9(100)	18 (100)	7 (100)

Table 21: Exposure Change

Variable	Obs	Mean	Std. Dev.	Min	Max
Exposure change if assessment formula changed	11	20.091	30.759	0	100

In the open-ended question related to changes in the TWIA assessment formula, it was suggested to move from a premium-based assessment formula to an exposure-based formula¹², to increase TWIA rates to cover the cost of wind/hail and catastrophic events more adequately, and make TWIA rates vary by census block groups.

3.2.4. Depopulation Programs

All insurers writing wind and hail coverage in Tier 1 were asked to indicate whether they participated in the TWIA voluntary market and assumption reinsurance depopulation programs (SB 900; 84th Leg. Session) that encourage the transfer of TWIA policies to insurers through the voluntary market or assumption reinsurance.¹³

All 18 companies that responded to this question indicated no participation in the voluntary market depopulation program. One company responded that they were not sure how many offers to policyholders they had made through the program. The response to a follow-up question “of the offers you made, how many TWIA policyholders have accepted your offer”, the answer was “very low hit ratio”.

All companies were asked if they planned to participate in the TWIA voluntary market depopulation program. Only two companies responded positively, of which one company currently

¹² One insurer responded: “When TWIA was originally created, companies' premium information was available and easy to obtain, while exposure data was not. As the reinsurance market has evolved, it prices the risk based on exposure data. This is common information for insurance risk management today. As such, it is a better determinant of ultimate loss than premium. Premium tends to underweight commercial risks as the price of commercial insurance is much lower per dollar of exposure than residential insurance. Additionally, within residential insurance, dwellings with higher value tend to have a lower premium per dollar of exposure than lower valued dwellings, which causes markets that serve low value residential property to get a disproportionate share of the TWIA assessment when using a premium based formula. Additionally, writers of primarily residential property insurance are bearing a larger portion of the assessment burden than writers of commercial property insurance when using a premium based assessment formula. Losses are based on exposure not premium, so since we are discussing funding for losses, it is more appropriate to use an exposure based assessment formula. If this assessment formula change was implemented, it is difficult to measure how our Tier 1 exposure would change because we have no knowledge of the industry exposure data.”

¹³ TDI has adopted rules to help implement the depopulation statutes (28 Texas Administrative Code Sections 5.4301 – 5.4309).

does not write hail and wind coverage in Tier 1, while the other writes homeowners with wind and hail coverage.

When asked how the market depopulation program can be improved, only one company commented: **“The agents control the takeout and if it were similar to Florida’s depop, the insured would make the decision and we think that would lead to a larger take-up rate.”**

When asked “What specific changes—statutory, regulatory, or other—to the program would cause you to participate or increase your participation?”, 13 responses were received, including 12 from insurers currently writing homeowners in Tier 1. Of those 12 insurers, nine also wrote wind and hail coverage in Tier 1. Four respondents were not sure about specific changes at the time, had no opinion, or indicated “n/a.” One that was not sure did not write homeowners in Tier 1; the other three indicating no opinion or “n/a” currently wrote homeowners with wind and hail. The comments received revolved around:

1. Policy Premiums with Wind and Hail (“The premium required to write wind/hail coverage in Tier 1 would be undoubtedly expensive.”)
2. Segmentation of risks in Tier 1 (“If risks located in the Tier 1 counties can be segmented such that more favorable risks receive less of a credit. Likewise, the opposite would apply to poorly graded risks, where TWIA rates would be most appropriate.”), would make voluntary market rates more competitive.
3. Increase TWIA rates to make them more adequate; current rates do not allow participation.
 - a. “ability to depopulate without having to match or be below TWIA wind rates”.
4. A TWIA assessment recoupment opportunity
 - a. “... may contribute to our willingness to participate in the program”.

5. The incentives previously mentioned would allow insurers to consider taking on TWIA exposures;
 - a. “flexibility to opt in or out depending on the details of the incentive programs”.
6. Formalized inspection processes to confirm wind mitigation on homes and positive flood elevation.

In terms of the assumption reinsurance program, only one company out of the 19 companies currently writing homeowners insurance in Tier 1 with wind and hail responded and indicated participation in the program. Notably, that company also indicated the intention to re-enroll in the program again next year. When asked how many policies the company had assumed since the participation, the respondent was not sure.

The remaining 18 insurers—currently writing homeowners in Tier 1 and not participating in the assumption reinsurance program—did not participate in the program in the past either. Interestingly, eight of the 18 companies that do not participate in the assumption reinsurance program indicated Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**) for their market participation or expansion. It is important to explore why the program is not popular.

Insurers were also asked how the assumption reinsurance program can be improved. Only one company responded to that question indicating that making more policies available for takeout would increase their uptake (“historically TWIA limited the number of takeout policies”). In addition, it was noted that currently agents controlled which policies the company received, and if that decision was transferred back to the insurers, they would have a better take-up rate.

3.2.5. History

Given that a substantial number of firms in any given year exited the market over the recent decade, as indicated in Figure 2 (of Section 2), we also explored the medium-term history covering

2015-2020 to understand specific concerns and opportunities that influenced market dynamics in Texas coastal territories. Of the 55 responses, only 40 responded to the history questions and half of them indicated that they wrote homeowners insurance with wind and hail coverage, while 20 did not write hail and wind in the past 5 years. Of those 20 who wrote, all but one insurer still writes wind and hail in the market. On average, compared to the past, the exposure of respondent insurers in Tier 1 (17 responded to the exposure question) has decreased by 6.6% with the large variation in the sample (standard deviation 42%). The average was largely influenced by one company that indicated 100% decrease in exposure. Of the 17, seven insurers indicated a 38% decline in exposure compared to the past, seven indicated no change in exposure, and only three insurers have experienced growth in exposure at an average of 51%.

To understand reasons for indicated changes, insurers were also asked to select condition(s) that prompted specific market adjustments relative to the recent history. These options are summarized in Table 22. One aspect to highlight is that the companies decreasing in exposure indicated far more conditions than those growing or experiencing no change. Notably, across all the groups of insurers, **expected loss and loss adjustment expenses** (Condition 4) and **(in)ability to compete with TWIA rates** (Condition 12)¹⁴ were consistently indicated as primary factors. Furthermore, for both the growing and the decreasing insurers, **reinsurance accessibility and cost** (Conditions 1 & 2) and **volatility of wind and hail risk** (Condition 6) were identified as three common conditions for market adjustments. For the decreasing insurers and for the insurers that indicated no changes in exposure relative to the past, **the wind and hail model and data accuracy**

¹⁴ Those who checked condition 12 also indicated that TWIA rates were somewhat or fully competitive. We believe TWIA rate competitive question (In your opinion, are TWIA rates competitive?) was perceived not as “competitive” to reflect market forces (demand and supply), but rather than the TWIA rates are hard to compete with.

(Condition 5) and **changes in expertise in underwriting and claims** (Condition 10) were two other additional common conditions.

Table 22: Concerns/opportunities associated with previous market adjustments

		Companies growing (3)	Companies Declining (6)	Companies with no change (6)	Companies who did not indicate any changes (4)
Condition 1	Reinsurance accessibility	X	X		
Condition 2	Cost of reinsurance	X	X		
Condition 3	Capital and surplus requirements				
Condition 4	Expected losses and loss adjustment expenses	X	X	X	
Condition 5	Wind and hail model and data accuracy		X	X	
Condition 6	Volatility of windstorm/hail risk	X	X		
Condition 7	Changes in consumer demand	X			
Condition 8	Expected changes in state rate and form regulation				
Condition 9	Correlation of wind/hail risks		X		
Condition 10	Changes in expertise in underwriting and claims		X	X	
Condition 11	Changes in litigation of risks		X		
Condition 12	(In)ability to compete with TWIA rates	X	X	X	
Condition 13	N/A: There were no changes			X	X
Condition 14	Other not specified	X ¹	X ²	X ³	X ⁴

¹ Desire to improve the company’s proportion of TWIA assessment

² Change in risk appetite; reduced agents in coastal areas

³ New to TX marketplace with very limited TWIA exposure written

⁴ Only write renewals

3.2.6. Hypothetical scenarios

All insurers were presented with three hypothetical scenarios in which Texas would implement the following specific changes (one at a time) and asked to indicate what their adjustments be.

Scenario 1: If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas

Scenario 2: If Texas required wind and hail coverage in every Tier 1 property policy

Scenario 3: If Texas required increasing the amount of funding TWIA receives through assessments

Responses across the two groups (writing or not writing homeowners policies in Tier 1) of insurers are provided in Table 23 – Table 25 below; and the responses among only Tier 1 companies are provided in Tables 26 - 28. As the responses indicate, most of the insurers (67%) would not make any changes to their current writing if Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 to write property insurance in Texas. Among those who wrote homeowners insurance in Tier 1, the percentage was 62%; among those not writing in Tier 1, the percent was 80%.

Table 23: Scenario 1 (all companies)

If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas	Yes indicates they write HO in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	8	16	24
Reduce writing in Texas	0	9	9
Stop writing in Texas	2	1	3
Total	10	26	36

Notably in response to Scenario 2 (**If Texas required wind and hail coverage in every Tier 1 property policy**), the responses were split, those indicating that they would reduce or stop writing in Tier 1 was slightly higher (51%), than those indicating no changes at all. Among those who currently write homeowners in Tier 1, only 63% would reduce or stop writing. Only 20% would reduce or stop writing among those who currently do not write homeowners in Tier 1.

Table 24: Scenario 2 (all companies)

If Texas required wind and hail coverage in every Tier 1 property policy, would	Yes indicates they write HO in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Tier 1	8	10	18
Reduce writing in Tier 1	1	12	13
Stop writing in Tier 1	1	5	6
Total	10	27	37

Responses for Scenario 3 were somewhat similar to those indicated for Scenario 2 above. Overall, 53% indicated the hypothetical change would not prompt any changes in their current writing in Texas. This percentage was lower (~46%) among those who currently write homeowners in Tier 1 and was approximately 70% among those who currently do not write homeowners in Tier 1.

Table 25: Scenario 3 (all companies)

If Texas required increasing the amount of funding TWIA receives through assessments	Yes indicates they write HO in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	7	11	18
Reduce writing in Texas	3	13	16
Total	10	24	34

Responses to Scenario 1 among the companies writing in Tier 1 were similar to overall patterns indicated for Tier 1 and non-Tier 1 companies—overall 62% indicating no changes. Interestingly, those with wind and hail coverage (78%) would not make changes either; while for those not writing wind and hail, 75% indicated they would reduce or stop writing in Texas (Table 26).

Table 26: Scenario 1 (Tier 1 companies)

If Texas required all insurers to write a proportionate share of wind and hail, would	Yes indicates they write WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	2	14	16
Reduce writing in Texas	5	4	9
Stop writing in Texas	1	0	1
Total	8	18	26

For Scenario 2, 63% indicated they would reduce or stop writing in Texas (Table 27). Interestingly, these responses were primarily driven by those who currently do not write wind and hail in Tier 1; of those eight companies responding to this question, half would reduce, and half would stop writing in Texas.

Table 27: Scenario 2 (Tier 1 companies)

If Texas required wind and hail coverage in every Tier 1 property policy, would	Yes indicates they write WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Tier 1	0	10	10
Reduce writing in Tier 1	4	8	12
Stop writing in Tier 1	4	1	5
Total	8	19	27

Finally, responses to Scenario 3 showed that this specific change would also prompt overall reduction in Tier 1 (Table 28); no one company indicated that they would fully stop writing in Texas. Among those who currently write wind and hail in Tier 1, 50% would make no change and 50% would reduce, and 63% of those not writing wind and hail in Tier 1 would reduce writing in Texas.

Table 28: Scenario 3 (Tier 1 companies)

If Texas required increasing the amount of funding TWIA receives through assessment	Yes indicates they write WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	3	8	11
Reduce writing in Texas	5	8	13
Total	8	16	24

Overall, these responses indicated that fewer changes would be expected if Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas. On the other hand, the requirement of wind and hail coverage in every Tier 1 property policy and increasing the amount of funding TWIA receives through assessments, would prompt greater reductions and complete exits from Tier 1, and Texas, respectively.

Statistical comparison of proportion indicated no discernable differences between the proportion of insurers that would reduce or stop writing across the Tier 1 and non-Tier 1 companies for Scenario 1 (see Table 29). For Scenario 2, the proportion of the companies indicating changes (reduce or stop) were statistically higher in Tier 1 than that in non-Tier 1. In response to Scenario 3, we find statistically marginal difference (at the 10% significance level), indicating that the proportion in Tier 1 who would reduce/stop was slightly higher over those who currently did not write homeowners in Tier 1.

Table 29: Proportion (indicating reduction or stop of writing) comparison test across Tier 1 and non-Tier 1 companies

	Tier 1: No	Tier 1: yes	Diff (no-yes)	z-value
Scenario 1	0.2 (0.126)	0.385 (0.095)	-0.185 (0.158)	-1.05
Scenario 2	0.2 (0.126)	0.630 (0.093)	-0.430 (0.157)	-2.32**
Scenario 3	0.3 (0.145)	0.542 (0.102)	-0.242 (0.177)	-1.29*

Asterisks correspond to the estimated probabilities (p) associated with the test: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

We also estimated that the proportion of insurers that would reduce or stop writing in response to Scenario 1 were higher (statistically significant at the 5% level) among those not writing wind and hail in Tier 1 (but writing homeowners policies there) relative to those currently writing wind and hail in Tier 1. Similarly, the proportion that would stop or reduce in response to Scenario 2 was estimated to be statistically higher if the company was not currently writing wind and hail coverage. There was statistically no difference between the proportion of companies indicating any changes (stop or reduce) in policy underwriting for Scenario 3 across the two types of insurers (see Table 30).

Table 30: Proportion (indicating reduction or stop of writing) comparison test across Tier 1 companies with and without wind and hail coverage

	Tier 1 WH: No	Tier 1 WH: yes	Diff (no-yes)	z-value
Scenario 1	0.75 (0.153)	0.222 (0.098)	0.528 (0.182)	2.55**
Scenario 2	1 (0)	0.474 (0.115)	0.526 (0.115)	2.59***
Scenario 3	0.625 (0.171)	0.5 (0.125)	0.125 (0.216)	0.53

Asterisks correspond to the estimated probabilities (p) associated with the test: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

3.2.7. New application approval/denial; Policy renewals

This section intended to understand decisions employed by the insurers writing wind and hail in Tier 1 during the year 2021 (as of the survey date) to approve or deny new applications and renew existing policies in Tier 1. Summary statistics for the 15 insurers responding the following three questions are provided in Table 31.

Q1: What percentage of new homeowners applications received in Tier 1 were for a policy that includes wind/hail coverage relative to the total number of homeowners applications

received (regardless of whether the application was for wind/hail coverage) in 2021 (as of today) in Tier 1?

Q2: What percentage of new homeowners applications with wind/hail coverage did you deny insurance in Tier 1?

Q3: What percentage of existing homeowners policies did you deny renewing wind/hail coverage?

Table 31: New application approval/denial; policy renewals

Variable	Mean	Std. Dev.	Min	Max
Q1	55.733	38.542	3	100
Q2	35.2	38.951	0	98
Q3	2.4	6.759	0	25

Notes: 15 respondents

On average, approximately 56% of new homeowners applications received in Tier 1 were for a policy that included wind/hail coverage relative to the total number of homeowners applications received in Tier 1 in 2021. Five insurers indicated that 100% of new applications were for wind and hail coverage. Of the applications received, on average 35% were denied insurance in Tier 1, and only small percentage (2.4% on average) were denied the renewal for wind and hail coverage.

Below we list few of the reasons indicated for denials for new applications

1. Applications did not meet the coastal underwriting (UW) guidelines due to the condition of the property, loss history, distance to coast, probable maximum loss, condition and age of roof, wind/water concerns; mobile/manufactured homes, transient rentals
2. Tier 1 homeowners policies with wind and hail can be capital intensive
3. Inability to verify wind mitigation on homes

Reasons indicated for denial of renewals¹⁵

1. Property and/or insured did not comply with UW guidelines (property conditions, # of non-weather-related claims)
2. Failure to provide requested UW information

This section also explored if the insurers used policy forms that included the two-year suit-filing deadline, one-year-claim-filing deadline, or both. Out of 19 insurers, 79% indicated that they had used policy forms that included one or both of the deadlines. The insurers that used policy forms with one or both policy deadlines were also asked to indicate if they had reduced or decreased exposure. Three insurers indicated a decrease, eight indicated no change, and only two increased their exposure due to use of the policy forms. On average, exposure decreased by approximately 1% (standard deviation 4.41%). The maximum decrease was indicated at 15%. The average increase was 4%.

¹⁵ Some companies indicated that they did not deny wind/hail coverage by itself.

3.3. Telephone Interviews - Residential Property Insurers

The telephone interviews were conducted as part of stage two of the homeowners insurance survey to advance the understanding of the state of the insurance market, challenges, incentives, and reasons for success of insurance companies operating in Texas coastal territories (Tier 1, Tier 2, and Harris County). To make a “representative” selection of insurers for the interview, we used 10 years of company-specific data covering 2010-2020 to categorize insurers into groups based on their long-term exposure (homeowners) in the coastal territories. Specifically, we grouped them into four categories: (1) consistent players in the market despite the volatility of their exposure (i.e., those that have written policies during the 2010-2020; for the summary statistics refer to Tables 7 & 8 in Section 2); (2) those that have been growing aggressively in terms of homeowners exposure (greater than 400% of the growth rate, see summary statistics reported in Table 10); (3) those declining at the highest rates (average decline rate of losers at 75% or more, see summary statistics reported in Table 10) using the long-term decadal percentage change in their exposure ; and (4) insurers writing wind only through voluntary market (summary statistics reported in Table 9).

From the population of insurers in the coastal territories, we were able to successfully match 21 insurers that responded to the survey to the four categories described in the paragraph above. Their names and NAIC numbers are provided in the Table 32 below. While all 21 companies were contacted with the request to interview with us, only seven companies agreed to participate.

Table 32: Companies selected for telephone interviews

	Tier 1	With wind and hail	Non-Tier 1
Always there	3		
Long-term growing	10		2
Long-term growing; wind only	1	1	
Long-term loss	3	1	
Wind only voluntary	2	2	
Total	19		2

The data captured from the seven interviews was analyzed and categorized into the following **four broader themes** comprising eight subcategories (see Section 3.3.1 below):

1. Company perspective and philosophy about underwriting in Texas
2. Challenges in the Texas insurance market
3. Insurance incentives in the Texas insurance market
4. Reasons for long-term company success.

3.3.1. Data from Telephone Interviews

As discussed above, after employing multiple criteria related to Tier 1 exposure, history of growth, and the size of a company, 21 representative insurance companies were identified and contacted for in-depth telephone interviews (see Table 32 for the list). Seven agreed to participate in the interviews to provide further insights about important aspects identified based on the initial survey responses. Six of the seven companies agreed to audio and visual recording for the in-depth interview, and one company declined to be recorded. The interviews lasted approximately twenty to forty-five minutes and were conducted over a one-month period. A synopsis of the data captured

from the seven in-depth interviews with small- and large-scale insurance companies operating in the Texas coastal territories are summarized below:¹⁶

Theme I: Company perspective and philosophy about underwriting in Texas.

Description: Company perspectives about the state of the insurance market in Texas.

Theme I: Summary of Responses

Three companies indicated the state of the insurance market in Texas is challenging, hardening, or hurting everyone in the market from top to bottom. One company felt the role of TWIA could diminish a little; and a more free market with some regulations could be the most efficient market.

Five companies indicated they cannot compete with TWIA's rates while one company felt they were never competing with TWIA for wind coverage.¹⁷

Theme I: Subcategories

- State of the insurance market.
- Interview responses: Responses related to the state of the insurance market in Texas and how it impacts underwriting in Tier 1.
 - *So, I personally think it is a **very challenging market** and one that I do worry about the impacts of climate change on all sorts of events and not just limited to hurricane events that impact the coast, but also things like the winter storm last year, hail events all seem to be getting more and more severe.*
 - ***In terms of the market, it's definitely hardening.** I would say insurers really don't have too much of an option, but to raise rates, especially with some of the hail losses that are being seen and the cat models are catching up and starting to account for them, but those hail losses are detrimental. **At least for us, they were killing us.***
 - ***From top to bottom, everyone's hurting** and the market's definitely going to see some increased rates. There's just really no other choice for it.*
- Role of TWIA
- Interview responses: Company perspectives on TWIA's role writing wind and hail damage in Tier 1.
 - ***I think TWIA's role could diminish a little bit,** like I said, Texas, the department itself has been pretty easy and I use easy in like air quotes but they're, they're allowing the market to sort itself out. And **in my opinion a free market with some***

¹⁶ Not every company answered each question.

¹⁷ We should note that the survey responses (both the online and telephone) related to TWIA rates were inconsistent and should be interpreted with caution. E.g., many insurers who thought that the TWIA rates were low also indicated that they either did not know TWIA's rates or consider TWIA as a competitor.

regulations, but a free market can be an efficient market. And so that they're really allowing the private insurance companies to take rate where they need to take them and they understand that everyone's hurting. And also because part of that's really driven by reinsurance costs.

- *As far as TWIA goes, we've been very careful with what we're writing in that area. Typically they're going to be safe for our larger accounts that are coming our way. So there is a premium component.*
- *Just given how little exposure we have in the area, we haven't just spent a lot of time looking at the TWIA, just to better understand the rates. Again, I think it's something we'll look at in the long term, but in the short term, it's just not something that we focus on.*
- (In)ability to compete with TWIA rates.
- Interview responses: Company perspectives regarding if their company can or cannot compete with TWIA rates.
 - ***Can't compete w/ TWIA rates in coastal zone for wind.** There are certain areas the company cannot compete with TWIA and other areas they can compete.*
 - *Speaking from the competitive landscape that we were seeing there, **we weren't concerned with competing with TWIA**, just because the growth that we were able to achieve was sufficient to meet our goals that we were going afterwards on trying to grow the product.*
 - ***It's really just, we can't compete with TWIA's rates really.** And that kind of speaks for all private insurance companies that I've heard of. I think if TWIA's able to disincentivize some of these favorable risks that have mitigation features and different things where the insured is taking that step to self-mitigate. I think if TWIA is able to almost sift those out and let those hit the private insurance companies, then I think that could see their role diminish, **but as it currently stands, I don't see any way that the private market could move in unless TWIA were to somehow give up some control.***
 - *Our rate will probably be pretty high because the pricing for like RMS and AIR is just really just looking at the average annual losses and kind of grossing them out, right? **And for that rate, for that high rate, if there is a TWIA that's available, like the demand for your policies will not exist.** Everybody will switch to TWIA, right?*
 - *So we'd like to write there more, but yeah, **we can't do it at the rates TWIA, we can't compete with at that price.** For sure.*
 - ***Hard to compete with TWIA because they are the cheapest.***

Theme II: Challenges in the Texas insurance market

Description: Issues that are a challenge for small- and large-scale insurance providers in the Texas insurance market.

Theme II: Summary of Responses

Findings included six companies indicating that building codes and regulations are a challenge in Texas. Whereas Florida has “*more stringent building codes than Texas does, so that's a big incentive to be in Florida versus Texas.*” Challenges also consisted of environmental issues such as the 2021 winter storm, wind and hail events, climate change, and that catastrophes are getting more severe and frequent. Other challenges indicated were the competition from larger, national companies.

Theme II: Subcategories

- Policy / regulations / building codes
- Interview Responses: Responses related to challenges in the market over the last few years that have prompted company strategies to adapt to changing risks.
 - ***I don't think that we faced any strong challenges writing wind in Tier 1 or writing wind along the coast from a regulatory standpoint. I think one of our biggest pain points, just in my experience and talking with previous management staff that I've worked with, one of our biggest pain points is in Texas is their lack of restrictions when it comes to like certifications for repair companies.***
 - *That plumbers, roofers, people that are repairing broken fixtures, repairing homes that we're ensuring, don't always require their certifications where other states will. I think it's been more of a loss problem that repairs that we're paying for on those homes were either not being completed or not being completed to sufficient standards, which would then incur more claims or additional claims in subsequent years. **That had been the only like major concern from a regulatory standpoint that we would have loved to have seen a bit more restrictions on.***
 - *So I'll use Florida as an example. That state has made it very easy for us to know what we're writing in terms of does it have the proper mitigation and are we getting the proper elevation certificates for flood, and that we know that they have flood coverage. They've got standardized forms that help us understand what we're writing. **Texas, there are times where we can maybe get our hands on an old inspection, but there's not as much information I think out there that can help us underwrite some of that stuff on the front end, which does limit us.***
 - *Well, that's pretty much why we want to stay in **Florida, because we have more stringent building codes than Texas does, so that's a big incentive to be in Florida versus Texas.***
 - *The one other thing we haven't touched on, you mentioned that I put it to my survey, but I think the **statewide building codes is a big missing and not just for the coastal market, but for the entire state.** I think of, you know, and this is getting a bit into the infrastructure too with the power grids and all that.*
 - *So **having some kind of standard in place that helps the insurance company understand what exactly we're looking at with the risk in terms of wind mitigation and knowing that it's got the proper elevation.** I mean, I think that goes a long way with helping us get more comfortable writing those risks at the coast.*

- Climate
- Interview Responses: Responses related to challenges in the market over the last few years that have prompted company strategies to adapt to changing risks.
 - *And so where *name* talked about our strategy of hitting those major metro areas, we're starting to shift a little bit away from DFW because it gets that kind of hailstorm or some crazy event that impacts us almost every other year, where Harvey was a one in 10 year event.*
 - *We lost quite a bit. If we didn't have the winter storm, we would've made a profit. But we were down probably like \$25 million last year. A lot of water claims and then just kind of the construction delays. We've had some people still living in apartments even after Uri claims that happened last year. Some people are still displaced from that while their homes are getting fixed.*
 - *I think number one is volatility right now, and I think we're in a situation we're starting to see that catastrophes are getting more and more severe and they're getting more and more frequent. So, if we didn't have reinsurance in place, this would just not be a tenable solution to anything.*
- Competition from national carriers
- Interview Responses: Responses related to challenges in the market over the last few years that have prompted company strategies to adapt to changing risks.
 - *More of our struggles trying to grow further inland in the state were **competing with more of the national carriers**. We have gotten a lot of agent feedback that national carriers such as Nationwide, Allstate, they have a bigger hold on inland territories in Texas. That had really prevented a lot of our growth for the inland in the state, which is why we were able to gain more of our portfolio growth in the coastal areas.*
 - *In terms of constraints for Tier 1, it really just comes down to price. It's difficult with the types of CAD exposures that Texas has. Texas has every peril depending on where you are in the state. **It's a little bit, use the term lightly impossible to do right in every part of the state, unless you're a progressive, or one of those big players, but as a regional insurance company, we had to select the focus and we're focused on the coastal area. And the challenge with that, is that really comes down to price.***
 - *Reason things are in decline is because **other companies coming in and taking market share.***

Theme III: Incentives in the Texas insurance market.

Description: Company philosophy on reinsurance. Impact of reinsurance rates on the company's ability to grow in Tier 1?

Theme III: Summary of Responses

Finding indicated that companies could only afford increasing reinsurance cost if they could charge actuarially sound rates. More policies on the coast could only be written if they could have more profitable business inland.

Theme III: Subcategories

- Reinsurance
- Interview Responses: Responses related to Company philosophy on reinsurance. Impact of reinsurance rates on the company's ability to grow in Tier 1?
 - ***It's a mix of both*** (private or state sponsored). *The majority of it is through private companies. We work with a reinsurance broker. We're actually working with [a company's name]. I believe I saw that TWIA was also working with the same company as well. They manage our catastrophe reinsurance treaties, which are supplemented through quite a few different private reinsurers. Florida's the only other state that has a public fund, the Florida hurricane CAT fund that we also participate in.*
 - *As these reinsurance rates are going up, it's because the models are going... We don't like X, Y, and Z where it's, like I said, they're starting to capture more of that hail exposure and in certain areas. If we have this business in that south, the DFW area, now that the models are starting to become a little bit harder on those hail exposure than our modeled losses look worse. And then our reinsurance rates go up. That drives part of the repositioning along the coast because we're in the cat business. And then also part of it, it's just general increase in rates across the board.*
 - *So I think you hit it on the first statement where you said we want to make sure we charge actuarially sound rates and then for reinsurance costs, if we're writing more on the coast, that means we have to write more profitable business inland.*
 - ***We don't buy our own reinsurance. We roll it through the *company name* corporation.*** *So, some of our conversations, when we look at writing additional wind coverage, those go up through corporate as well.*

Theme IV: Reasons for long-term company success.

Description: Company perspective of reason for long term company success and why the company has continued to grow.

Theme IV: Summary of Responses

Findings indicated that companies attributed long term success to the regulatory environment in Texas and because their risk is spread over customers across the entire state (“...there's reinsurance

risk assumed by even customers in El Paso as well as Houston.”) Additional reasons for success included agency relationships and that “Texas is easy market compared to other Gulf states.”

Theme IV: Subcategories

- Long-term success
- Interview Responses: Responses related to company perspective of reason for long term company success and why the company has continued to grow.
 - *Yeah, I think in Texas, the **regulatory environment** has been really friendly towards us and has allowed us to charge not only appropriate hurricane premiums, but also some of those more complex mechanisms I mentioned: our net cost of reinsurance charge, which we spread to all customers, all throughout the state because there's reinsurance risk assumed by even customers in El Paso as well as Houston.*
 - *Yeah. I guess starting from the very beginning, because the company itself is pretty young, I want to say around maybe 12 years or so, **but in the very beginning, a big part of that rapid growth had to do with agency relationships.** We had a partnership that is no longer, that we moved past, but they had a really good relationship with us, they were giving us all kinds of business. And it wasn't necessarily focused, I guess you could say, some of it was in the south area, some of it was along the Tier1 , Tier 2 coastal areas and stuff like that, and some of it was even out in the Western states.*
 - *Texas, in general, is a pretty easy market compared to some of the other Gulf states we interact with, it's a file and use, so we can go ahead and start using rates if we wanted to prior to approval and all of that specifics, but **in general Texas allows for mostly a free market, which can help some insurers.***

3.4. Survey Results – Commercial Property Insurers

3.4.1. Preferences for incentives

In Table 33, the distribution of incentive options selected by all survey participants are reported. Approximately 13% of participants did not select any options, including options 16 and 17. Twenty-four insurers selected one option only, and the remaining 15 selected two or more options simultaneously. We should also note that the companies writing commercial properties in

Tier 1, on average, selected 1.4 more incentives options relative to those not writing in Tier 1 (this difference was statistically significant at the 5% significance level).¹⁸

Table 33: Distribution of selected options

	Freq.	Percent
0	6	13.33
1	24	53.33
2	7	15.56
3	1	2.22
4	1	2.22
6	1	2.22
7	2	4.44
8	2	4.44
9	1	2.22
Total	45	100.00

Among all insurers participating in the survey, the percentage distribution for each option is provided in Figures 11 & 12. Notably, more than half of the insurers (53%) selected option 16 (**There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance**). The percentage was similar across the insurers writing in Tier 1 and among those writing wind and hail coverage in Tier 1. Looking at other options individually, insurers showed similar preferences for Incentive 13 (**Improve and enforce building codes, standards, construction requirements**), and the Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**), at approximately 20% each. These were followed by 11% of insurers indicating the Incentive 7 (**Mandate higher deductibles/Expand use of wind/hail deductibles**) and Incentive 8 (**Fewer or no restrictions on underwriting guidelines**), respectively.

In terms of incentive preferences by company type, for those writing commercial properties in Tier 1, Incentive 13 (**Improve and enforce building codes, standards, construction requirements**) and Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**)

¹⁸ Bivariate regression of count of options on an indicator variable for a Tier 1 presence with CP.

were equally preferred options chosen by 37% of insurers. Among those who wrote wind and hail in Tier 1, Incentive 13 (**Improve and enforce building codes, standards, construction requirements**) was the highest, chosen by 46% of insurers, while Incentive 1 (**Charge rates that you believe are actuarially sound in Tier 1**) and Incentive 7 (**Mandate higher deductibles/Expand use of wind/hail deductibles**) were second highest, preferred by the 38% of insurers. Meanwhile, Incentive 3 (**Reduce reinsurance cost or improve accessibility to reinsurance**) was supported by 15% of the companies. Overall, preferences for the incentives were similar among all the groups, with Incentive 13 (**Charge rates that you believe are actuarially sound in Tier 1**), Incentive 1 (**Reduce reinsurance cost or improve accessibility to reinsurance**) & Incentive 7 (**Mandate higher deductibles/Expand use of wind/hail deductibles**) standing out as the most relevant.

Among the commercial property insurers not writing in Tier 1, the half that selected option 16 (**There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance**) also did not elaborate on other incentives not listed in the survey.¹⁹

¹⁹ Nine insurers commented on the open ended incentives option 17. One indicated that the adoption of the building codes from the international code council would incentivize writing. The other eight indicated that they were either in runoff or no longer wrote commercial property business in Texas.

Figure 11: Preferences for different incentives by insurer type

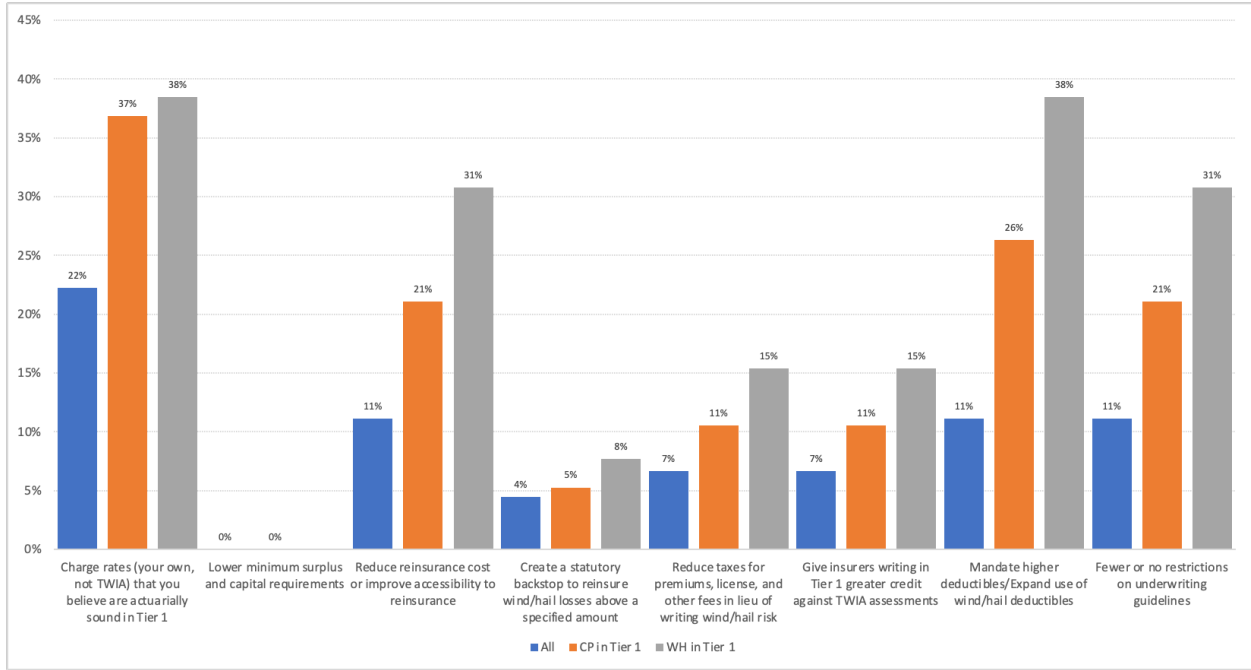
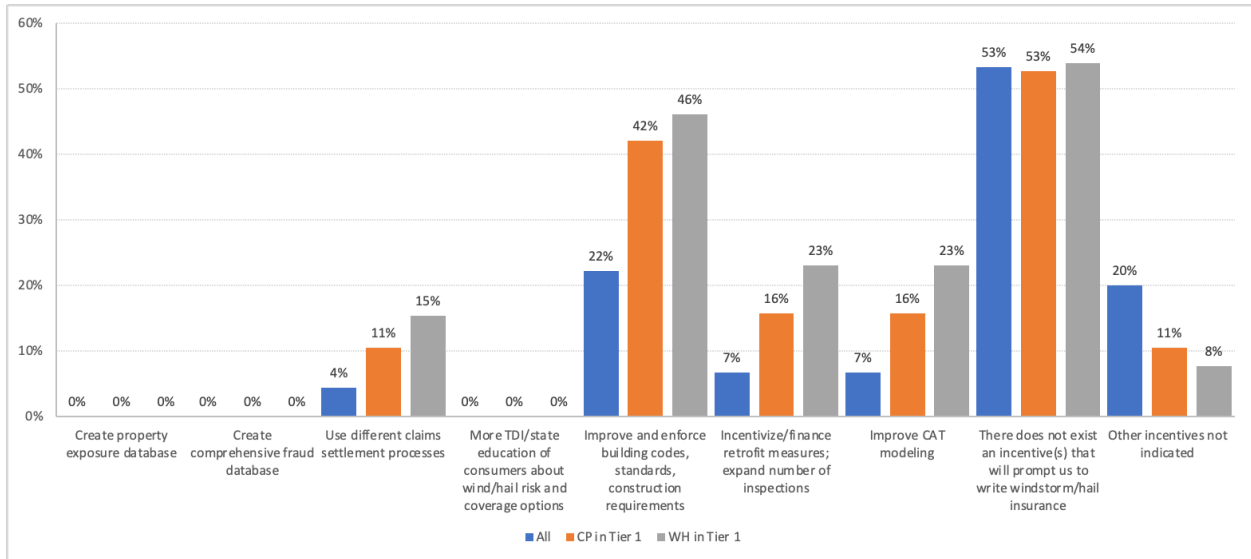


Figure 12: Preferences for different incentives by insurer type



3.4.2. Change in exposure and rates

As indicated in Table 34, among those who wrote wind and hail in Tier 1 if the insurer’s preferred incentives existed, the average exposure increase was indicated at 17%, with the minimum at 0% and the maximum 100%. Insurers not writing in Tier 1 did not indicate how much their exposure would change.

Table 34: Summary statistics (“If the incentives you indicated above existed, by how much would you increase your exposure?”)

Variable	# of observations	Mean	Std. Dev.	Min	Max
Exposure increase (%) Tier 1 with Hail and Wind	15	16.933	34.047	0	100
Exposure increase (%) others (no Tier 1 & no HW)	3	0	0	0	0

Companies writing wind and hail with their commercial property policies in Tier 1 were also asked to indicate how their current rates compared to TWIA rates. The distribution of these responses is provided in Table 35. Notably, 25 insurers writing in Tier 1 did not know how their current rates compared with the TWIA, including 17 insurers that wrote wind and hail coverage in Tier 1.

Table 35: Summary of Rates (How does your current rates compare with TWIA rates?)

	Freq.	Percent
It is higher by 25-50%	0	0
It is higher by 50-75%	0	0
It is higher by less than 25%	0	0
We do not know what TWIA rates are	25	100
It is about the same	0	0
It is lower	0	0
Total	25	100.00

The insurers not writing commercial properties in Tier 1 were not asked rate-related question, as it was assumed that they would not have a good knowledge of TWIA rates and would provide inaccurate assessment of their own rates, given no or limited current experience in Tier 1.

3.4.3. TWIA perceptions

We also explored commercial property insurers’ perceptions about TWIA as a competitor in the market and its two depopulation programs. All but one of the 32 that responded did not perceive TWIA as a competitor (Table 36). Notably, two-thirds of the companies who did not perceive TWIA as competitor also wrote commercial property in Tier 1.

Table 36: TWIA perception

Do you perceive TWIA as a competitor?	Freq.	Percent	Cum.
No	31	96.88	96.88
Yes	1	3.12	100.00
Total	32	100.00	

Interestingly, the majority of the companies considered TWIA rates at least somewhat competitive across all types of insurers, as indicated in Table 37. When asked whether TWIA assessment formula should be changed, the majority also indicated “No”, across all insurer types (Table 38).

If changes in the assessment formula were implemented, those already writing wind and hail in Tier 1 indicated that they would increase exposure by approximately 9% on average (standard deviation 29%). This distribution was skewed by one company that indicated that they would increase their exposure by 100%. In fact, 10 out of 12 companies indicated they would not increase

exposure at all, and one other company indicated only a 10% increase if changes in TWIA assessments were made (Table 39).²⁰

Table 37: Perception TWIA rates

In your opinion, are TWIA rates competitive?	All insurers	CP in Tier 1	No HO in Tier 1	Wind and hail in Tier 1	No wind and hail in Tier 1
No	42.31%	45.45	25	46.67	42.86
Somewhat	26.92%	22.73	50	26.67	14.29
Yes	30.77%	31.82	25	26.67	42.86
Number responded (total column %)	26 (100)	22 (100)	4 (100)	15 (100)	7 (100)

Table 38: Perception TWIA assessment

Should there be any changes to TWIA's assessment formula?	All insurers	HO in Tier 1	No HO in Tier 1	Wind and hail in Tier 1	No wind and hail in Tier 1
No	92.59	90.91	100	86.67	100
Yes	7.41	9.09	0	13.33	0
Number responded (total column %)	27 (100)	22 (100)	5 (100)	15(100)	7 (100)

Table 39: Exposure Change

Variable	Obs	Mean	Std. Dev.	Min	Max
Exposure change if assessment formula changed	12	9.167	28.749	0	100

3.4.4. Depopulation Programs

All insurers writing wind and hail with their commercial property policies in Tier 1 were asked to indicate whether they participated in the TWIA voluntary market and assumption reinsurance depopulation programs (SB 900; 84th Leg. Session) that encourages the transfer of TWIA policies to insurers through the voluntary market or assumption reinsurance.

All 14 companies that responded to this question wrote WH in Tier 1 and indicated no participation in the voluntary market depopulation program. All companies were asked if they

²⁰ No company responded to the open-ended question related to the changes in the TWIA assessment formula.

planned to participate in the TWIA voluntary market depopulation program. All responded negatively and did not provide comments. Similarly, no company participated in the assumption reinsurance program, and did not participate in the program in the past either. Participants did not offer answers how the assumption reinsurance program can be improved. It is important to explore why the program is not popular.

3.4.5. History

We also explored the medium-term history covering 2015-2020 to understand specific concerns and opportunities affecting market dynamics in Texas coastal territories. Of the 34 responses, 18 of them indicated that they wrote commercial property insurance with windstorm and hail coverage, while 16 did not write hail and wind in the past 5 years. Of those 18 who wrote in that timeframe, all but two companies still write wind and hail in the market. On average, compared to the past, the exposure of respondent insurers in Tier 1 has decreased by 11% with the large variation in the sample (standard deviation 53%). Of the 15 companies that indicated a change in exposure, five companies experienced a decrease, eight companies grew, and two companies did not change. Of the five decreasing companies, two declined in exposure by 100%, one company declined by 80% and two declined by 40% each. As for the growing companies, only one company experienced 100% growth in exposure; others indicated a moderate growth rate at around 5.6%.

To understand reasons for the indicated changes, commercial property insurers were also asked to select condition(s) that prompted specific market adjustments relative to recent history. These options are summarized in Table 40. Notably, the companies that responded to this question were all writing commercial property in Tier 1. The companies consistently indicated **changes in expertise in underwriting and claims** (Condition 10) and **cost of reinsurance** (Condition 2) as

two common conditions for market adjustments. **Reinsurance accessibility** (Condition 1), **expected losses and loss adjustment expenses** (Condition 4), and **volatility of wind and hail risk** (Condition 6) were three other common conditions identified among the commercial property insurers.

Table 40: Concerns/opportunities associated with previous market adjustments

		Writing CP in Tier 1	Writing WH in Tier 1
Condition 1	Reinsurance accessibility	X (5)	X (3)
Condition 2	Cost of reinsurance	X (6)	X (4)
Condition 3	Capital and surplus requirements	X (2)	X (2)
Condition 4	Expected losses and loss adjustment expenses	X (5)	X (3)
Condition 5	Wind and hail model and data accuracy	X (3)	X (3)
Condition 6	Volatility of windstorm/hail risk	X (5)	X (3)
Condition 7	Changes in consumer demand		
Condition 8	Expected changes in state rate and form regulation		
Condition 9	Correlation of wind/hail risks	X (1)	X (1)
Condition 10	Changes in expertise in underwriting and claims	X (7)	X (7)
Condition 11	Changes in litigation of risks		
Condition 12	(In)ability to compete with TWIA rates		
Condition 13	N/A: There were no changes	X (2)	X (2)
Condition 14	Other not specify	X (3)	X (3)

Notes: Number of companies indicating a specific condition is provided in parentheses.

3.4.6. Hypothetical scenarios

Similar to homeowners insurers, all commercial property carriers were presented three hypothetical scenarios in which Texas would implement the following specific changes (one at a time) and asked to indicate what their adjustments might be.

Scenario 1: If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas

Scenario 2: If Texas required wind and hail coverage in every Tier 1 property policy

Scenario 3: If Texas required increasing the amount of funding TWIA receives through assessments

Responses across the two groups (writing or not writing commercial properties in Tier 1) of insurers are provided in Table 41 – Table 43 below; and the responses among only Tier 1 companies are provided in Tables 44 - 46. As the results indicate, 61% would not make any changes to their current writing if Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 to write property insurance in Texas. Among those who wrote commercial property in Tier 1, the percentage was 46%. All of the companies not writing CP in Tier 1 indicated that they would not make any changes to their current writing in Texas.

Table 41: Scenario 1 (all companies)

If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas	Yes indicates that a company writes CP in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	9	11	20
Reduce writing in Texas	0	12	12
Stop writing in Texas	0	1	1
Total	9	24	33

Notably in response to Scenario 2 (**If Texas required wind and hail coverage in every Tier 1 property policy**), 73% of the companies would not make any changes to their current writing. The percentage was 63% among those writing CP in Tier 1, whereas all the insurers not writing in Tier 1 indicated no changes in response to this hypothetical policy scenario.

Table 42: Scenario 2 (all companies)

If Texas required wind and hail coverage in every Tier 1 property policy, would	Yes indicates writing CP in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Tier 1	9	15	24
Reduce writing in Tier 1	0	8	8
Stop writing in Tier 1	0	1	1
Total	9	24	33

Responses for Scenario 3 were somewhat similar to those indicated for the Scenario 2 above. Overall, 73% indicated that proposed changes would not prompt any changes in their current writing in Texas. We note that this response was consistent across Tier 1 (63%) and non-Tier 1 companies (100%).

Table 43: Scenario 3 (all companies)

If Texas required increasing the amount of funding TWIA receives through assessments	Yes indicates writing CP in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	9	15	24
Reduce writing in Texas	0	9	9
Total	9	24	33

Responses to Scenario 1 among the companies writing in Tier 1 were somewhat mixed between the companies writing wind and hail and those not writing wind and hail with their commercial property policies. Overall, 60% of companies writing wind and hail coverage indicated the proposed change would prompt them to reduce or stop writing in Texas. Companies not writing wind and hail coverage indicated fewer anticipated changes, if any, in response to this hypothetical scenario (Table 44).

Table 44: Scenario 1 (Tier 1 companies)

If Texas required all insurers to write a proportionate share of wind and hail, would	Yes indicates writing WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	6	6	12
Reduce writing in Texas	3	9	12
Stop writing in Texas	1	0	1
Total	10	15	25

For Scenario 2, 64% indicated they would not make any changes to their current writing. The majority of companies (73%) writing wind and hail coverage expected not to make any changes.

Table 45: Scenario 2 (Tier 1 companies)

If Texas required wind and hail coverage in every Tier 1 property policy, would	Yes indicates writing WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Tier 1	5	11	16
Reduce writing in Tier 1	4	4	8
Stop writing in Tier 1	1	0	1
Total	10	15	25

Finally, responses to Scenario 3 showed that this specific change would prompt reduction of writing among Tier 1 companies that write wind and hail coverage. The majority of Tier 1 companies without wind and hail coverage would not make any changes in response to the proposed Scenario 3 (Table 46).

Table 46: Scenario 3 (Tier 1 companies)

If Texas required increasing the amount of funding TWIA receives through assessment	Yes indicates writing WH in Tier 1, and No otherwise		
	No	Yes	Total
Not make any changes to your current writing in Texas	9	7	16
Reduce writing in Texas	1	8	9
Total	10	15	25

Overall, these responses indicate that some changes would be expected among companies writing in Tier 1 if Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas, and if Texas required increasing the amount of funding TWIA receives through assessments. On the other hand, the requirement of wind and hail coverage in every Tier 1 property policy would not prompt much change in Tier 1 or Texas as a whole (Tables 42 & 45).

3.4.7. New application approval/ denial; Policy renewals

This section intended to understand decisions employed by the companies writing wind and hail in Tier 1 during 2021 to approve or deny new applications and renew existing policies in Tier 1. Summary statistics for the 13 insurers responding to the following three questions are provided in Table 47.

Q1: What percentage of new commercial property applications received in Tier 1 were for a policy that includes wind/hail coverage relative to the total number of CP applications received (regardless of whether the application was for wind/ hail coverage) in 2021 in Tier 1?

Q2: What percentage of new CP applications with wind/hail coverage did you deny insurance in Tier 1?

Q3: What percentage of existing CP policies did you deny renewing wind/hail coverage?

Table 47: New application approval/denial; policy renewals

Variable	Mean	Std. Dev.	Min	Max
Q1	45.615	49.453	0	100
Q2	16.667	29.721	0	75
Q3	9.333	22.52	0	80

Notes: 13 respondents

On average, approximately 46% of new CP applications received in Tier 1 were for a policy that included wind/hail coverage. Five companies indicated that 99-100% of new applications were

for wind and hail coverage. Of the applications received, on average, 17% were denied insurance in Tier 1, and 9% were denied the renewal for wind and hail coverage.

Below are a few of the reasons indicated for denials of new applications:

1. Applications did not meet the coastal underwriting (UW) guidelines
2. Wind/hail exposure and existing concentration were concerning
3. Adverse Loss History
4. Some did not track this level of data.

Reasons indicated for denial of renewals:²¹

1. Adverse loss activity; change in exposure
2. Failure to meet underwriting criteria; out of risk appetite; loss history.

In terms of the companies' usage of policy forms that included the two-year suit-filing deadline, one-year-claim-filing deadline or both, 11 out of the 14 companies that responded to this question indicated that they had used policy forms that included one or both of the deadlines. The companies that used policy forms with one or both of the deadlines were also asked to indicate if they had reduced or decreased exposure. Seven companies indicated decrease, one indicated no change, and only one increased their exposure due to use of the policy forms. On average, the exposure increased by approximately 0.33% (standard deviation 3.64%). The maximum decrease was indicated at 1%, while the maximum increase was 10%.

²¹ Some companies indicated that they did not deny wind/hail coverage by itself.

3.5. Telephone Interviews - Commercial Property Insurers

Interviews with commercial insurers were conducted over Zoom. We did not have data on companies' long-term exposure to employ the selection strategy similar to residential property insurers. From the responding companies, we selected eleven commercial insurance companies to contact for in-depth interviews. A total of four companies agreed to participate.

The data captured from the four interviews was analyzed and categorized into the following **four broader themes** comprising fourteen subcategories (see Section 3.5.1 below):

1. Company perspective and philosophy about underwriting in Texas
2. Challenges in the Texas insurance market
3. Insurance incentives in the Texas insurance market
4. Reasons for long-term company success.

3.5.1. Data from Telephone Interviews with Commercial Insurers

A synopsis of the data captured from four in-depth interviews with commercial insurance companies operating in Texas is below and in the companion table.

Theme: Company perspective and philosophy about underwriting in Texas.

Summary of Responses:

Each of the companies expressed concern for the tightening of the insurance market in Texas. However, the companies shared slightly diverging philosophies for underwriting in the state. One company actively seeks to include wind loss coverage in its policies within Tier 1 to capitalize on TWIA credits and the associated premium income. Three companies take a more cautious approach to writing insurance policies in Texas, often excluding wind loss coverage. Each of the companies expressed concern for TWIA's low rates and funding structure within the market.

Description: Company perspectives about the state of the insurance market in Texas.

Subcategory:

- State of the insurance market
- Interview Responses: Company perspectives related to the state of the insurance market in Texas and how it impacts underwriting in Tier 1 territories.
 - *So we write in Florida, all the Gulf states, including Texas. **I'm sure we have an account or two on the books where we do write the wind hail in Tier 1, but it's probably a very small** or lower valued building or ancillary to an account that may be located somewhere else... **When we came into Texas, we've taken a very conservative approach** to coastal properties in general... I would say we're pretty close to capacity.*
 - *It really requires a thoughtful management of how much aggregate you're willing to consume as an organization... I would say in terms of the appetite for **Texas relative to other states, I would say some of the benefits is that there is a larger coastline.** If you go all the way down to Brownsville, Texas relative to Houston in Harris County, that does give you some bit of diversity as well.*
 - *And so we try to write as much as we can within Tier 1, but it's also a challenge because it's some of the most severely exposed areas for hurricanes along the coast. We are very selective relative to the type of risk, a type of construction that we will write and we'll base the construction type on distance to the coast.*
 - *Texas is not, I guess, as disrupted as some other states. We do business in all the Gulf states. We've only been in Texas three and a half years, I think, now. Maybe four. **The market has tightened.... Everything we write in Tier 1 and Tier 2 in Texas, we want the wind on it.** We don't want to exclude the wind. First, we want the credits for future assessments from TWIA. And second, sometimes when you strip out the wind premium, there's very little premium left to cover all of the other losses.*
 - *If I go to one of those counties in the very north of Texas, State Farm, Allstate, Liberty Mutual, Farmers, they're all writing in that area, and they all want those policies.*
- Role of TWIA
- Interview Responses: Company perspectives on TWIA's role writing wind and hail damage in Tier 1 territories.
 - *It seems to be helping the market provide coverage out there. **But I don't know enough about it other than to say that we're not sure TWIA is adequately funded to be there.***
 - *I've read articles, both pro and con. **The articles that generally say that the rate is not adequate are usually pretty detailed. I would say I've always been of the mind that I think the rates are a little bit too low.** If we look at what we do in the admitted markets or non-coastals, we see, on average, a higher rate level. In terms of rate action or rate increases, TWIA approves, I think it's every year, or every other year or whenever their board meets. But like I said, my general perception is, I feel like they're a little too low.*
 - *TWIA is doing a great job. I think it's more of ... Hey, look. We do business in all those states, and we know how political all of these organizations are. **But the***

problem I see with TWIA is that they don't take rate increases on a regular basis like they should.

- (In)ability to Compete with TWIA
- Interview Responses: Company perspectives related to their ability to compete with TWIA.
 - ***You're looking at competing against us as an industry pushing rates up, compared to an insurer of last resort, if you will, that is keeping rates flat. And I understand there's political and certain reasons behind not increasing it during the pandemic, but certainly if you're not keeping up with rate, and this goes back to my inflation comments, if you're not keeping up with rate, your loss costs are outstripping any sort of rate. If you're not getting any rate increases your lost costs are going to start to run away pretty quickly.***
 - ***But they got to keep those rates moving up, because the rest of the industry is continuing to increase rates, especially with the cost of reinsurance, and TWIA doesn't necessarily buy the same levels, if at all, reinsurance.***
 - ***The feeling that we've had is that we're not losing coastal business to TWIA. We're determining what we think we understand about the exposure of our portfolio, and then our underwriting guidelines dictate where we should write and how much we should price for it. Right now, we're not viewing TWIA as a competitor.***

Theme: Challenges for Writing in Texas

Summary of Responses:

The main challenges for commercial property insurers are the cost and availability of reinsurance; lax or outdated building codes; and climate conditions. Company representatives explained that reinsurance companies are raising their rates corresponding with the increase in severity and frequency of coastal storms. Other challenges include inflation and legal fees associated with new regulations in other states.

Description: Issues that are a challenge for small- and large-scale insurance providers in the Texas insurance market.

Subcategory:

- Reinsurance
- Interview Responses: Perspectives related to the cost and availability of reinsurance.
 - ***There's no way to regulate them because they're not US companies.... Some of the carriers that we've used for many years for our CAT reinsurance told us this year that they're getting outside of that portfolio. They've experienced unacceptable loss levels. Their investors have lost money. ... I mean, we've seen pricing increases on our property cover go up by 15, 20% a year, and you're stuck with it.***

- *The reinsurance underwriters are getting a lot more persnickety or particular with regards to how much coastal property you're writing. And so that kind of has a huge influence on what we can do.*
- *They're not sharing how much, but everything is showing double digit increases. Both the insurance and reinsurance marketplace, they recognize the fact that if we're not properly priced there, it's going to undermine our ability to provide coverage.*
- *Actually, the renewal for Florida doesn't look too bad. Florida wasn't hit last year. And then we're looking at some of the other states.*
- Building Codes
- Interview Responses: Perspectives related to the impact of building codes.
 - *And building codes, not just in Texas, but along most of the coast really provide limited help in terms of requiring structures have some reasonable strength to withstand a hurricane.*
 - *I would say the building codes are not quite to the level they are in Florida. As an example, there's a pretty interesting line where some of that Texas building codes stop off at, which require some of the windows, some of the AC seven building code requirements that really taper off after you get past Harris County.*
 - *You can have the code, if the buildings are not inspected at the right time and they're not build per the code, that's a problem as well. The local jurisdiction having that control is a huge factor.*
 - *I do feel like we were a little late to the game from a state perspective because the codes really changed, I think in 1996. And Texas has been a little bit behind in terms of requirements or construction requirements. Building structures that can withstand heavier winds and that type of thing. I think it's getting better. But like I said, I don't know that it's uniformly where it should be.*
 - *The concept of how fast Texas is growing, irrespective to where you're at within the state, the number of people moving into Texas buying and building homes, the building boom that we've had for years. You could say, it could be inconceivably possible to keep up with it because there's so much construction going on.*
- Climate
- Interview Responses: Perspectives related to environmental challenges in the market.
 - *Storms don't seem to be getting any weaker. They're always stronger. The intensity is much higher, it seems like, as well as frequency of storms.*
 - *So the old adage that hurricanes stopped at shoreline, they really don't. I mean, you get a big enough one, I've seen models of CAT fives coming across. They're coming into Texas, basically up the ship channel of Houston and going all the way up into the metroplex.*
 - *We're trying to do the best we can to understand how climate change is impacting things. And there is no roadmap yet for that, other than the fact that... the entire industry is recognizing that the fact that climate change is having an impact based on frequency and severity.*
 - *It's going to be more a reaction to the market. To the extent that all of those things, the more severe storms, the sea level rising, the reinsurers bake that into their rates and make it just all that much more expensive. At some point, then,*

that's going to make us say, "Okay, do we need to control or reduce our exposure here."

- *We start to see, and this has been going on for some time, the migration of people along the coastline, **the migration of people towards more catastrophe prone areas** because of land that's been repurposed that was otherwise catastrophe prone.*
- Inflation
- Interview Responses: Perspectives that mention inflation as a challenge in the insurers market.
 - *I think there's a lot of challenges that we see that are both related to what we've seen from inflation, so the **inflationary trends that we're seeing today in the marketplace**, specifically in the homeowners, with not only the market evaluations going up, but most importantly and what we care most about, which is just the supply chain issues, cost of materials, labor costs, and if you extrapolate that to the commercial side, elongation of business interruption claims, additional costs for materials.*
- Policy and Regulation
- Interview Responses: Perspectives related to legal challenges within the market.
 - *Writing residential property in **Texas is somewhat problematic because of some of the non cancellation rules**. For example, you are not able to non-renew a residential property unless it's had three act of God losses in three years and you've sent a letter to the insured, warning them after the second loss and before the third, which is almost impossible.*
 - ***Florida's got all kinds of other fraud issues going on that you guys in Texas, thank God, it's not as bad, or hasn't gotten there**. We also have this thing called one-way attorney's fees in Florida, which is the worst thing anybody ever thought of. The legal industry lives off insurance companies and lawsuits.*
 - *Florida is an example with assignment of benefits, appraisal clauses, arbitration, enhanced arbitration clauses, public gesture clauses. That has been a growing element of where we see a lot of the litigation and a lot of claims that are making their way into our loss models that were not necessarily contemplated. It's not to say that in every single case that that's not warranted, **but we do see a lot more legal costs**.*

Theme: Incentives and Recommendation

Summary of Responses:

Companies unanimously requested improved building code enactment and enforcement. Other incentives include reducing the size of the residual market by raising rates and developing a permanent state-level catastrophic fund.

Description: Company view on incentives for market participation.

Subcategory:

- Building Codes
- Interview Responses: Perspectives related to improved building codes as an incentive.
 - *Texas is an example where you've probably got the building codes not to the level that are pretty much required in most areas within Florida, as an example. I think that's an area, so **I think building code, some of the legislation around enforcing that in particular areas would be very helpful.***
 - *And Texas has been a little bit behind in terms of requirements or construction requirements. Building structures that can withstand heavier winds and that type of thing. I think it's getting better. But like I said, **I don't know that it's uniformly where it should be. I think there's some room for improvement there.***
 - ***We would love Texas to adopt building codes like Florida has.** We're members of IBHS. You guys probably know what IBHS rates Texas at. It's not very good. You're a little better than some other states, but your laws and the enforcement of your laws when it comes to building code, it's pretty poor... If nothing else, start like Florida did, in Tier 1 and Tier 2.*
 - *I think building code, it would be number one on my list, regardless, because again what that does is it protects the population. It also makes the buildings more insurable. And again **we're not trying to get out of paying losses, but if building codes can bring buildings a little bit more in line with the reality of the risk in the state of Texas, I think that's a good thing for everybody.***
- TWIA Adjustments
- Interview Responses: Perspectives related to TWIA adjustments as an incentive.
 - ***Let's make sure that TWIA keeps up with their rate filings.** I know it's not popular. But even if they take 3 or 4 or 5% rate increases year after year, they keep moving that bar so they stay above the market.*
 - *I think the **residual market should be smaller.***
 - *I would say **rate adequacy today is key** and if we are able to achieve rate adequacy, I think that helps to solve some of those problems. I think if you're underpriced in business in a particular zone, then it's just a matter of time before that catches up with you.*
- Catastrophic funds/reinsurance
- Interview Responses: Perspectives expressing a desire for a state-level catastrophic reinsurance as an incentive.
 - *If you guys created a **cat fund, like Florida did, where we can buy some of the lower levels of reinsurance from you guys, and your legislature protects that money that is created for it, and don't allow it to be used for anything else, and the pot keeps growing and growing and growing and growing and growing every year, then that's great, because then the reinsurers know that some of the first levels that we buy are from the cat fund.***
 - ***To the extent that we can continue to get credits, or decent credits, for the wind exposure that we're taking in Tier 1 and Tier 2, when the big losses come in and everybody gets assessed, then it makes sense to us to say, "Okay, look, yeah, I got assessed, I don't know, a million dollars or whatever it might be. But look, I have credits worth \$700,000, so I'm only going to have to pay 3, because I've been year after year writing all of this exposure in Texas."** So those are probably the things that I think would help the marketplace.*

Theme: Reasons for Success

Summary of Responses:

Companies consistently pointed towards improvement in modeling as a reason for their success.

Companies have used these models to geographically diversify their portfolios. In general, companies choose to take a measured, long-term approach to writing in the coastal region.

Description: Company perspective of reason for long term company success and why the company has continued to grow.

Subcategory:

- Models
- Interview Responses: Perspectives related to using catastrophic modeling for business decisions.
 - *But what we found is that we can lean on the models a bit more for hurricane as opposed to 20 years ago, because they're so much better, but they're not foolproof and they're not perfect. And we understand that.*
 - *We license AIR, RMS and ... I forget. The Karen Clark model. Those are the three that we use. And we actually license them in-house. And then we're constantly modeling the portfolios and seeing what our exposure is, and when we have to stop writing in an area, if we get too concentrated.*
 - *We rely very heavily on an assumed performance of that building relative to the model, which is not perfect, but the wind models are much better than they used to be, to give us a reasonable shot at managing our exposure across the portfolio.*
 - *I think the industry that sells our modeling companies like AIR and RMS, I know they've retooled their models. I think the biggest retool that went through was back in like 2002 or 2003. The old CAT models used to model the losses at a higher level, the closer the proximity of the building to the coast. And when they recalibrated those, they did that because we were actually seeing in reality that if a hurricane came, made shore and proceeded across land, it tended to generate tornado or tornadic activity, which caused heavier damage further in.*
- Geographic Diversification
- Interview Responses: Perspectives related to geographic diversification as a business strategy.
 - *We balance that against what we have more inward or inland and try to keep that in check where we can write some business that's closer to the coast, but it's supported by business that's off coast or inland. And then just try to manage to kind of a CAT model balance. Like I said, I would say we're pretty close to capacity.*
 - *So instead of playing the rate game in our state, we went to other states and started writing business in those states so that we could, one, again, get that spread of risk that insurance companies want. And Louisiana and Texas and*

Alabama and Mississippi were places that we were willing to do that and get that spread of risk.

- *But the strategy that we're trying to employ is **if you're geographically diversified in your portfolio, then you need to be able to handle these events.** You wouldn't pull out of Texas just because of Uri, but we need to be able to finance that. And you do that by writing a diverse book. And that's really what we're trying to do.*
- Long Term View
- Interview Responses: Perspectives related to long term business strategy.
 - *We take a pretty long-term approach, and we take a very measured and I guess, **conservative approach to the way that we do business so that we can maintain the solidarity of the company and be able to make good on the promise that we've given to all of our policyholders.***
 - *So again, it's just one of those things where we kind of **take a really long-term view of things,** more so than maybe some of the stock carriers, because they can generate capital pretty quick.*
 - *A foundational element in terms of our strategy is that **we want to be able to understand what the risk is and once we commit to an area, stay in that area.** We want sustainable coverage. It's sustainable profitability because if we're not profitable, we have no choice but to pull back on coverage that's provided to the marketplace and that doesn't do the marketplace any good. And frankly, we're in the business of paying losses, but we need to do it in a profitable way so that we could pay those losses year in and year out.*

3.6. Comparison of 2021 responses to those received during 2016 and 2018

The past two rounds of market incentives studies were performed by TDI in 2016 and 2018 providing some opportunities to explore similarities or discrepancies in responses across the three different cycles. During 2021 cycle, the survey instrument was designed around the topics also covered during the 2016 and 2018 cycles, with at least one important difference being that the 2021 survey was administered online, and presumably more structured in terms of response options. In the past two-rounds, many questions were more open-ended, making it more challenging to consistently summarize them. We should also note that the 2021 round also provided open-ended options among other pre-specified ones, allowing insurers to not be constrained by options prescribed by the researchers.

In the past two rounds, the majority of insurers surveyed were the largest insurers in terms of written premiums. During the 2021 round, the survey was distributed to all residential and commercial policy carriers irrespective of their size in Texas to have more representative sample. The online survey also made post-survey data processing relatively easier. The wide distribution of the survey allowed us to select companies for in depth interviews based on company-specific history over the past decade.²²

Overall, as revealed by the 2021 homeowners insurer survey responses, the three most commonly selected incentives (33-48% of insurers) were:

1. The insurer charging rates that it believes are actuarially sound in Tier 1
2. Reduce reinsurance cost or improve accessibility to reinsurance
3. Create a statutory backstop to reinsure wind/hail losses above a specified amount

Among commercial property carriers, the three most selected incentives (11-20% of insurers) were:

1. Improve and enforce building codes, standards, construction requirements
2. The insurer charging rates that it believes are actuarially sound in Tier 1
3. Mandate higher deductibles / Expand use of wind/hail deductibles
4. Fewer or no restrictions on underwriting guidelines

Incentives that were listed as the most significant during 2018 were:

1. Give insurers writing in Tier 1 greater credit against TWIA assessments
2. Fewer or no restrictions on underwriting guidelines
3. Improve and enforce building codes, standards, construction requirements

²² This was limited to residential analyses only.

Notably, during 2016 round, among incentives common to the 2018 and 2021 rounds, the highest ranked incentive was also related to the ability to charge actuarially adequate rates (similar to the findings in 2021), along with adopting and enforcing building codes, standards, and construction requirements (similar to the findings in 2018).

In terms of preferences for the three hypothetical scenarios explored in the survey, for the Scenario 1 – **If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas** – in the 2021 responses, the majority anticipated few changes in exposure; in the 2018 responses, insurers indicated they would reduce or stop writing in Tier 1. In 2016, most of the companies responding to this question ranked this requirement as the second most favorable incentive. For the two other scenarios, the responses during the 2021 cycle were similar to those during the 2018.

With regards to depopulation programs, responses were somewhat similar during the 2021 and 2018, however we should also note that the responses during both rounds were scattered, making it hard to generalize overall findings.

4. Private Insurance Market – Aggregate Level Analysis

In this section, statistical analyses of aggregate (ZIP code level) private homeowners insurance policies with wind and hail coverage are provided. The objective was to understand how private insurance uptake correlates with ZIP code level socioeconomic, demographic and hazard risk factors. A dataset from TDI was complemented with socioeconomic and demographic data available from the U.S. Census Bureau. Panel data regression models were performed to estimate the relationship between main drivers and private insurance policies, while also accounting for the overall trend in the market common across all ZIP codes as well as county-specific effects potentially related to: building codes and the quality of enforcement; average market

competitiveness; and baseline riskiness with regards to wind and hail perils. Key findings are summarized below:

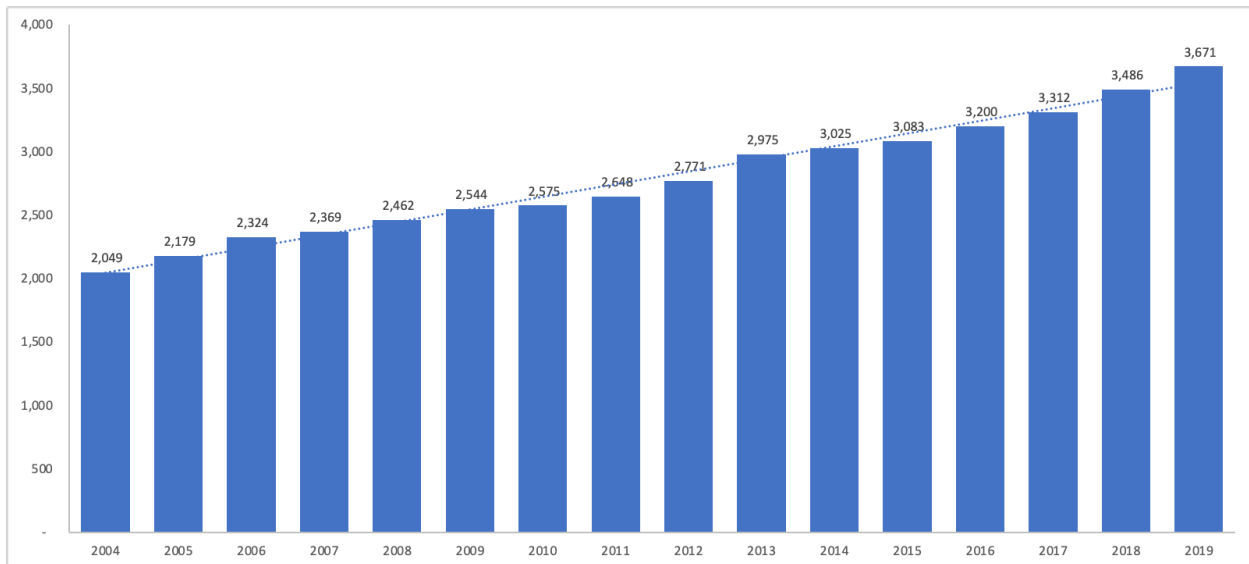
1. Uptake level in the private insurance market increases in affluent ZIP codes (insurance penetration is higher in ZIP codes with high per capita income)
2. Policy uptake, exposure, and premiums increase, on average, in large (by population size and area) ZIP codes as well as ZIP codes with a higher percentage of females or population with a bachelor's degree or higher.
3. Demand for private insurance also increases with recent hurricanes and storms
4. Insurance uptake is lower in ZIP codes with higher poverty and unemployment rates, and it declines in ZIP codes with high proportion of mobile homes (proxy for structurally poor-quality housing stock).
5. Findings similar to 1 – 4 above were observed in a sample of only Tier 1 ZIP codes.
6. Federally-funded hazard mitigation activities are associated with lower ZIP code level exposure and premiums per policy holders.

4.1. Data

We compiled the data at the ZIP code level covering a time span of over 15 years, starting from 2004. We based our sample on policy counts, exposures, and premiums with wind and hail coverage available through the private market in the entire state of Texas. These data were available from the TDI. As depicted in Figure 13, the average number of policies in a ZIP code increased steadily over time, with an average annual growth rate corresponding to ~4%. We should also note that the growth over the 15-year period examined in this report was approximately 80%. Similarly, the total average ZIP code level exposure (i.e., the value of coverage) exhibited 95%

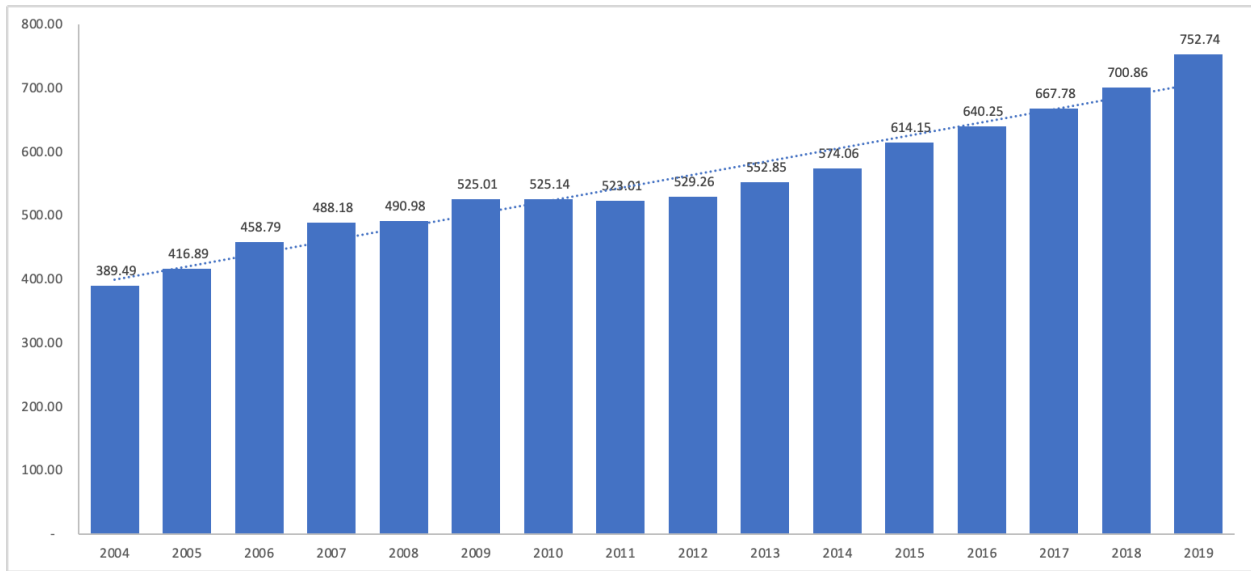
growth in 2019 compared to 2004 (Figure 14). On the other hand, as depicted in Figure 15, average ZIP code level exposure per policy exhibited substantial variation over time, with overall upward trend; we estimated average annual growth rate to be very modest ($\sim 0.5\%$). This may indicate that the growth in total exposure has been primarily driven by the increased number of policies over time. Meanwhile, the average ZIP code level premiums per policy have exhibited U-shaped trend over the same time period (Figure 16), with 2008 marking the beginning of increased premiums per policy. However, the most recent three years in the sample have indicated stabilized premiums at around \$1,390 per policy.

Figure 13: Average number of policies per Texas ZIP code



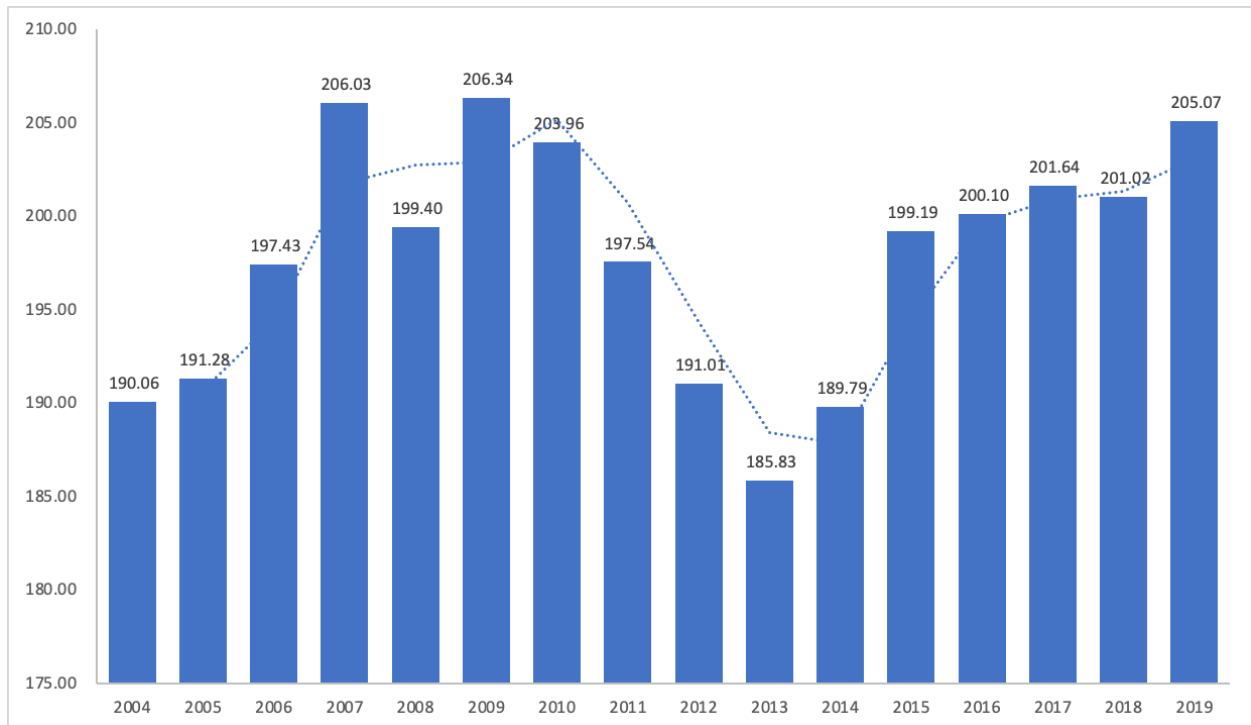
Source: TDI; Authors' calculations

Figure 14: Average inflation-adjusted exposure per Texas ZIP code (\$M)



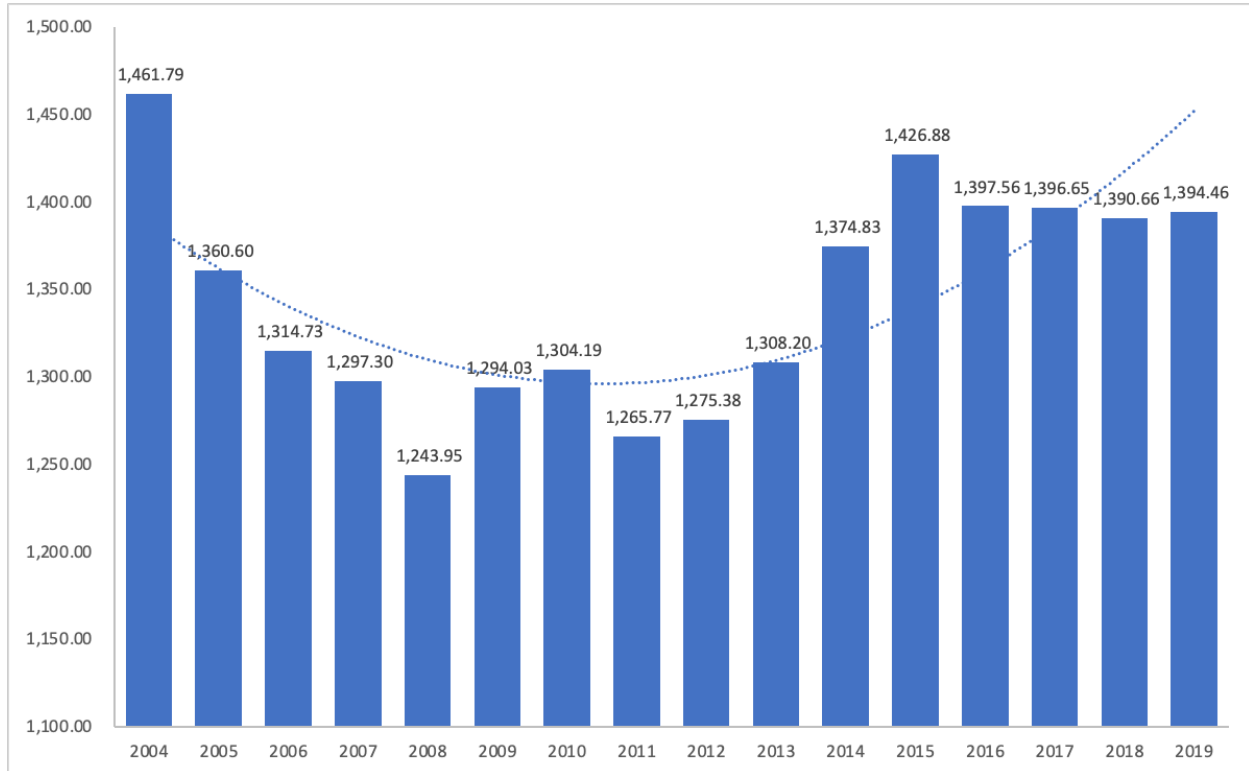
Source: TDI; Authors' calculations

Figure 15: Average inflation-adjusted exposure per policy holder (\$1000) per Texas ZIP code



Source: TDI; Authors' calculations

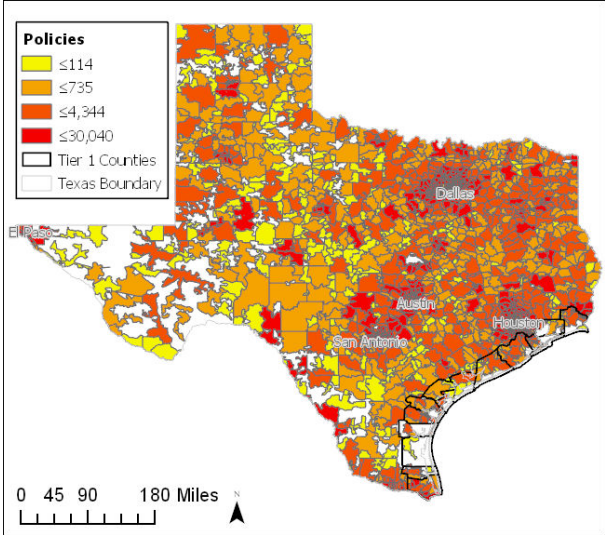
Figure 16: Average inflation-adjusted premiums per policy holder per Texas ZIP code



Source: TDI; Authors' calculations

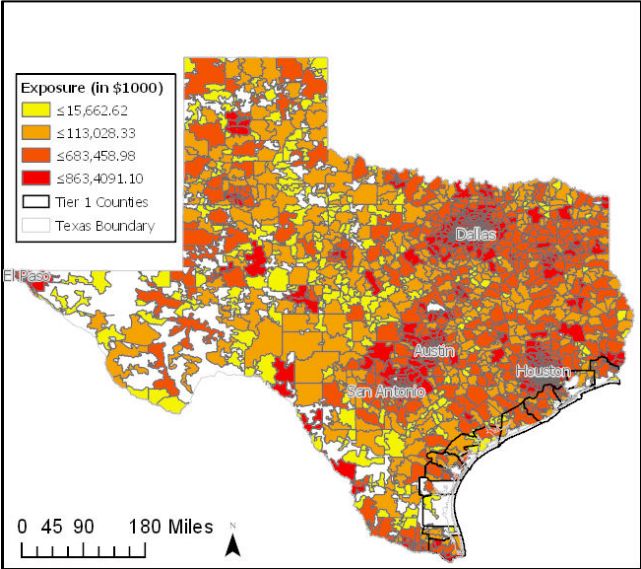
In terms of spatial distribution, the sample covers ZIP codes in all 254 counties in Texas, including all Tier 1 counties, although we should note that only 14% of sample observations (ZIP code-by-year) correspond to Tier 1 territories (see Figures 17-19). As shown in the figures below, the private insurance policies evenly cover the ZIP codes in South-Eastern part of Texas, with relatively less concentration in the mid- and west side of it.

Figure 17: Average number of policies by ZIP code (2004-2019)



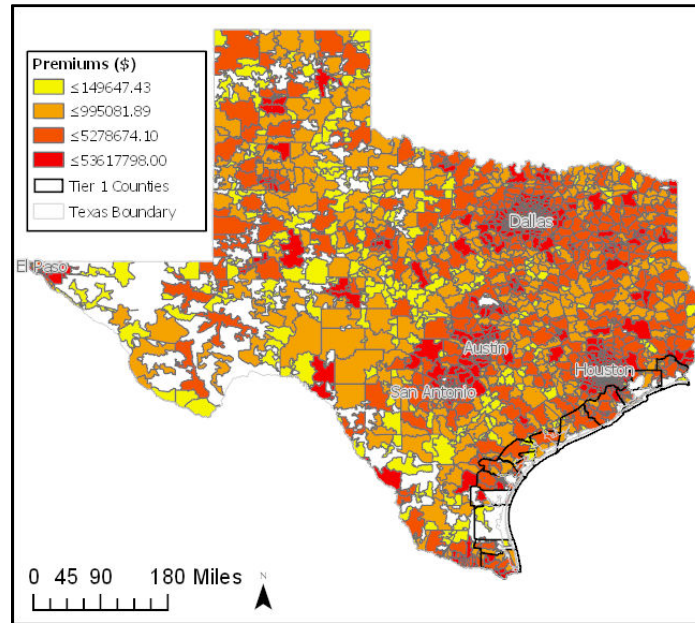
Source: TDI; Authors' calculations

Figure 18: Average value of exposure by ZIP code (2004-2019)



Source: TDI; Authors' calculations

Figure 19: Spatial Distribution of Annual Average Total Premiums by ZIP code (2004-2019)



Source: TDI; Authors' calculations

The TDI dataset on insurance policies was complemented with socioeconomic data available from the U.S. Census Bureau American Community Survey (ACS) and Decennial Census. ZIP code-level socioeconomic data are available for the 2000 Decennial census and through the 5-year estimates from the ACS publications. To construct annual ZIP code observations, the ACS 5-year estimates were assigned to the year in which the data were published; e.g., the 2007-2011 ACS 5-Year estimate were assigned to 2011.²³ Since there are no ACS publications prior to 2011 with ZIP code-level data, the values between the decennial year 2000 and the most recent ACS publications (2011) were linearly interpolated. Multiple socioeconomic and demographic variables were constructed based on these data series. Specifically, to account for factors that likely drive

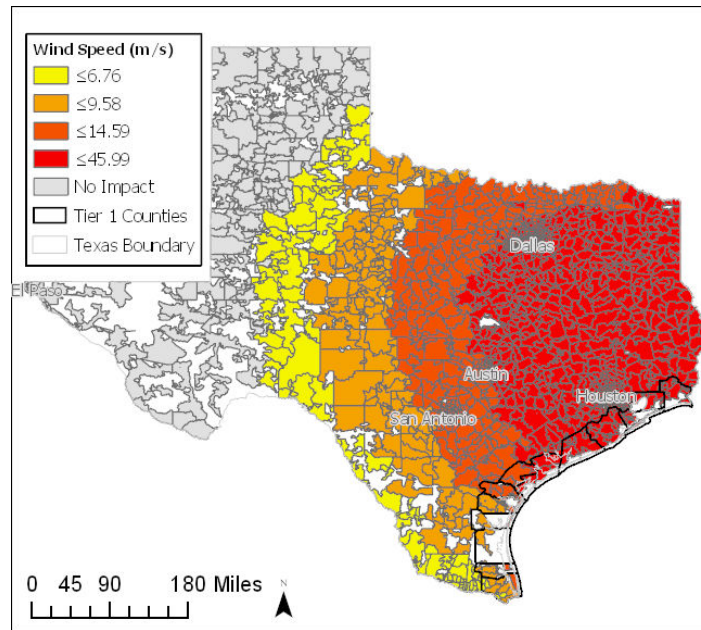
²³ Using 5-year averages creates overlapping ACS estimates. Comparisons between overlapping periods for some variables and places should be taken with caution (<https://www.census.gov/programs-surveys/acs/guidance/comparing-acs-data.html#:~:text=Due%20to%20the%20impact%20of,changed%20the%202020%20ACS%20release.&text=Data%20users%20should%20not%20compare,estimates%20with%20any%20other%20data>)

household level risk preferences and perceptions (e.g., race and ethnicity, marital status, education, wealth, housing tenure) we collected data on various demographic, socioeconomic, and housing variables including per capita income, median house value, percent owner-occupied housing units, percent mobile homes, percent unemployed among civilian labor force, percent of people in poverty (all ages), population size, percent black and white non-Hispanic or Latino race and ethnicity, percent female, and percent of population with bachelor's degree or higher.

Physical magnitude of wind exposure is measured by the wind speed that was constructed using the wind field model outputs developed by the Done et al. (2020). Specifically, the authors employ a two-step process to generate surface wind field: (1) upper wind fields are modelled with a parametric wind model based on best track observations and (2) lower-level wind fields are modelled using a numerical boundary layer model that accounts for the effects of heterogeneous terrain (e.g., mountains, surface frictions, and coastlines) (Done et al. 2020). The data contained latitude and longitude points of maximum wind speed measured in meters per second (m/s) for every major tropical cyclone during 2004-2019 and were separated by region and storm. Overlapping regional wind fields were averaged across the same storm. The data were processed in ArcGIS using the "Summarize Within" tool to associate wind data to ZIP code for each storm event. In years with multiple storms, the storm with the highest windspeed was used to account for the storm intensity during that hurricane season. The overall average wind speed in the sample is estimated at around 5.5 m/s corresponding to 12.3 miles per hour, which is arguably very low wind exposure. This is not surprising given greater spatial coverage of ZIP codes across the state of Texas in areas where wind speed is not concerning. Notably, maximum in the sample corresponds to 96 miles per hour wind speed (43 m/s) which corresponds to a lower bound of Category 2

hurricane wind force. The distribution of the surface wind across sample ZIP codes for the 2008 Hurricane Ike is depicted in Figure 20.

Figure 20: Wind Field for Hurricane Ike (2008)



Source: Done et al. (2020)

We should also note that the variables measured in dollar amounts (e.g., income, house value, exposure, premiums) were inflation adjusted and converted into 2019 prices using the Urban CPI. Variable descriptions and summary statistics are provided in Table 48 and Table 49, respectively.

Table 48: Variable Description

Variable Name	Description
Total policies	Total number of policies with wind and hail coverage
Policies per capita	Total number of policies per capita
Total exposure	Total value of exposure in \$1,000 (i.e. value of policy coverage)
Exposure per policy	Total value of exposure in \$1,000 per policy
Total premiums	Total value of premiums
Premiums per policy	Total value of premiums per policy, log
Income	Per capita income, log
Max. wind speed	Maximum wind speed, m/s
Population	Population, log
Median House Value	Median house value, log
Percent Bachelor	Percent people with bachelor's degree and higher

Percent Female	Percent female population
Percent White	Percent white population, non-Hispanic and Latino
Percent Black	Percent black population, non-Hispanic and Latino
Percent unemployed	Percent unemployed out of civilian labor force
Percent Occupied, Homeowners	Percent of homeowner occupied housing units
Percent poor	Percent poverty (all ages)
Percent mobile homes	Percent of mobile homes

Table 49: Summary Statistics

Variable Name	Mean	Standard Deviation	Min	Max
Total policies	3,136.10	4,695.93	1	39,339.49
Total policies, log	6.55	2.145	0	10.58
Policies per capita, log	-1.83	0.670	-10.12411	2.662355
Total exposure, \$1000	622,350.6	1,110,182	18.49	1.18e+07
Total exposure, log	11.57	2.32	2.92	16.29
Exposure per policy, \$1000, log	5.03	0.394	1.336353	6.928738
Total premiums	4,209,337	6,772,776	111.2861	7.20e+07
Total premiums, log	13.71	2.16	4.71	18.09
Premiums per policy, log	7.17	0.34	4.21	8.94
Income, log	10.16	0.39	7.68	13.15
Max. wind speed	5.55	6.780	0	43.19
Population, log	8.38	1.87	.69	11.76
Median house value, log	11.60	0.58	9.35	15.13
Percent Bachelor	19.67	14.07	0	100
Percent Female	49.73	5.63	0	100
Percent White	58.41	27.99	0	100
Percent Black	8.48	13.56	0	100
Percent Unemployed	6.58	5.23	0	100
Percent Occupied, homeowners	71.29	17.85	0	100
Percent poor	0.16	0.11	0	2.62
Percent mobile homes	14.13	13.81	0	100

Notes: Sample contains 28,078 ZIP code-by-year observations, covering 2004-2019 period.

4.2. Model

To understand the private insurance market penetration with wind and hail policies, we estimate the following random effects (RE) panel data model:

$$y_{zt} = \beta_0 + \beta_2 Wind_{zt-1} + \beta_4 X_{zt-1} + \beta_6 Dem_{zt-1} + \beta_7 Area_z + \mu_z + \mu_t + \mu_{ct} + \varepsilon_{zt} \quad (1)$$

The dependent variable, y_{zt} , measures different aspect of the insurance market at a zipcode z in a given year t , including aggregate policies, total amount of exposure (i.e., the value of coverage) and total premiums by ZIP code. All variables correspond to private market with wind and hail coverage. We use logarithmic transformation to normalize the data. We also estimate models with the following dependent variables: exposure and premiums per policy, as well as policies per capita to proxy for private insurance uptake at the ZIP code level.

Wind is the maximum wind speed (m/s) associated with the named storms in the year t at ZIP code z based on the Done et al. (2020) model calibration. We use wind speed measured at previous year to explore private insurance responses to the update in risk perception that can potentially trigger risk management behavior (Gallagher, 2014; Kousky, 2011; 2017 Davlasheridze and Maio, 2019; Petrolia et al. 2013; 2015). X_{zt-1} is a vector of variables measuring local economic conditions including ZIP code-level unemployment rate, population size (proxy for the market size) as well as per capita income (log). We also account for the median home value and percent homeowners since the dependent variable corresponds to insurance policies written for homeowners. To capture the stock of vulnerable housing structures potentially excluded from voluntary market coverage, we also control for the percent of mobile homes in a ZIP code. Mobile or manufactured homes generally are exempt from the provisions of building codes and are subject to manufacture and installation standards (so called HUD code).²⁴ Despite these standards, mobile

²⁴ See https://www.hud.gov/program_offices/housing/rmra/mhs/faqs

homes generally are more susceptible to flood and wind damage, and particularly the older mobile homes built with fewer manufacture and installation regulations and standards (Filion and Sands, 2016; Lim et al., 2017; Donner, 2007; Lieberknecht et al. 2021). Dem_{zt-1} captures various ZIP code level demographic variables including race and ethnicity (percent white and black non-Hispanic or Latino race), percent female, percent population with bachelor's degree or higher. These demographic variables intend to capture preference heterogeneity that may drive both the risk perception as well as risk mitigation and insurance behavior (Petrolia et al. 2015). We also control for the physical size of a ZIP code by accounting for its area ($Area_z$), measured in square miles.

In addition to these main control variables, the model specified in equation (1) also includes the year fixed effects (μ_t) to control for annual changes in insurance market due to common shocks to all ZIP codes. These shocks could be related to statewide insurance market regulation or particular severity of weather events in a given year. We assumed μ_z that denotes ZIP code unobserved time-invariant effects to be random, hence we chose the RE panel model as the estimation strategy. This choice was guided by the lack of within ZIP code variation of many socioeconomic variables in our sample, which makes Fixed Effects (FE) panel model inefficient. The US Census Bureau ACS 5-year series are 5-year averages and exhibit limited within ZIP code variation, and the data constructed were interpolated for the years 2004-2011. The interpolated variables are likely to be correlated with FE, if ZIP code level unobservables were assumed to be fixed. Last, we also control for county-specific effects (μ_c) to account for county's general exposure to wind and hail perils as well as the effects of building codes and the quality of their enforcement which may differ across counties, and the state of the overall market competitiveness

in a county. Finally, standard errors (ε_{zt}) are clustered at a county level to allow for heteroscedasticity and flexible correlation of errors over time and across ZIP code within a county.

4.3. Results

In Table 50, we present results from models with dependent variables corresponding to homeowners policies with wind and hail coverage. Column (1) corresponds to the total number of policies and column (2) to the policies per capita (i.e., take-up rates). As indicated by the positive coefficients associated with income, the total number of policies respond positively with increasing income within a ZIP code as well as rise with recent hurricane exposure. The policy counts are also higher in larger ZIP codes both with regards to their population size as well as the area. Policies rise significantly with higher proportion of population with bachelor's degree or higher and the greater the percent female population in a ZIP code, all else held constant, likely indicating preferences for insurance among female population relative to male. Total policies were estimated to be higher in ZIP codes with large proportion of white race relative to Hispanic, but this effect was statistically only marginally significant at 10% significance level. As expected, total policy counts decreased in ZIP codes with higher percent of mobile homes.

Notably, the effects of most variables stay consistent when policies per capita (or insurance take up rates) are used instead of total policy counts as the dependent variable, except for population. With population growth, we estimated that the number of private insurance policies per capita decline, all else unaffected. We also note that the coefficients associated with both the white and black population were statistically significant at the 1% significance level and positive, indicating that ZIP codes with higher proportion of both race on average have higher policy counts per capita relative to Hispanic and Latino race and ethnicity, the category omitted from the model. In both models, year effects were highly significant and positive (not reported here for brevity of

results), indicating overall upward trend in policies after netting out the effects of important market and wind exposure factors.

Table 50: Private Insurance Policy Uptake

	Total Policies, log	Policies per capita, log
Income, log	0.1482*** (0.0568)	0.1313** (0.0576)
Max. Wind Speed	0.0019** (0.0009)	0.0016 (0.0010)
Population, log	0.7106*** (0.0326)	-0.1810*** (0.0257)
Median House Value, log	-0.0062 (0.0254)	0.0004 (0.0255)
Percent Bachelor	0.0044*** (0.0015)	0.0042** (0.0017)
Percent Female	0.0083*** (0.0021)	0.0064*** (0.0019)
Percent White	0.0018* (0.0011)	0.0026*** (0.0010)
Percent Black	0.0029 (0.0019)	0.0032** (0.0015)
Percent Unemployed	-0.0001 (0.0014)	-0.0007 (0.0013)
Percent Occupied, homeowners	-0.0009 (0.0010)	-0.0009 (0.0010)
Percent Poor	-0.0939 (0.1044)	-0.1388 (0.1052)
Percent Mobile Home	-0.0007*** (0.0002)	-0.0006*** (0.0002)
Area, sq. miles	0.0020*** (0.0003)	0.0013*** (0.0002)
<i>Year effects</i>	Y	Y
<i>County Effects</i>	Y	Y
<i>N</i>	28,078	28,071

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

In terms of total value of exposure and exposure per policy holder, our regression results presented in Table 51 show that total exposure and coverage per policy generally are higher in

affluent ZIP codes (positively associated with income) and increase with larger ZIP codes. Population size is significant and positively correlates with total exposure, but its effect is not statistically different from zero on average coverage per policy. With prior wind experience both the total coverage as well as the coverage per policy increase, presumably capturing increased demand for wind and hail insurance. People are more likely to engage in mitigation behavior including purchase of insurance when the risk is salient and disaster memory is fresh (Botzen and van den Bergh, 2012). With higher median house value, we estimated significant increase in the coverage per policy, all else held constant. Demographic factors primarily were significant for total coverage, suggesting increased coverage in ZIP codes with a larger share of females, a larger proportion of white population, and with greater levels of education; these effects were not significant for the average exposure. We also note that the larger share of black population in a ZIP code, the lower the exposure per policy holder. Average exposure also declined in ZIP codes with high poverty rates. A higher proportion of homeowner-occupied housing units was associated with an increase in the average coverage per policy; and total coverage declined with a larger proportion of structurally poor-quality housing stock (e.g., mobile homes). Mobile homes did not exhibit statistically significant effect on the amount of coverage per policy holder. Similar to the results reported in Table 50, we also estimated that total exposure has been trending upwards over time (not reported in the Table 51), indicating overall expansion of the market attributed to other factors not accounted in the model.

Table 51: Exposure

	Total Exposure (\$1000) log	Exposure (\$1000) per Policy
Income, log	0.2485*** (0.0662)	0.1101*** (0.0242)
Max. Wind Speed	0.0031*** (0.0009)	0.0012*** (0.0003)
Population, log	0.6624*** (0.0358)	-0.0077 (0.0077)
Median House Value, log	0.0255 (0.0295)	0.0331** (0.0158)
Percent Bachelor	0.0046*** (0.0017)	0.0005 (0.0006)
Percent Female	0.0078*** (0.0023)	-0.0003 (0.0007)
Percent White	0.0021* (0.0012)	0.0004 (0.0004)
Percent Black	0.0015 (0.0019)	-0.0013*** (0.0005)
Percent Unemployed	0.0006 (0.0014)	0.0008 (0.0006)
Percent Occupied, homeowners	0.0013 (0.0012)	0.0022*** (0.0006)
Percent Poor	-0.1832 (0.1294)	-0.1000* (0.0568)
Percent Mobile Home	-0.0007*** (0.0002)	-0.0000 (0.0001)
Area, sq. miles	0.0025*** (0.0003)	0.0003*** (0.0001)
<i>Year effects</i>	Y	Y
<i>County Effects</i>	Y	Y
<i>N</i>	28,076	28,077

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

In Table 52, regression results with premiums as the dependent variable are reported. We estimated total premiums as well as premiums per policy to be higher in affluent ZIP codes as captured by the positive and significant coefficient associated with income. Higher wind exposure in previous year also increased total premiums but only marginally, the effect was not statistically

different from zero on the average premium size. Premiums increased with both the population size as well as the size of area of a ZIP code, but the increasing population was found to be negatively associated with premiums per policy holder. Premiums (both total and average) increased in ZIP codes with larger proportion of white population. The average premium declined with an increasing share of black, non-Hispanic population in a ZIP code. Average premiums rise generally with high unemployment and with a larger share of homeowner occupied housing units. Mobile homes were found to be associated with a decline in total premiums in a ZIP code on average. We should also note that the larger proportion of female population and ZIP codes with populations with higher educational attainment, on average, have higher total written premiums, but these effects were not statistically different from zero for average written premiums per policy. Although not reported here, over time we estimated total premiums to be upward trending as well, while the average premiums written per policy declined during 2006-2008 relative to 2005 and increased starting from 2013 onward.

Table 52: Premiums

	Total Premiums, log	Premiums per Policy, log
Income, log	0.2090*** (0.0579)	0.0787*** (0.0200)
Max. Wind Speed	0.0020* (0.0011)	0.0002 (0.0003)
Population, log	0.6362*** (0.0341)	-0.0254*** (0.0064)
Median House Value, log	0.0049 (0.0270)	0.0157 (0.0143)
Percent Bachelor	0.0034** (0.0014)	-0.0008 (0.0005)
Percent Female	0.0071*** (0.0021)	-0.0007 (0.0006)
Percent White	0.0022** (0.0010)	0.0006** (0.0003)
Percent Black	0.0017 (0.0018)	-0.0012** (0.0005)
Percent Unemployed	0.0010 (0.0013)	0.0014** (0.0006)
Percent Occupied, homeowners	0.0010 (0.0012)	0.0024*** (0.0007)
Percent Poor	-0.1404 (0.1031)	-0.0538 (0.0374)
Percent Mobile Home	-0.0006*** (0.0002)	0.0001 (0.0001)
Area, sq. miles	0.0024*** (0.0003)	0.0002*** (0.0000)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	28,078	28,078

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

4.3.1. Sub-sample of Tier 1 counties

We also restricted the sample to ZIP codes located in Tier 1, where the wind and hail risk is more concentrated and concerning, and where wind and hail coverage is primarily provided through TWIA. This restriction reduces the sample size to 4,000 (ZIP code by year) observations, corresponding to 230 ZIP codes. As reported in Table 53, wind risk only significantly increases

the total policies and has no effect on the private market insurance uptake at a ZIP code-level. This is not surprising given that in Tier 1 wind and hail insurance is primarily provided through TWIA. Similar to the full sample, policy numbers and uptake are higher in affluent ZIP codes, increase with educational level, and are higher in larger ZIP codes by area. Population size was found to be positively associated with total policy counts but has statistically no discernable effects on policy take-up rate. We found policies to be higher in ZIP codes with high unemployment rates also.

Table 53: Policies in Tier 1

	Total Policies, log	Policies per capita, log
Income, log	0.4407** (0.1734)	0.4314** (0.2166)
Max. Wind Speed	0.0049* (0.0026)	0.0041 (0.0026)
Population, log	0.8981*** (0.0579)	-0.0479 (0.0455)
Median House Value, log	0.1384 (0.1907)	0.1295 (0.1801)
Percent Bachelor	0.0078** (0.0034)	0.0063* (0.0033)
Percent Female	0.0170 (0.0121)	0.0115 (0.0098)
Percent White	-0.0005 (0.0015)	0.0013 (0.0019)
Percent Black	0.0035 (0.0023)	0.0030 (0.0021)
Percent Unemployed	0.0118** (0.0054)	0.0122** (0.0048)
Percent Occupied, homeowners	0.0028 (0.0028)	0.0027 (0.0021)
Percent Poor	-0.1675 (0.5035)	-0.1312 (0.4673)
Percent Mobile Home	-0.0095 (0.0065)	-0.0078 (0.0054)
Area, sq. miles	0.0010*** (0.0004)	0.0006* (0.0003)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	3,996	3,995

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

In terms of private insurance market exposure in Tier 1, we estimated that the total value of insurance policy coverage with wind and hail as well as average coverage per policy increase with income, hurricane risk, and with larger ZIP codes (Table 54). Population drives the total value of exposure up but does not affect the exposure per policy. This is presumably because both the policies and exposure increase proportionately in response to increasing demand for insurance

(e.g., proxied by the size of population). Exposure per policy increases with higher median house value, however this effect is only marginally significant at the 10% significance level.

Table 54: Exposure in Tier 1

	Total Exposure (\$1,000) log	Exposure (\$1,000) per policy
Income, log	0.6262*** (0.1944)	0.1962** (0.0936)
Max. Wind Speed	0.0066*** (0.0025)	0.0017* (0.0010)
Population, log	0.8924*** (0.0778)	0.0024 (0.0168)
Median House Value, log	0.2593 (0.2406)	0.0983* (0.0574)
Percent Bachelor	0.0085** (0.0039)	0.0004 (0.0014)
Percent Female	0.0155 (0.0143)	-0.0014 (0.0033)
Percent White	0.0011 (0.0022)	0.0015 (0.0010)
Percent Black	0.0021 (0.0026)	-0.0020*** (0.0007)
Percent Unemployed	0.0134** (0.0065)	0.0013 (0.0020)
Percent Occupied, homeowners	0.0058 (0.0045)	0.0026 (0.0016)
Percent Poor	-0.2746 (0.4989)	-0.1229 (0.1168)
Percent Mobile Home	-0.0104 (0.0079)	-0.0010 (0.0011)
Area, sq. miles	0.0016*** (0.0004)	0.0006*** (0.0002)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	3,996	3,997

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Finally, as reported in Table 55, income, risk, population, educational attainment, and the size of ZIP codes are associated with higher total premiums at a ZIP code, all else held constant.

Premiums per policy (average premiums) appear to be less responsive to these changes. They marginally increase in response to increased percent of owner-occupied housing units in a ZIP code; and they decline in ZIP codes with a higher proportion of black non-Hispanic population and in ZIP codes with higher share of people below poverty line (also marginally significant).

Table 55: Premiums in Tier 1

	Total Premiums, log	Premiums per policy, log
Income, log	0.4923*** (0.1764)	0.0685 (0.0790)
Max. Wind Speed	0.0059* (0.0031)	0.0010 (0.0010)
Population, log	0.8541*** (0.0771)	-0.0205 (0.0161)
Median House Value, log	0.1172 (0.2075)	-0.0403 (0.0426)
Percent Bachelor	0.0072** (0.0033)	-0.0008 (0.0016)
Percent Female	0.0163 (0.0134)	-0.0007 (0.0029)
Percent White	0.0009 (0.0018)	0.0013 (0.0009)
Percent Black	0.0016 (0.0032)	-0.0025* (0.0013)
Percent Unemployed	0.0121* (0.0064)	-0.0002 (0.0020)
Percent Occupied, homeowners	0.0053 (0.0043)	0.0024* (0.0013)
Percent Poor	-0.3453 (0.5025)	-0.2213* (0.1193)
Percent Mobile Home	-0.0101 (0.0076)	-0.0006 (0.0008)
Area, sq. miles	0.0015*** (0.0004)	0.0004** (0.0002)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	3,996	3,997

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

4.3.2. Extension – residential loans

One important variable missing from the model specified in equation (1) is wind and hail insurance requirement. While Texas does not mandate property owners to carry windstorm and hail insurance, it is generally required by mortgage companies. To account for this requirement, we collected the data from the Federal Deposit Insurance Corporation (FDIC), which contains information regarding financial liabilities and assets by financial institutions. Using this data, we identified four different residential loan categories to calculate the amount of mortgage loan by ZIP code in each year: (1) 1-4 family residential loans that include total secured loans by 1-4 family residential properties; (2) loans secured by 1-4 family first liens; (3) loans secured by 1-4 family junior liens; and (4) all other adjustable rate closed-end loans secured by 1-4 family residential properties, secured by first liens.²⁵ Not all ZIP codes are served by financial institutions, and we also acknowledge that a lack of records for financial institutions at a ZIP code does not necessarily imply that the houses are not financed through federally-backed mortgage institutions. Instead of setting these observations at zero, we restricted the sample to only those observations for which mortgage loan data were available from the FDIC. This decreases the sample by four-fold. Notably, as reported in Appendix A Tables A4-A6, the results are largely consistent with full sample with regards to main regressors. As for the mortgage variable, its coefficient was estimated significant and positive, suggesting an increase in the number of private insurance policies as well as policy take-up rates by ZIP codes with more mortgage loans, all else held constant. This is in line with survey-based research suggesting that residents with mortgages are more likely to have wind coverage (Petrolia et al. 2015). However, when this effect is estimated on the intensive margin (amount of coverage), the association becomes negative: the higher mortgage loans, the

²⁵ Available <https://www.fdic.gov/bank/statistical/>

lower the insurance coverage. Interestingly, mortgage requirements were associated with lowering premiums per policy, presumably because insurers are able to offer discounted premiums when bundling wind and hail perils with other types of coverage (e.g., homeowners insurance, fire, flood, etc.), all else held constant.

4.3.3. Extension – the effect of federal mitigation policy

We also evaluated the effect of an important federal level policy that supports mitigation efforts entailing property buyouts, retrofits, and other types of hard structural projects. Specifically, we focused on the FEMA’s Hazard Mitigation Grants Program (HMGP). The HMGP is authorized under Section 404 of the 1988 Stafford Act, and provides grants to state, local and tribal governments after a major Presidential disaster declaration (PDD) (Carter et al. 2018). While HMGP grants are triggered by a PDD, the program funds are available statewide if the state receives a PDD and thus not limited to PDD declared counties only (Carter et al. 2018). A typical funding scheme for the HMGP involves cost-share with the federal government covering up to 75% of the eligible project costs, while the remaining 25% is commonly covered by local or state funds. The HMGP funds a variety of mitigation projects including buyouts, stormwater management, structural elevation, floodproofing and retrofitting, flood control structures, warning systems, mitigation planning, and public education activities. Among all, buyouts are the largest spending category.

We draw the data from the FEMA’s OpenFEMA dataset and restrict the sample to ZIP codes within HMGP-eligible counties (includes all ZIP codes if a PDD was declared state-wide and all ZIP codes within PDD declared counties). Obviously, not all HMGP-eligible counties undertake mitigation, and ZIP codes where these projects are implemented are prioritized by their risk tolerance. For all ZIP codes within eligible counties if no HMGP grant is spent, we replace these

observations with zeros. It is assumed that the more spent on property buyouts, the less vulnerable structures will be exposed to risk, which may in turn reduce private insurance coverage as well as the policy counts, all else held constant. On the other hand, if grants are spent on structural retrofits, it is expected these mitigation activities would also result in lower the insurance premiums. We report these results in Appendix A Tables A7-A9. The coefficients associated with the HGMP variable were estimated to be negative; however, they were not a statistically significant determinant for policy up-take at the ZIP code level. We find statistically significant and negative association between the HMGP spending per capita and exposure per policy holder as well as the average premium per policy. Specifically, with increased spending on various types of federally-funded mitigation programs, average premiums and exposure per policy decline. These effects were highly significant at less than the 1% significance level. The coefficients associated with other control variables were largely consistent with main model results. Overall, property level mitigation – buyouts or retrofits – is important for mitigating losses not only for insurers, but it may also benefit individual policy holders through reduced cost of insurance (e.g., premiums). Further analyses of specific mitigation projects, when data become available, will provide better insights about relative efficacies of the types of mitigation activities.

5. Residual Market Mechanisms – Review and Empirical Analysis

This section covers state-level residual market mechanisms (RMM) in selected Atlantic and Gulf of Mexico states (TX, AL, LA, MS, FL, NC, SC) and summarizes interviews with five regulators from coastal states (MS, LA, FL, NC, RI) regarding various aspects of their state’s RMMs. More specifically, in Section 5.1, we provide a brief overview of the RMMs. In Section 5.2, windstorm and hail plans from selected coastal states, and Florida and Louisiana FAIR plans, are reviewed for recent legislative and operational developments. In Sections 5.3 – 5.5, we perform statistical analyses employing data from the Property Insurance Plan Service Office (PIPSO) reports to understand the dynamic evolution of RMMs in response to damaging storms and hail incidents, when accounting for economic and market forces (e.g., HHI as a metric for the market concentration) and controlling for time-invariant cross-state heterogeneity and common trends affecting insurance markets. The effects of depopulation efforts and advancements on RMMs in Florida, Texas, and Louisiana are further examined relative to states that lag in their depopulation efforts. Last, Section 5.6 provides theme summaries based on the state insurance regulators’ interviews.

5.1. Study of State Residual Market Mechanisms - Overview

In the past 30 years, natural disaster losses have been on the rise worldwide and in the United States. Since 1980, the U.S. has sustained more than 291 weather and climate disasters, each of which caused more than \$1 billion in direct damage and, combined, have resulted in an estimated economic loss exceeding \$1.9 trillion (NOAA, 2021). The year 2020 set a new annual record of 22 “billion-dollar events,” and was the sixth consecutive year in which more than 10 such events impacted the U.S. (NOAA, 2021). Notably, these billion-dollar events have been dominated by

severe storms and tropical cyclones, which made up more than 63% of all types of events and were responsible for more than 68% of cumulative losses.

Accelerated population growth and exposure of assets to damaging storms pose substantial risk to property and business owners, private insurers and reinsurers, as well as strain public resources to aid with recovery (Kleindorfer and Kunreuther, 1999). Transferring hazard risk to a third party (i.e., insurers) is one way to manage increasing risk; however, the fundamental dilemma private insurers face is how to handle the host of interrelated problems that arise when dealing with catastrophic risks (Jaffee and Russell, 1997). To remain solvent and satisfy regulatory requirements, private insurers must hold or have access to sufficient capital through reinsurance or financial markets to cover losses from catastrophic events, thus requiring rates to be actuarially sound or adjusted adequately post-event. But rates that are risk-based may exceed customers' willingness to pay for insurance.

These complex issues and experiences with catastrophic events have prompted the development of various government-sponsored residual market mechanisms (RMM). RMMs, while initially foreseen as insurers of last resort, in some states have become insurers of first resort (Kousky, 2011). Depopulating them and encouraging market participation have become priorities for state regulators. While several novel approaches to creating favorable incentives for insurers have been proposed, aligning them with regulatory and statutory requirements has proven to be a challenging task.

State RMMs cover a variety of programs, including Fair Access to Insurance Requirements (FAIR) plans, beach and windstorm plans, and hybrid programs run by two states (Florida Citizens and Louisiana Citizens).²⁶ Other state-run programs include reinsurance programs providing

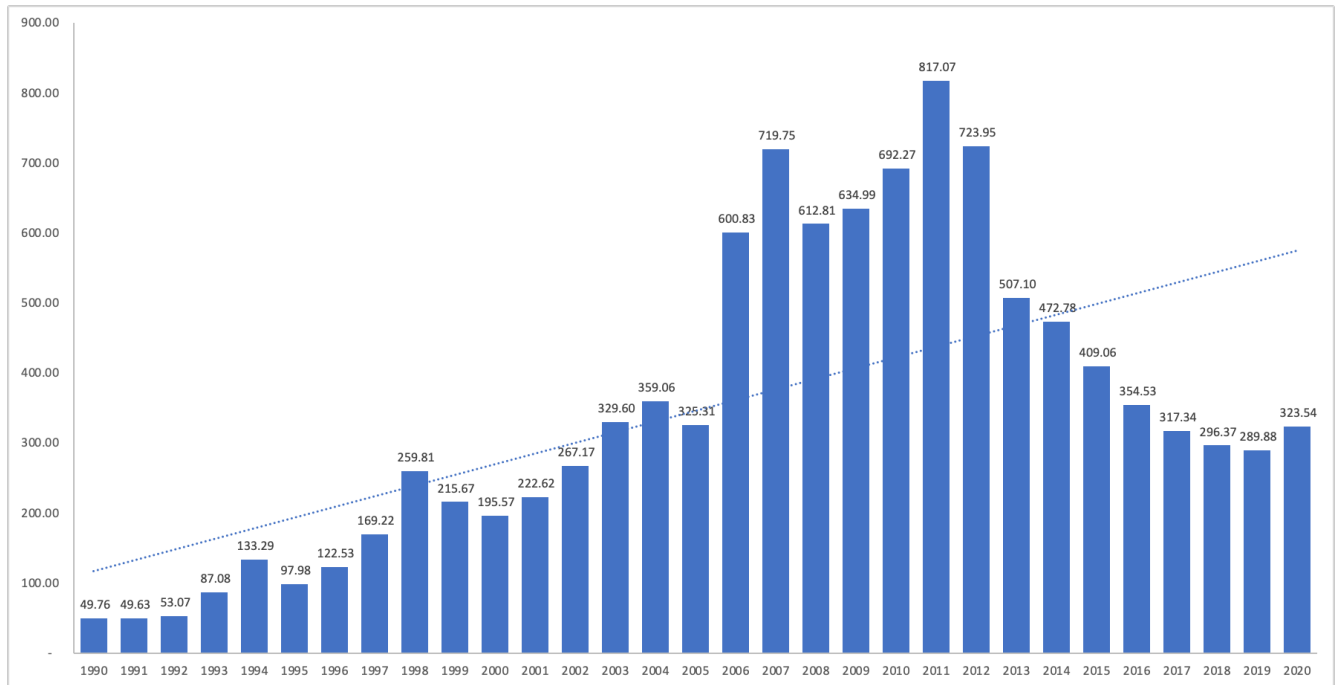
²⁶ Florida Citizens Property Insurance Corps (Florida Citizens) and Louisiana Citizens Property Insurance Corp. (Louisiana Citizens).

insurance to insurers (Kousky, 2011). FAIR plans often provide coverage in urban and coastal areas, offer hazard-specific policies, and cover other exposures such as vandalism and fires. Beach and wind plans cover predominantly wind-and-hail-only risk in high-risk coastal areas. Florida Citizens and Louisiana Citizens are hybrid programs that provide insurance in the entire states. This report provides an overview of state-residual programs (beach and wind plans, Florida Citizens, and Louisiana Citizens) operating in selected North Atlantic and Gulf of Mexico coastal states (North Carolina, South Carolina, Georgia, Florida, Mississippi, Alabama, Louisiana and Texas). Employing data collected over three decades, this report provides a holistic analysis of the evolution of states' windstorm and hail pools in response to frequent catastrophic events and risk exposure and assesses whether their depopulation efforts have delivered on their expectations. We also explore a dynamic evolution of the private insurance market in response to these environmental, market and policy variables, while also controlling for unobserved time-invariant heterogeneity across states.

5.2. Residual Market Mechanisms

RMMs have been growing explosively in the last three decades both in terms of their exposure (i.e., total insured value) and the total number of policies. Notably, the largest growth was estimated after Hurricane Katrina in 2005 and Hurricane Sandy in 2011. Meanwhile, total premiums written also have increased, following the exposure and policy count trends (see Figure 21 - 23). It should be noted that while the growth overall is trending upward, the most recent decade starting in 2011 has seen a sharp aggregate decline in both exposure value and policy counts in the selected Atlantic and Gulf Coast States.

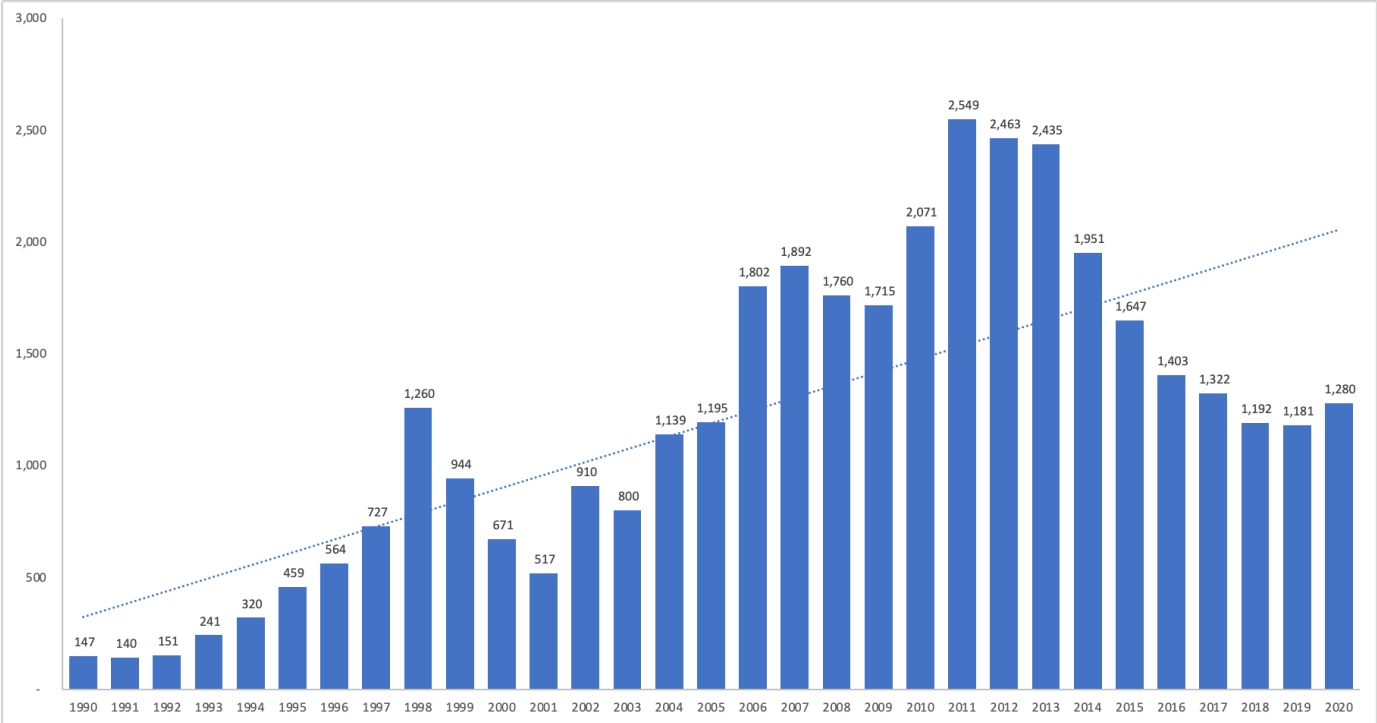
Figure 21: Total value of exposure (\$B) of Beach and Wind Plans (includes FL Citizens and LA Citizens)



Source: PIPSO reports (1990-2020)

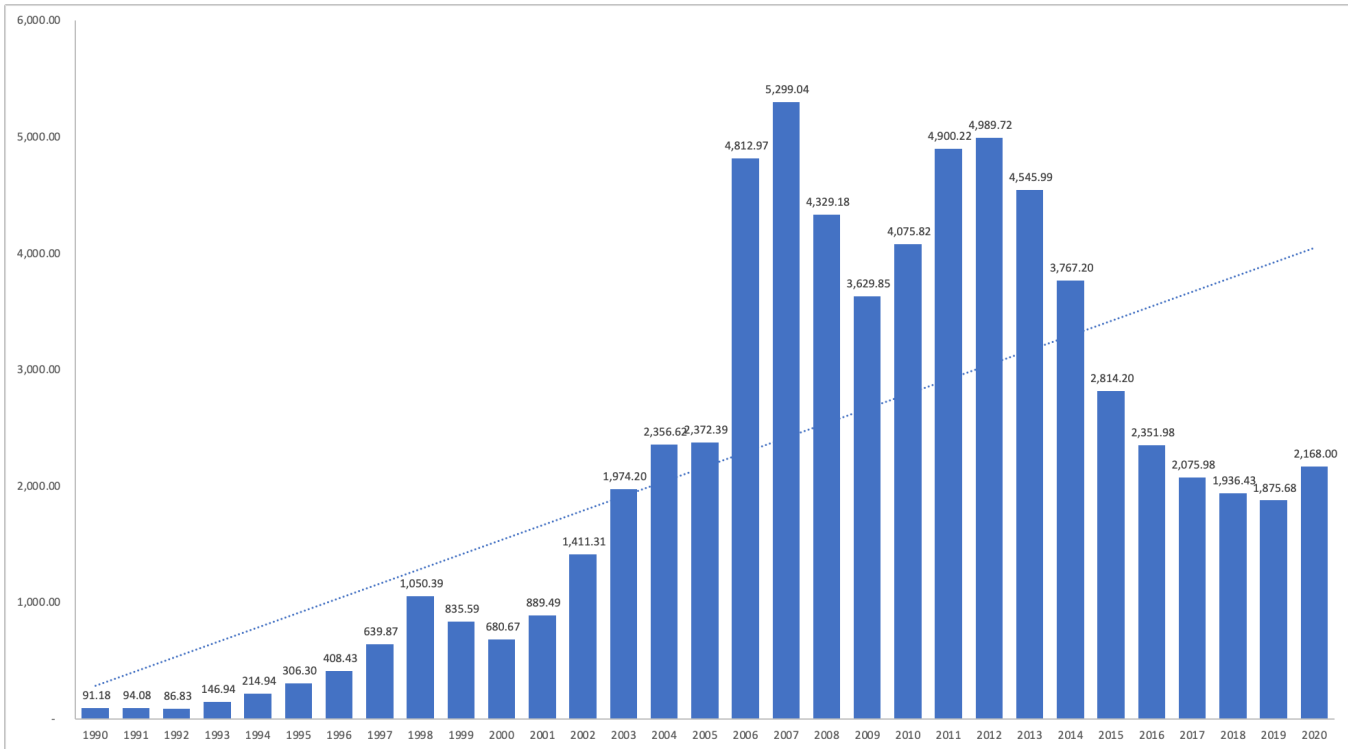
Notes: Exposure is total value of exposure (i.e., total insured values) in eight North Atlantic and Gulf Coast states. It is adjusted to real 2020 prices using urban consumer price index (CPI).

Figure 22: Total number of Beach and Wind Plan policies (1000s) (includes FL Citizens and LA Citizens)



Source: PIPSO Reports (1990-2020)

Figure 23: Total Beach and Wind Plan Premiums Written (\$M) (includes FL Citizens and LA Citizens)



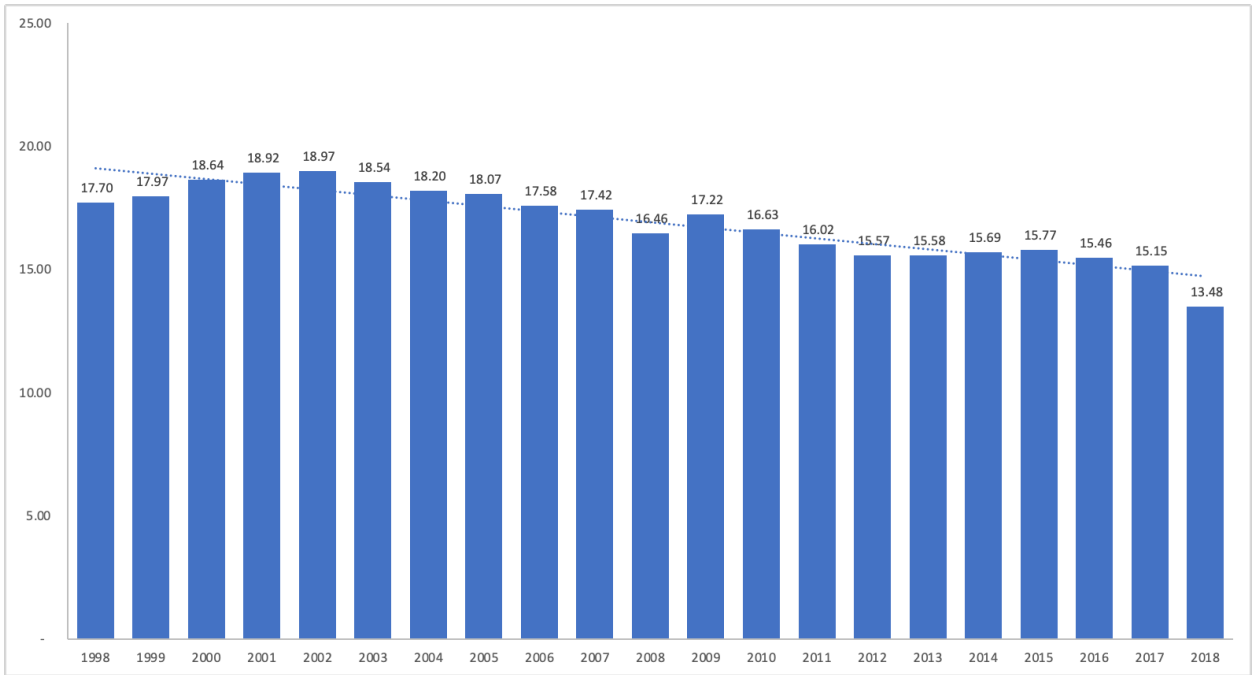
Source: PIPSO Reports (1990-2020)

On the other hand, exposure measured by house-year²⁷ from the standard insurance market has been declining steadily (Figure 24), while the total and average premiums per dollar exposure have been increasing (Figures 25 & 26).²⁸ During the years 2009-2020, the markets have also seen increasing numbers of private firms operating in the region (Figure 27).

²⁷ One house-year corresponds to policy coverage on a dwelling for 12 months. Commonly, it consists of coverage by one policy for an entire 12-month period, but it may also correspond to a number of policies for which the combined length of coverage is 12 months (e.g., four policies, each with three months of coverage). E.g., see <https://naic.soutrnglobal.net/Portal/Public/en-GB/DownloadImageFile.ashx?objectId=8246&ownerType=0&ownerId=2006>

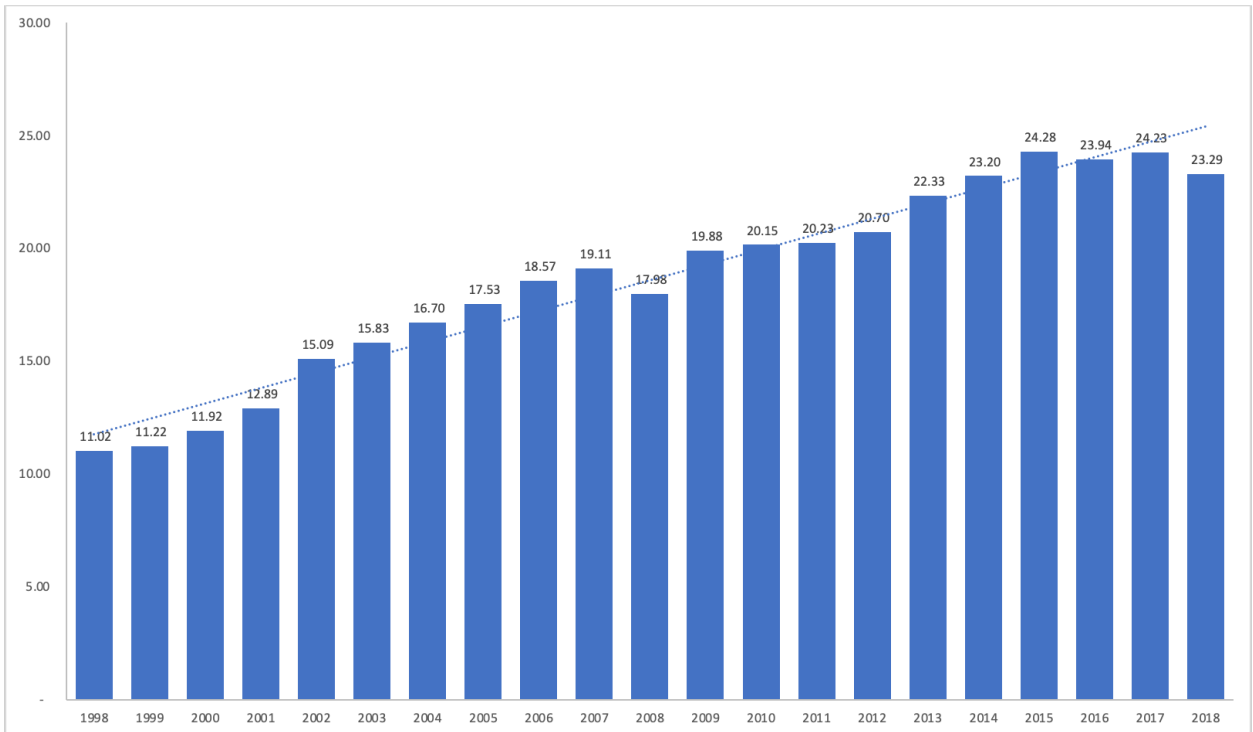
²⁸ We note that because of the differences in units of exposure measurements, exposure variable based on NAIC reports are not directly comparable to that based on PIPSO data.

Figure 24: Total Annual Exposure Residential Dwelling (House-Year, \$M) (private insurance)



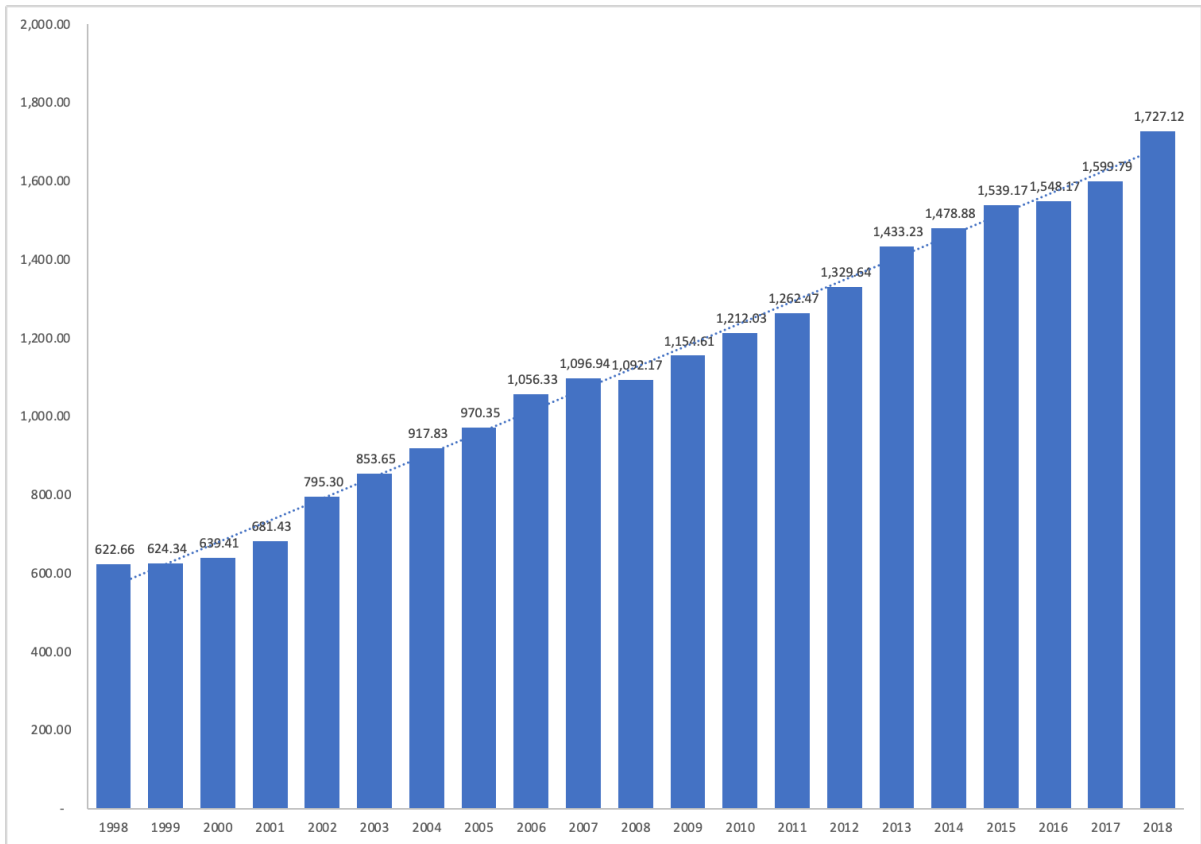
Source: NAIC

Figure 25: Premiums private (\$B)



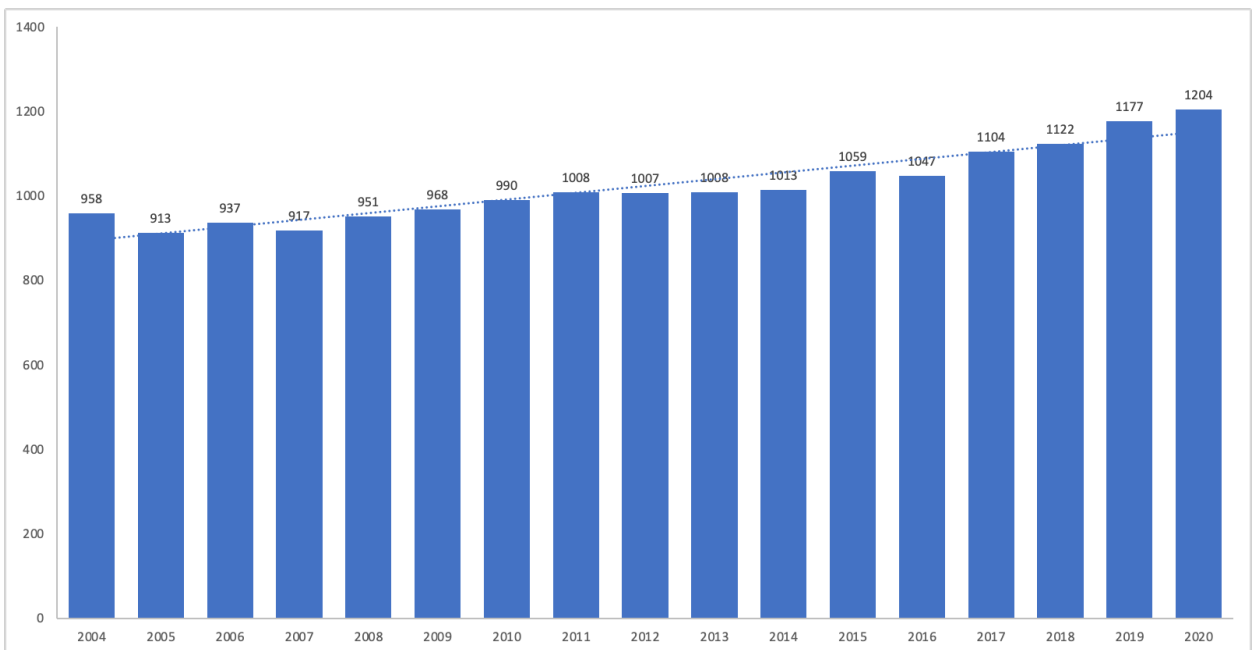
Source: NAIC

Figure 26: Average premiums per house-year (private market)



Source: NAIC

Figure 27: Number of private insurance firms operating in the sample states



Source: NAIC

In addition to major hurricane events that have triggered important shifts in the insurance market, annual fluctuations in exposure and policy counts could also be due to various legislative and regulatory developments taking places in each of the states, as well as various depopulation programs the states have initiated to scale back RMM size (e.g., Florida, Louisiana, and Texas). Appendix D Table D1 summarizes major operational and statutory differences of programs across the states including membership requirements, coverage, property exclusions, liability limits, underwriting, cancelations and non-renewals, statutory requirements for loss recoupments and committee membership. Brief reviews of wind and hail insurance programs by states are provided below.

5.2.1. Alabama

The Alabama Insurance Underwriting Association (AIUA) was formed as a voluntary association in 1970 by insurance industry leaders in cooperation with the Alabama Department of Insurance (ALDOI). Act # 2008-392 (enacted May 16, 2008, effective November 1, 2008) codified the AIUA Plan of Operation and requires all companies licensed to write property insurance in Alabama to be members of the Association. Thereafter, the AIUA Board of Directors could make changes to rates, rules and procedures for voluntary writings, and extensions of the plan with the approval of the Alabama Insurance Department. The AIUA provides insurance to eligible properties located in coastal areas of Baldwin and Mobile Counties whose owners have had difficulty obtaining insurance in the private market. The Alabama beach plan provides insurance for wind and hail perils, fire and extended coverages, and thefts.²⁹

In 2007, the Gulf Front Zone was created and the minimum hurricane deductible for Gulf Front and Beach Zones was increased to 5%. Currently, Alabama has 11 Zone Boundaries. They

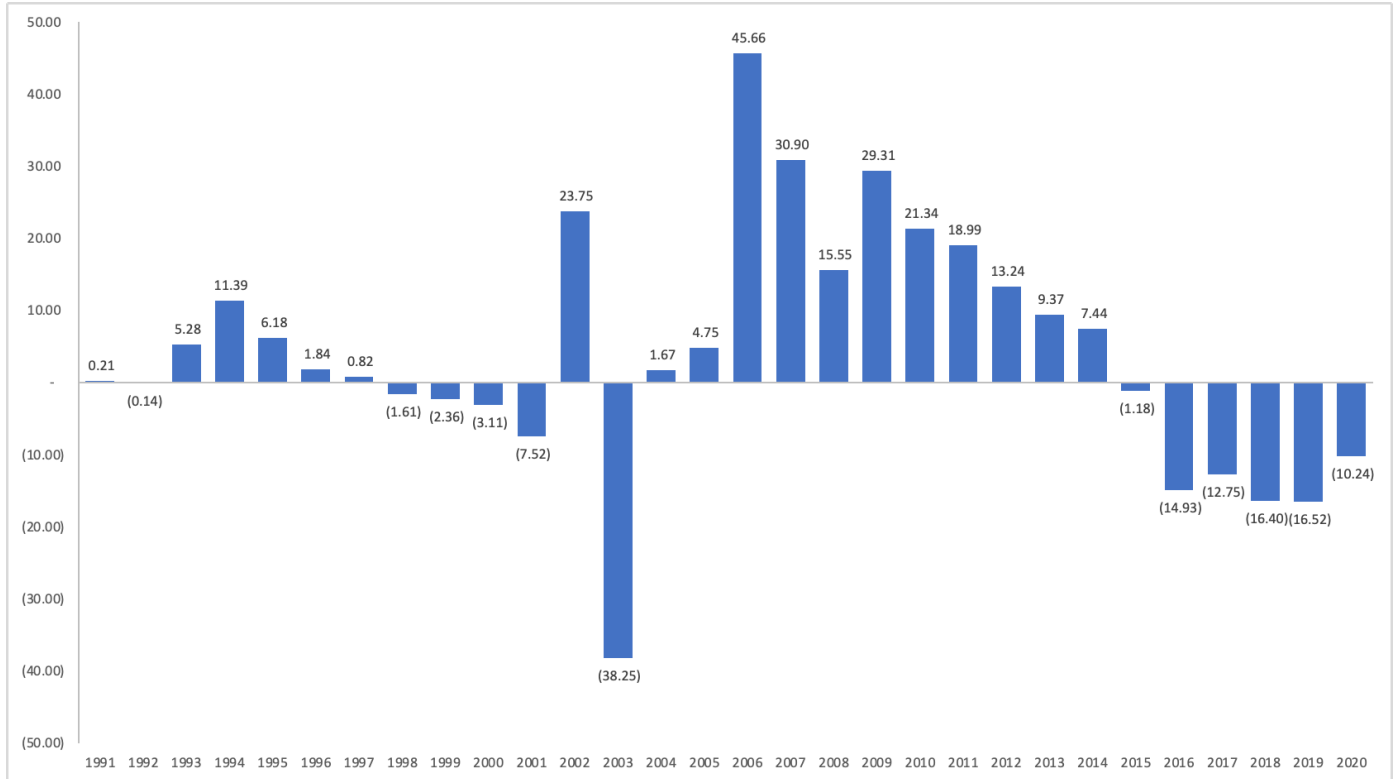
²⁹ Effective January 1, 2018, fire, extended and theft coverages are no longer available; only wind, hail and hurricane coverages will be available.

include the Gulf Front Zone, which consists of areas south of the Intracoastal Waterway, and a series of five zones for Mobile County and five zones for Baldwin County based on distance from the coast (excluding areas within the Gulf Front Zone) with a maximum distance inland of 20 miles. In 2013, deductibles were amended based on AIUA rating zone to 1%, 2%, 5%, and 10%. In 2014, discounts were added for residential structures that followed hurricane mitigation standards. In 2016, AIUA made a series of changes to policies, classifying the difference between replacement cash value (RCV) and actual cash value (ACV) as it pertained to roofs, contents, condominiums, secondary dwellings, and living expenses, as well as the process for converting to RCV at policy renewal. After 2016, all new policies within the 11 Zone Boundaries transitioned to wind/hail/hurricane only for both habitational and commercial properties and their contents. Most recently, in 2021, only a roof which had reached its full life expectancy would remain covered at ACV, and The Plan began offering no-charge fortified roof upgrades for policies based on ALDOI standards.

As depicted in Figure 28, the AIUA grew rapidly in 2006 relative to 2005, with the number of policies issued increasing by approximately 84%. The highest rate of growth in terms of policies was reported in the 2004-2014 decade, when the number of policies increased to 31,996 from 3,169 (with annual average increase ~18%). Since 2014, policy counts have been declining steadily at an average of 11% annually. Concurrently, the exposure to loss has also grown dramatically from \$435 million (in real 2020 prices) in 2004 to \$6.08 billion in 2014, corresponding to approximately 30% annual growth rate during the same period. Exposure also has been declining by approximately 2% annually since 2014 (Figure 29). AIUA has been operating profitably for the most part during the 1990-2020 period, as depicted in Figure 30 with the longest period of gains for 10 consecutive years reported starting in 2006. Despite the four

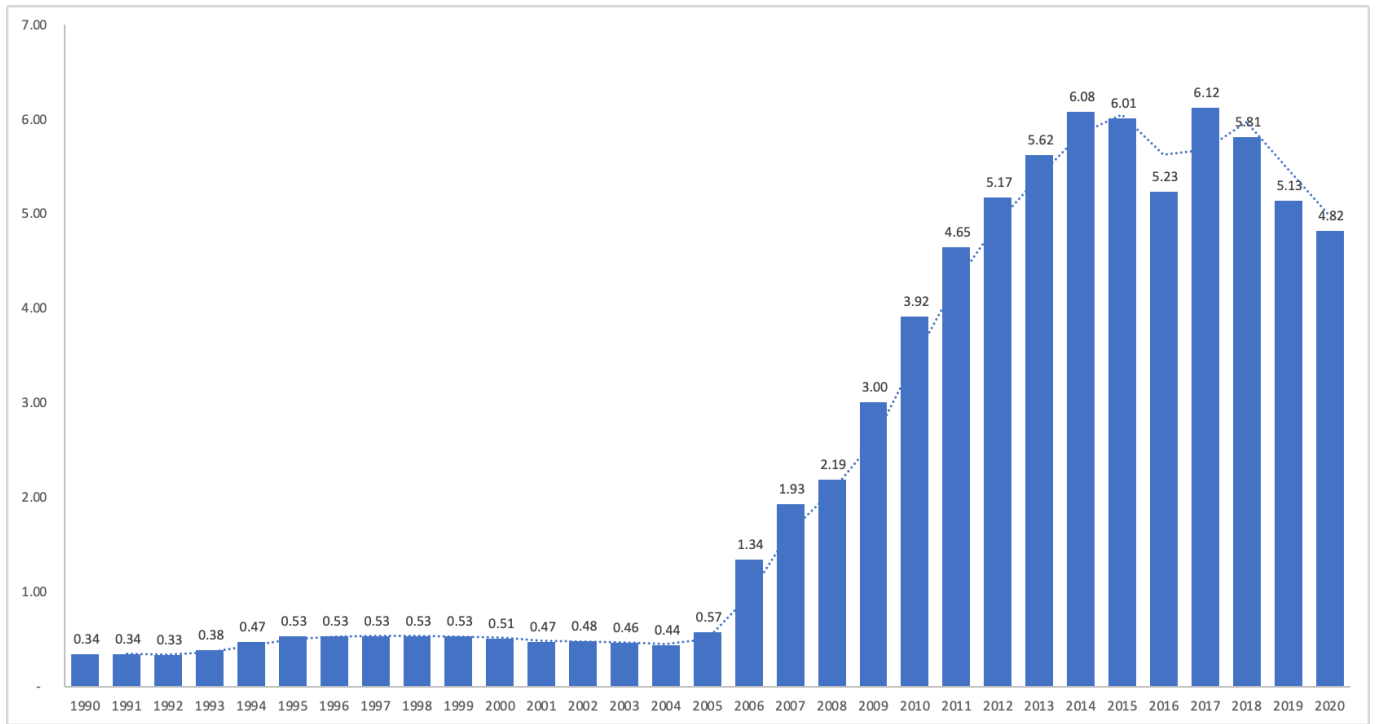
episodes of loss to the Plan (1997-1998; 2004-2005, 2016 and 2020), overall, during the 1990-2020 period cumulatively profits have outweighed losses by more than \$277 million.

Figure 28: Annual growth of AIUA policies



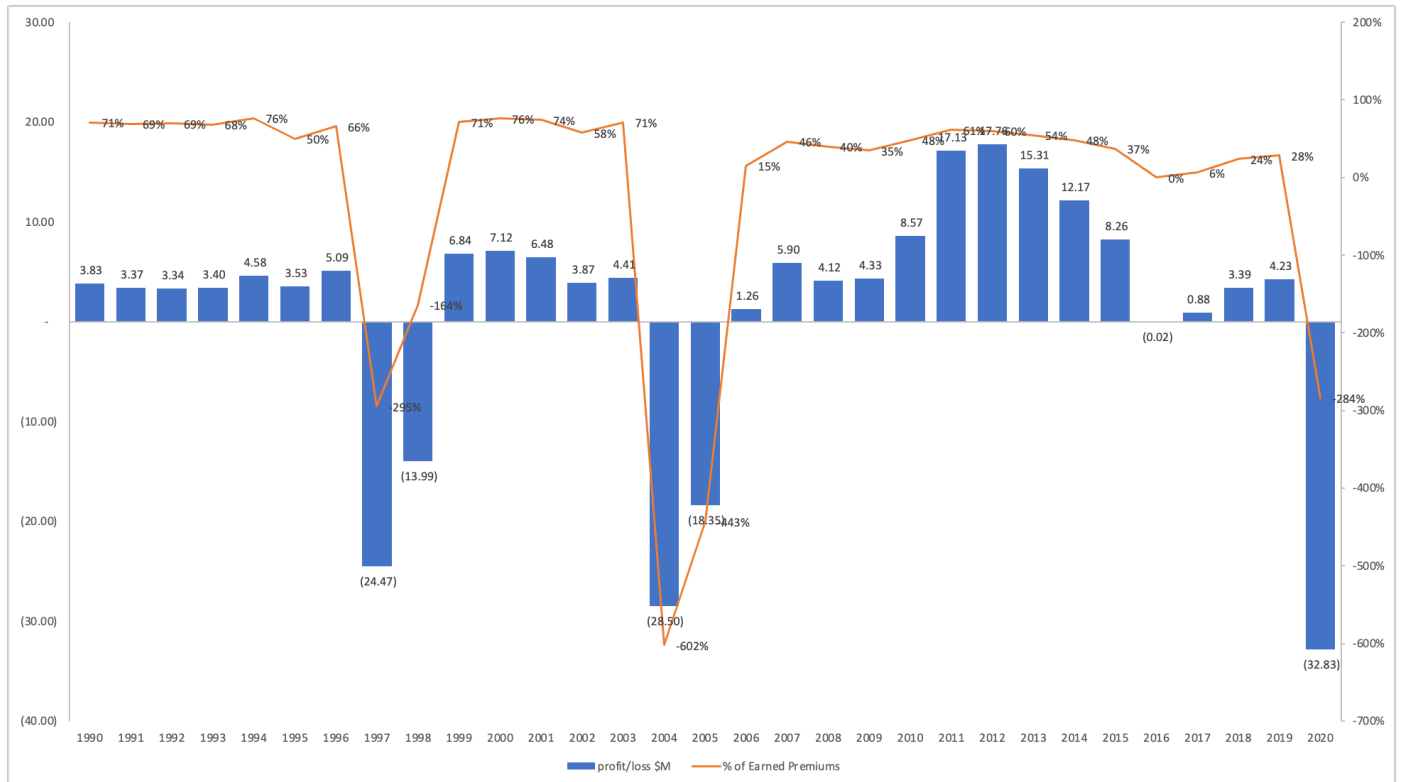
Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 29: AIUA Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 30: AIUA Profit/Loss (\$M) (real 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

5.2.2. Mississippi

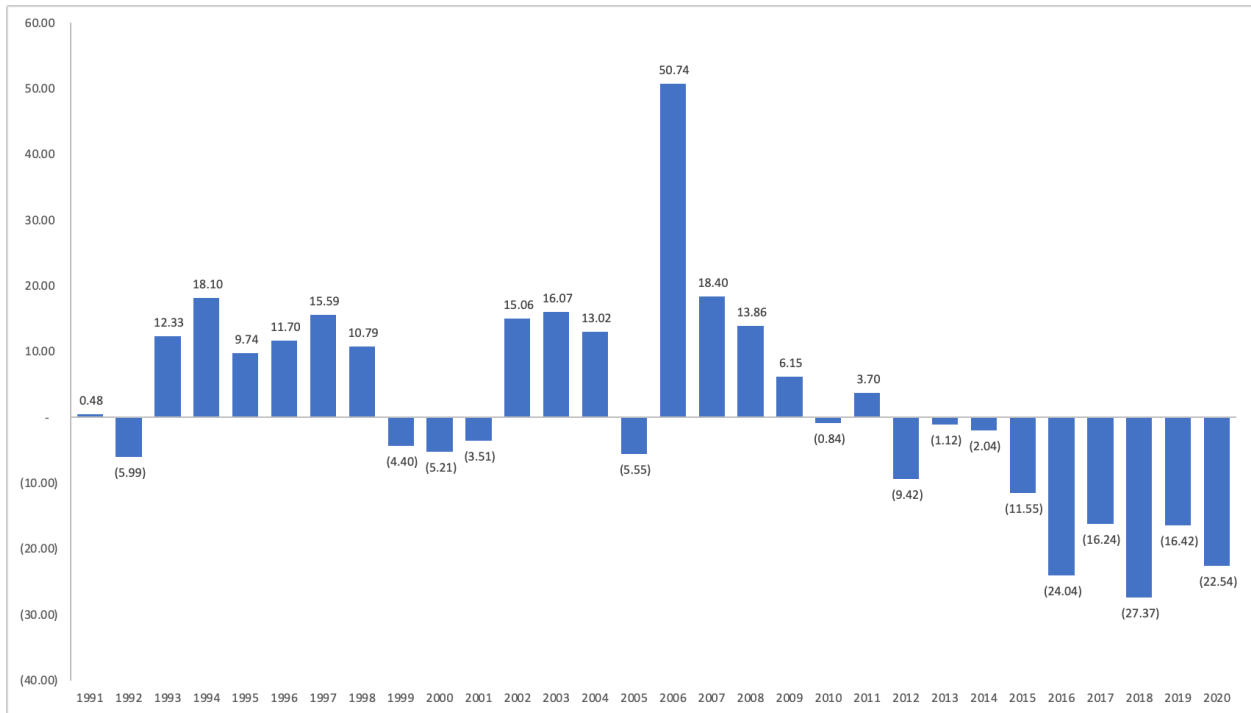
Mississippi has two residual market plans: the Mississippi Windstorm Underwriting Association (MWUA) and the Mississippi Residential Property Insurance Underwriting Association (MRPIUA). The MWUA provides a market for windstorm and hail insurance in the coastal areas of Mississippi,³⁰ while MRPIUA provides property insurance in both rural and urban areas. All insurers writing insurance in Mississippi are required to be members of both associations, which are funded by premiums as well as assessments made against the member companies to cover shortfalls during catastrophic years. The assessment is made based on a

³⁰ MWUA was created by Section 83-34-1 through 83-34-29 of the Mississippi Insurance Code during the 1987 Session of the MS legislature. It became effect on October 1, 1987, and was amended twice in 2007 (House Bill 1500) and 2019 (House Bill 444).

percentage of a member company's total written property premiums. In 2007, Mississippi adopted a new plan of operations, which was amended in 2011 by changing the recoupment percentages. A recent 2019 amendment removed the recoupment mechanism.

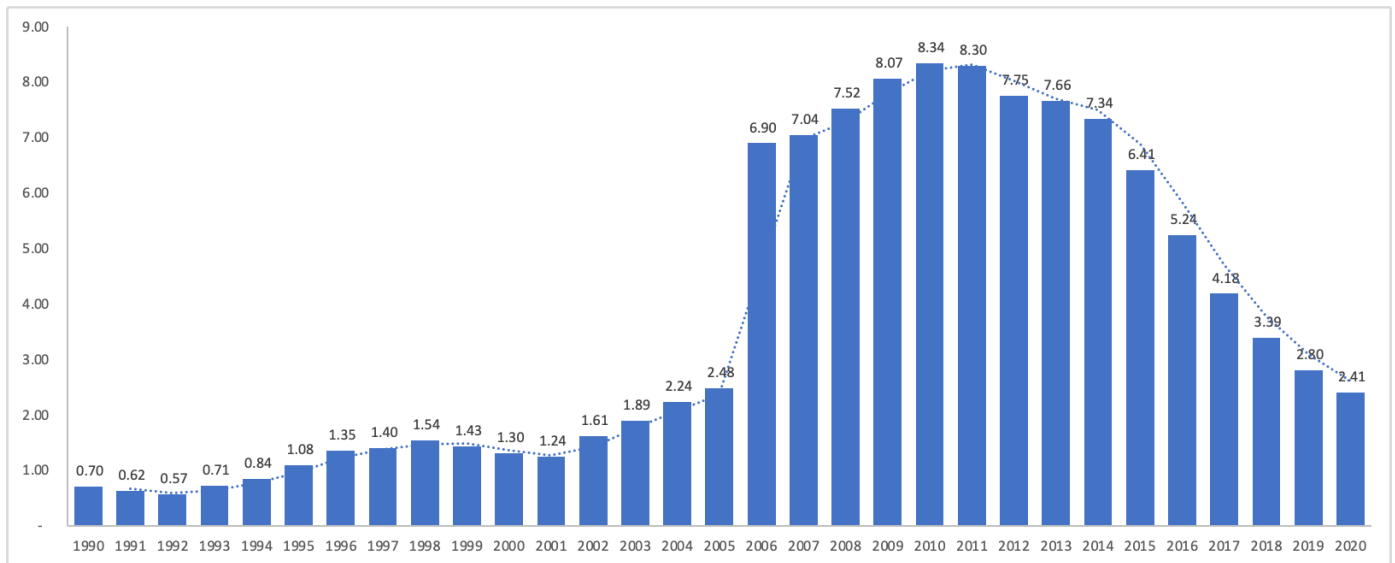
As depicted in Figure 31, the MWUA has been growing steadily at an average annual growth rate of 6.55% until the year 2006, when the growth rate spiked to 50.7%, presumably in response to Hurricane Katrina. The number of policies has been declining since 2012 at an average rate of 14.5% annually. Concurrently, the exposure to loss grew from \$2.5 billion (in real 2020 prices) in 2005 to \$6.9 billion in 2006, further sustaining steady growth until 2011, and the exposure has been declining since then by approximately 11% annually (see Figure 32). MWUA plans have not been financially sound based on the profits and losses reported during the 1990-2020 period. Notably, while the number of profitable years (18 years in total) exceeded the number of loss years (12), cumulative losses over the loss years have exceeded \$1.1 billion, while aggregate profits have been orders of magnitude smaller (approx. \$24 million). The loss in 2005 amounted to over \$859 million (Figure 33).

Figure 31: Annual growth of MWUA policies



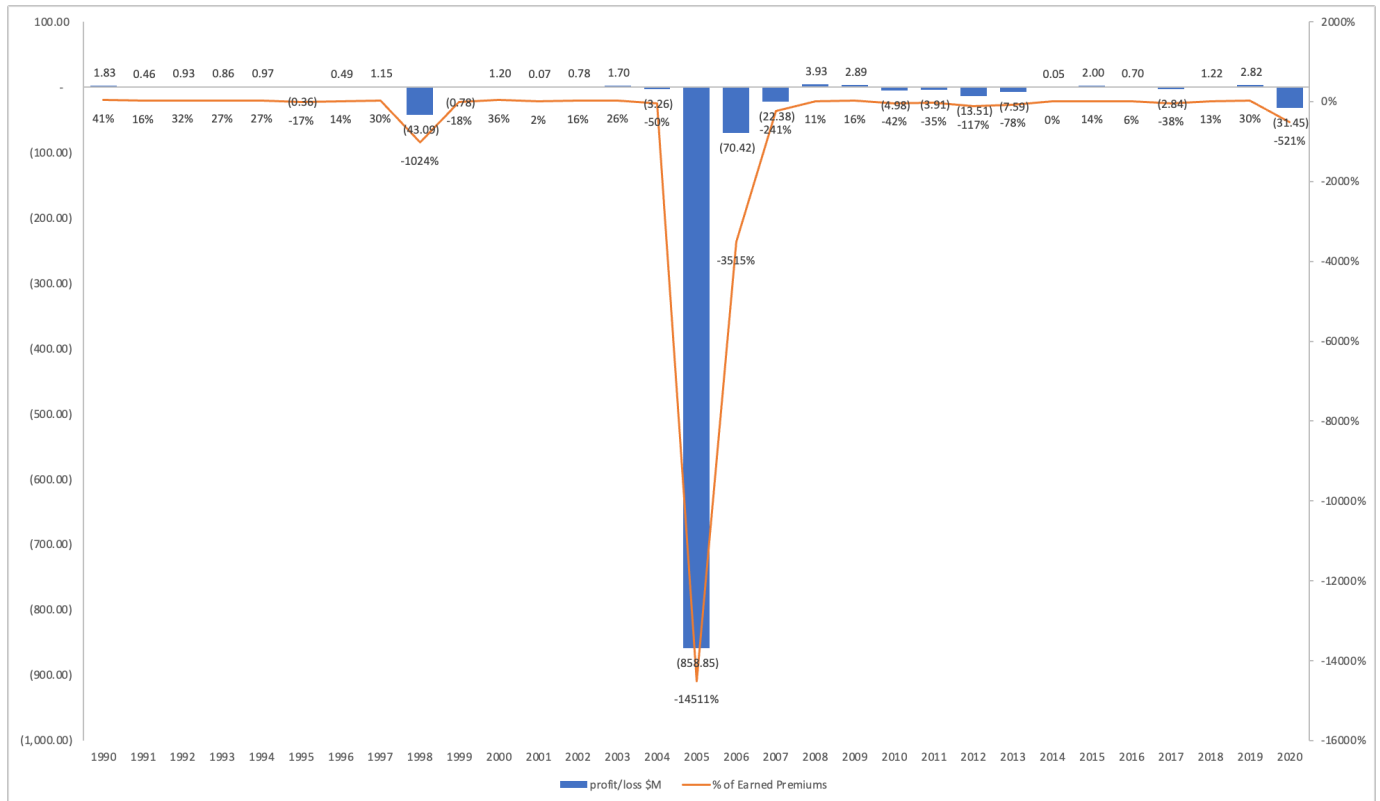
Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 32: MWUA Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 33: MWUA Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

5.2.3. Texas

The Texas Windstorm Insurance Association (TWIA) (formerly, the Texas Catastrophe Property Insurance Association) was established in 1971 in response to Hurricane Celia, which struck the Texas coast on August 3, 1970. Following extensive damage from Celia, many insurers stopped writing policies in coastal communities. TWIA provides wind-and-hail-only coverage in Tier 1, which consists of the 14 coastal counties of Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio and Willacy and parts of Harris County. All insurance companies licensed to write property insurance in Texas are required to be TWIA members, and their participation is determined based on their sales of windstorm insurance in Tier 1 relative to sales of property insurance statewide.

Select legislative changes that have occurred since TWIA's inception include mandates regarding appropriation of funds in 1985, the activation of the Texas FAIR Plan in 2002 in response to the mold crisis experienced in Texas³¹, and requirements to follow specific building codes for new and repaired structures in 2003. In 2008, there were changes to TDI rules which removed the minimum and maximum caps to member assessment percentages.

House Bill (HB) 4409 in 2009 addressed the funding of losses and operating expenses of the TWIA. Specifically, public securities funding was created in 2009 (HB 4409) and was amended in 2011 under HB 3. Legislation in 2015 (Senate Bill 900) further revised the funding structure, creating alternating layers of public securities and member company assessments. Public securities are issued on behalf of TWIA by the Texas Public Finance Authority and repaid by policy premiums and policyholder surcharges. If these premiums and surcharges are not sufficient to cover losses, the statute also authorizes a surcharge on coastal policies insuring property and automobiles in the catastrophe area. The recent 2019 legislation requires TWIA to call an emergency meeting of member insurers if estimated losses arising from a storm may require a member assessment. The 2019 act also requires that the cost of TWIA's reinsurance above its minimum required funding level (100-year storm losses) must be paid by assessments of its member insurers. The 2019 amendment also updates claims-handling processes and claims deadlines in order to improve policy holder experiences; streamlines policy renewal processing and payment options; modifies depopulation programs; and directed legislative oversight boards to study and makes recommendations for changes to TWIA's funding and funding structure.

TWIA encourages insures to participate in its depopulation programs. The Texas Legislature authorized the Voluntary Market Depopulation Program and the Assumption Reinsurance

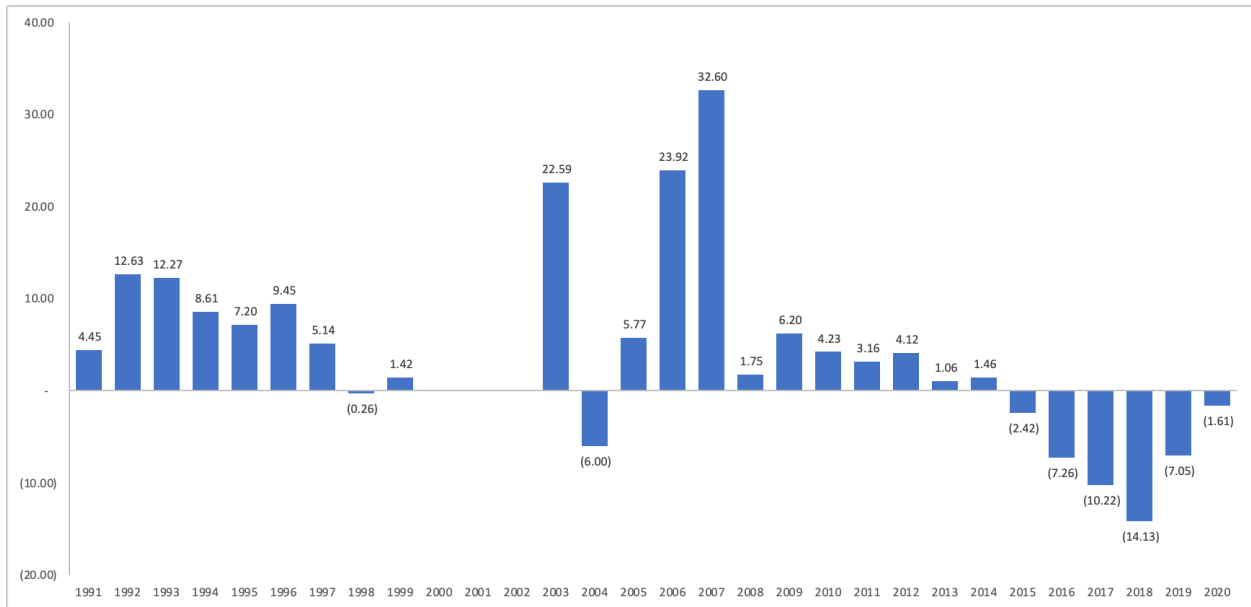
³¹ The legislature authorized the creation of the FAIR Plan in 1995 (Tex. Ins. Code Art. 21.49A added in 1995). The FAIR Plan lay "dormant" from 1995-2002.

Depopulation Program in 2015. The Assumption Reinsurance Depopulation Program was amended in 2019. The Voluntary Program allows for policy changes to occur at the time of renewal, and the Assumption Reinsurance Program allows insurers to make offers on a large number of policies annually. Under the Assumption Reinsurance Program, policyholders have the option to accept the offer and transfer their policy to the private market, or they can reject the offer and remain with TWIA.³²

As depicted in Figure 34, the total number of TWIA policies grew positively (at a varying rates) until year 2014, with the largest annual growth of 48% between 2006-2007. During the 2015-2020 period, policy counts decreased at an annual rate of 6.4% on average. Exposure has mostly trended up, with the highest increase in exposure to loss after 2005 during 2006 and 2007. Consistent with the decline in policy numbers, exposure has also decreased during the last 5-year period examined in this report (see Figure 35). In terms of program financial standing, the losses during the four consecutive years covering the 2005-2008 period, and the losses in 2010, 2012, and 2017 have accumulated to \$3.7 billion, while aggregate profits were approximately \$1.6 billion (Figure 36).

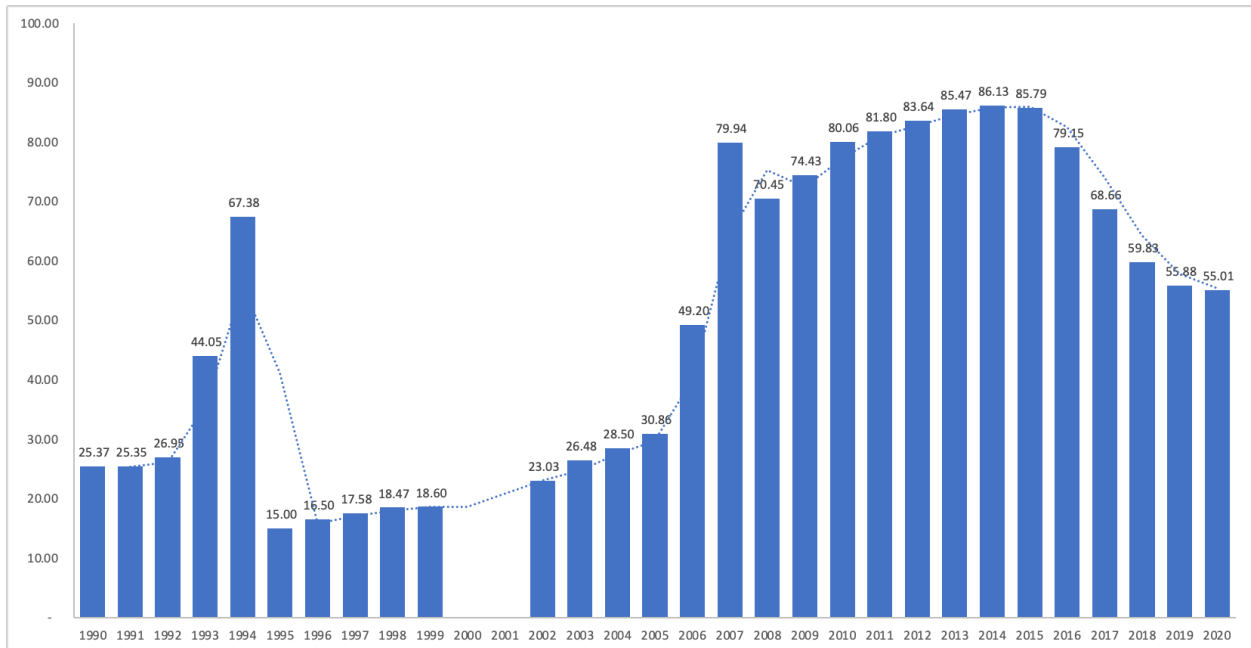
³² Retrieved from the <https://www.twia.org/frequently-asked-questions/#depopulation> .

Figure 34: Annual growth of TWIA policies



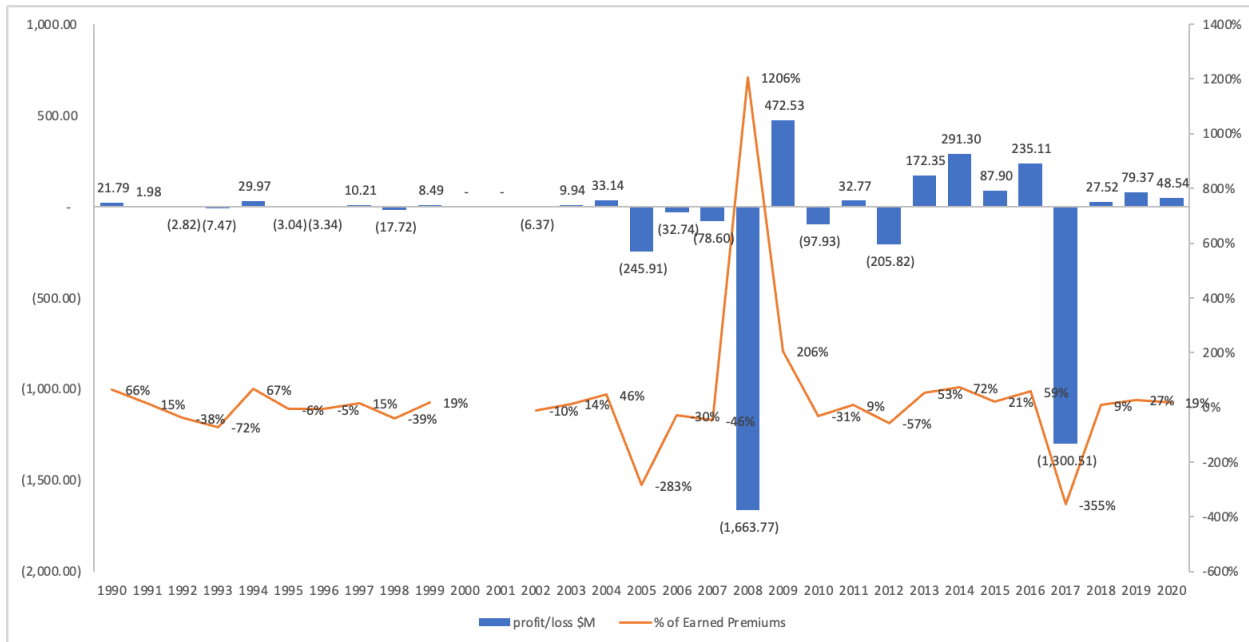
Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 35: TWIA Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 36: TWIA Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

5.2.4. North Carolina

North Carolina has two residual market plans. The North Carolina Joint Underwriters Association (NCJUA), the state’s FAIR plan, was created in 1969 to make insurance available for those unable to buy coverage through the standard insurance market; it covers the entire state excluding barrier islands along the Atlantic Ocean. Coastal Property Insurance Pool (CPIP), formerly known as the Beach plan, covers beach and coastal areas (18 coastal counties) and offers homeowners policies with windstorm and hail coverage. As a way to ensure a robust risk financing program, NCJUA plans have been optimized to use both traditional reinsurance and capital markets.

Since the 1980s, key structural and legislative changes have been made to each plan. Changes to CPIP’s Plan of Operations included allowing policyholders to purchase wind and hail policies from other licensed companies in 1988. In 1998, member companies were required to adjust catastrophic named storm losses, if they ceded the wind coverage. Other changes included

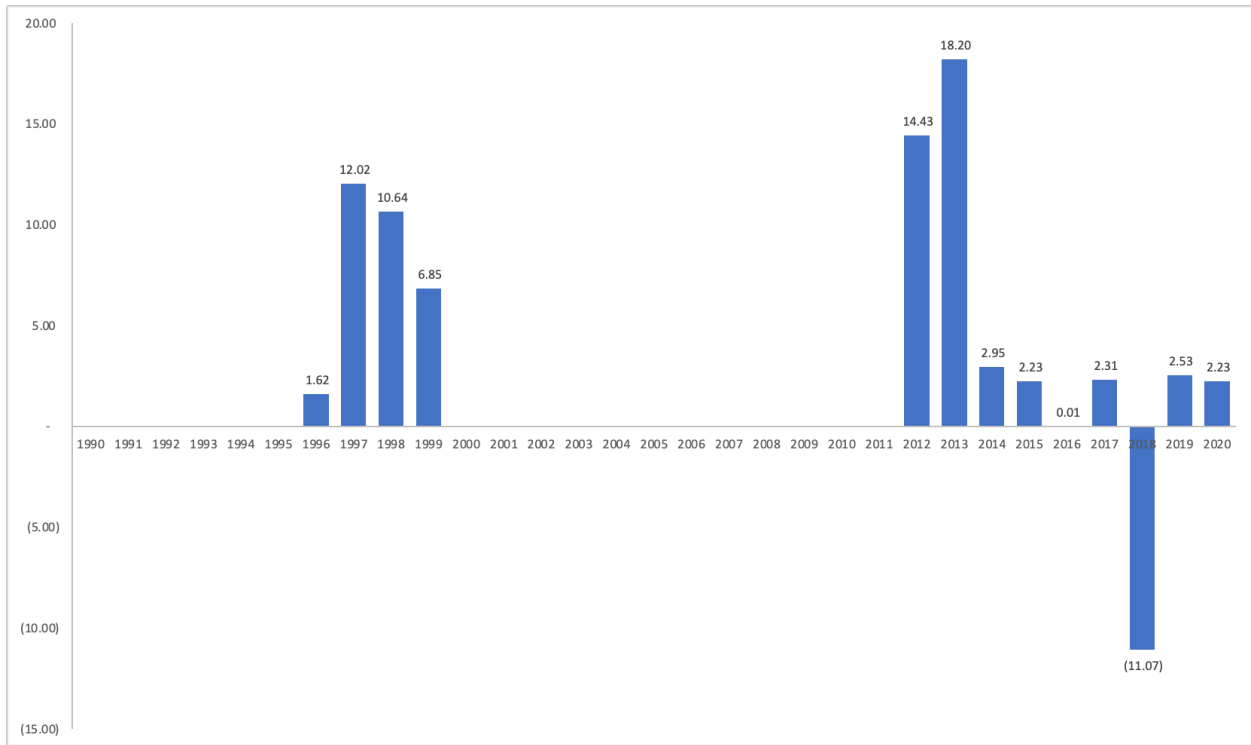
reducing coverage limits and placing a one-billion-dollar cap on non-recoupable assessments in 2009. In 1987, the NCJUA FAIR plan added optional peril coverage and began offering replacement cost coverage in 1993. In 2010, it reduced coverage maximum limits and enacted a named storm deductible of 1% for residential properties in coastal areas.

In 2008, changes were made in CPIP, allowing increases in homeowners policy deductibles and rates and allowing CPIP to retain more capital. Legislation in 2009 (HB 1305) was aimed at reforming the beach plan. The bill caps insurers' assessments³³ for losses incurred in one year at \$1 billion; allows insurers to assess a 10% surcharge on every property insurance policy statewide after a major storm if the \$1 billion deficit threshold is surpassed; and reduces coverage limits for residential property to \$750,000 from \$1.5 million.

Data for NC plans (CPIP and FAIR) are incomplete as shown in Figures 37-39. In terms of policy counts, the aggregate CPIP and FAIR count has been growing at an average annual rate of 5%. Policy counts declined substantially by 11% in 2018 relative to 2017 (Figure 37). Meanwhile, exposure to loss had grown steadily until 2014. Since then, there has been a declining trend, though the recent couple of years have seen slight increase in exposure values (Figure 38). In terms of profitability of the program, the NC plans (CPIP and FAIR) experienced financial distress during 1996-1999, 2011, and 2018-2019, on aggregate suffering approximately \$1.8 billion in losses, of which 2018-2019 losses make up 64%. Cumulative profits during years of gains have been almost twice as small as the losses the program has incurred (see Figure 39).

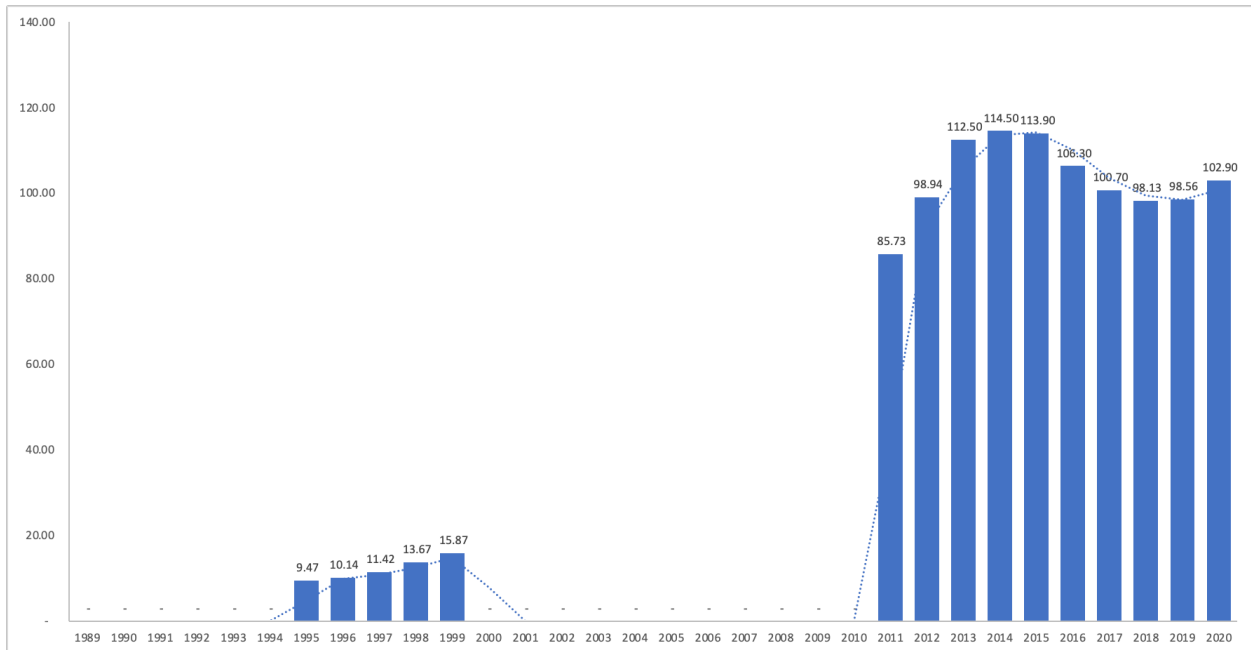
³³ The assessment is known as a Catastrophe Recovery Charge. These charges are calculated separate from premiums and are clearly identified. Each month, it is the insurer's responsibility to file a report and submit payment for assessment surcharges collected. The surcharge is reviewed annually and continues until the deficit has been recovered. If a secondary event occurs while the initial surcharge is still being collected, a secondary Catastrophe Recovery Charge will be included on all new and renewed policies.

Figure 37: Annual growth of CPIP and FAIR policies, NC



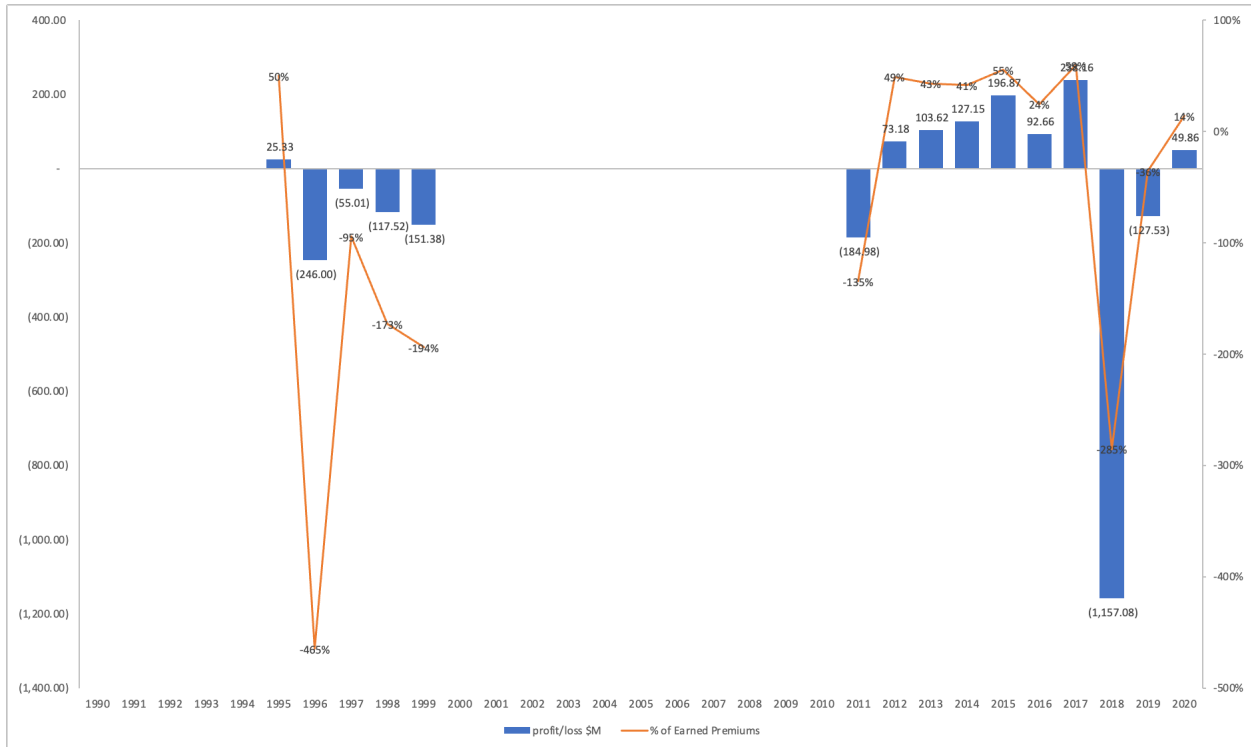
Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 38: NC Residual Market Plans Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 39: NC Residual Market Plans Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

5.2.5. South Carolina

The South Carolina Wind and Hail Underwriting Association (SCWHUA), also known as the Wind Pool, was created in 1971 and provides wind and hail coverage for residential and commercial properties in the coastal area of the state. The Association was re-codified in 1988 and the Plan of Operations was amended to allow the Director of Insurance to extend coverage to new areas as needed. In 1995, the Legislature required the SCWHUA to include loss of income, fair rental value, and additional living expenses to their coverage offerings. By 1997, it created a new condominium unit owner policy and revised dwelling, commercial, and mobile home policies by incorporating new changes to the Insurance Services Office (ISO) dwelling policy. Originally, SCWHUA operated in a single territory. The area of coverage expanded in 2007, resulting in two zones.

The Wind Pool has always existed as a single servicing carrier and as a syndicate since 1975. It only provides wind and hail policies for its region, which includes select areas of Charleston, Georgetown, and Horry Counties. During catastrophic events, it operates under a Single Adjuster Program, i.e., assigns claims to an available adjusting firm. The SCWHUA is not affiliated with any other FAIR or wind plan, but it does provide management services for the South Carolina Property and Casualty Insurance Guaranty Association.

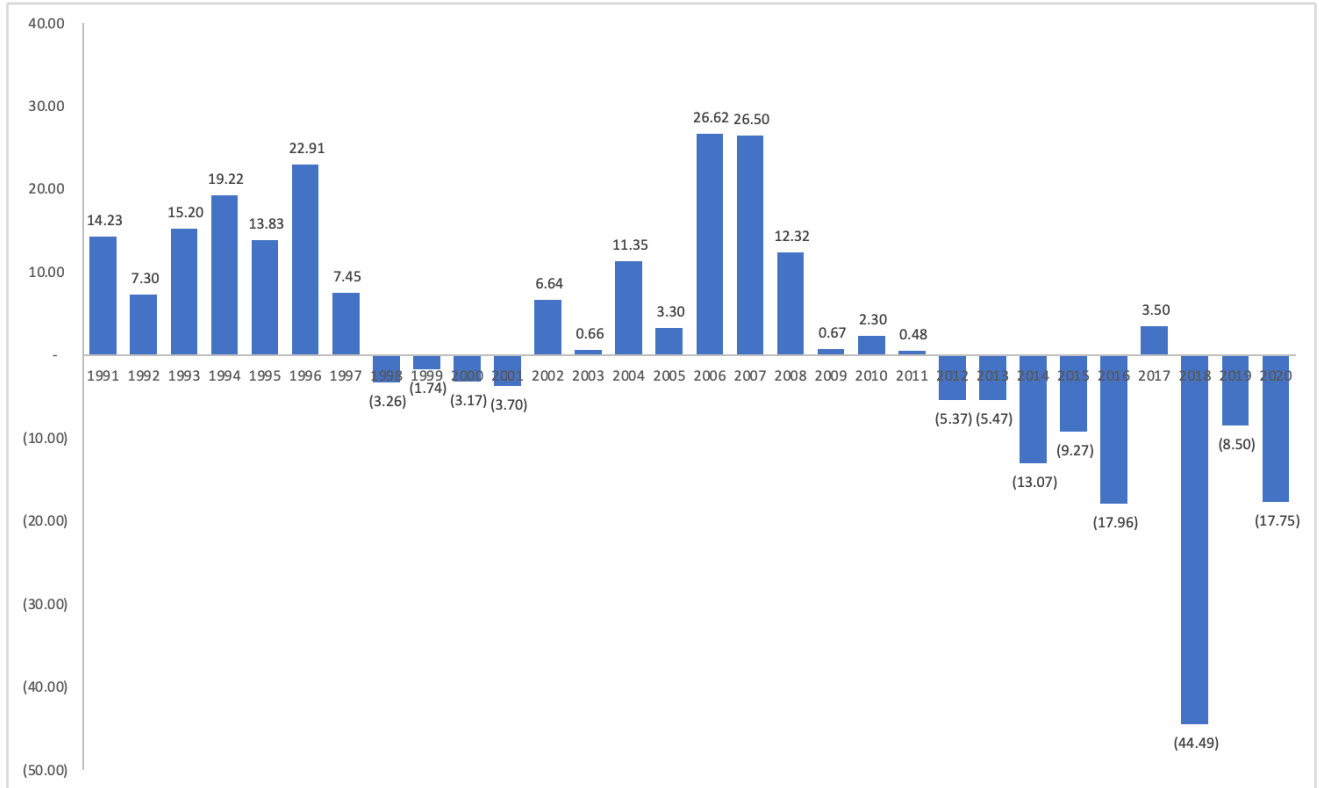
The SCWHUA encourages participating agencies to have one to two licensed agents attend educational seminars through SCWHUA's certification program. If agencies are in compliance, they receive a 10% commission. Non-certified agencies receive a 5% commission.

From January 1, 2008, the state insurance department has required Wind Pool policyholders who choose replacement cost coverage to purchase flood insurance. Around 70% of Wind Pool policyholders already had flood coverage at that time, and several thousand additional policyholders are now covered for flood damage. Legislation expanding the Wind Pool's coverage territory was approved in June 2007. Residents who make their homes more resistant to wind damage are also given tax breaks. Insurers are required to report participation in the SCWHUA's Voluntary Writing Program. Insurers report credits through an online service, and since 2007 they have been required to report by zones. Insurers receive credits for in-force liability up to a maximum limit set by SCWHUA and participation is based on written voluntary business from two calendar years prior to the year reporting.

Wind Pool policies have been increasing at approximately 4% annually in South Carolina, with the growth rates reaching 36% during 2006 and 2007. Starting from 2012, policy counts have been falling steadily with the highest decline reported in 2018 (Figure 40). Exposure to loss experienced explosive increase after 2005, reaching the highest value in excess of \$22.8 billion in 2009. Since

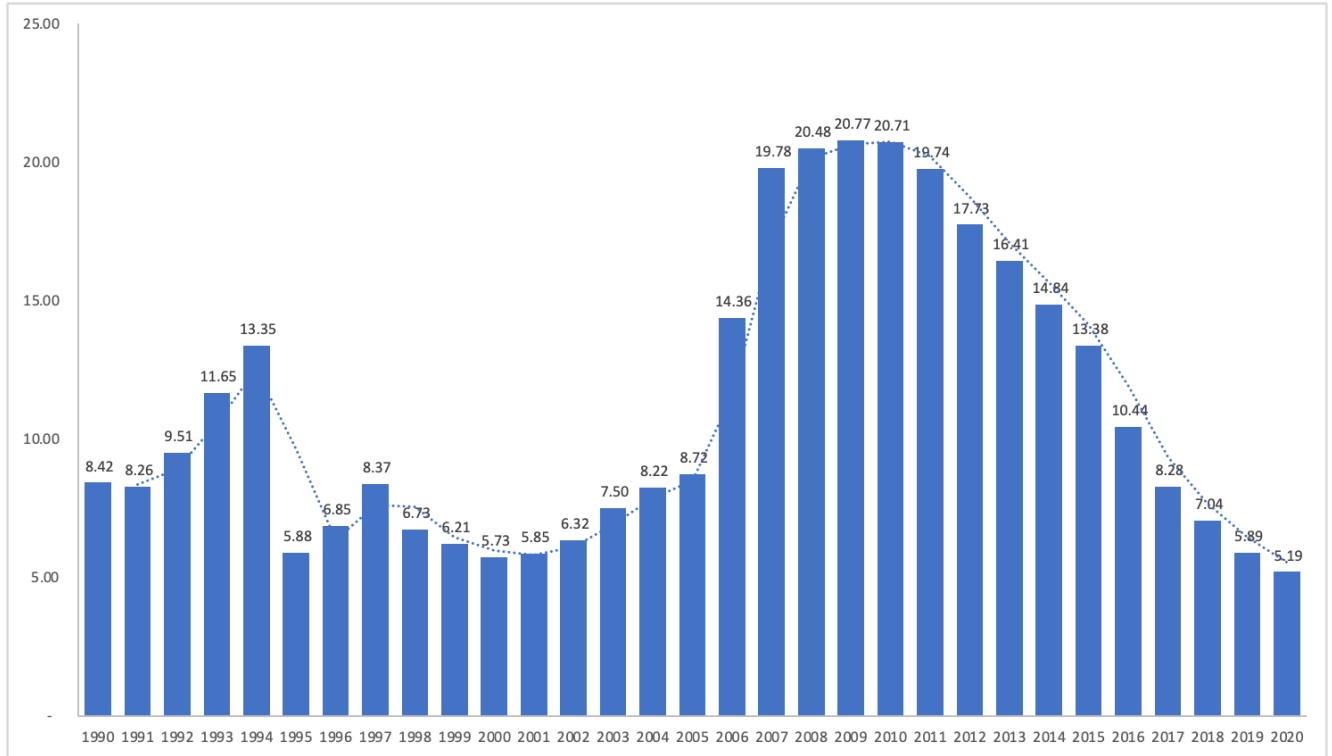
2009, the exposure has been declining. In 2020, it had declined to 25% of its 2009 exposures (Figure 41). Financial gains and losses reported during 1990-2020 period show that except for the initial year of profit (\$92.8 million), which presumably included start-up assessments or other means to capitalize the association, the program has sustained financial distress for approximately 30 years. During 1991-2020 period, cumulatively losses have exceeded profits by approximately \$96.7M and notably, when accounting for major catastrophic losses, the annual average profit/loss as a percent of total earned premiums has been estimated at around -49% during the same period (see Figure 42).

Figure 40: Annual growth of SCWHUA policies



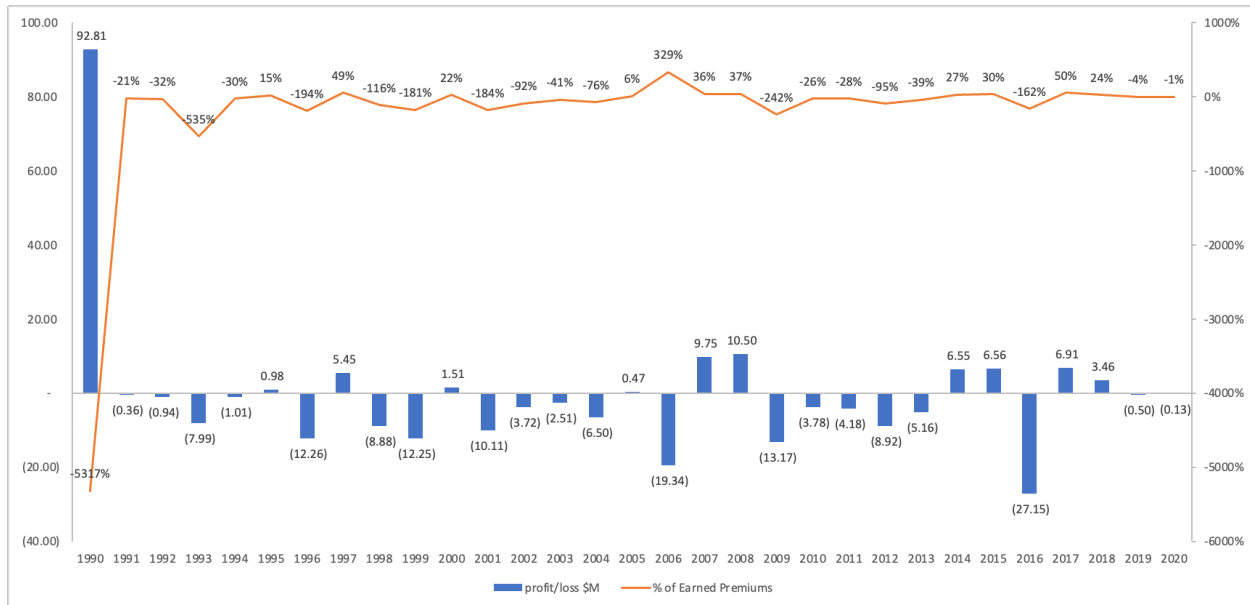
Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 41: SCWHUA Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO

Figure 42: SCWHUA Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, Beach and Wind/Hail, PIPSO
 Notes: In 2006, earned premiums were reported negative.

5.2.6. Florida

Florida Citizens Property Insurance Corporation (CPIC), also known as Florida Citizens, is a government entity of the state of Florida that was established after a 2002 merger of the former Florida Residential Property & Casualty Joint Underwriting Association and the former Florida Windstorm Underwriting Association. It is exempt from both federal and state taxes. The CPIC has experienced exponential growth since its inception and has become the largest insurer in Florida since 2006. Citizens is required to maintain three separate accounts (dividing its revenues, assets, liabilities, losses and expenses): (1) personal lines, (2) commercial lines, and (3) coastal accounts. Insurance rates are capped by the statute and cannot increase more than 10% annually.³⁴ When the Florida Legislature established Citizens in 2002, it authorized Citizens to create a depopulation program in order to reduce the number of its policies and exposure. Both new and

³⁴ Excludes coverage changes, sinkhole loss coverage, and surcharges.

existing companies are encouraged to assume exposure and take on policies from Citizens. The ability to transfer policies in blocks has allowed Citizens to transfer approximately 2.9 million policies (corresponding to \$757 billion in exposure) to the private insurance market between 2003-2020 (PIPSO FAIR, 2020).

One of the most recent advancements toward depopulation was the so-called Policyholder Choice project, allowing policyholders to choose among competing carriers and to view premium estimates for all offers. Agents are also able to view all depopulation-related documents and register the policyholder's carrier choice directly in Citizens' policy system. A new improvement initiated in 2018 further allows personal lines policyholders to submit their choice online, allowing their selection of offers to be viewed by agents in real time. As part of its depopulation efforts, the Florida Legislature authorized Citizens to create a clearinghouse program. Under the program, authorized insurers that have voluntarily agreed to participate can offer coverage to new applicants and existing Citizens policyholders that may render their property ineligible for coverage with Citizens.³⁵ Thirteen carriers participate in the Clearinghouse program and have assumed over 126,000 new and renewal policies.

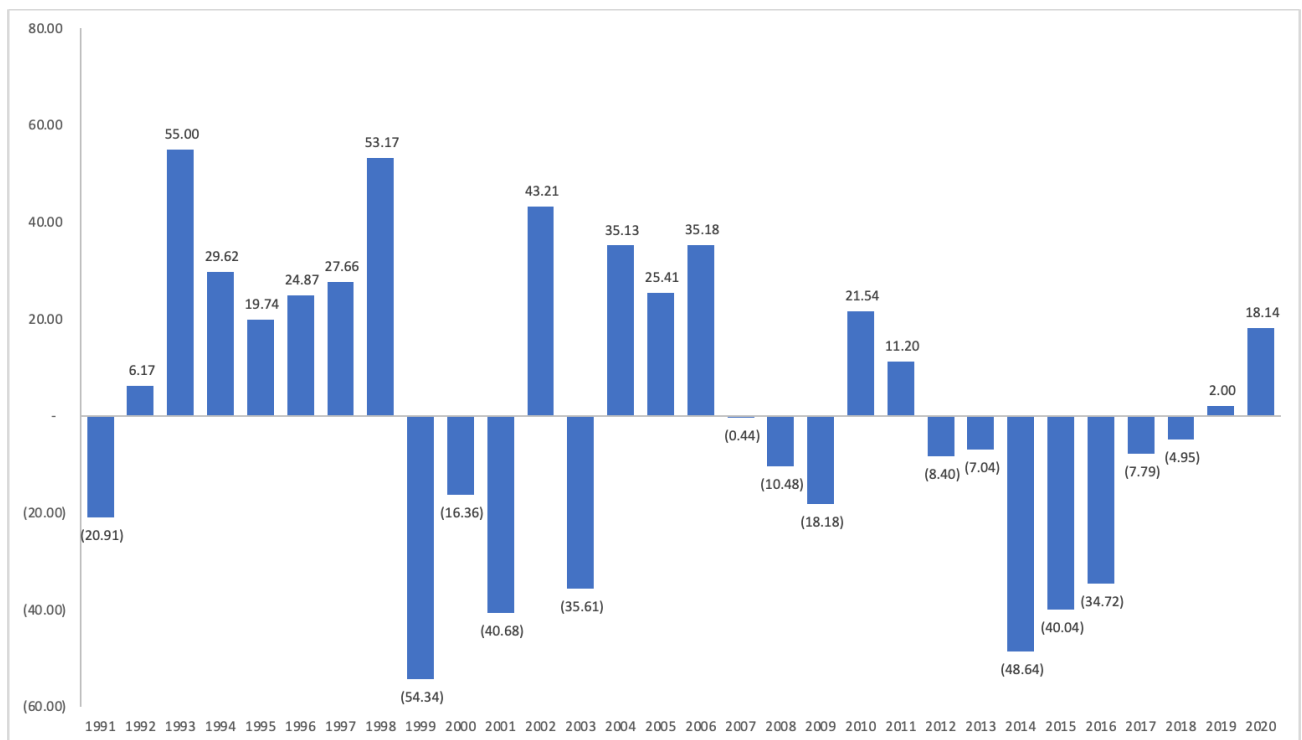
Annually, in order to determine the amount of regular assessment payable by each assessable insurer, Citizens is calculating each insurer's participation ratio based on their Coastal Accounts. Insurers that voluntarily write windstorm exposure may receive credit against their participation ratios.

As shown in Figure 43, Citizens has experienced years of explosive growth in terms of policy numbers, with the largest annual growth rate 122% in 1993, followed by 114% annual growth in

³⁵ The Property Insurance Clearinghouse launched with an HO-3 policy on January 27, 2014. Since then, DP-1, DP-3, HO-6, HW-2 (wind-only homeowners) and HW-6 (wind-only condominium owners) policy types have been added. Two mobile home products (homeowners and dwelling) were added in March 2020.

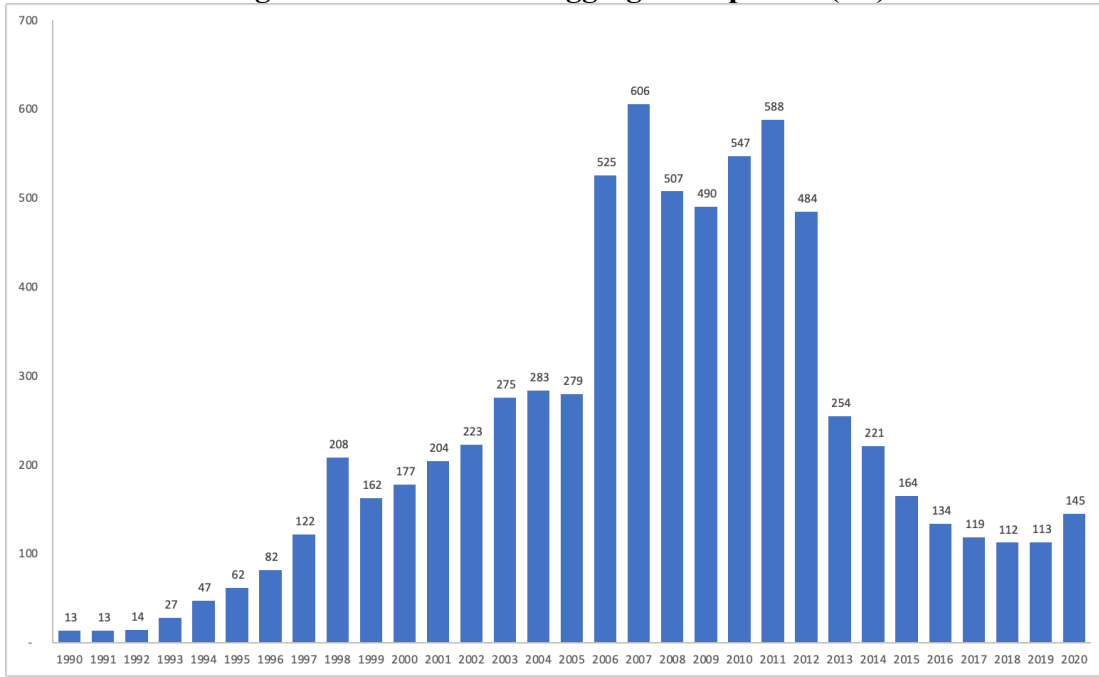
1998, 76% in 2002, and an average growth rate of 47% during 2004-2006. Policy counts declined during 2014-2018 and grew back in 2019-2020, with 2020 showing 22.2% growth relative to 2019. Despite a few years of decreases, during 1990-2020 CPIC experienced an average 13% annual growth in policy counts. In terms of exposure to loss, the CPIC exposure increased steadily over time until 2007 (Figure 44). Exposure then declined during 2012-2017, presumably due to depopulation efforts. The exposure to loss has been growing again during the recent three years. Years 2004, 2005, and 2017 have been financially distressful for the program. During the 2004-2005 hurricane years, operational losses amounted to approximately \$5.5 billion, and in 2017 the program has sustained nearly \$2.1 billion in losses. Despite these financial shortfalls, nine years of relative calm after 2005 resulted in a long consecutive period of profitability, the profits nearing to \$10 billion (Figure 45).

Figure 43: Annual growth of FL Citizens policies



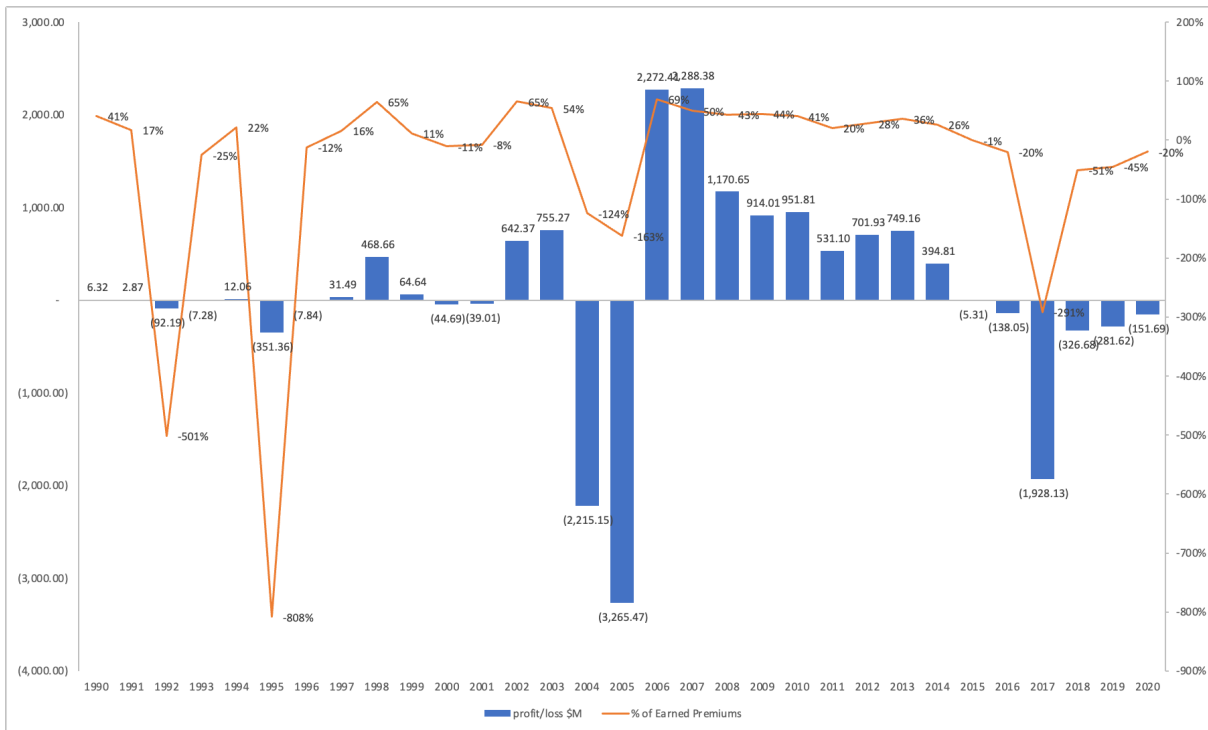
Source: Compendium of Property Insurance Plans, FAIR, PIPSO

Figure 44: FL Citizens Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, FAIR, PIPSO

Figure 45: FL Citizens Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, FAIR, PIPSO

5.2.7. Louisiana

Louisiana Citizens Property Insurance Corporation (LA Citizens or LCPIC) was created by the legislature in 2003 and it operates both the Louisiana Citizens FAIR and Coastal Plans, effective Jan. 1, 2004. The LA Citizens plans are exempt from federal and state income taxes by statute. LA Citizens rates are not competitive with private insurers by law and must be at least 10% higher than private market rates. To ensure that LA Citizens would remain the insurer of last resort, a new law (SB 130) enacted in 2009 requires LA Citizens to impose a 10% surcharge above the highest rates charged by private insurers with at least two percent market share in a parish.³⁶ New companies that have not reached two percent market share are required to have sold at least 25 homeowners policies in the previous year to be included in the rate structure. The bill also states that the board may establish territorial rates as deemed appropriate, but any rate changes should be approved by House and Senate committees on insurance. In 2007, the Louisiana legislature initiated a depopulation incentive program to increase the availability of property insurance, while decreasing the business written by LA Citizens. Legislation (HB 952) passed in June 2010 relaxed the original takeout policy program,³⁷ allowing insurers who participate in the depopulation program to assume fewer policies and choose the ones they want from LA Citizens. The companies are also required to prove that they have the capacity to increase their risk exposure. The 2007 legislation also was designed to make LA Citizens more attractive to insurers. Financial incentives were given to new insurers entering the homeowners market on the condition that 25% or more of their policies would be policies taken over from LA Citizens.

Initially, when the LCPIC was established, no provision was made detailing assessments for potential future deficits. In 2005, losses and loss adjustment expenses from Hurricanes Katrina and

³⁶ For more details, please see <https://legis.la.gov/legis/ViewDocument.aspx?d=668905>

³⁷ Originally it required insurers to assume bundles of 500 policies to eliminate cherry-picking.

Rita required LCPIC to take on \$978 million in bonds. In 2006, LCPIC borrowed additional funds to pay bond related expenses until they implemented emergency assessment requirements to be paid by insurers state-wide in 2007.³⁸ In 2011, the Louisiana Legislature enacted a law to allow LCPIC to collect assessments. It details two types of assessments: regular and emergency assessments. Regular assessment is authorized when the LCPIC deficit in a given calendar year is less than 10% of the statewide industry property insurance premiums. Insurers can choose to recoup assessments from regular policyholders. For deficits above 10% of statewide industry property insurance premiums, the emergency assessments are used, and insurers must charge their policyholders the appropriate percentage on each policy over the next year to pay the emergency assessments. Assessments can be levied to insurers in an amount up to 10% of the premium written on property owners.³⁹ Assessments and surcharges are used to pay for bonds and expenses incurred related to the repayment of the bonds until all remaining debt is repaid in the form of regular or emergency assessments. In addition, there is a state income tax credit available to policyholders who pay assessments.

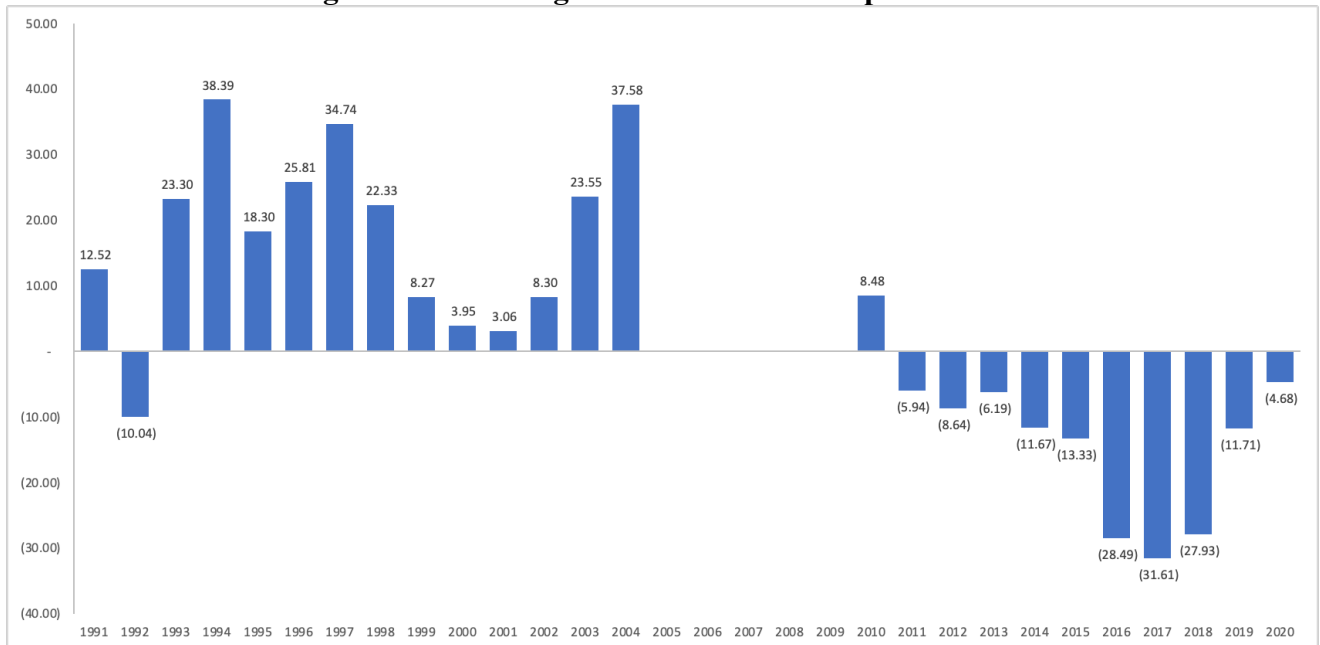
LA Citizens policy counts grew on average by 25% annually during 1991-2004; the data during 2005-2008 are not available. Starting 2010, the policies have been declining steadily by approximately 12% annually (Figure 46). Exposure to losses increased during the initial period and has been declining since 2009, when it reached the highest value (approximately \$34B) (Figure 47). Cumulatively, the program sustained more losses than profits during 1990-2020, with the former exceeding the latter by \$61.7 million. The program sustained its largest loss in 2012,

³⁸ For more details, please see <https://www.lacitizens.com/docs/default-source/financial-reports-and-statements/2012-annual-statement---final.pdf>

³⁹ See https://www.lacitizens.com/docs/default-source/financial-reports-and-statements/2016-12-31-annual-statement---final.pdf?sfvrsn=9035e403_6

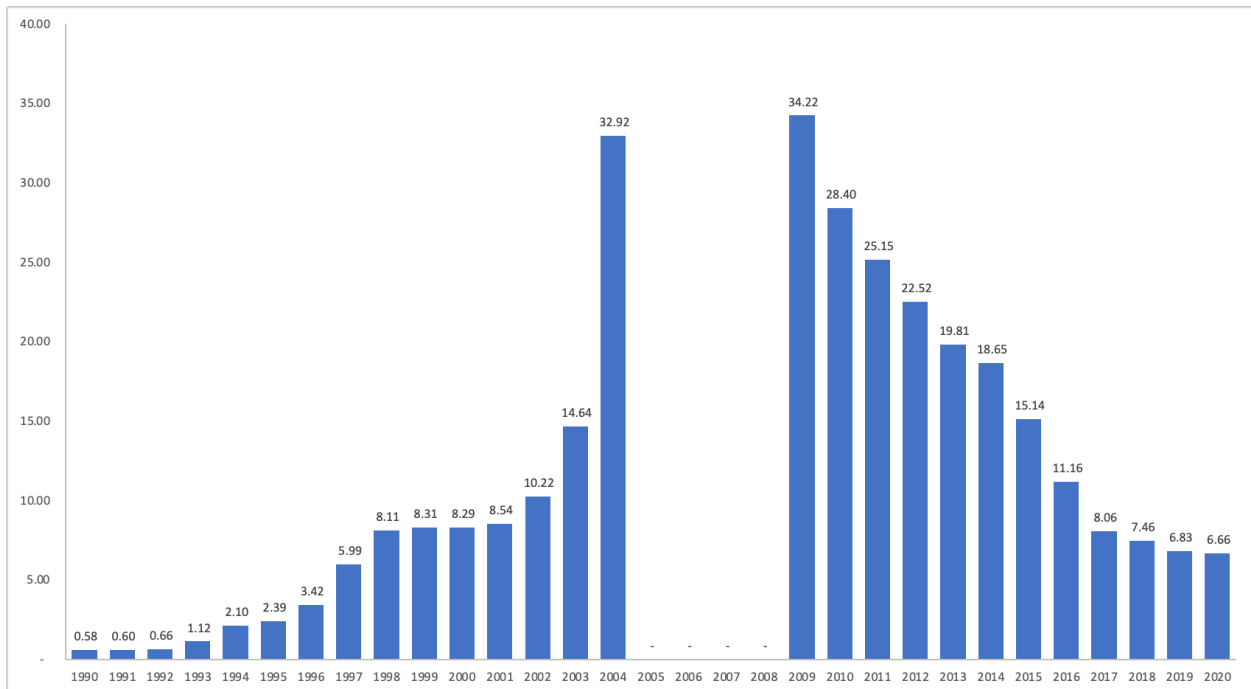
amounting to \$113 million, followed by \$95 million and \$90 million in 2008 and 2020, respectively (Figure 48).

Figure 46: Annual growth of LA Citizens policies



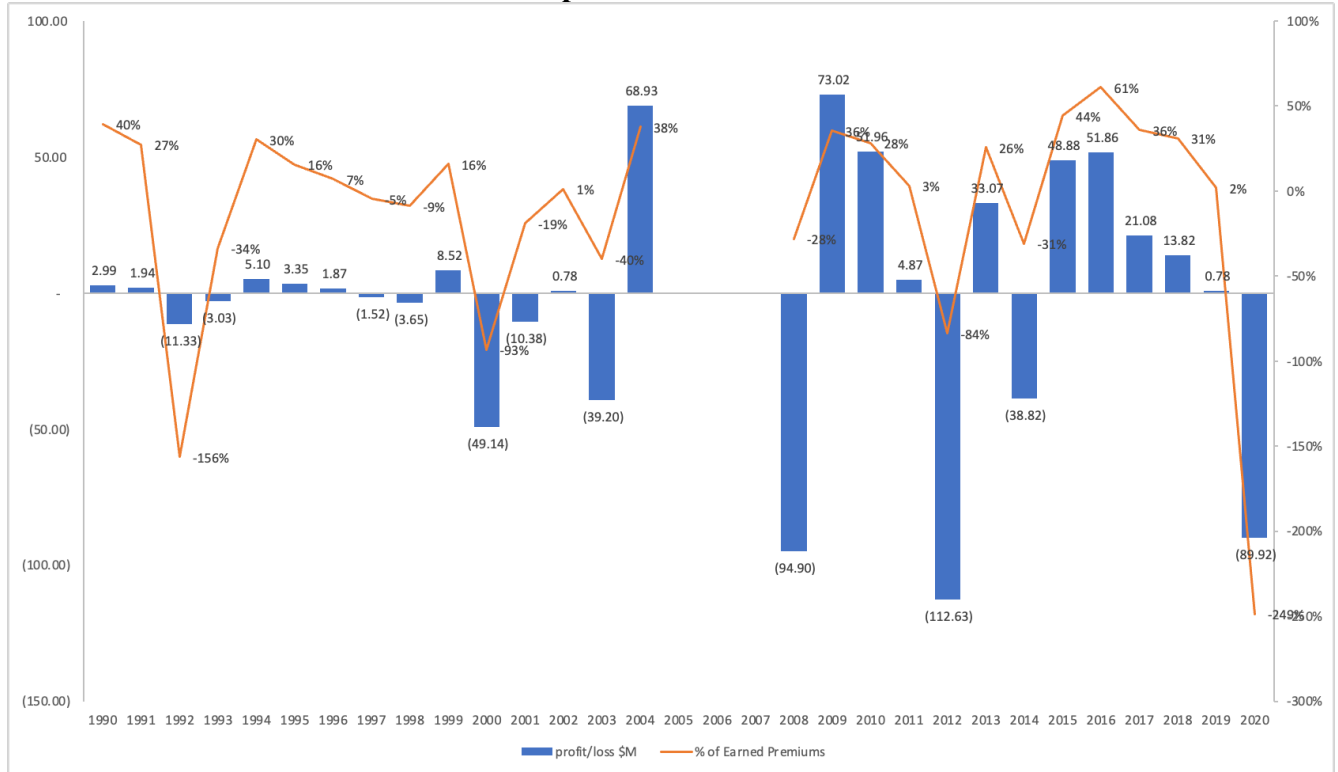
Source: Compendium of Property Insurance Plans, FAIR, PIPSO
 Notes: data for 2005-2008 are not available.

Figure 47: LA Citizens Aggregate Exposure (\$B)



Source: Compendium of Property Insurance Plans, FAIR, PIPSO
 Notes: data for 2005-2008 are not available.

Figure 48: LA Citizens Profit/Loss (\$M, 2020 prices) and as percentage of earned premiums



Source: Compendium of Property Insurance Plans, FAIR, PIPSO
 Notes: data for 2005-2008 are not available.

5.3. Data

5.3.1. Insurance

Data for this study were obtained from multiple sources. State level data on insurance policies (residential and commercial), premiums, exposures, losses/gains, and more were obtained from the Property Insurance Plan Service Office Inc. (PIPISO). PIPISO reports provide exhibits with data for FAIR and Beach/Wind plans for fiscal years ending September, October, November and December and are available from 1990 through 2020. Exhibits A relate to FAIR plans, while Exhibits D relate to windstorm and beach plans. Each summary provides information about application and policy counts, premiums written and earned, profits and losses, exposures, and

reported number of losses by classes (habitational and commercial). For this study, we pulled data for windstorm and beach plans for the following states along the Gulf of Mexico and North Atlantic coasts: Texas, Alabama, Mississippi, Louisiana, Florida, South Carolina and North Carolina. Our sample excludes the state of Georgia because windstorm and hail pools were abolished in 1982 and are no longer offered as part of the FAIR plans available through the Georgia Underwriting Association (PIPSO FAIR Plans, 2021).

It should be noted that windstorm and beach plans are covered by Alabama Insurance Underwriting Association (AIUA), Mississippi Wind Underwriting Association (MWUA), North Carolina Insurance Underwriting Association, South Carolina Wind and Hail Underwriting Association, and Texas Windstorm Insurance Association. In Florida and Louisiana, both windstorm and beach plans are covered by the Citizens Property Insurance Corporations (CPIC) of Florida and Louisiana, respectively. Florida CPIC was created in 2002 through a merger of the former Florida Residential Property & Casualty Joint Underwriting Association and the former Windstorm Underwriting Association.⁴⁰ The Louisiana CPIC was created in 2003 to operate the Louisiana Citizens FAIR and Coastal Plans.⁴¹ Both CPICs operate throughout the state and are reported as part of the FAIR plans in the PIPSO report. For the sample analysis, instead of excluding these plans, we complement the windstorm and beach plans from Texas, Alabama, Mississippi, North Carolina, and South Carolina with the FAIR plans from Florida and Louisiana CPICs.

⁴⁰ Chapter 627.351(6) of the Florida Statutes was amended during the 2002 Legislative session to create the Citizens Property Insurance Corporation.

⁴¹ On August 15, 2003 the Louisiana Citizens Property Insurance Corporation was created by Title 22, Subpart B, Section 1430 to operate the Louisiana Citizens FAIR and Coastal Plans effective 01/01/04.

Variables capturing private insurance market operations were obtained from the National Association of Insurance Commissioners (NAIC). NAIC reports cover only residential dwelling (not commercial) policies and owner-occupied policy types; they provide aggregated state-level data about the total exposure (number of house-year), (aggregate) premiums and average premiums. The data are reported for 1998-2019. Among the policy types, HO-3 is the most dominant and provides coverage for most perils, including windstorm and hail, unless specific exclusions apply. For ease of exposition, all dwelling types except for renters and condo owners were included in the aggregate data.⁴² Data do not permit separation of exposure/premiums by perils, and before 2011, aggregate measures also included policies written through RMMs. Since 2011, the two sources of insurers have been separated. To create a proxy for the private insurance market, we used premiums and exposures through windstorm/beach and FAIR plans pre-2011 and subtracted them from the aggregate state premiums and exposures.

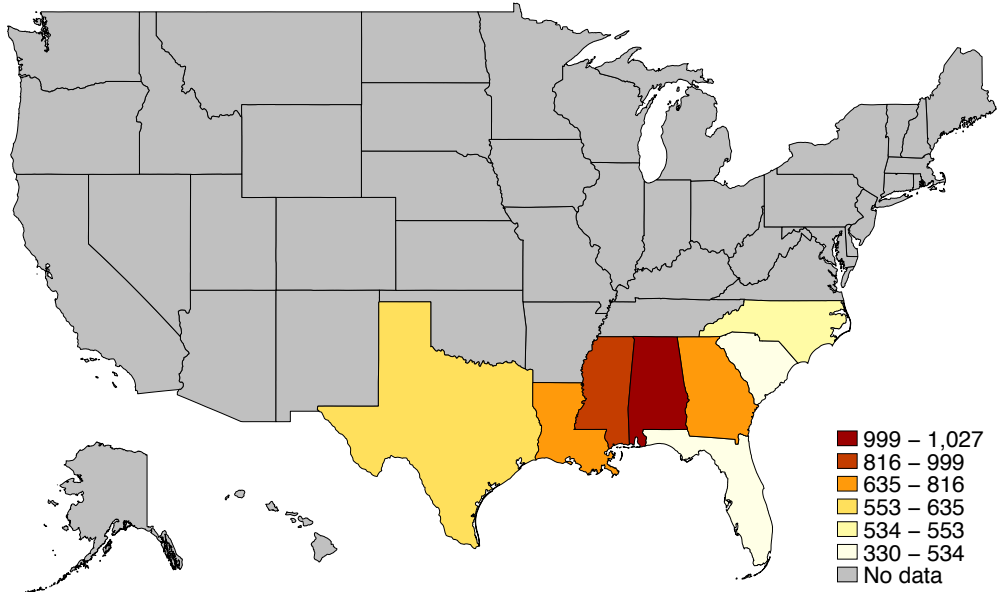
In addition to dwelling reports, we also obtained firm state-level data for 2004-2020 from the NAIC state page of firms' financial statements. The data cover all insurers writing business (admitted carriers + surplus lines) in a state, and provide information about the company's code, short name, group code, state of domicile, premiums written, premiums earned, and losses incurred. We used this dataset to count the number of private insurers working in a state in a given year. Using firm-level premium data, we also calculated the Herfindahl-Hirschman Index (HHI), a commonly used metric for market concentration calculated as the sum of squared market shares of all firms operating in the insurance market. Specifically, for each state and year, we calculated the market share of each firm in the total homeowners insurance market,⁴³ then summed the squared market shares within each state. HHI values can range from 0 to 10,000; higher values

⁴² Detailed descriptions about policy types are provided <https://www.iii.org/article/are-there-different-types-policies>

⁴³ We used premiums to calculate firm's share in the market.

indicate greater concentration, with 10,000 being an absolute extreme with only one firm in the market. More specifically, adopting the benchmark of the U.S. Department of Justice for merger guidelines, HHI values higher than 1,800 generally indicate highly concentrated markets; values between 1,000 and 1,800 show medium concentration; and HHI below 1,000 is indicative of low market concentration (U.S. Department of Justice, 1997). The HHI (homeowners insurance) for our sample for the period 1989-2020 is 908, with a minimum of 306 in Florida in 2019 and a maximum of 1,444 in Mississippi in 2004. As shown in Figure 49, across the sample states, HHI indicated medium to low concentration in the year 2020. The highest HHI was calculated for Alabama, followed by Mississippi. However, the value for the latter was below 1,000, indicating overall low market concentration.

Figure 49: HHI in 2020



Source: NAIC; authors.

5.3.2. Hazard

To control for the physical intensity of windstorms, we used NOAA’s National Hurricane Center records of named landfalling hurricanes and tropical storms to calculate total number of landfalling hurricanes in each state of reference. In Table 56, we report the total number of named hurricanes and tropical storms that hit the selected states along the Atlantic and Gulf Coast during the 1980-2020 and 1990-2020 periods, respectively. Florida was impacted the most by both tropical cyclones and hurricanes, followed by North Carolina, Louisiana, and Texas.

Table 56: Tropical storm, named hurricanes by state (totals during 1985-2020)

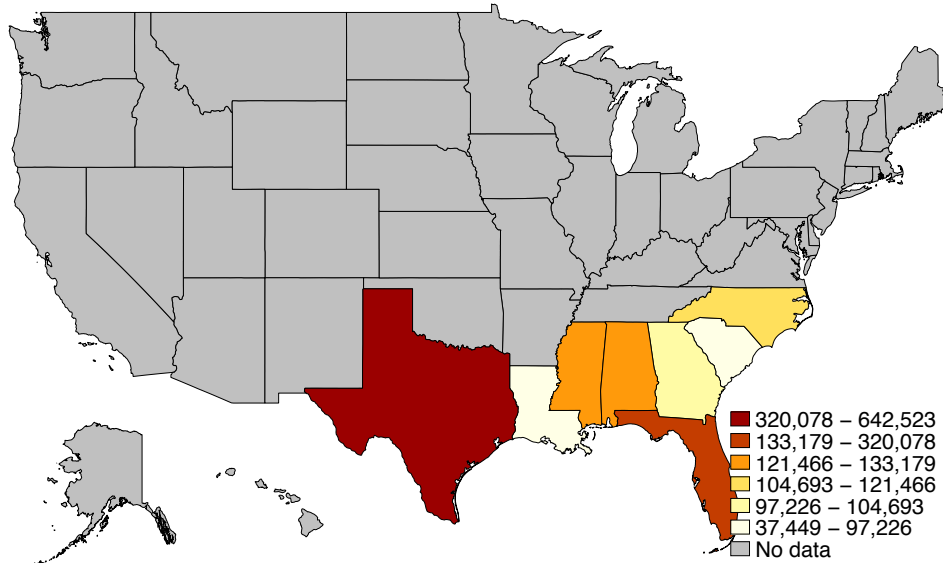
State	Named Hurricanes (1980-2020)	of Which: Major Hurricanes (1980-2020)	Tropical Storms (1990-2020)
AL	8	5	1
FL	22	12	41
GA	3	1	1
LA	18	4	10
MS	5	2	2
NC	20	5	9
SC	6	2	3
TX	14	6	14

Source: NOAA, National Hurricane Center <https://www.nhc.noaa.gov/data/>

In addition to the event indicator, we also collected data about property damages from NOAA’s National Centers for Environmental Information Storm Events database. We specifically aggregated events related to coastal storms, tropical cyclones, hurricanes, windstorms, hail, and tornados. In Figures 50 and 51, we map average total and per capita damages (CPI adjusted to 2020 real prices). In terms of total damages, Texas and Florida led the sample states, which is not surprising given that they are the most populous states in the sample. However, when normalizing damages by population, Louisiana and Mississippi reported higher damages. In Figure 52, we also

report the number of unique events⁴⁴ that occurred during 1980-2020. In terms of the maximum number of events, Texas led the rest of the sample states.

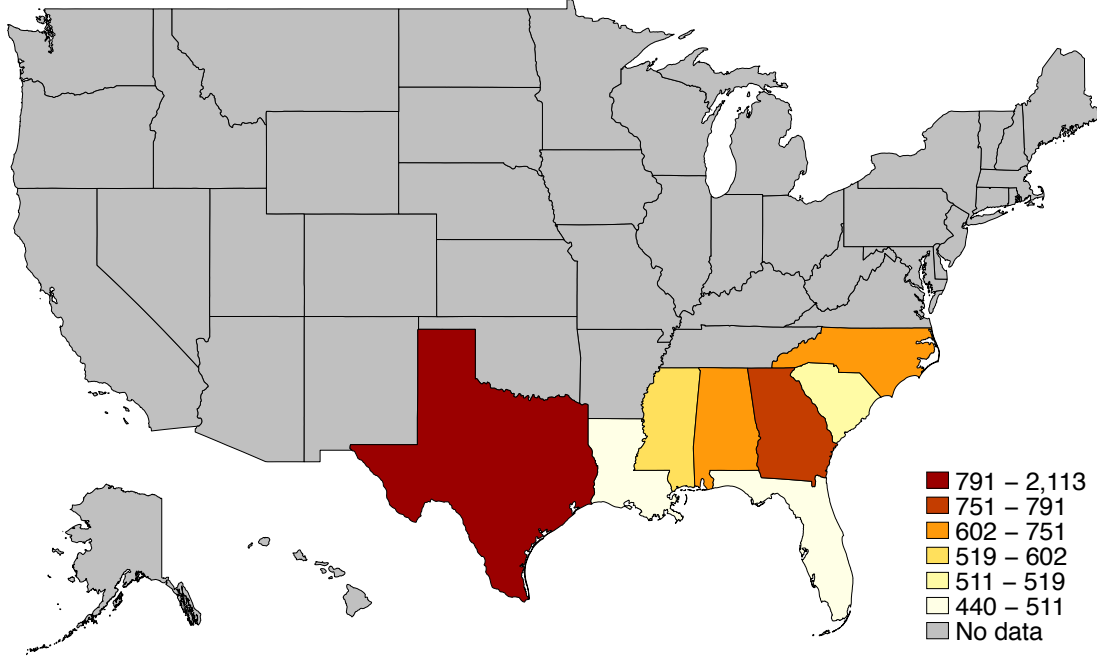
Figure 50: Total property damage from storm events (average damages 1980-2020 in 1000\$ CPI adjusted in real 2020 prices)



Source: NOAA Storm Events Database

⁴⁴ We note that for the same event, NOAA assigns multiple unique numbers if the event hits several counties within a state.

Figure 52: Average number of storm events during 1980-2020



Source: NOAA Storm Events Database

In addition to these measures of events and their impact sizes, we also collected data about Presidential disaster declarations (PDD) from FEMA. A PDD is declared when the impact of an event is so large it overwhelms local capacity to respond to its consequences. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, the President has the authority to issue declarations for disasters that cause significant damage. Once a PDD is issued, FEMA is responsible for coordinating delivery of financial assistance and resources to the affected states and localities. For each state and year, we counted PDDs related to storms, hurricanes, hail, and tornadoes. These PDD counts capture both statewide disaster declarations and PDDs issued for selected counties impacted by hazards of interest within a state.⁴⁵ In Table 57, total PDDs for each state during 1989-2020 are reported.

⁴⁵ PDD counts do not include emergency declarations.

Table 57: PDDs by states (1989-2020)

States	PDD counts
Alabama	50
Florida	47
Georgia	29
Louisiana	34
Mississippi	45
North Carolina	32
South Carolina	17
Texas	35

Source: FEMA

5.3.3. Other control variables

As for other control variables, we included a state's per capita income and percent coastal population with data taken from the Bureau of Economic Analysis (BEA). We controlled for a state's annual unemployment rate using data from the Bureau of Labor Statistics (BLS). We also collected data for new single-family housing permits and construction values using estimates from the U.S. Census Bureau. Table 58 reports the summary statistics of our main variables. Our sample was based on an unbalanced panel of a total of seven states (excluding Georgia) for the period from 1990 through 2020. All monetary values were adjusted to 2020 real prices using the urban consumer price index.

Table 58: Summary statistics

Variable Name	Description	Mean	St. Dev.	Min	Max
Income	Per capita income, log	10.59	0.147	10.187	10.887
unemp_rate	Unemployment rate	6.14	1.792	2.5	11.4
pct_population_coastal	Percent coastal population	35.43	31.341	10.314	100
bld_SF_coastal	# of single-family coastal building permits, 000s	25.20	36.037	.872	205.917
ln_value_SF_coastal	Av. value of single-family building construction	19.02	0.234	18.473	19.544
MH_number	Number of Major Hurricanes	0.14	0.485	0	4
N_No_occur	# of years with no hurricanes	3.73	3.673	0	20
disaster	Number of PDD	1.17	1.083	0	5
LossRatio	Loss and LAE ratio	2.00	11.499	.019	145.372
# of Policies, log	# of Beach and Wind Plan Policies, log	10.90	1.628	7.974	14.342
# of Policies per capita, log	# of Beach and Wind Plan Policies per capita, log	-3.49	0.909	-5.452	-1.379
Exposure, log	Total Value of Exposure, 000\$, log	16.30	1.893	12.721	20.222

Exposure per policyholder	Total Value of Exposure per policyholder, 000\$, log	5.40	0.520	3.888	7.081
Exposure per capita	Total Value of Exposure per capita, 000\$, log	1.90	1.126	-1.114	4.571
Premiums, log	Total Premiums Written, 000\$, log	11.30	1.688	8.495	15.351
Premiums per capita, log	Premiums per capita, 000\$, log	0.40	0.451	-8.899	1.318
Premiums per exposure, log	Premiums per dollar exposure, 000 E, log	-5.00	0.585	-7.208	-3.987
depop	Depopulation dummy = 1,0	0.13	0.340	0	1
HHI	Herfindahl-Hirschman Index	889.16	300.280	305.775	1444.23

Notes: summary statistics are based on full sample consisting of 174 state-by-year observations, corresponding to seven states over the period 1990-2020.

5.4. Model

To understand the dynamic evolution of the insurance market and the impact of wind and hail perils on the availability and affordability of insurance, we estimated the panel fixed effects model, specified in equation (2) below:

$$y_{st} = \beta_0 + \beta_2 Haz_{st-1} + \beta_4 Market_{st-1} + \beta_6 Dep_{st-1} + \mu_s + \mu_t + \varepsilon_{st} \quad (2)$$

The dependent variable, y_{st} , measures different aspects of the insurance market (both private and RRM) at state s in a given year t , including beach plan policies issued (log transformed), exposure (log), and premiums (log). For the standard market that does not capture RMM policies, we considered only exposure and premiums from private insurers, as data for policy counts were not reported in NAIC reports.

Haz_{st-1} is the vector of hazard-related variables that capture both the event occurrence as well as its magnitude. Specifically, we included the number of major hurricanes (categories 3 through 5) that directly passed through the sample states at year $t-1$. To capture the magnitude and severity of the event (wind and hail), we included the number of PDDs in a state at year $t-1$. We also measured the number of storm-free years (years without hurricanes) between hurricane years to estimate how prolonged periods of calm affect both the RMM as well as standard insurance market outcomes. For example, in 2014, Florida Citizens policy count dropped below one million for the first time since 2006, likely attributed to eight storm-free years that had allowed private insurers

to rebound and increase their market shares. Storm-free years also imply accumulation of more surplus (Hartwig and Wilkinson, 2016).

To capture the financial standing of the RMM in previous years, we used the total incurred loss and loss adjustment expense (LAE) ratios reported for windstorm and beach plans. Loss and loss adjustment expense ratio were calculated as the ratio of the total of incurred loss and loss adjustment expenses to earned premiums. A high loss ratio can be an indicator of financial distress. In understanding catastrophic insurance market structure, it is important to assess the degree of market concentration. Less and greater concentrated markets both have their advantages (e.g., less concentrated markets could promote greater competitiveness and risk diversification, and greater concentration could foster economic efficiency; Allen and Gale, 2000, 2004), but either may have implications for the vulnerability of insurers. For example, excessively concentrated markets raise concerns about a limited degree of competitiveness and greater exposure of insurers to catastrophic losses (Shim, 2013). In order to control for market concentration, the model specified in equation (2) includes HHI. In addition to HHI, local economic conditions in the model are accounted for by including states' unemployment rate, population size (proxy for the market size) as well as per capita income (log). To estimate an independent effect of the new development on insurance market, the model also controls for the total number of building permits issued in a state for single-family housing development. We also controlled for the average estimated market value of new construction (log transformed) using the aggregate estimated market value of building permits for single-family housing divided by the number of building permits. These data are available from the U.S. Census Bureau Building Permits Survey. New development in high-risk areas may imply increased asset exposure to risk and thereby lead to higher demand for insurance. However, in some states where legislation bars RMMs from insuring new construction in high-risk-prone areas

(e.g., Florida) (Hartwig and Willkins, 2016), this variable may have the opposite effect on policies issued through RMM.

In order to account for the effects of depopulation on RMM and private insurance market outcomes, our model also includes a variable (*depop*), constructed as an interaction of the two indicator (dummy) variables: one identifying states that have initiated depopulation efforts (Florida, Texas and Louisiana) and another indicating major developments toward depopulation starting in 2013.⁴⁶

The model includes the year fixed effects (μ_t) to control for federal-level policy changes common to all states regarding insurance market regulation in a given year (e.g., tax exemptions). μ_s denotes state-specific fixed effects to control for unobserved time-invariant heterogeneities across states, including differences in regulatory structures (e.g., rates regulations), geography, long-term exposure to storm/hail hazard and other time-invariant features, like area of land exposed to high risk, etc. The error term is ε_{st} . Finally, standard errors are clustered at the state level to allow for heteroscedasticity and flexible correlation of errors over time between the clustering units.

5.5. Results

5.5.1. RMM policies

In Table 59, we report results from the regressions with dependent variables corresponding to different measures of beach plan policies. Specifically, we considered total number of policies

⁴⁶ Depopulation programs started at different times in Florida, Texas and Louisiana. For example, in Texas major depopulation programs were introduced in 2015; efforts started in 2007 in Louisiana and 2003 in Florida. Including state-specific depopulation dummies caused multicollinearity concerns when we created the individual state-specific depopulation variable. Hartwig and Willkinson (2016) noted that despite early efforts in Florida and Louisiana, the most significant advancements toward depopulation started and were felt in 2013. We thus combined depopulation program effects post-2013.

(columns 1 & 2), log value, and log of policies per capita (columns 3 & 4). Regression results without and with the HHI variable are presented in columns 1 & 3 and columns 2 & 4, respectively. Results with HHI correspond to a shorter time period (2005-2020) because HHI was not available prior to 2005, while the full sample corresponds to the 1990-2020 period. In all samples analyzed, several variables have remained consistent both in terms of their statistical significance and signs. Specifically, we estimated that the increasing number of building permits for single-family home development in prior years was associated with more policies from RMM markets and policies per capita. This association likely indicates the role beach and wind plans play in accommodating the demand from new development in high-risk-prone areas. However, we estimated that as the percentage of a state's coastal population increased, the RMM policy counts (both the total policies and the policies per capita) declined, all else held constant. The results also indicated that in states with post-2013 depopulation efforts, the total number of RMM policies and policies per capita, on average, have significantly decreased. In terms of average value of new single-family housing development, this variable was highly significant in the model with HHI only (columns 2 & 4) and indicated an increase in both total policy counts and policies per capita.

None of the disaster/hazard variables showed statistically significant effects on policy counts. We did, however, estimate that states in which beach and wind plans suffered financial distress (i.e., higher values of loss and loss adjustment ratio) experienced a significant spike in the number of total policies and policies per capita. We estimated a negative effect of per capita income on policy numbers, but this effect was significant only for the full sample (columns 1 & 3), and the sign flipped when we included HHI in the model (column 2). In the models with HHI, we also estimated a significant and positive effect of unemployment rates, suggesting that states that lacked job opportunities experienced growth in both the total number of policies and policies per capita.

We should also note that, controlling for various socioeconomic and disaster variables, overall wind and beach plan policies have been trending upwards significantly over time relative to the year 1991 (the year that is omitted) in the full sample (columns 1 & 3) and relative to the year 2005 in the sample with HHI (columns 2 & 4).

Table 59: Fixed effects model RMM policies

	# of policies (log) (1)	# of policies (log) (2)	Policies per capita (log) (3)	Policies per capita (log) (4)
L.Income, log	-5.475*** (1.329)	3.976** (1.878)	-4.201*** (1.335)	3.117 (1.902)
L.unemp_rate	0.008 (0.048)	0.116** (0.052)	0.062 (0.049)	0.142** (0.054)
L.pct_coastal_pop	-0.251*** (0.048)	-0.341*** (0.077)	-0.299*** (0.051)	-0.410*** (0.085)
L.bld_SF_coastal	0.009*** (0.002)	0.011*** (0.002)	0.009*** (0.002)	0.012*** (0.002)
L.ln_value_SF_coastal	0.373 (0.456)	1.658** (0.644)	0.682 (0.460)	1.859*** (0.678)
L.MH_number	-0.049 (0.104)	-0.164 (0.111)	-0.07 (0.104)	-0.187 (0.117)
L.N_No_occur	0.003 (0.011)	0.007 (0.011)	-0.001 (0.012)	-0.001 (0.012)
L.disaster	0.011 (0.033)	0.006 (0.032)	0.031 (0.033)	0.025 (0.033)
L.LossRatio	0.007** (0.003)	0.004* (0.002)	0.006** (0.003)	0.004* (0.002)
l.depop	-0.828*** (0.138)	-0.650*** (0.155)	-0.926*** (0.143)	-0.677*** (0.159)
L.HHI		0.001 (0.001)		0.001 (0.001)
_cons	67.763*** (18.615)	-53.041** (25.152)	35.860* (18.639)	-60.123** (25.384)
R ²	0.86	0.82	0.84	0.82
N	174	94	167	87

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; (includes beach and wind plans/FAIR for LA, FL). Includes state and year fixed effects.

5.5.2. RMM Exposure

We now turn to the models in which dependent variables correspond to RMM exposures. We considered total value of RMM exposure, exposure per policy holder and exposure per capita, all log transformed. As shown in Table 60, with increasing frequency of major hurricanes, RMM exposures declined; however, the effect is highly significant in the full sample in which exposure

per policyholder serves as a dependent variable. In all other model specifications, the effect was found to be marginally significant at the 10% significance level. We also found some limited empirical evidence that with extended periods of calm, the exposure per policyholder increased in the full sample (column 4). Depopulation variables were estimated to be negative and statistically highly significant in all samples, suggesting that efforts and advancements toward depopulation have been successful in terms of reducing the total value of RMM exposure, dollar exposure per policy holder, and exposure per capita. With rising shares of coastal population in a state, exposure measures have been declining significantly, while exposures at all margins have been increasing with the total number of coastal building permits and the rising average values for new single-family development (these effects, while positive, were not significant for exposure per policyholder in a model with HHI).

States with high unemployment rates, on average, had higher total exposure and exposure per capita in the 2005-2020 sample, but the effect was not statistically different from zero in models without HHI. Income was estimated to increase exposure measures in the 2005-2020 sub-sample, and the effect on total exposure was estimated to be statistically significant and negative in the full sample. The higher loss ratio was associated with higher levels of exposure, but the effects were marginally significant at the 10% significance level. HHI did not matter for RMM exposure values. Although not reported, all coefficients associated with year dummies were significant and positive, suggesting increasing exposures on average, after controlling for various market, economy-wide, and hazard exposure variables.

Table 60: RMM exposure values

	Exposure (log)	Exposure (log)	Exposure per policyholder (log)	Exposure per policyholder (log)	Exposure per capita (log)	Exposure per capita (log)
	(1)	(2)	(3)	(4)	(5)	(6)
L.Income, log	-3.822** (1.874)	5.437** (2.139)	1.653 (1.017)	1.461* (0.858)	-2.589 (1.942)	4.900** (2.176)
L.unemp_rate	0.029 (0.067)	0.153** (0.059)	0.021 (0.037)	0.036 (0.024)	0.081 (0.072)	0.183*** (0.061)
L.share_coastal_pop	-0.366*** (0.068)	-0.453*** (0.088)	-0.115*** (0.037)	-0.112*** (0.035)	-0.408*** (0.074)	-0.528*** (0.098)
L.bld_SF_coastal	0.013*** (0.003)	0.012*** (0.003)	0.004** (0.002)	0.001 (0.001)	0.013*** (0.004)	0.013*** (0.003)
L.ln_value_SF_coastal	1.696*** (0.642)	1.691** (0.734)	1.323*** (0.349)	0.033 (0.294)	1.961*** (0.669)	1.764** (0.775)
L.MH_number	-0.266* (0.147)	-0.225* (0.126)	-0.217*** (0.080)	-0.062 (0.051)	-0.281* (0.151)	-0.267* (0.134)
L.N_No_occur	0.002 (0.016)	0.021* (0.012)	-0.001 (0.009)	0.014*** (0.005)	-0.007 (0.017)	0.01 (0.014)
L.disaster	0.048 (0.046)	0.012 (0.036)	0.037 (0.025)	0.006 (0.015)	0.063 (0.049)	0.024 (0.038)
L.LossRatio	0.008* (0.004)	0.005** (0.002)	0.001 (0.002)	0.001 (0.001)	0.008* (0.004)	0.005** (0.003)
l.depop	-1.183*** (0.195)	-0.938*** (0.176)	-0.354*** (0.106)	-0.288*** (0.071)	-1.275*** (0.207)	-0.974*** (0.182)
L.HHI		0.001 (0.001)		0 (0.000)		0.001 (0.001)
_cons	34.671 (26.247)	-60.139** (28.635)	-33.092** (14.240)	-7.098 (11.487)	3.83 (27.102)	-67.879** (29.036)
R ²	0.8	0.83	0.42	0.65	0.77	0.83
N	174	94	174	94	167	87

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; (includes beach and wind plans/FAIR for LA, FL). Includes state and year fixed effects.

5.5.3. RMM Premiums

In Table 61, we report regression results from the models in which dependent variables correspond to premiums from beach and wind plans. Specifically, we considered the total and average premiums per policy holder and per dollar of exposure, respectively (all log transformation). The results are presented for the full 1991-2020 sample (columns 1, 3, & 5) and the sub-sample covering the 2005-2020 period (columns 2, 4, & 6). These models indicated that for every additional major hurricane incident, the average premium per policy holder and the

average premiums per exposure value increased significantly, likely suggesting risk-adjustment responses due to the increased frequency of hurricanes in year t-1. On the other hand, as expected, with extended periods of relative calm between major hurricanes, the average premiums declined significantly (columns 3 & 6).

The depopulation variable indicated that in states that have implemented depopulation initiatives relative to states that lag behind, total premiums have declined while average premiums have increased significantly. States with higher shares of coastal population also were associated with declining total and average premiums per capita, while the average premiums per dollar exposure increased, but only marginally, in the model with HHI. With higher unemployment rates, we estimated a decline in average premiums, thereby indicating that the RMMs also consider affordability concerns in communities that lack job opportunities. However, the estimated effect was mixed for the total premiums: total premiums declined in the full sample (column 1), while we found that higher unemployment rates were associated with higher total premiums (column 2), all else held constant.

We also found that the total number of coastal building permits, a variable measuring the pressure of new development, was associated positively with total premiums and negatively with average premiums (both per capita and per exposure). Rising average estimated market values of single-family construction have been also negatively associated with average premiums, likely suggesting the effects on insurance premiums of various mitigation measures and compliance with enhanced building codes. In terms of income, we found this variable had a negative effect on the average RMM premiums (both per capital RMM premiums and the RMM premiums per exposure), but the effects on total premiums were mixed in the sample. We also estimated that the more concentrated the insurance markets are (higher HHI), the lower the average premiums per

policy holder and per dollar of exposure would be. Controlling for all these variables, significant and positive coefficients of all year dummies in the model (not reported in the table) suggested that overall RMM premiums have been trending upward over the sample timeframe.

Table 61: RMM premiums

	Premiums (log)	Premiums (log)	Premiums per capita (log)	Premiums per capita (log)	Premiums per exposure (log)	Premiums per exposure (log)
L.Income, log	-7.549*** (1.369)	4.658*** (1.658)	-2.081** (0.940)	0.475 (0.944)	-3.734** (1.441)	-0.986 (1.339)
L.unemp_rate	-0.088* (0.049)	0.092** (0.046)	-0.095*** (0.034)	-0.029 (0.026)	-0.115** (0.052)	-0.065* (0.037)
L.share_coastal_pop	-0.329*** (0.046)	-0.314*** (0.057)	-0.094*** (0.034)	-0.016 (0.039)	0.02 (0.052)	0.096* (0.055)
L.bld_SF_coastal	0.011*** (0.003)	0.007*** (0.002)	0.002 (0.002)	-0.004*** (0.001)	-0.002 (0.003)	-0.005*** (0.002)
L.ln_value_SF_coastal	0.415 (0.469)	0.929 (0.572)	0.047 (0.322)	-0.757** (0.324)	-1.276** (0.494)	-0.790* (0.459)
L.MH_number	-0.042 (0.107)	0.012 (0.097)	0.006 (0.073)	0.160*** (0.056)	0.223** (0.113)	0.222*** (0.079)
L.N_No_occur	-0.016 (0.011)	-0.001 (0.010)	-0.019** (0.008)	-0.009 (0.006)	-0.018 (0.012)	-0.023*** (0.008)
L.disaster	0.01 (0.033)	0.003 (0.028)	0.004 (0.023)	0.004 (0.016)	-0.034 (0.035)	-0.002 (0.023)
L.LossRatio	0.008*** (0.003)	0.003* (0.002)	0.002 (0.002)	-0.001 (0.001)	0 (0.003)	-0.001 (0.002)
l.depop	-0.376*** (0.138)	-0.517*** (0.134)	0.421*** (0.098)	0.101 (0.078)	0.775*** (0.150)	0.388*** (0.110)
L.HHI		0 (0.001)		-0.001** (0.000)		-0.001* (0.000)
_cons	91.762*** (19.169)	-45.739** (22.020)	24.538* (13.157)	11.467 (12.641)	57.630*** (20.176)	18.565 (17.923)
R ²	0.91	0.88	0.71	0.73	0.45	0.61
N	175	95	174	94	174	94

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; (includes beach and wind plans/FAIR for LA, FL). Includes state and year fixed effect.

5.6. State Regulators – Telephone Interviews

Telephone interviews with several state regulators were conducted over Zoom to understand how other states manage their residual insurance markets. Interview questions focused on the history of their residual market, successful depopulation efforts, and preparations for future conditions. A total of five states (Rhode Island, Mississippi, Louisiana, North Carolina, and Florida) agreed to participate in an interview. We note Rhode Island was not covered as part of the RMM analyses above (Sections 5.2-5.5). The data captured from the five interviews was analyzed and categorized into the following four broader themes comprising twelve subcategories:

1. History of the Residual Markets
2. Share of the Market and Goals for Depopulation
3. Challenges within the Insurance Market
4. Incentives and Reasons for Success

5.6.1. Data from Telephone Interviews with State Insurance Regulators

A synopsis of the data captured from in-depth interviews with insurance regulators from five coastal states is provided below.

Theme: History of the residual markets

Summary of Responses:

Interview responses regarding the history of their residual market overwhelmingly highlight the impact of hurricanes on the residual insurance market. Each of the regulators noted significant increases in policies in the years following major hurricane landfalls. This includes hurricane landfalls in other states in which carriers were operating. One of the states specifically

highlighted legislative change following major hurricanes to restrict private insurers' ability to cancel policies and impose unreasonable deductibles.

Description: State regulators' perspectives about the history of the state residual market

Subcategory:

- Direct Weather Events
- Interview Responses: These responses highlighted the impact of direct hit hurricanes on the state's insurance market and policies.
 - *We have not had a sizable storm since Hurricane Katrina. **Right after [a named storm], there was a peak in policies in 2007 to about 47,000. Now there are only about 12,905 policies.... We're going to have another storm and the pool will repopulate.***
 - *One of the reasons why I think that we are seeing a little bit of **an influx is because of the fact that we've had so many storms.***
 - ***In 2012, [a named storm] hit this part of the country and we had another legislative dust up...** for windstorm deductibles, they're statutorily not allowed to exceed 5%... so this separate hurricane deductible does not apply unless it's a hurricane in [our state]... We have not had a storm in which they have been able to impose the hurricane deductible.*
 - *So, 2004 is when we started our program, and **2005 was a bad year here with [two named storms].** Our high was immediately following Katrina and Rita which represented about 10% of the market which is very high.*
 - *And then we began to experience both hurricanes, as well as these other attritional losses [from convective storms] that have caused significant deterioration in surplus and made our state unattractive in comparison to other states that don't have these challenges.*
- Extended Market Reactions
- Interview Responses: These responses noted market disturbances from surrounding states.
 - ***The private market is raising rates following storms in other states like Louisiana. We're keeping an eye on this to determine if we need to adjust our rates.***
 - *The companies that come from other states on the coastal line on the coastal areas like Louisiana or Florida. **The issue is when they get hit with a storm and those companies are domiciled in those states it can really be impactful.***
 - *One specific **insurer [based in a neighboring state] that had a pretty significant market share in our state, maybe in the five to 10% area, they literally canceled. Did not notify [our] department and sent out cancellation notices. [Our] legislature reacted by creating a commission on hurricane loss projection methodology.***
 - ***Sort of with inflation and with the market, the [private] rates are creeping.** The rest of the country was waiting for this wave now with the increased building costs and all those things that are going on. We're waiting, it hasn't happened yet but we're waiting.*

- *That's what's getting more difficult for the private sector is getting that reinsurance.*

Theme: Share of the Market

Summary of Responses:

Interview responses described the share and health of residual markets relative to the private insurance market. The majority of policies participating in the residual markets are coastal properties with high coastal wind risk. States try to maintain its residual market insurance premiums above the price of the standard market. The respondents were actively trying to depopulate their residual insurance pool.

Description: State regulators' estimates of their RMM's share of and role within the insurance market.

Subcategory:

- Relative Share
- Interview Responses: These responses provide insight into the relative share of the residual market compared to the private market within each state.
 - *[Our association] only covers the **bottom 6 counties which are considered the coastal counties**. They have about 12,905 policies now. The **private market has been stable** with 2 new companies incorporated in the last 5 years.*
 - ***70% of our coast is insured by the residual market...** The market came down in December of 2018 and in September 2022, we're **expecting greater growth**.*
 - *For the last 10 years it's **held at 3%**. **It's gone down every year**, but just by a small amount. It's currently 3.07... 70% of that 3% that they write were for coastal [wind risk].*
- Relative Price
- Interview Responses: These responses described the residual market premium prices relative to the standard market in each state.
 - ***Our rates are becoming competitive with the commercial market** because the commercial market is raising rates following storms in Louisiana. We are keeping an eye on this because **we want our rates to stay above the standard market**.*
 - *We have a **15% surcharge above the standard market rates**.*
 - *I think they're much higher... Not even just that **they're higher, you can't get all the bells and whistles with the policy either, it's a pretty stripped-down policy.**"*
 - *It was meant and intended to be **strictly a residual market**; it was never intended to be a primary market. By statute, **rates have to be 10% higher than the average market rates**.*

- *We have some legislative things that we would like to help us not be so competitive on rates... because **our rate is lower in comparison** to the other companies. There's not a barrier there that we believe we'd like to have.*
- **Depopulation Goals**
- Interview Responses: These responses contain the regulators' perceived goals for depopulation in their state's residual market.
 - *We have no clear depopulation goals. We believe the surplus market is stabilized. Non-admitted carriers came in and wrote many of the policies that were in the residual market. **But we will always have a residual market.***
 - *I think the way we need to **look at it is not more about the exposure so much as are we financially sound in our residual market.***
 - ***We're not actively attempting to reduce it...**a lot of the 3% [which is our share of the market] has nothing to do with windstorm. Less than, if you take it's well under a quarter, it's well under 1% that's driven there by the windstorm.*
 - *We're **trying to reduce the footprint** to the best of our ability, and unfortunately, right now with the market the way it is, we're significantly growing.*
 - *We were successful in depopulation all the way down to 0.5% from 10% so that was a pretty successful depopulation, in my opinion... It was so successful we're trying it again.*

Theme: Challenges within the Market

Summary of Responses:

The age of construction and pace of development is a shared challenge across each state. Older construction is higher risk and more difficult to insure. Two states noted a lag in building code adoption with push-back from local builders. Another challenge raised has been balancing the role of non-admitted carriers with the residual markets. Non-admitted carriers “write things that many carriers won't write,” but are subject to fewer regulations than admitted carriers.

Description: State regulators' perspectives on the challenges of managing the residual market.

Subcategory:

- **Building Code Implementation:**
- Interview Responses: Responses outlined challenges related to building code enactment and implementation within the state.
 - *We passed new building codes but all lower 6 counties opted out... We've also been **having trouble finding certified builders** in our state to implement the FORTIFIED Home standards.*
 - *[Building Code] has changed over the last 20 years, we have always been in a dialogue with the building code commissioner but **there's a lot of pressure from the builders to not bring in some of these building code changes ...** They were*

really able to push back to not get the building code updated. I do not think we are at the latest, but I think we're maybe only one or two behind.

- *Our building codes have been improved over the years and we did have another bill this year for the FORTIFIED homes program... But it's not signed yet and it's unfunded... The framework is there as soon as we can find a funding mechanism.*
- Age of Construction
- Interview Responses: Responses included statements regarding the age of construction and the pace of development.
 - *About 70% of policies in the residual market are built before the mid-1990s which is not a good risk.*
 - *We're mitigating the amount of new houses that will be massively in the wind and flood zone, but we have a very old housing stock too and much of it is in a flood zone. As I just mentioned, there's literally houses dating from the 1600s, and things from the Revolutionary War. That's how old some of this stuff is.*
 - *When it first started... [in the] 1980s our coast really was not very dense. There was not a lot of population there, but it grew dramatically since the 1990s because our cost of insurance is much cheaper and our land and real estate is a lot cheaper. It's helped economics, but it has not helped with insurance. And so it has been a challenge for us with regards to not over growing the residual market.*
- Preparing for Future Conditions and Climate Change
- Interview Responses: These responses reflect how state regulators believe their agency is specifically responding to future conditions and climate change.
 - *We have built up a surplus over the last 17 years. We have a good reinsurance program in place for first and second events which is close to \$1 billion in coverage including the surplus. We are worried about multiple storms in the same year like what happened in Louisiana in 2020. We just hope it won't happen to us.*
 - *I think one of the biggest concerns that we have is flooding. We really believe that if you have resiliency in the roof. If your roof is strong, you can sustain most of these winds... we got a grant last year and we were able to help these communities replace their roofs.*
 - *We do have a number of building restrictions. We have a lot of restrictions on building, we don't have the most modern building code but we have a pretty good building code. It requires a lot. There's a statewide agency that does track where flood areas are, there's a statewide overlay on building zones. We also adopted the [climate change disclosure agreement].*
 - *The plan for that is to get our reinsurance that we can and have the infrastructure in place, and if we have to expand, we expand and we depopulate when we can.... Fortunately, we were able to secure \$1.2 billion for this season, but what's getting more difficult for the private sector is getting that reinsurance.*
- Non-admitted Carriers
- Interview Responses: Responses included concerns about non-admitted carriers operating within the state.

- *We can't regulate them or control their rates. We would prefer to have a healthy admitted market and then a surplus market. **They (non-admitted carriers) have their role in the industry.***
- *Even an admitted carrier can go insolvent if the right thing happens... So just because they're not admitted doesn't necessarily mean they're not financially sound... They are cheaper. **The main thing about the non-admitted carriers is that they can write things that many carriers won't write.***
- *We really don't directly regulate the surplus market, we regulate it through the brokers. **It's very hard to compare that kind of information with the information you get from admitted insurers.***

Theme: Incentives and Reasons for Success

Summary of Responses:

These findings highlight the steps states have taken to incentivize private carriers to take on more policies within the state. Each of the states acknowledged the role of mitigation to reduce risk, with two of the states directly incentivizing the retrofitting of roofs. Financial risk management structures were described, including catastrophic funds and state level reinsurance. One state provided details on assessing companies that do not meet a minimum standard of coastal writing. Only one state requires wind and hail coverage for their homeowner's policies.

Description: State regulators' perspectives on policy incentives and reasons for success.

Subcategory:

- Risk Mitigation:
- Interview Responses: These responses included specific efforts to mitigate wind and hail risk to incentivize private market uptake.
 - *The windpool provided incentives for retrofitting roofs. But there is **low uptake** on that.*
 - *We think if we can get **new roofs that have a resilient type of construction, insurance companies are more likely to want to take those risks.** So we got grants and we're still continuing to work on grants.*
 - *There was discussion at the legislature that an insurer is just going to ask a coastal property owner to mitigate their risk, and then they're going to cancel them or raise their premium anyway. So let's put something in there that says, and it doesn't say it exactly this way, but if the insurer asks you to mitigate, the insurer cannot nonrenew you subsequent to the mitigation. So, what happened? **Insurers didn't request mitigation. They're not going to take that risk. I think that works against us.***
- Financial Risk Management

- Interview Responses: These responses outlined surplus, reinsurance, and catastrophe funds secured within each state.
 - *We have a good reinsurance program in place for first and second events which is close to \$1 billion in coverage including the surplus. Once we get through **surplus and reinsurance, carriers are then assessed up to an amount.** Then the carriers can go to the policyholders to recoup some amount.*
 - *We **assess companies that do not write at the coast**, so if they do not write enough homeowners at the coast, then they're assessed. So instead of giving them an incentive, they get somewhat penalized.*
 - *You know, if you want to compete with reinsurance costs, **send out to ask for a cat bond or work on negotiating the cat bond.***
- Other State Policies
- Interview Responses: These responses include miscellaneous policies that impact the wind and hail insurance markets within each state.
 - *We have a regulation that insurers **cannot exclude wind on homeowners policies or dwelling fire policies.***
 - *When we attend the NAIC, we will purposely meet with **insurance companies and explain to them that in [our state] you do not have any wind exposure if you don't want wind exposure.** So you can exclude wind and exclude hail. So really our state is a great state for homeowners [insurance]."*
 - *Another provision **limits application of a deductible to once per calendar year.** That's a reaction to 1954 when there were three hurricanes in one year. There's things like they **can't cancel or increase premium for losses, with no payout or payouts under \$500. They cannot nonrenew or increase costs for catastrophe-only claims**, so if it was a [storm name] claim with nothing else. They can't cancel or surcharge for prior claims on a property with a prior owner where the risk has been mitigated.*
 - *There must have been 10 or 12 different depopulation programs—**statutory dollar bonuses that would encourage companies to take policies**, requiring them to keep the policies for three years and not cancel or not renew them except for non-payment.*
 - *We passed a statute for an incentive program to entice these small regional companies to come in and write in the state because the big players had enough on their books.... We apportioned \$100 million to this incentive program—only about \$25 to 30 million was actually taken by the small regional companies—and they had to **write a premium in the same amount as the grant money they took.***
 - ***The quality of the data companies get from the residual market is very important** in their participation in the depopulation programs. We have gone through a tremendous amount of effort to clean up the underwriting files and to prepare data sets for companies to look at.*

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Appendix A

Table A1: Exposure (log)

	All	Tier 1	Tier 2
2011	-0.042 (0.166)	-0.047 (0.151)	-0.095 (0.146)
2012	-0.143 (0.167)	-0.115 (0.152)	-0.053 (0.141)
2013	-0.015 (0.159)	0.012 (0.146)	-0.092 (0.148)
2014	0.003 (0.157)	0.055 (0.142)	-0.350 (0.325)
2015	-0.048 (0.153)	0.027 (0.137)	-0.135 (0.143)
2016	-0.011 (0.156)	0.084 (0.140)	-0.107 (0.144)
2017	-0.071 (0.156)	0.031 (0.140)	-0.073 (0.134)
2018	-0.172 (0.151)	-0.055 (0.137)	-0.046 (0.133)
2019	-0.066 (0.152)	0.092 (0.138)	0.049 (0.127)
2020	-0.001 (0.150)	0.156 (0.138)	0.060 (0.127)
R^2	0.48	0.46	0.58
N	271,844	87,446	66,231

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors are reported in parenthesis. The regression includes company-, ZIP code-, county-, and county-by-year indicator variables. Regression coefficients are interpreted relative to the omitted year 2010.

Table A2: Policy (log)

	All	Tier 1	Tier 2
2011	-0.055 (0.150)	-0.055 (0.135)	-0.145 (0.144)
2012	-0.045 (0.148)	-0.023 (0.133)	-0.071 (0.135)
2013	0.003 (0.144)	0.021 (0.132)	-0.097 (0.140)
2014	-0.007 (0.143)	0.029 (0.129)	-0.359 (0.309)
2015	-0.055 (0.138)	0.004 (0.123)	-0.177 (0.135)
2016	-0.073 (0.140)	0.008 (0.125)	-0.163 (0.137)
2017	-0.131 (0.141)	-0.044 (0.127)	-0.158 (0.130)
2018	-0.225* (0.136)	-0.133 (0.123)	-0.110 (0.125)
2019	-0.169 (0.138)	-0.039 (0.126)	-0.052 (0.122)
2020	-0.263 (0.201)	-0.121 (0.189)	-0.030 (0.123)
R^2	0.45	0.46	0.57
N	271,690	87,391	66,216

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors are reported in parenthesis. The regression includes company-, ZIP code-, county-, and county-by-year indicator variables. Regression coefficients are interpreted relative to the omitted year 2010.

Table A3: Premiums (log)

	All	Tier 1	Tier 2
2011	-0.004 (0.164)	0.018 (0.149)	-0.053 (0.145)
2012	-0.014 (0.163)	0.006 (0.146)	-0.046 (0.148)
2013	0.106 (0.160)	0.129 (0.145)	0.033 (0.148)
2014	0.086 (0.159)	0.137 (0.144)	0.134 (0.145)
2015	0.100 (0.153)	0.177 (0.136)	0.063 (0.141)
2016	0.158 (0.157)	0.239* (0.140)	0.081 (0.144)
2017	0.077 (0.160)	0.167 (0.144)	0.156 (0.135)
2018	0.070 (0.154)	0.166 (0.138)	0.186 (0.132)
2019	0.188 (0.153)	0.310** (0.139)	0.265** (0.127)
2020	0.285* (0.153)	0.405*** (0.141)	0.317** (0.126)
2011	(0.153)	(0.141)	(0.126)
R^2	0.49	0.44	0.60
N	272,915	87,960	66,524

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors are reported in parenthesis. The regression includes company-, ZIP code-, county-, and county-by-year indicator variables. Regression coefficients are interpreted relative to the omitted year 2010.

Table A4: Policies with mortgage

	Total Policies, log	Policies per capita, log
Income, log	0.2260*** (0.0618)	0.2000*** (0.0621)
Max. Wind Speed	0.0004 (0.0004)	0.0002 (0.0004)
Population, log	1.0147*** (0.0221)	0.0502** (0.0220)
Median House Value, log	-0.1059 (0.0838)	-0.1278 (0.0851)
Percent Bachelor	0.0083*** (0.0025)	0.0088*** (0.0025)
Percent Female	0.0103*** (0.0028)	0.0084*** (0.0025)
Percent White	0.0047*** (0.0013)	0.0052*** (0.0013)
Percent Black	0.0020 (0.0022)	0.0023 (0.0022)
Percent Unemployed	0.0037 (0.0029)	0.0020 (0.0024)
Percent Occupied, homeowners	0.0000 (0.0009)	-0.0000 (0.0010)
Percent Poor	-0.0608 (0.1829)	-0.0221 (0.1834)
Percent Mobile Home	-0.0017 (0.0017)	-0.0012 (0.0017)
Area, sq. miles	0.0004** (0.0002)	0.0003 (0.0002)
Residential Mortgage Loan, log	0.0099** (0.0042)	0.0098** (0.0042)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	6,733	6,733

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A5: Exposure with mortgage

	Total Exposure (\$1,000), log	Exposure (\$1,000) per Policy
Income, log	0.2992*** (0.0610)	0.0940 (0.0573)
Max. Wind Speed	0.0011** (0.0005)	0.0008* (0.0004)
Population, log	0.9685*** (0.0366)	-0.0082 (0.0262)
Median House Value, log	0.0913** (0.0418)	0.2078** (0.0913)
Percent Bachelor	0.0064*** (0.0020)	-0.0013 (0.0028)
Percent Female	0.0087*** (0.0027)	-0.0013 (0.0027)
Percent White	0.0059*** (0.0015)	0.0017 (0.0015)
Percent Black	0.0035 (0.0027)	0.0015 (0.0022)
Percent Unemployed	0.0077*** (0.0025)	0.0043* (0.0025)
Percent Occupied, homeowners	0.0053*** (0.0014)	0.0056*** (0.0011)
Percent Poor	-0.1103 (0.1406)	-0.0701 (0.1439)
Percent Mobile Home	-0.0035** (0.0018)	-0.0018 (0.0015)
Area, sq. miles	0.0007*** (0.0002)	0.0002* (0.0001)
Residential Mortgage Loan, log	-0.0061* (0.0034)	-0.0157*** (0.0037)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	6,733	6,733

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A6: Premiums with mortgage

	Total Premiums log	Premiums per Policy, log
Income, log	0.3444*** (0.0713)	0.1505** (0.0613)
Max. Wind Speed	0.0004 (0.0005)	0.0001 (0.0005)
Population, log	0.8868*** (0.0344)	-0.0376 (0.0258)
Median House Value, log	0.0116 (0.0413)	0.1435 (0.0883)
Percent Bachelor	0.0031 (0.0023)	-0.0047 (0.0036)
Percent Female	0.0095*** (0.0026)	0.0006 (0.0028)
Percent White	0.0035** (0.0014)	0.0001 (0.0009)
Percent Black	-0.0002 (0.0026)	-0.0020 (0.0019)
Percent Unemployed	0.0092*** (0.0024)	0.0067** (0.0031)
Percent Occupied, homeowners	0.0031** (0.0015)	0.0050*** (0.0014)
Percent Poor	-0.1641 (0.1334)	-0.1352 (0.1482)
Percent Mobile Home	-0.0020 (0.0014)	0.0003 (0.0014)
Area, sq. miles	0.0009*** (0.0002)	0.0002** (0.0001)
Residential Mortgage Loan, log	-0.0057 (0.0036)	-0.0151*** (0.0047)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	6,733	6,733

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A7: Policies with HMGP

	Total Policies, log	Policies per capita, log
Income, log	0.4339*** (0.1356)	0.4277*** (0.1329)
Max. Wind Speed	0.0038 (0.0038)	0.0031 (0.0039)
Population, log	0.9934*** (0.0277)	-0.0045 (0.0277)
Median House Value, log	0.0444 (0.0396)	0.0461 (0.0360)
Percent Bachelor	0.0064* (0.0034)	0.0062* (0.0032)
Percent Female	0.0162*** (0.0051)	0.0146*** (0.0051)
Percent White	0.0008 (0.0016)	0.0008 (0.0015)
Percent Black	0.0031*** (0.0012)	0.0031*** (0.0011)
Percent Unemployed	-0.0022 (0.0049)	-0.0013 (0.0044)
Percent Occupied, homeowners	0.0020* (0.0011)	0.0017 (0.0011)
Percent Poor	-0.3597 (0.3068)	-0.4292 (0.2624)
Percent Mobile Home	-0.0011*** (0.0001)	-0.0009*** (0.0001)
Area, sq. miles	0.0002 (0.0003)	0.0001 (0.0003)
HMGP per capita, log	-0.0285 (0.0372)	-0.0264 (0.0360)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	1,892	1,892

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A8: Exposure with HMGP

	Total Exposure (\$1,000), log	Exposure (\$1,000) per Policy
Income, log	0.8199*** (0.1923)	0.4364*** (0.0890)
Max. Wind Speed	0.0055 (0.0046)	0.0002 (0.0024)
Population, log	1.0206*** (0.0358)	0.0248 (0.0152)
Median House Value, log	0.1274 (0.0839)	0.0476 (0.0301)
Percent Bachelor	0.0096** (0.0043)	0.0019 (0.0015)
Percent Female	0.0167** (0.0073)	-0.0000 (0.0044)
Percent White	0.0013 (0.0017)	0.0002 (0.0010)
Percent Black	0.0020 (0.0014)	-0.0022*** (0.0008)
Percent Unemployed	0.0013 (0.0045)	0.0049** (0.0023)
Percent Occupied, homeowners	0.0110*** (0.0017)	0.0077*** (0.0014)
Percent Poor	-0.0310 (0.3392)	0.1863 (0.2355)
Percent Mobile Home	-0.0011*** (0.0001)	-0.0000 (0.0000)
Area, sq. miles	0.0005 (0.0004)	0.0003** (0.0002)
HMGP per capita, log	-0.0439 (0.0429)	-0.0116*** (0.0034)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	6,733	6,733

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A9: Premiums with HMGP

	Total Premiums log	Premiums per Policy, log
Income, log	0.6899*** (0.1960)	0.2783*** (0.0918)
Max. Wind Speed	0.0032 (0.0039)	-0.0016 (0.0012)
Population, log	0.9974*** (0.0360)	0.0027 (0.0167)
Median House Value, log	0.1077* (0.0561)	0.0443** (0.0208)
Percent Bachelor	0.0051 (0.0047)	-0.0019 (0.0020)
Percent Female	0.0192*** (0.0074)	0.0024 (0.0043)
Percent White	0.0009 (0.0016)	0.0001 (0.0007)
Percent Black	0.0015 (0.0011)	-0.0020*** (0.0007)
Percent Unemployed	0.0027 (0.0052)	0.0054** (0.0022)
Percent Occupied, homeowners	0.0117*** (0.0016)	0.0090*** (0.0012)
Percent Poor	0.0290 (0.3682)	0.3076 (0.2402)
Percent Mobile Home	-0.0009*** (0.0001)	0.0002*** (0.0000)
Area, sq. miles	0.0002 (0.0004)	0.0001 (0.0002)
HMGP per capita, log	-0.0463 (0.0462)	-0.0159** (0.0073)
Year Fixed Effects	Y	Y
County Fixed Effects	Y	Y
<i>N</i>	6,733	6,733

Notes: Standard errors are reported in parenthesis and are clustered by county. All explanatory variables are lagged by one period. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Appendix B

Survey Instrument

Please answer each question.

Groupwide survey responses are acceptable as long as responses from each company within the group are consistent. Otherwise please submit a separate survey response for each company.

If you deem any response confidential, please note the question. At the end of the survey, you will have the opportunity to identify responses you deem confidential and cite the applicable statute or common law privilege. We will compile and aggregate insurer responses, and a summary of the results will be included in TDI's next biennial report to the Texas Legislature. We will provide individual company responses to a legislative office if requested.

Group or company name:

Name of person responding:

Email address:

Phone number:

Definitions

Assessment formula means the formula for determining each member's participation in TWIA's insured losses and operating expenses described in Insurance Code Section 2210.052 and 28 TAC Section 5.4162.

Exposure means total limits of liability for building, contents, and other structures.

Homeowners means insurance coverage against loss to real property, or tangible personal property, at a fixed location provided through a homeowners insurance policy or a residential dwelling fire and allied lines insurance policy.

Tier 1 includes Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kenedy, Kleberg, Matagorda, Nueces, Refugio, San Patricio, and Willacy counties. For purposes of this survey, **Tier 1** also includes the following communities in Harris County that are east of State Highway 146: Pasadena, Morgan's Point, Shoreacres, Seabrook, and La Porte.

You and Your mean your company (or if your company is part of a group, all companies within your group) authorized to write residential property insurance in Texas.

Incentives

Questions in this section explore potential incentives structures that could incentivize your company to increase exposure in Tier 1.

Do you write homeowners insurance in Tier 1?

Yes

No

Given that you write homeowner's insurance in Tier 1, do you write windstorm/hail insurance on homeowners' policies?

Yes

No

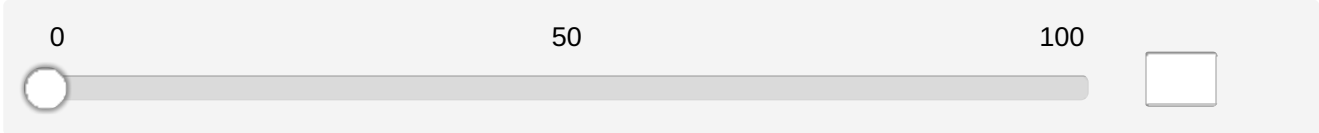
Given that you write windstorm/hail insurance in Tier 1, what would incentivize you to further increase your current wind/hail exposure? Check all that apply.

- Charge rates (your own, not TWIA) that you believe are actuarially sound in Tier 1
- Lower minimum surplus and capital requirements
- Reduce reinsurance cost or improve accessibility to reinsurance
- Create a statutory backstop to reinsure wind/hail losses above a specified amount
- Reduce taxes for premiums, license, and other fees in lieu of writing wind/hail risk
- Give insurers writing in Tier 1 greater credit against TWIA assessments
- Mandate higher deductibles/Expand use of wind/hail deductibles
- Fewer or no restrictions on underwriting guidelines
- Create property exposure database
- Create comprehensive fraud database
- Use different claims settlement processes
- More TDI/state education of consumers about wind/hail risk and coverage options
- Improve and enforce building codes, standards, construction requirements
- Incentivize/finance retrofit measures; expand number of inspections
- Improve CAT modeling
- There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance

Other not listed here (please specify)

If the incentives you indicated above existed, by how much would you increase your exposure? Give approximate percentage:

0 50 100



How do the wind and hail portion of the rates you currently charge compare with TWIA rates?

- It is higher by less than 25%
- It is higher by 25-50%
- It is higher by 50-75%
- It is higher by more than 75%
- It is about the same
- It is lower
- We do not know what TWIA rates are

Given that you write homeowners insurance in Tier 1 but do not write windstorm/hail insurance, what would incentivize you to start writing?

- Charge rates (your own, not TWIA) that you believe are actuarially sound in Tier 1
- Lower minimum surplus and capital requirements
- Reduce reinsurance cost or improve accessibility to reinsurance
- Create a statutory backstop to reinsure wind/hail losses above a specified amount
- Reduce taxes for premiums, license, and other fees in lieu of writing wind/hail risk
- Give insurers writing in Tier 1 greater credit against TWIA assessments
- Mandate higher deductibles/Expand use of wind/hail deductibles
- Fewer or no restrictions on underwriting guidelines
- Create property exposure database
- Create comprehensive fraud database
- Use different claims settlement processes
- More TDI/state education of consumers about wind/hail risk and coverage options
- Improve and enforce building codes, standards, construction requirements
- Incentivize/finance retrofit measures; expand number of inspections
- Improve CAT modeling
- There does not exist an incentive(s) that will prompt us to write windstorm/hail insurance

Other (please specify)

If the incentives you indicated above existed, how much windstorm and hail coverage would you write on your Tier 1 homeowners exposures?

How do you think the the wind and hail portion of the rates you would charge would compare with TWIA rates?

- It will be less than 25% higher
- It will be 25-50% higher
- It will be 50-75% higher
- It will be more than 75% higher
- It will be about the same
- It will be lower
- I do not know what TWIA rates are

TWIA questions

This section intends to understand perceptions about TWIA and its two depopulation programs.

Do you perceive TWIA as a competitor?

- Yes No

In your opinion, are TWIA rates competitive?

- Yes No Somewhat

Should there be any changes to TWIA's assessment formula?

- Yes No

If you think TWIA assessment formula should be changed, what should the changes be? Please be as specific as possible:

Do you plan to re-enroll in the program?

- Yes No

What specific changes-- statutory, regulatory, or other-- to the program would cause you to participate or increase your participation?

Do you perceive TWIA as a competitor?

Yes

No

In your opinion, are TWIA rates competitive?

Yes

No

Somewhat

Should there be any changes to TWIA's assessment formula?

Yes

No

If you think TWIA assessment formula should be changed, what should the changes be? Please be as specific as possible:

SB 900 (84th Leg. Session) created a depopulation program that encourages the transfer of TWIA policies to insurers through the voluntary market or assumption reinsurance. TDI has adopted rules in an effort to implement the new depopulation statute (28 Texas Administrative Code Sections 5.4301 – 5.4309).

Do you plan to participate in the program?

Yes

No

What specific changes-- statutory, regulatory, or other-- to the program would cause you to participate or increase your participation?

New application approval/ denial; Policy renewals

This section intends to understand decisions employed by your company during the year 2021 (as of today) to approve/ deny new applications and renew existing policies in Tier 1.

What percentage of new homeowners applications received in Tier 1 were for a policy that includes wind/hail coverage relative to the total number of homeowners applications received (regardless of whether the application was for wind/ hail coverage) in 2021 (as of today) in Tier 1?

What percentage of new homeowners applications with Wind/Hail coverage did you deny insurance in Tier 1?

List reasons why you denied insurance to new homeowners applications with Wind/Hail coverage.

What percentage of existing homeowners policies did you deny renewing wind/hail coverage?

List reasons why you denied policy renewals.

Did you use policy forms that include the two-year suit-filing deadline, one-year claim-filing deadline, or both, under Insurance Code Section 2301.010?

Yes

No

Given that you used policy forms described in previous question, has your exposure increased or decreased? Move the slider to indicate the approximate percentage.

Decreased by 100% Stayed the same Increased by 100%

TWIA

This section intends to understand perceptions about TWIA and its two depopulation programs.

Do you perceive TWIA as a competitor?

Yes

No

In your opinion, are TWIA rates competitive?

Yes

No

Somewhat

Should there be any changes to TWIA's assessment formula?

Yes

No

If you think TWIA assessment formula should be changed, what should the changes be? Please be as specific as possible:

If the changes you indicated were implemented, would you increase Tier 1 exposure? By how much?

Would not increase Tier 1 exposure Would increase by 50% Would increase by 100%

SB 900 (84th Leg. Session) created a depopulation program that encourages the transfer of TWIA policies to insurers through the voluntary market or assumption reinsurance. TDI has adopted rules in an effort to implement the new depopulation statute (28 Texas Administrative Code Sections 5.4301 – 5.4309).

Do you participate in the voluntary market depopulation program?

Yes

No

How many TWIA policyholders have you made offers to through the program?

Of the offers you made, how many TWIA policyholders have accepted your offer?

Do you plan to participate in the voluntary market depopulation program next year?

Yes

No

How can the voluntary market depopulation program in 28 TAC Section 5.4306 be improved?

What specific changes-- statutory, regulatory, or other-- to the program would cause you to participate or increase your participation?

Do you participate in the assumption reinsurance depopulation program?

Yes

No

How many TWIA policies have you assumed since participation?

Do you plan to re-enroll in the assumption reinsurance depopulation program next year?

Yes

No

Did you participate in the assumption reinsurance depopulation program in the past?

Yes

No

Please explain why you do not or no longer participate.

How can the assumption reinsurance program in 28 TAC Section 5.4307 be improved?

Hypothetical scenario

Now we would like to shift your attention to several hypothetical scenarios in which Texas requires specific changes. Answer each question assume no change to current statutes, apart from the change described in the question being answered.

If Texas required all insurers to write a proportionate share of wind and hail insurance in Tier 1 in order to write property insurance in Texas, would you:

- Stop writing in Texas
- Reduce writing in Texas
- Not make any changes to your current writing in Texas
- Increase writing in Texas

If Texas required wind and hail coverage in every Tier 1 property policy, would you:

- Stop writing in Tier 1
- Reduce writing in Tier 1
- Not make any changes to your current writing in Tier 1
- Increase writing in Tier 1

If Texas required increasing the amount of funding TWIA receives through assessments, would you:

- Stop writing in Texas
- Reduce writing in Texas
- Not make any changes to your current writing in Texas
- Increase writing in Texas

Historical perspective

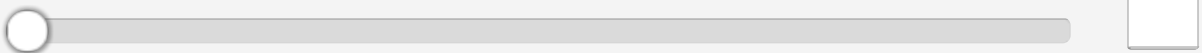
To better understand market incentives structures and various constraints and opportunities that may have prompted market adjustments during the immediate past, questions in this last section relate to your experience with Tier 1 during the 2015-2020 period.

During the period of 2015-2020, did you write homeowners insurance with Windstorm and Hail in Tier 1?

- Yes
- No

Given that you wrote homeowners insurance with Windstorm and Hail in Tier 1, compared to the past, has your exposure changed? Move the slider to indicate the approximate percentage.

Decreased by 100% Stayed the same Increased by 100%



What conditions have prompted these market adjustments? Choose all that apply.

- Reinsurance accessibility
- Cost of reinsurance
- Capital and surplus requirements
- Expected losses and loss adjustment expenses
- Wind and hail model and data accuracy
- Volatility of windstorm/hail risk
- Changes in consumer demand
- Expected changes in state rate and form regulation
- Correlation of wind/hail risks
- Changes in expertise in underwriting and claims
- Changes in litigation of risks
- (In)ability to compete with TWIA rates
- N/A: There were no changes

Other (please specify)

Please indicate any questions/ responses you deem confidential and cite the applicable statute or common law privilege.

To receive a copy of your survey responses, please email Meri Davlasheridze at davlashm@tamu.edu.

Appendix C

Building Codes and Their Enforcement in Texas and Florida

Texas

The Insurance Institute for Business & Home Safety (IBHS) publishes a report assessing the residential building codes, enforcement systems, and contractor and building official licensing requirements within the coastal Gulf and Atlantic states exposed to tropical cyclones. Texas ranks 15th out of 18 coastal states (IBHS, 2021). The state of Texas does not have mandatory building codes or licensing requirements for building officials. However, the state first adopted the 2000 International Residential Code (IRC) for all residential construction within municipalities in 2001 (excluding unincorporated areas). This was updated to the 2012 IRC in the 2021 legislative session (Tex. Local Government Code Ch. 214). Still, there is no mandatory adoption of building codes across the state (IBHS, 2021). Municipalities may adopt local amendments to add, modify, or remove requirements from the 2012 IRC (Tex. Local Government Code Ch. 214). In fact, generally all incorporated cities have adopted more recent editions of the IRC and include more extensive building permit requirements and building inspection programs (IBHS, 2019). Unincorporated areas, therefore, experience far less protection against damage from natural hazards. In fact, IBHS found that within 10 coastal counties surveyed, over 264,000 single-family housing units and more than 840,000 residents were living without any building code protection (IBHS, 2019).

Building codes within the seacoast territory vary by location and may be determined by the national American Society of Civil Engineers (ASCE) Risk Categories. Residential buildings fall

within Risk Category II (Engineering Express 2022; ATC, 2022). Texas has relatively low enforcement of its building codes compared to other states (IBHS, 2021). Building code enforcement, which includes construction permitting and inspections, is the responsibility of the local jurisdiction and can vary widely. A 2017 state law requires builders in unincorporated areas to provide inspection reports to the county to demonstrate compliance with the building code or face prosecution. However, these inspections are done by a third party hired by the builder and may be subject to conflict of interest (IBHS, 2021).

It is important to note that TDI adopted the 2018 International Residential Code and the 2018 International Building Code as of September 2020 thus requiring a higher level of protection for properties insured by the Texas Windstorm Insurance Association (TWIA) (TDI, 2021). TDI rules require that properties meet the 2018 codes and undergo building inspections. TDI appointed inspectors perform inspections for on-going construction projects. For completed improvement construction projects, inspection may be performed by the Texas licensed Professional Engineers. Jurisdictions participating in the FEMA National Flood Insurance Program also adopt a local ordinance that meets or exceeds the minimum NFIP criteria for construction.

Florida

Florida consistently ranks first or second in the IBHS Rating the States report (IBHS, 2021). The 2021 report places Florida first for its updated statewide mandatory code, strong enforcement, and contractor and building official licensing requirements. The seventh edition of the Florida Building Code, Residential (FCBR) became effective in December 2020. Local amendments to the state building code result from updates to the International Codes as well as changes to FEMA,

NFIP, and HUD requirements. Some new 2020 provisions to the FCBR include methods to seal roof decks to mitigate the effects of wind-driven rain and requirements related to installing fastener spacing, lapping, and number of plies (DDA Engineers, P.A., 2021; ATC, 2022). Other changes are related to roof mitigation, roof diaphragms that are resisting wind loads in regions regularly receiving high winds, and soffits.

Following these changes, the base requirements in some of the highest wind risk regions now offer the same level of protection as the IBHS FORTIFIED Home Gold Standard. The FORTIFIED Gold™ was specifically designed to reinforce the areas of a home conventional construction may leave susceptible to damage from high winds and wind-driven rain (IBHS, 2021).

Florida's building code enforcement and inspection is regulated and consistent across the state (IBHS, 2021). Florida mandates training and certification for its building officials which involves taking courses and passing an exam for a 24-month certification. The state also requires licensing of general, plumbing, mechanical, electrical, and roofing contractors. These contractors must also participate in continuing education opportunities.

Appendix D

Table D1: Summary of State Wind and Hail and Beach Plans

	AL	FL	LA	MS	NC	SC	TX
Membership							
mandatory	X	X	X	X	X	X	X
Pool type: Syndicate (S), Multiple Service Carrier (MSC)	S	MSC	S	S	S	S	S
Eligible areas							
Statewide		X	X				
Specific geographic Area	X	X		X	X	X	X
Coverage Provided							
Fire, E.C. & V.M.M.	X	X	X		X		
Crime					X		
Homeowners		X	X		X		
Sprinkler Leakage		X	X		X		
Other (windstorm and hail)	X	X	X	X	X	X	X
Property Excluded							
Farm	X				X	X	
Manufacturing					X	X	
Mobile Homes	X	X				X	
Other	X						
Uninsurable Property							
Vacant, open to trespass	X	X	X		X		
Poor physical condition ¹	X	X	X	X	X	X	X
Poor housekeeping ²	X	X	X	X	X	X	X
Property used for purposes violating law of public policy	X	X	X	X	X	X	X
any structure not built in accordance with appropriate building codes	X	X	X	X	X	X	X
Other dwelling/structures in or over water	X	X			X	X	X
Liability limits (in thousands)							
Habitational (Buildings)	500	700	1000	1000	750	1300	1773
Habitational (contents)	250	% up to \$700	500	250	0.4	1	374
Commercial (Fire resistive building)	1000	1000 to No cap	5500	TIV	3000, 6000	2500	4424
Commercial (ordinary masonry buildings)	1000	1000 to No cap	5500	TIV	3000, 6000	2500	4424
Commercial (Frame buildings)	1000	1000 to No cap	5500	TIV	3000, 6000	2500	4424
Commercial (Fire resistive contents)	1	1000 to No cap	2200	TIV	1	1	1
Commercial (ordinary masonry contents)	1	1000 to No cap	2200	TIV	1	1	1
Commercial (Frame contents)	1	1000 to No cap	2200	TIV	1	1	1

Nature of Pool: Single (S); Separate Accounts (SA), FAIR & Coastal (FC))	S	3 SA	FC	S	S	S	S
Plan Participation Ratios (%)							
Fire & E.C.	100		100		100	100	90 ³
Homeowners	75		100		100	75	50
Commercial Multi-Peril	50		70		100	65	90 or 50
Other					50 - 100	Y	
Credits for Voluntary Writings							
Credits for voluntary writings	X	X		X	X	X	X
Basis of Voluntary Credit (prior year to 2021 reporting)	2020	2020		2020	2020	2019	2020
Lines of Business Eligible (% of Premium Applied for Credit)							
Fire	100%	0%	0%	75%	100%	0%	0%
E.C.	100%	100%	0%	75%	100%	100%	90%
Homeowners	75%	100%	0%	75%	100%	100%	50%
Farm Owners	0%	100%	0%	75%	50%	0%	50%
Mobile Homes (Fires)	100%	100%	0%	75%	100%	100%	0%
Mobile Homes (homeowners)	75%	100%	0%	75%	100%	100%	50%
Commercial multi-Peril	50%	100%	0%	75%	100%	100%	0% ⁴
Commercial property program	100%	100%	0%	75%	100%	100%	90%
Other	0%	0%	0%	75%	100%	0%	50%
Underwriting performed by staff or servicing insurer (SI)	Staff	Staff	Staff	Staff	Staff	Staff	Staff
Losses, adjustment performed by staff or servicing insurer (SI)	Staff	Staff	Staff	SI	Staff	Staff	Staff ⁵
Ceding commission for servicing insurer	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Producer's commission (%) (high)	8	14	10	12	13	10	16
Producer's commission (%) (low)	8	7	10	10	5	5	16
Premium Payment Installment Program		X	X	X	X		X
Routine Inspections							
Habitational (1 to 4 family)							
Owner occupied (new)	X	X	X	X	X	X	X
Not owner occupied (new)	X	X	X	X	X	X	X
Owner occupied (renewal)	X	X	X	X	X	X	X
Not owner occupied (renewal)	X	X	X	X	X	X	X
Commercial							
new	X	X	X	X	X	X	X
renewal	X	X	X	X	X	X	X
Cancellations and Non-renewals (#of days notice for exceptions to 30 day requirements)							
Cancellations							
Habitational	10, 5	10	10 to 30	10	< 30	10	14
Commercial	10, 5	45	10 to 60	10	< 30	10	14
Non-Renewals							
Habitational		120	10 to 30		< 30	10	60

Commercial		45	10 to 60		< 30	10	60
Statutory provision for recoupment of losses		X		X			X
Beach Plan Rate Structure							
Same as Bureau Rates				X	X		
Surcharge Applied to Bureau Rates	X	X	X		X		
Loss Costs					X	X	
Other		X				X	X
Governing Committee or Board							
Membership							
Industry	9		4	5	7	11	3
Public	4	9	8	2	3	1	5
Agent			3	3	4	2	1
State ⁶				1			
Status of Membership ⁷							
industry	E:V		A:V	A:V	E:V	E:V	A:V
public	A:V	A:V	A:V	A:V	A:V	A:V	A:V
agent			A:V	A:V	A:V	A:V	A:V
State (Treasurer)				A:V			
Term of Office (years)							
industry	1			3	1	1	3
public	2	3		3	1	1	3
agent				3	1	1	3
state				4			
Standing Committees							
Underwriting	X	X		X	X	X	X
Claims	X	X		X	X	X	
Accounting	X			X	X	X	
Finance		X		X			
Investment		X	X	X			
Public Relations							
Human Resources					X		
Appeals	X			X	X	X	
Legal			X	X			
Other	X	X	X		X	X	X

Source: Compendium of Property Insurance Plans (FAIR); Compendium of Property Insurance Plans (Beach and Wind Plans), PIPSO

Notes: ¹Includes unrepaired fire damage. ² Includes overcrowding & storage of rubbish & flammable material). ³ The 90% applies to extended coverages TX not to fire (28 Tex. Admin. Code 5.4001). ⁴ Property portion of a commercial multi-peril is included when determining an insurer's participation and credits. ⁵ Independent adjusters, managed by TWIA staff, employed. ⁶ Commissioner or employee of the Department of Insurance serves as an ex-officio member. ⁷ Status specifies whether the member was elected (E), appointed (A), voting (V) or non-voting (NV).