California's Ban on Climate-Informed Models for Wildfire Insurance Premiums

Rex Frazier[*]

INTRODUCTION

Popular news outlets have effectively covered how homeowners living in high fire risk areas find it increasingly difficult to obtain property insurance.[1] However, there is very little public discussion of, and little scholarship[2] on, how

*DOI: https://doi.org/10.15779/Z384X54H5B

1. Nicole Friedman, Californians in Fire-Prone Areas Find It Harder to Buy Insurance, WALL ST J., Aug. 20, 2019, https://www.wsj.com/articles/californians-in-fire-prone-areas-find-it-harder-to-buy-insurance-11566338023; Nathan Rott, It's Becoming Increasingly Hard for California Homeowners to Get Insurance, NPR (Jan. 12, 2018), https://www.npr.org/2018/01/12/577713360/its-becoming-increasingly-hard-for-california-homeowners-to-get-insurance; Ry Rivard, In Risk-Prone Areas, Fire Insurance Is Getting Harder and Harder to Come By, VOICE OF SAN DIEGO, (June 14, 2019), https://www.voiceofsandiego.org/topics/news/in-risk-prone-areas-fire-insurance-is-getting-harder-and-harder-to-come-by/; Katherine Chiglinsky & Elaine Chen, Many Californians Being Left Without Homeowners Insurance Due to Wildfire Risk, INS. J. (Dec. 4, 2020), https://www.insurancejournal.com/news/west/2020/12/04/592788.htm.

2. A very recent examination of insurance regulation and climate change can be found in KAREN CHAPPLE ET AL., U.C. BERKELEY CTR. FOR CMTY. INNOVATION, REBUILDING FOR A RESILIENT

California's rules *against* using current and future risk data – including cutting edge climate science – in insurance premiums contributes to this difficulty. This lack of legal commentary likely results from few attorneys reading actuarial journals, and even fewer actuaries being remotely interested in publishing in legal journals.

California regulations have long required insurers to seek state approval of future rates for catastrophic fire risk based upon at least twenty years of their actual, historical fire losses.[3] However, according to the California Commission on Catastrophic Wildfire Cost and Recovery, "[t]he science is clear that wildfire severity and the frequency of large fires are increasing due to climate change."[4] Five of the six largest wildfires in recorded history occurred in 2020[5] and fifteen of the twenty most destructive fires in the state's history have taken place since just 2015.[6] Clearly, Californians are living in a period of unprecedented, rapid change in their physical realities.

While the current, backward-looking rating method may have worked in the past, it cannot account for how escalating wildfire activity is already increasing the amount of money needed in the insurance system to fund rapidly increasing insured losses. If California law will not permit insurers to develop rates using advanced scientific understanding, such as recognition of changing seasonal rain patterns,[7] then it is likely that insurers will choose to limit issuance of policies in high-risk areas where insurance rules make it difficult to obtain adequate prices. Reliable catastrophe models that account for various risk factors—such as vegetation type and moisture, topography, housing density and location, and wind conditions—are currently available to insurers. California insurers use such models for internal analysis and decision-making, but California law bans use of these tools to develop catastrophic wildfire pricing. State permission to use these models to formulate prices would enable insurers to develop strategies for serving specific, high-risk areas.

While there are reasonable questions that should be addressed before state officials permit use of these modern, scientific models, none of these questions

RECOVERY: PLANNING IN CALIFORNIA'S WILDLAND URBAN INTERFACE 10 (2021), https://www.next10.org/sites/default/files/2021-06/Next10-Rebuilding-Resilient.pdf ("Regulations also limit insurers to using historical damage data to determine risk estimates even though updated catastrophe models can provide more realistic risk determinations that reflect climate change's impacts on the frequency and intensity of wildfires.").

3. *See* CAL. CODE REGS. tit. 10, § 2644.5 (2021).

4. COMM'N ON CATASTROPHIC WILDFIRE COST & RECOVERY, FINAL REPORT 8 (2019), opr.ca.gov/docs/20190618-Commission_on_Catastrophic_Wildfire_Report_FINAL_for_transmittal.pdf.

5. *See*, CHAPPLE ET AL., *supra* note [2], at 2.

6. Dep't of Forestry & Fire Prot., Top 20 Largest California Wildfires (Sept. 10, 2021), https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf.

7. Daniel L. Swain et al., *Increasing Precipitation Volatility in Twenty-First-Century California*, 8 NATURE CLIMATE CHANGE 427-433, [427] (2018) ("Mediterranean climate regimes are particularly susceptible to rapid shifts between drought and flood—of which, California's rapid transition from record multi-year dryness between 2012 and 2016 to extreme wetness during the 2016–2017 winter provides a dramatic example.").

are novel and all are resolvable. The biggest question that should be asked is, "Why is it illegal in California to consider climate-informed catastrophe models when setting wildfire insurance premiums?"

This Article consists of three parts. In Part I, I describe California's regulation of catastrophic fire insurance premiums and argue why the rationale for this system is no longer persuasive. In Part II, I summarize an alternative approach to regulation using forward-looking data, including emerging climate science. Finally, in Part III, I outline important considerations in transitioning to this new model.

I. OVERVIEW OF CALIFORNIA INSURANCE PRICE-SETTING

Unlike most consumer products, homeowners' insurance rates are subject to state control. An insurer cannot charge a rate to a member of the public without the California Insurance Commissioner's prior approval.[8] The California Department of Insurance (CDI) has promulgated a lengthy and complex set of regulations for determining the range of permissible rates. Known as the "prior approval regulations,"[9] these CDI rules specify every element necessary for developing an insurance rate, including permissible expenses,[10] the maximum permissible rate of return,[11] and projected losses.[12] This last factor, which is a forecast of the frequency and severity of future insured losses, is squarely within the realm of actuarial science and typically demands a more sophisticated analysis than a layman can muster. Nonetheless, this last factor is at the heart of this Article.

When projecting expected fire losses, an insurer distinguishes between ordinary and catastrophic fire losses. For ordinary fire losses (e.g., a single kitchen fire), an insurer's projected losses are based on its "historic losses per exposure"[13] over a relatively short period of time (e.g., one to three years). For catastrophic losses (e.g., a conflagration damaging multiple homes, whether that be a dozen, hundreds, or thousands), California rules require an insurer to project its losses differently– using a "multi-year, long-term average of catastrophic claims…[t]he numbers over which the average shall be calculated shall be at least 20 years…"[14] So, for a simple example, if an insurer has paid $20 million for catastrophic fires over the last twenty years, the insurance regulations would permit the insurer to collect an extra $1 million a year ($20 million over twenty years) in premium to pay for catastrophic fire losses on top of the premium needed to pay for ordinary fires. This is the "catastrophe adjustment."

8. *See* CAL. INS. CODE § 1861.05 (2021) ("No rate shall be approved or remain in effect which is excessive, inadequate, unfairly discriminatory or otherwise in violation of chapter.").
9. CAL. CODE REGS. tit. 10 §§ 2644.1–2644.28 (2021).
10. *Id.* § 2644.12 (the so-called "Efficiency Standard").
11. *See id.* § 2644.16. [3]
12. *See id.* § 2644.4. [3]
13. *See id.* § 2644.4(a). [3]
14. *See id.* § 2644.5. [3]

The traditional reliance upon this method to smooth the impact of catastrophic fire losses is understandable. Catastrophic fires are "low frequency, high severity" events.[15] Recognizing this, the state allows insurers to accumulate premiums over a long period of time to pay for the enormous number of claims produced by the occasional catastrophe. But, as climate change has recently become more obvious, so have the traditional rating system's vulnerabilities. It is a fair question to ask whether building tomorrow's insurance rates based on information from twenty or more years ago is scientifically justifiable. Does the existing historical "look-back" system undermine the need to encourage climate adaptation and reward resiliency efforts?

A. Looking Backward has Become Less Effective in Predicting the Future

Figure 1 depicts how insured catastrophic losses have changed rapidly and why this issue has become extremely prominent for insurers over the past few years. The chart displays industrywide underwriting profitability dating back to 1991, measured through the end of 2018.[16] If a bar is red, that means the industry, as a whole, lost money for that year; a green bar indicates an annual gain. The blue line is the cumulative profitability result – if the blue line is below $0, that means a cumulative loss since 1991; if the line is above $0, that means a cumulative gain since 1991. The once unimaginably large firestorm that killed twenty-five people in Oakland Hills, California[17] drove the industrywide loss in 1991, with several years of small losses thereafter, but the chart shows that this 1991 industrywide cumulative loss was erased by 2005, with a period of significant underwriting profitability through 2016.

15. AM. INS. ASS'N, PROPERTY-CASUALTY INSURANCE BASICS 1, https://www.aig.com/content/dam/aig/america-canada/us/documents/careers/property-casualty-basics.pdf.

16. Insurers were ultimately able to recover a portion of these 2017 and 2018 losses from the electric utilities that caused significant fires. These recoveries are reflected in the chart, but do not change the chart's trend. The 2021 losses, when finally tallied, are likely to be similar to 2017 and 2018. Don Jergler, *Grim California Wildfire Outlook Has Insurers Forking Over Big Bucks for Modeling*, INS. J. (June 18, 2021), https://www.insurancejournal.com/news/west/2021/06/18/619392.htm; Steve Evans, *California's Caldor Wildfire Behaviour Said Extreme, To Drive Rising Losses*, ARTEMIS (Aug. 18, 2021), https://www.artemis.bm/news/california-caldor-wildfire-behaviour-extreme-rising-losses/.

17. *Fire Sweeps Through Oakland Hills,* HISTORY: THIS DAY IN HISTORY (Nov. 13, 2009), https://www.history.com/this-day-in-history/fire-sweeps-through-oakland-hills.

Figure 1[18]

An initial observation about the chart is how stable homeowners' insurance profitability was through the 1990's. Insurers viewed wildfire risk as manageable and not a significant driver of long-term profitability. Credit rating agencies did not consider California wildfire risk when rating insurers.

Then, in the early 2000's, the picture was even better for insurers with successive years of underwriting profitability. By the middle of the 2000's, the CDI was so concerned about "excess profit" being earned by insurers that it began asking them whether their then-prior approved rate levels were excessive due to low loss experience.[19] A critical flashpoint materialized in 2015 when the CDI not only rejected a rate increase request by the state's largest homeowners' insurer, State Farm, but also ordered both a prospective rate reduction and retroactive premium refund. This triggered a lawsuit by State Farm in 2016,[20] which, as of 2021, is still ongoing.[21]

In the face of this rate litigation from just five years ago, Figure 1 illustrates the stark impact of climate change following several years of drought. These climate change-related conditions led to unprecedented and unfathomable insured losses starting in 2017 with the Thomas Fire[22] in Southern California and the Tubbs Fire[23] in Northern California. The losses in 2017 eliminated the entire industrywide profitability dating back to 1991, and the losses in 2018 doubled this loss. Yet, just the year before commencement of these massive losses, the

18. Milliman (August, 2021).

19. During the author's time working at the Personal Insurance Federation of California, member insurance companies reported receiving such letters from the CDI and engaging in discussion with CDI staff about whether then-approved rate levels were "excessive" under Proposition 103.

20. Matthew Renda, *State Farm Sues California Over Refund Demand*, COURTHOUSE NEWS SERV. (Dec. 5, 2016), https://www.courthousenews.com/state-farm-sues-california-over-refund-demand/.

21. State Farm Gen. Ins. Co. v. Lara, No. D075529 (Cal. Dist. Ct. App. Filed Feb. 25, 2019).

22. Dakin Andone, *The Thomas Fire, the largest wildfire California's modern history, is out*, CNN, June 2, 2018, https://www.cnn.com/2018/06/02/us/thomas-fire-officially-out/index.html.

23. CalFire, https://www.fire.ca.gov/incidents/2017/10/8/tubbs-fire-central-lnu-complex/ (last visited Sept.28, 2021).

state regulator and a licensed insurer were arguing whether homeowners' insurance rates should go down.

These unprecedented losses came after a decade of relatively low homeowners' insurance premium growth. As the chart below illustrates, the growth of California's average homeowners' insurance premium was less than half the growth across the United States from 2010 – 2018.

Figure 2[24]

Homeowners' Insurance Average Premium

Low Historical Losses Lead to Slow Rate Inflation

State	2018	Rank	2010	Rank	10 year change
Louisiana	$1987	1	$1546	2	39.0 %
Florida	$1960	2	$2014	1	34.2 %
Texas	$1955	3	$1578	3	29.4 %
Colorado	$1616	7	$926	19	81.0 %
California	***$1073***	***31***	***$939***	***17***	***16.4 %***
United States	$1249		$909		41.9 %

Source: *Property Insurance Report*
National Association of Insurance Commissioners Data

Under the historical loss ratemaking system during this period, California premium growth was constrained despite widespread public discussion of the already observed and looming climate change fire impacts.[25]

24. BRIAN SULLIVAN, PROPERTY INSURANCE REPORT 2-3 (2021).

25. *Wildfires: A Symptom of Climate Change*, NASA (Sept. 24, 2010), https://www.nasa.gov/topics/earth/features/wildfires.html ("We already see the initial signs of climate change, and fires are part of it."); *The Connection Between Climate Change and Wildfires*, UNION OF CONCERNED SCIENTISTS (Sept. 9, 2011), https://www.ucsusa.org/resources/climate-change-and-wildfires ("Wildfire activity in the United States is changing dangerously, particularly in the west, as conditions become hotter and drier due to climate change."); Suzanne Goldberg, *Climate Change Causing US Wildfire Season To Last Longer, Congress Told*, GUARDIAN (June 4, 2013) https://www.theguardian.com/world/2013/jun/04/climate-change-america-wildfire-season ("America's wildfire season lasts two months longer than it did 40 years ago and burns up twice as much land as it did in those earlier days because of the hotter, drier conditions produced by climate change."); Justin Worland, *How Climate Change Is Making Wildfires Worse*, TIME (July 15, 2015), https://time.com/3959260/climate-change-wildfires/ ("Increasingly hot and dry climates, the result of global climate change, have led to a worsening of wildfires around the world."); Adam Voiland, *Study: Fire Seasons Getting Longer, More Frequent* (July 27, 2015), https://climate.nasa.gov/news/2315/study-fire-seasons-getting-longer-more-frequent/ ("The authors attribute the longer season in the western United States to changes in the timing of snowmelt, vapor pressure, and the timing of spring rains—all of which have been linked to global warming and climate change."); *Here's How Climate Change Affects Wildfires*, ENVTL. DEF. FUND, https://climate.nasa.gov/news/2315/study-fire-seasons-getting-longer-more-frequent/ ("Not only is the average wildfire season three and a half months longer than it was a few decades back, but the number of annual large fires in the West has tripled — burning twice as many acres."); *How Does Climate Change*

Taken together, the low premium growth coupled with staggering losses that are expected to continue absent some significant change in current conditions, present a challenge to property insurers. Because of this, it is not surprising that property insurers would restrict the availability of their services in high-risk areas[26] (with a corresponding increase in policies issued by the "insurer of last resort," the California FAIR Plan,[27] which costs significantly more than obtaining insurance from a regular insurer[28]). According to a CDI study, "residential non-renewals by insurance companies increased statewide by 31% and FAIR Plan policies increased statewide by 36% from the end of 2018 to the end of 2019."[29] The impact on California consumers is clear; according to the California Senate Insurance Committee, FAIR Plan policies are "expensive and offer slim benefits." [30]

This availability issue seems likely to persist until insurers can "dig out of the hole" by obtaining approval for rates that rise to a new, climate-adjusted normal,[31] and permitting a ratemaking methodology that will prevent another hole from being dug in the future. A report issued by the California Senate Insurance Committee summed up the situation:

> "The chief emergent issue for many California insurance consumers remains the impact of climate change on wildfire risk, and the resulting long term fallout in the form of increased insurer nonrenewals, a growing secondary market, and more expensive policies. The 2017, 2018, and 2020 California wildfires set records for area burned, structures destroyed, and lives lost. Some records that stood for decades were broken and broken again in this short time span."[32]

Affect Forest Fires CLIMATE REALITY PROJECT (May 24, 2017, 6:00 AM), https://www.climaterealityproject.org/blog/how-does-climate-change-cause-forest-fires ("In the American West, fire season is now two-and-a-half months longer than it was just 40 years ago.").

26. TONY CIGNARALE ET AL., CAL. DEPT. OF INS., AVAILABILITY AND AFFORDABILITY OF COVERAGE FOR WILDFIRE LOSS IN RESIDENTIAL PROPERTY INSURANCE IN THE WILDLAND-URBAN INTERFACE AND OTHER HIGH-RISK AREAS OF CALIFORNIA (2018), www.insurance.ca.gov/0400-news/0100-press-releases/2018/upload/nr002-2018AvailabilityandAffordabilityofWildfireCoverage.pdf.

27. Press Release, Cal. Dept. of Ins., *Data on Insurance Non-Renewals, FAIR Plan, and Surplus Lines* (2015-2019) (Oct. 20, 2020), www.insurance.ca.gov/0400-news/0100-press-releases/2020/upload/nr104Charts-NewRenewedNon-RenewedData-2015-2019-101920.pdf.

28. Dale Kasler, *CA Insurance Crisis Deepens as Homeowner Rates Increase*, SACRAMENTO BEE (Dec. 8, 2020), https://www.sacbee.com/news/california/fires/article247680725.html.

29. Press Release, Cal. Dept. of Ins., *supra* note [25], at 1.

30. STAFF OF S. COMM. ON INS., 2021–2022 SESS., BACKGROUND PAPER: INFORMATIONAL HEARING ON WILDFIRES AND INSURANCE 8 (Cal. 2021).

31. Lana Cohen, *As California Fire Insurance Prices Skyrocket, Residents Ask Themselves: Should I Stay?*, MENDOCINO VOICE (Nov. 25, 2020), https://mendovoice.com/2020/11/as-california-fire-insurance-prices-skyrocket-residents-ask-themselves-should-i-stay/; Kasler, *supra* note [26]; Ed Leefeldt, *California Homeowners Face Higher Insurance Costs After Fires*, CBS NEWS (Jan 31, 2019), https://www.cbsnews.com/news/california-homeowners-face-higher-insurance-costs-after-fires/.

32. STAFF OF S. COMM. ON INS., *supra* note 28, at 2.

B. How Does the Long-Term Average Catastrophe Adjustment Fit into This Discussion?

Significant questions exist as to whether the current, backward-looking catastrophe adjustment process is sufficient for developing insurance rates in today's climate change reality.[33] Actuaries and scientists have referred to California's current insurance rules as "primitive"[34] and "unreliable."[35] They have noted that reliance on historical loss experience for catastrophic fires ignores current reality, such as dry vegetation from drought or increased housing units built in the wildland urban interface (WUI).[36] Additionally, the benefits of adaptation, resiliency, and mitigation efforts cannot be reflected using historical loss data.[37]

II. A BETTER ALTERNATIVE TO THE CURRENT CATASTROPHE ADJUSTMENT METHODOLOGY

Reliable models that measure current and future risk factors are readily available for insurers to project catastrophic wildfire losses, but they are prohibited from setting total premiums under California law.[38] These so-called

33. JEFFREY CZAJKOWSKI ET AL., CTR. FOR INS. POLICY RESEARCH, APPLICATION OF WILDFIRE MITIGATION TO INSURED PROPERTY EXPOSURE 76 (2020), p.76, https://content.naic.org/sites/default/files/cipr_report_wildfire_mitigation.pdf ("With already 4 million acres burned in 2020 alone in California – more than three times the annual average acreage burned in the 2010s – and climate research suggesting that the average area of California that burns may increase by more than 75%, clearly there is a need for improved wildfire risk reduction activities to play a more prominent role moving forward.").

34. Cody Webb & Eric Xu, The California Wildfire Conundrum, MILLIMAN (November 27, 2018), https://us.milliman.com/en/insight/the-california-wildfire-conundrum ("By contrast, California insurance law for property insurance as dictated by Proposition 103 remains primitive… Ultimately, California regulators, insurers, and policyholders are all 'stuck' until insurance laws change. Insurance companies facing mounting probability issues may have no recourse but to attempt to raise rates in high-risk areas, or to tighten their belts around underwriting of high-risk policies. Consequently, policy cancellations and nonrenewals may persist in higher numbers.").

35. About Catastrophe Modeling, AIR, https://www.air-worldwide.com/models/About-Catastrophe-Modeling/ (last visited Sept. 14, 2021) ("In the case of rare but severe events, historical loss information has proven unreliable in assessing future loss potential.").

36. David Evans et al., Wildfire Catastrophe Models Could Spark the Changes California Needs, MILLIMAN (October 28, 2019), https://www.milliman.com/en/insight/wildfire-catastrophe-models-could-spark-the-changes-california-needs.

37. CZAJKOWSKI ET AL., CTR. FOR INS. POLICY RESEARCH, *supra* note [31].

38. It is important to note that CDI regulations currently permit the use of probabilistic models for two, other types of low-frequency, high-severity catastrophic perils: 1) earthquake risk and 2) "fire-following" earthquake risk. *See* CAL. CODE REGS. tit. 10 § 2644.4(e) (2021) ("For the earthquake line of business and for the fire following earthquake exposure in other lines, projected losses and defense and cost containment expenses *may be based on complex catastrophe models* using geological and structural engineering science and insurance claim expertise. The use of such models shall conform to the standards of practice as set forth by the Actuarial Standards Board and the applicant shall have the burden of proving, by a preponderance of the evidence, that the model is based upon the best available scientific information for assessing earthquake frequency, severity, damage and loss, and that the projected losses derived from the model meet all applicable statutory standards." (emphasis added)).

wildfire "probabilistic models,"[39]—versions of which also exist for other perils––project catastrophic losses by taking into account many factors such as proximity of structures to other structures and wildlands, structure type/materials, weather patterns, topography, fire suppression resources and risk mitigation measures.[40]

CDI regulations currently permit the use of probabilistic models for two, other types of low-frequency, high-severity catastrophic perils: 1) earthquake risk and 2) "fire-following" earthquake risk.[41] When filing rate applications for these perils, an insurer projects its losses using these models and the CDI can accept or reject the modeled losses, or request that the insurer modify the projections as a condition of obtaining state approval. Further, members of the public are permitted to intervene in such filings, challenge the projections, and receive compensation for their efforts.[42]

There are several companies offering probabilistic wildfire models to insurers. AIR Worldwide offers its Wildfire Model for the United States;[43] CoreLogic offers its US Wildfire Model;[44] and RMS offers its North America Wildfire Model.[45] Each of these models is distinct, but shares the same basic approach: 1) understand the various possible fire locations, intensities, and frequencies that can occur, 2) apply thousands of different fire scenarios to an insurer's property portfolio to determine various property damage possibilities, and 3) calculate the expected financial loss from these different damages depending upon insurance policy terms and coverage amounts. AIR explains its model generation process as follows:

39. The National Association of Insurance Commissioners has produced an overview of such models. *Catastrophe Models*, NAIC, https://content.naic.org/cipr_topics/topic_catastrophe_models.htm (last updated April 26, 2021).

40. Anthony Cappelletti, The Increasing Risk of Wildfire Catastrophes, SOC'Y OF ACTUARIES (June, 2019), https://www.soa.org/news-and-publications/newsletters/general-insurance/2019/june/gii-2019-iss-7/the-increasing-risk-of-wildfire-catastrophes/.

41. *See* CAL. CODE REGS. tit. 10 § 2644.4(e).

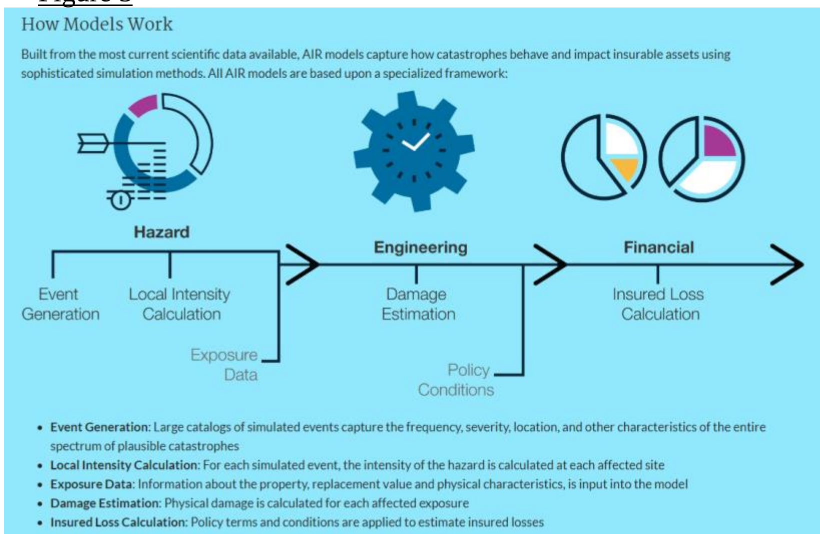
42. CAL. INS. CODE § 1861.10 (2021).

43. *AIR's Wildfire Model for the United States*, AIR, https://www.air-worldwide.com/models/wildfire2/Introducing-AIR-s-Wildfire-Model-for-the-United-States/ (last visited Sept. 14, 2021).

44. *Catastrophe Risk Management Solutions*, CORELOGIC, https://www.corelogic.com/protect/catastrophe-risk-management-solutions/ (last visited Sept. 14, 2021).

45. *North America Wildfire HD Model Suite*, RMS, https://www.rms.com/models/wildfire (last visited Sept. 14, 2021).

Figure 3[46]



Using such a model, an insurer not only can understand the current vulnerability associated with its existing customers, but it can project losses in areas it may wish to enter if its state-permitted premium levels would be sufficient to pay the expected losses. While it may be true that models could indicate higher premium levels in certain locations, it is equally true that insurers are disincentivized to ever issue policies in these places absent the underwriting and pricing knowledge that can be provided by these models. Is it better to have a system of "lower prices and less availability" that sends significant numbers of consumers in high-risk areas to the expensive FAIR Plan, or to have a system of "accurate prices and more availability" that helps consumers find robust coverage from admitted carriers at prices lower than the FAIR Plan?[47]

Instead of being constrained to a simple calculation based upon historical losses,[48] an insurer can understand its expected financial losses based on "key location and community level attributes to determine potential insured property losses. These models can calculate risk by looking at a range of location-specific factors such as topography, distance to vegetation, slope, and building-specific

46. AIR, https://www.air-worldwide.com/models/About-Catastrophe-Modeling/, (last visited 9/28/21).

47. Some may ask whether there is a role for government support of property insurance premiums given government subsidies of health insurance premiums. To date, neither the California Legislature nor the CDI has publicly considered such support for catastrophic property insurance, whether for earthquakes or fires.

48. David Evans et al., *supra* note [34] ("As an alternative to relying solely on historical experience, stochastic catastrophe simulation models, or 'cat models,' draw from fields like atmospheric science, environmental science, actuarial science, and engineering, and have been developed for a variety of catastrophic perils, such as hurricanes, floods, winter storms, earthquakes, and wildfires, to address many of the shortcomings associated with the use of insurers' historical averages.").

information including roof system covering, roof vents, suppression, and accessibility conditions."[49]

These models can also recognize the value of mitigation efforts in a way that historical loss analysis cannot.[50] The existing historical loss approach only allows the impact of mitigation activities to influence rates over time as losses are reduced. As the science of home hardening and defensible space continues to develop,[51] modeling firms can incorporate the beneficial aspects immediately into insurance ratemaking.[52] For instance, Figure 4 illustrates how the modeling firm AIR provides a method for insurers to include "secondary modifiers" in their rate applications that change justifiable premium levels based upon the actual conditions of its insured properties. As Figure 4 shows, the AIR model recognizes 1) home features (such as roof covering, wall siding, and windows, 2) yard features (such as defensible space), and 3) community efforts (such as Firewise communities).

Figure 4[53]

Immediate inclusion of mitigation impacts cannot happen in a system relying upon historical loss experience. Rather, an insurer must, under the current

49. CZAJKOWSKI ET AL., CTR. FOR INS. POLICY RESEARCH, *supra* note [36] at 4.

50. *Id.*

51. *Suburban Wildlife Adaption Roadmaps*, INSURANCE INST. FOR BUSINESS & HOME SAFETY, https://ibhs.org/wildfire/suburban-wildfire-adaptation-roadmaps/ (last visited Sept. 14, 2021).

52. David Evans et al., *supra* note [45] ("By recognizing mitigation features in the modeling process, insurers can calculate discounts for homeowners who mitigate risk. For wildfire, this includes features such as fire-resistive siding, specific roofing materials, and landscaping mitigation. For example, CoreLogic and AIR explicitly reflect community and homeowner mitigation characteristics in their models.").

53. Reproduced with permission from AIR.

regulatory regime, experience the beneficial aspects of mitigation through years of loss experience before the impacts could dampen rate escalation.

III. ISSUES TO CONSIDER BEFORE PERMITTING MODELED LOSSES

While many states have long permitted loss projections based upon probabilistic models,[54] it is natural for California to chart its own course and ask its own questions, that I will address in turn.

A. Are Insurer Actuaries Competent to Understand These Models?

With respect to understanding the models, there are many actuaries and experts in the insurance industry who are familiar with catastrophe models and have developed rigorous protocols for testing model input and output in order to assess the reasonableness, consistency, and reliability of results. Insurers often test model results against their actual catastrophic claims in order to better understand their strengths and weaknesses. The American Academy of Actuaries has developed extensive guidance on this subject in an "Actuarial Standard of Practice" (ASOP), ASOP 38, entitled "Using Models Outside the Actuary's Area of Expertise (Property and Casualty)."[55]

Section 3.1 of ASOP 38 instructs actuaries that intend to use models that incorporate specialized knowledge outside of the actuary's own area of expertise to: 1) determine appropriate reliance on experts; 2) have a basic understanding of the model; 3) evaluate whether the model is appropriate for the intended application; d. determine that appropriate validation has occurred; and e. determine the appropriate use of the model. Further, Section 4 of ASOP 38 requires actuaries to document evaluation and use of such a model and disclose such information when interacting with regulatory authorities.

However, not all regulators have actuaries on staff with this type of expertise. Importantly, ASOP 38 notes:

> While most actuaries conceptually agree that catastrophe models may provide more realistic measures of catastrophic risk than those provided by analyzing the latest twenty to fifty years of catastrophe losses, most actuaries are not experts in many of the underpinnings of these models.[56]

B. How Should Insurance Regulators Validate Probabilistic Models?

Given how hurricane risk became a significant issue decades before catastrophic wildfire risk, state insurance regulators have spent considerable time

54. People's Insurance v. Allstate, 36 A.3d 464 (Md. 2012) (upholding Allstate's use of probabilistic modeling to project hurricane losses and demonstrating that there has been little litigation on the use of probabilistic models in insurance ratemaking.).

55. *Using Models Outside the Actuary's Area of Expertise*, ACTUARIAL STANDARDS BD. (2000), http://www.actuarialstandardsboard.org/asops/using-models-outside-actuarys-area-expertise-property-casualty/.

56. *Id*. at p.iii.

analyzing probabilistic wind models and creating methods for validation. For instance, in 1995, the state of Florida established the Florida Commission on Hurricane Loss Projection Methodology to review hurricane catastrophe models for use in insurance ratemaking. In 2001 the Florida Office of Insurance Regulation also commissioned the development of a public hurricane loss projection model.[57] The South Carolina Department of Insurance (SCDOI) convened a Catastrophe Model Panel which conducted public hearings and published an "Evaluation of Hurricane Catastrophe Models in South Carolina"[58] to assist in developing a set of guidelines and recommendations to SCDOI for reviewing hurricane rate filings. Many other state regulators hire experts to assess the suitability of catastrophe models for the purpose of ratemaking and rely on these expert reviews in the course of fulfilling their regulatory duties.

Based upon individual state experiences, the NAIC, Casualty Actuarial and Statistical Task Force, has developed a "best practices" document for regulatory review of models.[59] Relevant issues include ensuring rate accuracy, understanding important model assumptions, protecting the confidentiality of the models in accordance with relevant state laws, and timely review of insurer requests to use these models. The NAIC also published a lengthy "Catastrophe Computer Modeling Handbook" in 2010.[60] In addition to an exhaustive overview of how models work, this publication urged insurance commissioners to exercise care in communicating with the public about use of models:

> Efforts should be extended to educate and inform those affected about the use of models. Targeted audiences include elected officials, insurance companies, insurance regulators, advisory organizations, consumer advocates, the media, the engineering community, builders, building inspectors and consumers.[61]

Additionally, at its Virtual Summer National Meeting in July 2020, the NAIC Catastrophe Insurance (C) Working Group heard presentations regarding a collective approach that could be adopted by California and other states through an interstate regulatory Catastrophe Model Clearinghouse.[62] The Catastrophe

57. *Wind & Hurricane Impact Research Lab'y: Fla. Public Hurricane Loss Model (FPHLM)*, FLA. TECH, https://research.fit.edu/whirl/projects/florida-public-hurricane-loss-model-fphlm/ (last visited Sept. 14, 2021).

58. Martin M. Simons et al., *Evaluation of Hurricane Catastrophe Models Used in South Carolina*, SOUTH CAROLINA DEP'T OF INS. DIV. OF ACTUARIAL AND MARKET SERV., (2013) https://doi.sc.gov/DocumentCenter/View/7184/SCDOI-PUBLIC-Hurricane-Model-Review-Report—-October-4-2013?bidId=.

59. NATI'L ASS'N OF INS. COMM'R (NAIC), CASUALTY ACTUARIAL AND STAT. (C) TASK FORCE REGUL. REVIEW OF PREDICTIVE MODELS (2020), https://content.naic.org/sites/default/files/inline-files/9-15%20CASTF%20-%20Predictive%20Model%20White%20Paper%209-09-2020.pdf.

60. NATI'L ASS'N OF INS. COMM'R (NAIC), CATASTROPHE COMPUTER MODELING HANDBOOK (2010), https://www.naic.org/documents/prod_serv_special_ccm_op.pdf.

61. *Id.* at 33.

62. NATI'L ASS'N OF INS. COMM'R (NAIC), PROPERTY AND CASUALTY INS. COMM. (2020), pgs. 10-14,

Model Clearinghouse would be a multi-disciplinary panel to develop standards, select expert reviewers and manage the review process for wildfire, flood, and other catastrophe models. Individual states would have the option to participate in the clearinghouse and rely on the expert reviews of these countrywide models, removing duplication of model review effort and cost across multiple states.

CONCLUSION

The pace of any regulatory change, whether federal, state, or local, is typically slower than proponents would like and, oftentimes, can be frustrating. However, regulatory caution is also understandable given the difficulty of determining how new procedures might lead to consumer harm. It is particularly difficult to achieve public support for regulatory change on highly technical issues because commentators and journalists are typically unable to fully understand the charges of active advocacy groups. In the absence of clear public sentiment in favor of a change and articulation of the concomitant benefits, regulators face headwinds. California currently faces these challenges on the issue of wildfire loss projections using probabilistic models.

This author believes the justification for setting California insurance rates by looking backward is becoming less persuasive. While use of historical experience to project future losses is administratively easier than working with more complicated models, the backward-looking methodology suffers from significant problems. It has driven significant property insurance unavailability and driven far too many California to higher priced options, such as the California FAIR Plan or the non-admitted market. Wildfire catastrophe models can provide up-to-date, science-based information to help California reset its course, allowing insurers and policymakers to accomplish significant public objectives. Risk-based pricing incorporating the learnings from these models allow insurers to connect homeowners' pocketbooks with climate-related risk. This connection provides an important signal to discourage future risk accumulation and encourage climate adaptation and resiliency efforts that government, to date, has been unable to accomplish.

Today's reliance on historical losses causes insurers to generally avoid high-risk areas without providing a pathway for recognizing adaptation activities within communities. Many states already permit insurers' use of probabilistic models in ratemaking for a variety of perils, including California for earthquake and fire-following earthquake rates. While there are significant details to be worked out in order to update California's insurance regulations and chart a path forward to allow use of advanced scientific models for wildfire rating, the effort is necessary to ensure a functioning property insurance market in the era of climate change.

https://content.naic.org/sites/default/files/national_meeting/Property%20and%20Casualty%20Insurance%20%28C%29%20Committee%20-%202020%20Summer%20National%20Meeting_0.pdf.