Availability, Affordability, and Adequacy of Insurance in Areas Impacted by Climate-related Risks

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Availability, Affordability, and Adequacy of Insurance in Areas Impacted by Climate-related Risks

An Expert Panel Discussion

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An Expert Panel Discussion

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Executive Summary

A group of experts was assembled by the Society of Actuaries Research Institute (SOA) on June 4, 2024 to discuss how climate change is influencing insurance affordability, availability, and adequacy in North America. Specific topics that were addressed included concerns the insurance industry has including ones of which they may yet be unaware, factors that are influencing insurers' decisions to offer insurance and how much and at what price, the gap(s) that currently exist between what insurance is offered and what is deemed necessary, possible solutions for closing the gap, and possible ways to fund the improvement in insurance coverage.

Insurers are primarily concerned about whether the catastrophe models they are using today are accurately reflecting the risk as climate change may be influencing it, not only in terms of how the frequency and intensity of events may be changing, but the very sub (or secondary) perils that may now be associated with primary events like hurricanes.

A variety of factors are driving insurers' decisions to offer insurance including the price they feel is necessary, which is higher (because of recent events and inflation) than what regulatory constraints allow or what consumers may be willing to pay, and because the options they have to provide better coverage are few and have little opportunity for adjustment.

Gaps in insurance coverage currently exist more from an affordability and adequacy standpoint than they do for availability. But availability is of concern in certain regions like California, Louisiana, and Florida, as well as across the southeastern United States. Reduced coverage is having a cascading effect on property values and mortgage approvals and is therefore influencing the sustainability of neighborhoods and communities.

Increasing capital availability to insurers is part of the solution as more capital will allow insurers to offer coverage in areas that have recently become challenging. Increased capital can come from raising rates as approved by regulators. Increasing rates will also make insurers more desirable to investors, which will have positive feedback. Improving resilience is another strategy for closing the gap. There are some existing federal programs offered through FEMA that give graduated discounts based on improving a resiliency score (for flood) and more programs like that could increase resilience even more. Insurers also give credits for improved resilience. Finally, improved building codes are seen as a necessity, but widespread acceptance and adherence will take time.

Sources to fund the improvements will ultimately come from consumers either through increased federal income or property taxes to improve infrastructure or through increased premiums.

Section 1: Background and Objectives

The escalating impacts of climate change are profoundly affecting the insurance industry, creating a growing problem of affordability, availability, and adequacy for homeowners and businesses. With the increasing frequency and severity of natural disasters such as hurricanes, wildfires, floods, and severe storms, insurers are facing unprecedented financial risks. This has led to higher premiums, stricter underwriting standards, and in some cases, the complete withdrawal of coverage in high-risk areas. Consequently, many policyholders are finding it increasingly difficult to obtain or afford insurance, leaving them vulnerable to significant financial losses.

One of the primary drivers of this issue is the surge in the frequency and intensity of natural disasters. For instance, the record-breaking recent wildfire seasons in California (Turco et al., 2023) and the recent above-average hurricane activity along the Gulf Coast have resulted in billions of dollars in insured losses. These events have strained the resources of insurance companies, forcing them to raise premiums to cover the heightened risk. In some regions, the risk is perceived to be so great that insurers have opted to exit the market entirely, deeming it unsustainable to continue providing coverage.

The situation is exacerbated by the fact that many of the areas most affected by climate change are also densely populated and economically significant. Coastal regions, which are particularly vulnerable to sea level rise and storm surges, are home to millions of people and countless businesses. As insurers pull back from these high-risk areas, local economies suffer, and property values decline (Ge et al., 2022). Homeowners and businesses are then left to rely on state-run insurance programs or federal assistance, both of which are often less comprehensive and more costly than private insurance options.

Government programs, such as the National Flood Insurance Program (NFIP) in the United States, are facing their own challenges in light of climate change. The NFIP, for example, is deeply in debt due to the increasing number of claims resulting in part from more frequent and severe flooding (SOA, 2020). To address this, the program has had to raise premiums for many and include surcharges for all, further burdening policyholders (GAO, 2023). Additionally, these programs often lack the resources to cover the full extent of damage caused by large-scale disasters, leaving significant gaps in coverage.

The implications of this growing insurance crisis are far-reaching. Without affordable and available insurance, individuals and businesses are less likely to invest in properties and infrastructure in high-risk areas, which can stifle economic growth and development. Moreover, the lack of adequate insurance coverage means that when disasters do strike, the financial burden falls more heavily on homeowners, businesses, and governments, leading to slower recovery times and greater overall economic instability.

Addressing the problem of insurance affordability, availability, and adequacy in the face of climate change requires a multifaceted approach. This includes improving risk assessment and management practices, investing in resilient infrastructure, and implementing policies that encourage or mandate climate adaptation measures. It also calls for increased collaboration between the public and private sectors to develop innovative insurance products and solutions that can better distribute and mitigate risk. By taking these steps, it may be possible to create a more resilient insurance system that can withstand the growing challenges posed by climate change.

On June 4, 2024, the SOA Research Institute assembled an expert panel to discuss the current status of property and casualty (P&C) insurance and how it is being influenced by climate change and how it may evolve in the near future. The discussion focused on several broad topics including current insurance concerns and challenges, factors that are influencing insurer decisions, what the gaps are in coverage, how these issues and gaps can be addressed, and who should pay for the solutions.

The panelists, listed in Section 7, were selected to represent a wide and diverse array of opinions, and were encouraged to contribute from their own, individual perspective working in areas such as insurance, reinsurance, state regulation, consultancy, meteorology, and climate finance. No specific comments were attributed to panelists; instead, a summary of the main discussion points is presented in this report.

The objectives of the ninety-minute expert panel discussion were to address:

1. What are the climate-induced challenges insurers are facing that we[1] are aware of?
    a. What are some that we might not be aware of?
    b. What should we be thinking about that we are not?

2. What is driving insurer decision-making on this issue?

3. What are the resulting market gaps in insurance coverages?
    a. What is the state of accessibility to coverage given these gaps?
    b. What are implications of these gaps to stakeholders, including in the broader economy such as mortgage writers?
    c. How will this evolve over time?

4. How can we address the above issues? What are approaches to solve these issues? For example:

    a. How should infrastructure change?
    b. How should building standards and codes change?
    c. Can we point to solutions outside North America?
    d. Would a vulnerability index (to indicate the impact of climate-risks on availability of insurance) be useful?

5. Who bears the cost now and who should bear the cost later?

[1] Usage of "we" in questions to panellists are meant to refer to the insurance industry and all relevant expert stakeholders.

Section 2: Climate Change Related Challenges for the Insurance Industry

To the lay person climate change conjures up thoughts on what the climate will be like at distant time horizons – typically out to 2100. Climate scientists focus many of their studies on these end-of-century periods and typically examine extreme climate scenarios. The Insurance Industry has different climate change concerns because of how they operate, where their flexibility is, and where their constraints are. Thus, some of their concerns may not be so obvious to the public, their clients, and even to actuaries. Additionally, some are yet to even be identified or carefully considered. Below are some thoughts from the expert panel.

2.1 CLIMATE-INDUCED CHALLENGES INSURERS KNOW ABOUT

For short-tailed lines like property, insurer regulatory capital requirements are dictated by the risk they are assuming in the very near term. Thus, insurers believe their greatest challenge is making sure that their pricing and their risk assessments are keeping up with the risk of today (especially as climate change may be influencing it) rather than worrying about whether they are prepared for what may be coming down the road 10 to 30 years from now. Specifically, insurers are concerned about whether the catastrophe models they are using today (e.g., this year) to better understand the probabilities with which extreme weather events will occur and thus to help inform rates will be valid for the next year and the year after that—in light of the climate changing—or whether they are reflecting a past long-term average that is no longer relevant. There is particular concern around flood, owing to the fact that there have been a lot of modelling changes that are motivated by how (heavy) precipitation has been changing. Wildfire is another peril that insurers are very concerned about in terms of whether the models are keeping up—in light of recent record heat and associated dryness.

Related to the aforementioned concern, insurers are concerned about the unpredictability of what's to come. Related to that is the fact that events are occurring with no historical analog or precedent and that disasters are occurring in places where they never have before. A very recent example is that hurricane Beryl in 2024 achieved Category 5 status earlier in the season (on July 1) than any other north Atlantic hurricane on record. Other unprecedented events have been happening in the form of largest wildfires, longest-lived late-season tornadoes, and hundred-year floods happening several times in the same year. The group Rebuild by Design housed within New York University, put out an atlas of disasters last year that mapped by county the experience of the climate disasters from 2011 to 2021 (RBD, 2022). The atlas showed that 90% of U.S. counties had experienced a climate disaster during that time. Importantly the study showed evidence that climate change is happening now and should not be assumed that it is only a future risk that is yet to come.

Insurers are concerned about how other non-climate related impacts are influencing the cost to repair, and thus insurance premiums. The information that the National Oceanic and Atmospheric Administration (NOAA) publishes annually regarding how billion-dollar weather disasters are changing must be interpreted with caution because more than just climate changes are driving the increases (e.g., exposure growth, inflation, etc.). The NOAA information leads many organizations (insurers, lenders, investors) to believe that climate change is really having a more significant impact and across many perils than it actually is. In fact, it is difficult, with the exception of flood and wildfire, to tease out significant climate trends in other perils like severe convective storms and landfalling hurricanes.

2.2 CHALLENGES INSURERS MAY NOT BE AWARE OF YET

There is an underlying concern that the appropriate insurance vehicles do not exist nor do appropriate organizations exist to offer them. A prime example is flood, which is not currently covered by private

insurers[2] and the majority of people concerned about climate change have flooding as their largest economic loss. There is therefore a disconnect between the people trying to solve the problem of how to deal with pricing and offering insurance in today's changing climate, and the people who are being most affected by the extreme events occurring in today's changing climate. The disconnect is further compounded because the people most exposed to extreme events are often but not always[3] the least able to deal with them in terms of implementing resiliency measures and being able to afford insurance. As prices continue to rise these people will be less likely to even have insurance.

In fact, it is much more likely that individuals and organizations required to buy property insurance are being affected more in the short term by increases in premiums and other changes to insurance policies and practices (presumably in part because of climate change) rather than they are being affected by climate change itself. And even if the future is being taken into consideration, there is some concern that costs are influencing decisions so that infrastructure is being built (by government) to what is expected by 2050 rather than to what is expected by 2100.

Another challenge insurers have is not fully knowing how bad the future can be—even if that future is next year (which is a time horizon entirely germane to the insurance industry). This is an important unknown especially if the catastrophe models they are using have not been keeping pace with climate change.

Regulators in the U.S. and to a lesser degree in Canada have yet to finalize[4] climate stress tests for insurers It is not known how stringent they will be or how restrictive new regulations may be regarding how (high) insurers can set their rates.

2.3 WHAT SHOULD INSURERS BE THINKING ABOUT THAT THEY ARE NOT?

Insurers should be thinking more about the future—about which places (geographically) will get worse from an insurability standpoint, because of climate change as well as because of other factors, and how to improve resiliency (theirs and their clients'). Anticipating where the offering of conventional insurance policies may become (more) difficult if not impossible (based on other heretofore unrecognized constraints) will help insurers to be more proactive about identifying other regions where underwriting is more feasible as well as to consider other options for acquiring and investing capital.

The insurance community should also be thinking about how building codes need to be evolving and how capital can be raised in order to develop homes, buildings, and infrastructure so that they will be resilient for the coming decades. Despite the uncertainty of how climate change will actually evolve and how extreme events will ultimately be affected, some aspects are known with high confidence: sea levels are rising and that will make coastal flooding more likely especially when storm surge from more powerful hurricanes is superimposed; inland flooding will get worse because of heavier rainfall because a warmer atmosphere can hold more water vapor, courtesy of the Clausius Clapeyron effect[5] and all else equal rain will fall more intensely—especially if weather systems move more slowly which is also expected as a consequence of the jet stream slowing down.

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[2] There is a private flood market, but it is small for residential lines and is extra. Commercial flood coverage is more widely available in the private market.
[3] The exception is wealthy property owners with coastal property.
[4] The NAIC has proposed but not finalized climate stress tests for U.S. admitted insurers.
[5] The Clausius Clapeyron effect is a physical relationship that states the maximum amount of water vapor that can exist at a given temperature. The maximum amount increases by roughly 7% for each one-degree Celsius increase.

Insurers should be thinking about (better) ways to collaborate. Entire communities could serve to benefit from increased collaboration between the insurance industry and government by virtue of the fact that the insurance industry likely has more access to climate conditioned cat modelled results that include where weather extremes will get worse. And because insurers' information is proprietary, they are reluctant to share it with government officials and financial institutions and especially with other insurers. As a result, there is a knowledge gap of where (regionally) risk will become (much) worse, which is hindering where states invest money for increased resilience.

Section 3: Factors that Are Influencing Insurers' Actions

From an insurance company standpoint, the bottom-line objective is about providing adequate coverage to consumers at an affordable price and still remaining profitable. One solution strategy, in principle, is to raise premiums to levels believed to be necessary, and/or to reduce coverage, and/or to stop coverage in some areas. However, it is a solution option that is not necessarily good for society as a whole.

There are several factors to consider including what a company believes is a necessary premium (rate) to cover the risk and where (geographically) it is worth covering, how that rate may be limited by regulatory constraints, and anticipating what consumers are willing to pay for coverage. All these factors influence insurers' decisions to set rates and even provide coverage.

To the layperson, because of the recent volatility of the market, there is a perception that (some) insurance companies have taken it upon themselves, without guidance from regulators or catastrophe models, to determine the potential climate threat going forward and thereby imposing enormous increases in premiums in some areas like California, Louisiana, and Florida. Insurers have published articles in various news media basically warning consumers that higher rates are coming.

In general, though, insurers are making decisions that are informed by data and models, but the knowledge is for the most part not being shared across the industry (i.e., with other insurers) nor is it even being shared with other sectors (e.g., government) owing to its proprietary nature. There are examples of information being shared with insurance regulators (see for example the NAIC Catastrophe Modeling Center for Excellence); and also cat model information is shared with regulators as part of insurer rate filings. Increasing exposure, costs to repair/replace, as well as climate influences on extreme weather are some of the factors influencing insurers' pricing decisions.

3.1 OVERCOMING AN EXISTENTIAL THREAT

In order to better serve customers, insurers are concerned first about survival and second about profitability. A recent report (Earnix, 2023) indicated that profit is even more important than growth. Today's climate—with increasing catastrophes (the costs of which are also being influenced by non-climate factors)—is pressuring their ability to exist and thrive and hence to help clients. The industry goals are to be able to retain sufficient capital to cover losses that result from an extreme disaster and to make some profit.

There are two camps when it comes to a company's level of concern. Some insurers see the current situation as an existential threat. Other insurance companies are also concerned, but not to the point of fearing that survival is in jeopardy. Decisions are influenced by concerns that depend on which camp (existential threat or merely concerned).

The size of the company and the geographic distribution of its portfolio has a considerable influence on how insurers perceive the situation and in which camp they lie. Companies with national or even regional books can have a better chance of surviving a very costly extreme event in a particular area. They can also adjust their portfolios to have a better chance of survival. Small or regionally limited insurance companies cannot (so much). Midwestern companies are very concerned about a growing threat of hail. Another company in California went out of business because of California wildfires.

3.2 ACCOUNTING FOR MORE THAN JUST CLIMATE CHANGE

Regardless of which camp they are in, insurers are also grappling with what actuarially informed rate they believe they need to charge in order to cover the risk because climate change, reinsurance costs, and inflation have changed that, although the latter two are more well understood than the first. It was already mentioned in the previous section that insurers are concerned about the steadily increasing risk on extreme weather from climate change that is exacerbated by the fact that some risks have very little steady state historical basis from which to derive rates.

Rates also have to reflect impacts of inflation and other increases in the cost to repair or replace (e.g., increases in wages and building materials which can be substantial depending on the material and its availability). Additionally, insurers are constrained by regulators in terms of how they set their rates.

3.3 USING OUTDATED TOOLS AND PROCEDURES WITH LIMITED FLEXIBILITY

Insurers typically use catastrophe models as a primary tool for informing their risk as well as actual loss experience. The information obtained from using that tool is then analyzed to inform how insurers manage their portfolios. To that end, there are really only a few options (panelists referred to them as levers/knobs) that are available at present to the insurance industry that can facilitate the process of optimizing a portfolio. Basically, they include increasing premiums, increasing deductibles, using endorsements, decreasing coverage in some areas and possibly increasing in others, and eliminating renewals. The knobs are constrained in either direction by other pressures like reinsurance costs and regulatory constraints, and the degree to which knobs can be effectively turned depends also on company (portfolio) size.

Insurers are questioning whether the catastrophe models they currently use need to be updated—not just in terms of environmental conditions reflecting recent history, but also whether the very sub-perils that a catastrophe model may account for, need to be updated. One example is the hurricane model. Recently hurricanes seem to be generating more tornadoes (stronger and farther north) and the wind damage from those is typically not modeled as a sub-peril of hurricane (in fact not at all to the author's knowledge). As hurricane Ida moved across the mid-Atlantic and northeast U.S. it generated an EF3 tornado in New Jersey, the first such strength tornado documented in NJ from a tropical system. As another peril example, winter storm models typically include damage from snow and ice but not from cold snaps when they are unaccompanied by an actual storm such as was the case during the Great Texas Freeze that unfolded in February 2021.

The panel echoed that they would like to have better tools and more (flexible) levers available to drive short term changes as well as better usage of existing ones. Importantly, the panel noted that the process of setting rates within the required regulatory framework could seek to address short term concerns in an ongoing manner. Although the 2050-time horizon for climate is not so significant to insurers right now, developing tools with that distant horizon in mind would be a more proactive approach that would let insurers steer the ship rather than be reactive.

There was some lengthy discussion on how knobs could be made more flexible. Strategies would most likely have to be state-dependent, but improving regulatory constraints across all states was also an option on which the panelists universally agreed. Even so, regulatory measures for California and the Southern

U.S. are very different from other states and even different from each other and not necessarily just because the primary peril of concern in California is wildfires and the primary peril of concern in the southeastern U.S. (Florida) is hurricanes and/or flooding.

3.4 WHAT REGULATORS SAY AND DO

One panelist suggested regulators could allow allowing (more) use of catastrophe models to help set rates rather than being constrained by historical information. Setting rates based on historical information may only help inform an average annual loss. As one example that was given, an Iowa-only insurer who knows the correct average premium based on some history is going to be in trouble after a major (hail) storm, when the claims are far more than they have resources to cover (although in reality the impact will depend on the reinsurance/risk transfer strategy and surplus position that exist).

Although catastrophe models can be used in all states currently (California restricts usage to earthquakes and fire following them although that restriction could soon change) to help inform rates for the risk as it exists today, there is no allowance for using such models to inform what the risk will be like—for example 10 years into the future.

In California, insurers who wish to charge a model-based rate are currently not permitted to do so, rather they are permitted to charge based on historical information. However, that will likely change as the California insurance commissioner recently unveiled a proposal to allow such models. This practice was criticized by residents. As a result of recent record wildfire activity in California, insurers with little recourse to use models and increase premiums have pulled out of the market leaving homeowners to purchase insurance elsewhere at two to three times their prior rate. Another constraint in California is that the premium cannot include the net cost of insurance (e.g., the cost of reinsurance incurred by the insurer). Thus, there is a perceived gap because of the regulatory constraint.

In Florida, the regulatory framework is high quality, however some stakeholders would like to speed up the process by which rates could be changed.

The insurance situation in other states however differs from that of Florida or California from the standpoint of insurance availability (i.e., it is available) although from a percentage-wise standpoint and over the period from 2019 through March 2024, rates in the Midwest have been going up some but not as much as in California or Florida or Texas (see Figure 1).

Insurers in the Midwest have the ability to diversify more so than those in California or Florida. Thus, the likelihood they will be wiped out by a single catastrophic event is less and therefore less of an existential concern.

Given the inter-state differences in regulatory practices, increased cross-state discussion amongst regulators could be a way to find common solutions. There is some discussion within the NAIC, and further discussion could be done from amongst individual states.

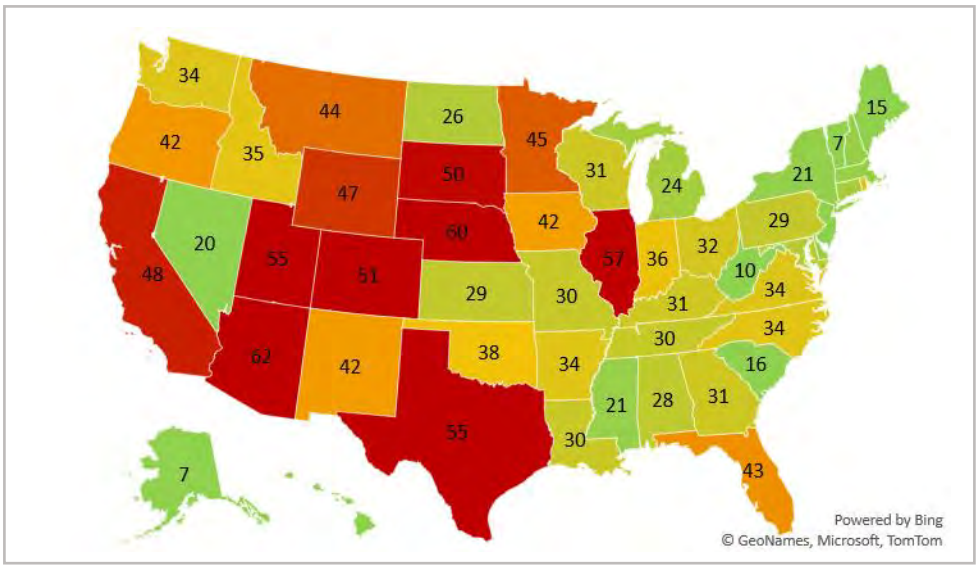


Figure 1. Increases (%) in home insurance rates over the period 2019-March 2024 by state. (Wyoming reflects increase over 2017-2022). Data from https://www.lendingtree.com/insurance/state-of-home-insurance/.

3.5 CONSUMER PERCEPTION

Cost almost always factors into consumer decisions to make purchases and that includes insurance. Thus, consumer perception regarding affordability of insurance directly influences spending, especially when back-of-the-envelope cost-benefit analyses are done. And the insurance industry is aware based on experience what the market may be willing to bear. Insurance premiums have increased on average in the U.S. about 25% in the last couple of years (LendingTree, 2024). And consumers perceive this as high relative to prior increases (e.g., before 2016) they have had to bear. The nationwide average increase in insurance premiums is therefore double the rate of inflation over the 2022-2023 period, which has been about 12.4% according to the U.S. Bureau of Labor and Statistics. And as a result, relative to other increases (food, cars, etc.), insurance rate increases are not very palatable. In some parts of the country, they are even less so, as premium rate increases have been still greater—by a factor of four to five times the rate of inflation (as shown in Figure 1), owing to increases in construction costs and cost to repair/rebuild.

The rate increases, especially as they are compared to those of inflation, do little to enhance consumers' willingness to pay for insurance simply because salary adjustments for cost-of-living increases have not kept pace with actual inflation and there is only so much money a consumer has in terms of disposable income.

Because the aforementioned knobs are currently few, and because of the constraints on how they can be turned, the changes insurers have been implementing are (or can be) perceived by the general public as drastic.

In a nutshell, the perceived risk and how it is changing because of climate, how reinsurance and other costs (e.g., replacement) are growing, and how regulatory requirements are continuing to unfold are all driving insurers' decisions on how best to manage their portfolios. The size of the company (portfolio) and its geographical distribution also influence an insurer's ability/need to make changes in rates, adjust coverage, eliminate coverage.

Section 4: Resulting Market Gaps in Insurance Coverages

There is a big disconnect when it comes to what consumers believe should be fair. The discussion in this section from the panelists centered around issues of affordability, availability, and adequacy, although the latter was not discussed because of time constraints.

4.1 AFFORDABILITY

In terms of affordability, rates have gone up by a lot, especially when compared against inflation, and thus have heightened homeowners' concerns. There is a large gap between what consumers think is fair and are willing to pay (even additionally) and what insurers feel is necessary.

Without exception, affordability can be enhanced by consumers reducing their risk and that reduction being recognized by insurers either for individual homeowners or entire neighborhoods and even larger regions. Insurer credit for such behavior could be an important way for consumers to offset inevitable increases in premiums. Ultimately, the most desirable situation from a consumer standpoint is one where they actually do not need insurance, although that is not the best end-goal for the insurance industry.

The affordability, availability, and adequacy aspects can also be better addressed by the insurance industry finding improved ways to attract capital. Right now, the industry is not a good place to hold capital for investing. One way is to allow insurers to charge the (premium) rate they feel they need but if that does not work then the industry will have to find other ways (e.g., investments, covering other lines of business, etc.). Increasing premiums in areas where insurance is currently available will provide more capital which can be used to help offset the risk in areas insurers have recently deemed un-insurable. This strategy could therefore reduce the overall gap. Insurance companies will then be viewed more favorably by investors who would provide even more capital. As one panelist said, there is plenty of risk to cover but currently there is insufficient capital to cover it. So, there is definitely a potential to raise more.

One panelist felt that the current insurance market is going through a (n episodic) rough patch but that it will probably improve. That is not to say that the improvement will happen spontaneously. In fact, it won't likely happen, because climate change is not going to stop or be reversed any time soon. It will happen because of new tools and new insights informing new strategies.

4.2 AVAILABILITY

Although the more widespread concern at the present is insurance affordability, there are also gaps in availability. Specifically, there are pockets of areas where insurers are unable to get the rate (premium) they feel they need because of regulation and/or because of consumer unwillingness to pay—so insurers are pulling out in order to protect their overall capital.

Some of these recent occurrences have been publicized and the states where this is occurring are Florida (because of hurricane risk), Louisiana (because of hurricane and flood risk), and California (because of wildfire risk).

One panelist noted that the situation regarding availability overall is not good, but it is not as bad as it was in 1992 or 2007 in Florida. In 1992, Hurricane Andrew resulted in 11 insurance companies becoming insolvent which resulted in a noticeable gap in insurance availability for some time. In 2007 a similar gap resulted from very hard insurance markets in 2004 and 2005 as well as from the pending economic crisis. Louisiana was bombarded by three landfalling hurricanes in 2020, two of which had *Greek* names (Delta and Zeta), which speaks to the length and activity of that season, and Hurricane Ida in 2021, which resulted in nearly one million insurance claims being filed for close to $25 B. That hyper-activity resulted in

insurance companies pulling out of Louisiana. In 2023, some companies stopped writing new policies in the state of California after several years of disastrous wildfire activity in that state.

Panelists conjectured that there are likely more examples in those states as well as in others that are not well known. The National Association of Insurance Commissioners (NAIC) as well as state departments are collecting the data regarding insurers pulling out and where that is happening, but the data and the resulting analyses are not yet available. The NAIC will share the data later in 2024 with the U.S. Department of the Treasury's Federal Insurance Office (FIO) as part of a collaborative effort to better understand the climate-related financial risks to the insurance sector. More information on the effort is available here.

4.3 IMPLICATIONS TO PROPERTY VALUES

The availability and affordability issues with respect to property insurance will also impact real estate prices. Ma et al. (2024) found that homes in designated High Fire Hazard Severity Zones that are subject to disclosure requirements sell for 4.3% less, on average, than similar homes not subject to disclosure of wildfire risk. An even earlier study by Pope (2008) found that disclosure of flood risk information led to similar reduction in home sale prices. Reduced home values will affect mortgage rates and mortgage lending practices across banks and Government Sponsored Entities (GSEs) such as Fannie Mae and Freddie Mac. Other issues related to difficulty in getting insurance include people leaving an area (migration) which would erode community tax base leading to reduced services (e.g., public school quality) and would further stress the social fabric and exacerbate societal inequality.

While these issues and potential consequences of high insurance premiums and reduced availability are front of mind for policy makers and mortgage lenders, panelists were not aware of any concrete evidence that it is being addressed. There is also some evidence of lenders pricing in climate risk when making loans. And if action is not taken, it is likely that, as insurance coverage continues to erode, the potential for communities to recover will decrease.

The U.S. Treasury Department is working with federal and state regulators to study the rising insurance costs and decreasing insurance coverage to better understand the impact of lack of affordable insurance on housing supply in different parts of the country.[6] Despite the heretofore absence of concrete steps to address the financial risks of climate change, the Treasury Department (for example) is aware of the (growing) problem and has discussed the implications (e.g., disproportionately impacted population).

Creative solutions will likely have to be found. Prior strategies may not work. One example is how to reform the National Flood Insurance Program (NFIP), and having it better subsidized rather than having it under-funded.

Housing scarcity in some locations provides a competing backdrop. The lack of housing acts to keep prices high and potentially in areas where it is difficult to acquire insurance because of climate risk, which acts to lower home value. Addressing housing scarcity by increasing densification in areas with high climate risk (e.g., like people moving into the wildland-urban interface or WUI as it is called where there is high wildfire risk) will simply further exacerbate the problem. It will be like building houses of cards in an earthquake zone. It is therefore important to look at solutions to the insurance affordability, availability, and adequacy problem holistically and not in a vacuum.

[6] Steps that the U.S. Treasury are taking noted in a news story here.

4.4 CLOSING THE GAP

All the tools that are currently available and then some will likely have to be deployed in order to reduce the insurance affordability, availability, and adequacy gap: regulators allowing higher premiums; increasing capital from premiums and investors, which will also address increased densification; and reducing risk at the individual property level as well as at the regional level, although this will not likely be possible everywhere as some of the tools that are available cannot be deployed right now.

Section 5: Approaches and Solutions

One strategy for combatting the effects of climate change on insurance availability, affordability, and adequacy is to improve resilience so that, as extreme events happen more frequently and more intensely and in regions where before they did not so much, there is less damage and less cost to repair and rebuild. The panelists shared their thoughts on ways to do that.

5.1 TAKING ADVANTAGE OF EXISTING PROGRAMS TO REDUCE COST

There are currently in effect several different programs to incentivize individual homeowners as well as entire communities to make their places of residence (and business) more climate resilient.

At the federal level, one solution method that is in place courtesy of the NFIP is a Community Rating System (CRS). If all properties within a community contribute in ways to reduce flood risk, then the entire community will receive a rating (from nine to one, where a lower number is better) and thus receive a discount on flood insurance. A class nine rating yields a 5% discount, a class eight yields a 10% discount, and subsequent lower-class ratings yield an additional 5% increase in savings. The program is voluntary although currently 1,500 or so communities participate nationwide.

The up take in the program has increased, especially over the last five years. One factor that could increase take-up further would be local government investment. An indirect benefit could be that greater insurance affordability would increase the value of the neighborhood and could in principle provide the justification for local governments to levy higher property taxes to recoup some of the initial costs to achieve a higher CRS rating.

In order for this option to be exercised, governments would need to initiate this but if they don't have the necessary resources (money, labor force, etc.) that could be a challenge.

Similar federal-level programs don't seem to exist for other perils like severe convective storm (hail) or hurricane (wind damage).

Although not mentioned by the panelists, a similar program for another important peril, wildfire, is one called FIREWISE. This program, implemented by the National Fire Protection Association, provides guidelines for homeowners to reduce their risk to wildfire. Some insurance companies in some states will offer a discount to homeowners who meet the guidelines. Several companies offer discounts in California, but fewer do elsewhere.

At the state level, several states offer incentives to make homes more resilient to climate induced weather extremes. A listing is below.

- California offers numerous programs focused on wildfire mitigation, energy efficiency, and water conservation. Programs include rebates for fire-resistant building materials, energy-efficient home upgrades, and water-saving devices.
- Florida provides incentives through the My Safe Florida Home program, which offers free wind inspections and grants for home improvements to make houses more resilient to hurricanes.
- Texas has initiatives like the Texas Windstorm Insurance Association (TWIA), which provides financial assistance for windstorm damage mitigation measures.
- Louisiana offers the Louisiana Hazard Mitigation Grant Program, which funds projects that reduce the risk of future damage from natural disasters.
- New York provides via The NY Rising program financial assistance for homeowners to rebuild and make their homes more resilient to future flooding and storms.
- North Carolina offers the North Carolina Resilient Coastal Communities Program, which helps coastal communities plan and implement resilience projects.
- New Jersey has the Blue Acres Buyout Program, which purchases flood-prone properties to reduce future flood risks, and the NJ Coastal Resilience Plan to support resilience initiatives.
- Massachusetts has the MVP (Municipal Vulnerability Preparedness) program offering grants and technical assistance to communities to prepare for climate change impacts.
- Rhode Island provides the Rhode Island Residential Resilience Program, which offers grants for home improvements to mitigate flood risks.
- Oregon has the Oregon Resilience Plan that includes incentives for seismic retrofitting and other measures to increase resilience to natural disasters.

These state-sponsored programs are designed to help homeowners protect their properties from various climate-related risks such as hurricanes, floods, wildfires, and more. The specific incentives can include tax credits, grants, low-interest loans, and rebates for qualifying improvements.

It's important to note that while programs exist in principle, implementation can be difficult although the situation can be improved by indicating what and where necessary materials can be obtained and otherwise providing more procedural guidance.

5.2 IMPROVING INFRASTRUCTURE

Investing in community-wide infrastructure ex-ante vs. ex-post is a tried-and true-method. It is the proverbial ounce of prevention to prevent paying a pound for the cure. Sea walls and levees can go a long way towards improving resilience but the strategy of building grey walls out of concrete is no longer being embraced by residents as an acceptable solution. Residents are not against paying for improved infrastructure, they just want a greener type of solution (e.g., like mangroves, coral, etc.).

5.3 UPDATING BUILDING CODES

At a sub-state level, other options, like changing building codes, don't actually cost anything to implement, although costs will have to be shouldered by construction companies to re-engineer designs, use different materials, apply different construction practices. And those costs will have to be passed on to consumers (homebuyers) down the line.

Although changing the building codes from an implementation standpoint seems straightforward, there is always pushback from groups that don't want to see the changes made for whatever reasons. So, in practice it will be difficult to get such changes passed at local and state levels and on the books. Altering building codes to mitigate against future damage from climate change is even more difficult given that such conditions may not exist currently to motivate the changes, and given that proving climate change per se

will be responsible for anticipated worse weather extremes is currently challenging for certain perils. It is also worth noting that improved building stock from updated codes will only pertain to a small portion of the entire building stock in a given region.

The desire to upgrade building codes does not suffer from a lack of information. The Insurance Institute for Business & Home Safety (IBHS) does considerable research, and all findings are publicly available free of charge. There is no question that improvements to the code work. The upgrades following Hurricane Andrew in 1992 are a testament to the utility. The primary resistance to upgrading codes stems from the cost to implement the changes. In some cases, it can take years for the changes implemented to roll through all the construction practices and procedures. But there are exceptions.

Although there are not many community-wide incentive plans for entire neighborhoods to reduce risk (and hence insurance costs) many insurers will provide incentives to individual homeowners to reduce their risk.

The community of Babcock Ranch, Florida is an excellent example of how planning and building a resilient community can reduce community insurance rates even in a hurricane-prone state like Florida. This climate ready community was, however, decades in the making but as a community, insurance rates are among the lowest for any location just 10 miles inland from the coast in Florida. Rates however can and do vary by individual property owing to age and signs of wear. During Hurricane Ian (2022) the community was essentially unscathed and did not even lose power (in part owing to the fact that it is 100% powered by its own solar powered electricity grid).

5.4 INSURER INCENTIVES

At an individual insurer level (whose practice can typically span a multitude of states if not all of them), insurers will typically provide discounts for improvements made to a home to increase its climate resilience. For example, installing sump-pumps, window shutters, more secure roof attachments (e.g., beyond what existing building codes may require) homeowners can weigh the cost of implementing changes to reduce their risk or accepting a higher deductible (effectively reducing their coverage) in order to reduce their insurance costs. Homeowners can weigh the costs of each to make a decision that can include a hybrid approach.

5.5 BEING PROACTIVE

It's important to note that many other organizations including government at the federal (e.g., NOAA, NASA, EPA), state, and local levels as well as non-government organizations (NGOs) such as Climate By Design, as well as other climate interest groups, and/or individuals are instrumental for not only getting the word out about the importance of communities and individual homeowners to become more resilient to climate change, but to provide more specific guidance on how to accomplish such. One great success story has to do with the response to the damage from hurricane Sandy in 2012. Typically, federal disaster relief funds are used to just be able to build back to whatever existed before. But the funding after Sandy was the first example of relief funds to build back to a higher standard. Rebuild by Design helped to spur that with over $4.3 B in investments in large-scale infrastructure that address storm surge and increase social resilience—projects born in the Hurricane Sandy Design Competition. More information is available from Grannis (2017).

5.6 LESSONS FROM ABROAD

The perception on most continents is that Europe is the most advanced when it comes to having thought about climate change and how it is impacting insurance affordability, availability, and adequacy. The Bank of England (BoE) has spearheaded more than one iteration of defining climate stress tests (BoE, 2022). The

panelists did not elaborate on how Europe or any other continents are managing issues of insurance but for the sake of completeness some information is provided here with some references to additional information for interested readers.

Europe is grappling with the challenges of insurance affordability and availability in the face of climate change by implementing a combination of regulatory measures, public-private partnerships, and innovative risk management strategies. Governments and insurance regulators are enforcing stricter climate-related risk assessment and reporting requirements to ensure that insurers account for the increasing frequency and severity of climate events. Public-private partnerships are being fostered to spread the financial risk of catastrophic events, with governments often acting as reinsurers for extreme losses. Additionally, the insurance industry is leveraging advanced technologies like predictive analytics and catastrophe modeling to better understand and price climate risks. There is also a push towards promoting climate resilience through incentivizing policyholders to adopt risk-reducing measures, such as improving infrastructure and using more sustainable practices. Collectively, these efforts aim to maintain the viability of the insurance market while protecting consumers and supporting broader climate adaptation and mitigation goals. Some additional information is available from Christophersen et al. (2023) and Hielkema (2023).

5.7 MOVING OUT OF HARM'S WAY

Leaving an area because it has a very high risk for property damage or to harm humans is also a strategy but one that still does not have a lot of backing. People want to live near the water, but they don't want their homes flooded during sunny days or stormy days. In the past, governments have said we are definitely going to build back—not retreat—from areas flooded.

That sentiment is changing. It was recalled during the discussion that *communities are asking for retreat programs both on the city and the state level. New Jersey has a very successful blue acres program for communities that want to leave and get buyouts*."

And build-back policies are changing. FEMA will no longer give money to build back a home that is a repetitive-loss or is more than 50% damaged,. And if a homeowner uses FEMA or HUD money to retreat, then the land left can no longer be built on—it has to be returned to nature.

Governments will have to be able to say where they are willing and able to invest for rebuilding and improving resiliency vs. deciding who needs to retreat and where those people will go. Retreat strategies for some communities are being formulated. Some like the New Jersey Blue Acres Buyout Program in existence since 1995 have proven to be very successful. But, in general, decisions are not easy and plans are taking time, but there are people who are asking for a retreat plan every day. Homeowners who continue to be flooded really want those government buyouts, but it is going to cost a ton.

5.8 VULNERABILITY INDICES

Vendors of climate risk information including those who build catastrophe models currently provide some version of a view of normalized risk to help insurers identify regions of low and high risk and where rates can be low or where they need to be higher. Provisions for more holistic versions of said normalized view of risk do not exist to the level of detail needed—e.g., one that factors in all the risk in a temporally correlated way, and converts that to an index that quantifies the degree to which insurance can be offered affordably and adequately, does not exist.

Additionally, there is also a national risk index that is publicly available in the U.S. It looks at the intersection of hazard and risk, as well as social vulnerability. It also accounts for resilience. It does have some challenges in terms of the underlying data.

The Community Disaster Resilience Zones (CDRZ) Act of 2022 uses the National Risk Index to identify high-risk communities. The Act has facilitated the allocation of mitigation dollars towards communities that have some of the highest risk and lowest resilience. The panel noted that overlaying an insurance availability lens on that would be quite helpful.

There is very limited information currently about where pockets of under-insurance are popping up, and it would be quite helpful to have a good understanding of where they are because that can inform more targeted investments and opportunities for insurance companies to understand where they could underwrite.

There is clearly a need, and the SOA may be in a position to sponsor research toward such an end.

Section 6: Who Is and Who Should Pay for Improving the Situation?

Investing more money into developing informative models, creating insightful indices, resilience strategies, and build-back or buy-out programs will go a long way to improving insurance affordability, availability, and adequacy. Although there are only a few different groups who can shoulder the cost, the ways in which money can be invested, and the methods for maximizing return on investment, continue to grow.

When it comes to infrastructure improvements, government is funding the majority of them, not just at the federal level but at the state, city, and local levels as well. Other groups such as Rebuild by Design are working with governments to share knowledge and ideas on the best ways to invest money.

What happened after Hurricane Sandy was a bellwether for rebuilding. Up until that storm, federal relief funds were provided that were sufficient only to build back what was there before. With Hurricane Sandy, funds were provided to build back better.

Other federal dollars to improve resilience are coming from HUD (Housing and Urban Development) via the CDBG (Community Development Block Grant) Program. The BRIC (Building Resilient Infrastructure and Communities) and the HMGP (Hazard Mitigation Grant Program) under FEMA also sponsor resiliency improvement projects.

The Infrastructure Investment and Jobs Act, signed into law by President Biden in 2021, is also helping to fund improvement like improved drainage and larger storm sewer capacity to make communities more climate resilient.

In deciding between grey vs. green infrastructure, for example, one has to weigh the up-front costs vs. the maintenance costs and which pools of money from where can or can't be used to pay for construction vs. maintenance. And that is just one example of the difficulty in determining ultimate cost and hence benefit.

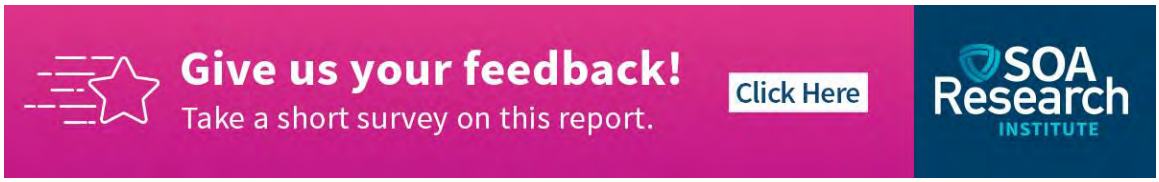
Given that the federal government has pockets that are only so deep, remaining burden has to be taken up by state and local governments.

One example was given for how New York City could raise considerable funds for improving resilience. By implementing a 2% surcharge on property and casualty insurance, back out medical malpractice and workers compensation, and then take those dollars and bond against it, the result is $19 billion in 10 years! It's an enormous amount of money. And New Jersey can raise $9.1 billion in 10 years. So, there are options for how to create new revenue for State level infrastructure.

But the insurance industry has to be on -board and support these strategies. Governments, educational institutions, and insurers need to work together.

Other options for who will pay (for ex-post solutions) have been noted elsewhere—such as higher premiums that would ultimately make insurance more available for all.

In summary, panelists noted a multitude of government sponsored programs that are available and in effect to improve resiliency, which will proactively serve to expand availability of insurance and reduce the protection gap.



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