



# ANALYZING HOMEOWNERS INSURANCE AVAILABILITY AND AFFORDABILITY FOLLOWING A CATASTROPHE

A Case Study Presented to the Federal Advisory Committee on Insurance Prepared by Oliver Wyman Actuarial Consulting

September 26<sup>th</sup>, 2023

A business of Marsh McLennan

### **MEET THE TEAM**



### **RICHARD J. BABEL, FCAS, MAAA**

Oliver Wyman Actuarial Partner Rich.Babel@oliverwyman.com

Rich has provided actuarial services for over 31 years; the first 15 with insurance carriers and as a consultant since then.

Rich has extensive experience in pricing and reserving for a variety of business segments, including homeowners.

Prior engagements led him to model the catastrophic exposure of a large US carrier using catastrophe models in a catastrophe-prone state.



### **ETIENNE SCARBOROUGH, FCAS**

Oliver Wyman Actuarial Senior Manager Etienne.Scarborough@oliverwyman.com

Etienne has 8 years of actuarial experience; 6 years with carriers and 2 years as a consultant for Oliver Wyman.

He specializes in predictive analytics, and his work spans a variety of segments across personal (including homeowners) and commercial lines.

Over the years, he developed a multitude of predictive models for insurance pricing using machine learning. He also has an extensive background in developing innovative solutions for data analysis in Python.



### **ROBIN FITZGERALD, FCAS, MAAA**

Oliver Wyman Actuarial Senior Manager Robin.Fitzgerald@oliverwyman.com

Robin has 26 years of actuarial experience; 15 years with insurance carriers and 11 years as a consultant for Oliver Wyman.

With a strong background in pricing and reserving, Robin's current focus is providing actuarial consulting services to regulators.

Recent work has centered on ratemaking and market issues related to workers compensation and personal lines.



### **OVERVIEW**

Our goal for this presentation is to discuss the analytical journey we went through to prepare our Homeowners Availability Study in Colorado.<sup>1</sup>

Every step of the way we will share our thought process as well as any lessons learned that we would build upon if we were to repeat the exercise.



# 4

**Catastrophic Exposure** 

sparse and volatile data;

Catastrophic events often produce

sophisticated scientific models are generally required in these cases.

### $\langle \rangle$

Я

#### From Data to Insights

Overview of the key findings that emanated from our Colorado study



# BACKGROUND



## INTRODUCTION BY COMMISSIONER CONWAY

- 1. Colorado Homeowners Market Status
- 2. Reasons for an Availability Study
- 3. Actions Taken Following the Study

### **TIMELINE OF EVENTS**



October 2020, December 2021

Colorado has experienced multiple catastrophic wildfires in recent years.

Events from 2020 and 2021 have each broken records in terms of size of insured losses for the state:

- 1. East Troublesome (2020): \$543m<sup>[1]</sup>
- 2. Marshall Fire (2021): > \$2,000m<sup>[2]</sup>

#### Anecdotal Customer Complaints Q1-Q2 2022

Over the course of 2022, the Division started receiving significantly more complaints from homeowners regarding their home insurance policies.

Many customers claimed they were getting non-renewed and/or had trouble finding coverage.

#### Senate Bill 22-206 is Passed August 2022

In response to what appeared to be a tightening insurance market, the state senate passed Bill 22-206 on "Disaster Preparedness And Recovery Resources".

One of its objectives was to seek ways of addressing the stability, availability, and affordability of homeowner insurance in the State.

#### Oliver Wyman Study Q4 2022, Q1 2023

In that context, the Division wanted to obtain a clear data-driven view of trends affecting their homeowner insurance market.

Our team was engaged by the Division to determine the existing or developing concerns regarding availability of homeowner insurance in the state.



# FRAMING THE PROBLEM



### **TWO TYPES OF DATA ANALYSIS TO CONSIDER**

Both are useful and complementary types of analysis, often employed at distinct stages of research.

### **DESCRIPTIVE ANALYSIS**

#### **Objective: Identify and measure a phenomenon**

What is happening?

- Exploratory in nature, it will usually entail a variety of graphs and metrics:
  - 1. Trends over time
  - 2. Summary Statistics (mean, median, etc.)
  - 3. Geospatial visualization
  - 4. Etc.
- It summarizes the data and its patterns but doesn't go into reasons or causes behind them
- Will usually need to come first, as any further analysis would depend on the results of this exploration

### **EXPLANATORY ANALYSIS**



#### **Objective: Identify the root causes of a phenomenon** *Why is it happening?*

- Explanatory analysis delves deeper in order to discern relationships between variables:
  - 1. Forming hypotheses and testing their validity
  - 2. Measuring/assessing correlations
  - 3. Etc.
- Since it is aimed at identifying causes & reasons behind a pattern, it will usually come as part of a second iteration; once the phenomenon is clearly identified and its magnitude well understood

Given our study was a first dive into the topic on behalf of the state of Colorado, its content was **predominantly descriptive**. The main priority was to translate anecdotes into facts in order to guide next steps.

To the extent that some hypotheses could be formed a priori (e.g., with regards to wildfire), some explanatory components have been factored in as well.

### ANALYSIS TOPICS OF THE COLORADO STUDY

Our primary goal was to identify and measure the existence of availability/affordability concerns in the state (i.e., descriptive)





#### **Correlation of Results and Wildfire Risk**

- Have ZIP codes with high wildfire exposure experienced higher premium increases in 2022?
- Have ZIP codes with high wildfire exposure experienced more exposure shrinkage in 2022?



#### **Historical Profitability vs Rest of Country**

Does the historical profitability of the state vs the rest of the country align with the trends in premiums/rate changes observed?

# **J** INFORMATION SOURCES

### **3 SOURCES OF INFORMATION WERE USED IN THIS STUDY**

The customized data call was the primary data source for this study, the other 2 serving as complements to help explain the results.



#### **DATA INTEGRITY**

Obtaining accurate and consistent data responses across the industry was a somewhat iterative process. Data integrity checks and follow-ups with carriers were a material effort during the course of the analysis. This is not unexpected given that the data requirements were new. The process would most likely be more straightforward in the future.

### STRUCTURE OF THE DATA CALL

Data had to be granular enough to conduct our analysis but also sufficiently convenient for carrier to populate accurately.



### **KEY METRICS ANALYZED IN THE STUDY**

These two metrics are key indicators of the availability/affordability situation in the state



- "Written units" represents the number of homes for which insurance policies are sold each month.
- For "Homeowners" policy types, one written unit represents one personal property insured for one year (e.g., one HO-3 policy).
- An industry-wide decrease in written units would indicate that fewer households are protected by insurance policies year-over-year.

VS \$ AVERAGE PREMIUM TRENDS

- Average premium is defined as Written Premiums / Written Units.
- It represents the average annual premium per written unit.
- Carriers will increase rates when in their perception, the current premium will no longer be high enough to cover the projected loss and expense levels.
- For example, this would happen if actuarial analyses highlight an increasing frequency and/or severity of losses vs prior estimates.

#### ADDITIONAL REPORTING CONSIDERATIONS

- "Homeowners" policy types only: The following exhibits are specifically focused on pure homeowner policies (i.e., excluding Renters & Condos).
- Year-to-date figures: These exhibits contain data from January through October for each year.
- **Group-level figures**: The data call was made at the company level, but then rolled up at the group level for analytical purposes. Each group only contains the volume from its underlying entities writing more than \$5M in direct premiums in the state of Colorado.
- **Top 5 carrier groups**: Where applicable, any reference to "Top 5 Carrier groups" is intended to represent the 5 largest groups in the state: State Farm, Liberty Mutual, USAA, American Family & Allstate. In 2021, these 5 groups represented 65% of the "Homeowners Multi-Peril" market in Colorado.<sup>1</sup>

# **CATASTROPHIC EXPOSURES**

4



### **ASSESSING CATASTROPHIC RISK: PAST IS NOT ALWAYS INDICATIVE OF THE FUTURE**

Where data is sparse and/or volatile, insurers often rely on scientific models to assess the risk rather than historical data alone.



- Look at historical patterns to predict future risk
- Assumption that the past is representative of the future
- Main process followed by actuaries to price insurance products

**Forward-Looking Risk Assessment** 



- Rather than relying on historical patterns alone, create models that proactively factor in cutting-edge scientific knowledge to make projections about the future, often simulation-based
- Extensive domain expertise and careful consideration are needed to calibrate adequately the assumptions and scenarios that underlie these models

 $\checkmark$ 

This works for well-established insurance products with lots of data, but not so much for emerging risks and catastrophic events

Used by insurers to predict future costs of catastrophic perils: Hurricanes, Earthquakes, Wildfires, etc.

### **GUY CARPENTER'S WILDFIRE RISK SCORE**

This tool allowed us to reconcile the availability findings with each region's wildfire exposure



- Enhanced & repurposed version of the US Forest Service's (USFS) Wildfire Hazard Potential for insurance usage.
- Classifies the US territory into 6 categories of wildfire hazard grades, from Very Low to Extreme.
- Developed for P&C insurers to enable an evaluation of wildfire risk at the location level.
- Scores are updated periodically to reflect updates to data sources & refinements in methodology.



#### **Specifications**

#### Baseline: USFS<sup>1</sup>

- USFS's Wildfire Hazard Potential represents a combined view of wildfire **likelihood & intensity**.
- It uses multiple spatial datasets:
  - Data produced for the Large Fire Simulator
  - Fuel & vegetation data (LANDFIRE)
  - Past fire occurrences (1992-2015).
- Primary purpose is to identify areas that require vegetation treatment, <u>not</u> explicit wildfire risk.

#### **Adjustments**

- **Fire Intensity**: Based on conditional flame length, adjusts for the potential for structure damage.
- Fire Suppression: Adjusts for enhanced suppression response in highly populated areas.
- **Spatial Smoothing**: Reduce cell-to-cell volatility and capture ember transport.
- **Ignition Frequency**: Adjust score in areas without recent ignitions.

#### Local Enhancements

• Apply a factor based on granular 30m resolution data, considering fuel, slope, and aspect.

#### Applications for this project

#### **Risk Assessment**

- This model can identify Colorado's high-risk areas at a very high level of granularity.
- This wildfire exposure can be translated at the Zip Code level using satellite imagery, by counting the building footprints falling under each hazard grade.

#### Interpretation of recent trends in industry data

• We were then be able to compare our findings in terms of premium increases & coverage restrictions to each area's wildfire exposure.

#### Important Note

• While the model is highly granular (30m resolution), the full benefit of this granularity is not realized when the results are summarized at a zip code or county level.

### **ESTIMATION OF WILDFIRE EXPOSURE BY ZIP CODE**

The detailed wildfire map has been translated at the Zip Code level using satellite imagery

#### 2. Localization of buildings on the wildfire map

All buildings get located on GC's wildfire map





https://www.microsoft.com/en-us/maps/building-footprints



#### **1. Microsoft Building Footprints**

Estimation of all building structures in the US using AI & Satellite imagery.



#### 3. Wildfire score assignation

Each building receives a score based on the area of the wildfire map they fall into.

#### 4. Percentage of Structures in

#### **High to Extreme Areas\***

The proportion of buildings with a wildfire score of "high or above" within a Zip Code is used to assess the wildfire exposure in that area.

Zip Code	Total Structures	VeryLow (1)	Low (2)	Moderate (3)	High (4)	VeryHigh (5)	Extreme (6)	High-or- Above Pct.
80002	5907	78%	22%	0%	0%	0%	0%	0%
80104	9341	0%	3%	73%	25%	0%	0%	25%

. . . . \_\_\_\_\_



### **KEY FINDINGS: COLORADO WILDFIRE EXPOSURE**

#### Representation of wildfire risk in Colorado at the ZIP code level

Measured as the % of building structures found in areas of "high", "very high" or "extreme" risk



#### Source: Guy Carpenter's wildfire risk score, ESRI dataset of U.S. ZIP Codes (from ArcGIS), Oliver Wyman Analysis © Oliver Wyman

#### Wildfire Exposure in Colorado

Wildfires are believed to have played a material role in Colorado's loss experience in recent years, and such it is anticipated that at least some of the measures implemented by carriers (such as non-renewals and tightening underwriting criteria) are targeted at controlling this risk.

There is indeed significant wildfire exposure in the state. The map on the left combines Guy Carpenter's wildfire risk score and satellite imagery to estimate the level of wildfire exposure found in each ZIP code of the state.

This wildfire exposure is largely concentrated in two bands of land that run across the state from North to South, with the easternmost band running close to the densely populated areas of Denver, Colorado Springs & Fort Collins.

#### **High-or-Above Areas of Wildfire Risk**

The wildfire map segments the US territory into zones representing exponentially more risk of wildfire. The risk starts becoming more material once we reach the "High" zone and above.

The exposure at the ZIP code level is estimated by counting the building structures that fall under high-or-above areas using satellite imagery. Overall this represents 16.64% of building structures in Colorado.

#### **Color Scale Disclaimer**

Any ZIP code not depicted with the darkest shade of green presents some exposure to areas with high-or-above risk of wildfire.

Note: Blank shadings indicate areas where a score was not available. Different ZIP code extraction dates between GC and OW are causing a handful of discrepancies.

# **5** FROM DATA TO INSIGHTS



### **KEY FINDINGS: STATE OF THE COLORADO MARKET**

#### **5-Year Loss Ratio Assessment**

The Colorado "Homeowners Multi-Peril" market has been struggling over the recent years from a profitability standpoint. Colorado's Loss & DCC<sup>1</sup> ratios have consistently been above countrywide averages, leading each time to an underwriting loss for the industry:





<sup>1</sup>: Derived from the rate filings of top national carriers (~Top 10) in each state.

The <u>magnitude of the difference</u> between rate adjustments undertaken in the state vs the rest of the country highlights the industry's perspective on the profitability of homeowner policies in the state.

Source: S&P Market Intelligence, Oliver Wyman Analysis.

<sup>1</sup>: DCC stands for Defense & Cost-Containment Expenses. It refers to the costs of adjusting a specific claim, and represents roughly 1%-2% of Earned Premiums for the "Homeowners Multi-Peril".

© Oliver Wyman Copyright © 2022, S&P Global Market Intelligence. Reproduction of any information, data or material, including ratings ("Content") in any form is prohibited except with the prior written permission of the relevant party. S&P and their content providers are not responsible for any errors obtained as a result of usage of such Content and will not be liable for any damages in connection with the use of this content.

### **KEY FINDINGS: TRENDS IN AVERAGE PREMIUMS**

Measured annually, average premiums have increased significantly between 2019 and 2022, and at an accelerating pace.

#### Industry movements in premiums & exposures – October 2022 year-to-date

	Written Premiums Growth (%)	Written Units Growth (%)	Avg. Premium Growth (%)
Year			
2020	13.52%	6.35%	6.75%
2021	10.73%	1.63%	8.96%
2022	16.00%	1.01%	14.84%

Average premiums have been increasing significantly over the last 3 years, and at an increasing rate.

In terms of **total exposures written**, the **industry is still growing** on a year-to-date basis, **although the trend is headed downwards with time**. In fact, on a quarterly basis growth is now reaching 0% as-of 2022-Q3 (see next slide).

#### Measured on a monthly basis, the magnitude of increases is even clearer, standing at +51.7% between January 2019 and October 2022.

Average Direct Premiums Written by Month



### **KEY FINDINGS: TRENDS IN WRITTEN EXPOSURES**

The growth in written units observed at the industry level is driven by the largest carrier groups; others have been shrinking in the last 2 years.

YoY Change in Direct Units Written by Quarter



- The industry as a whole has been growing (at a generally declining pace) since 2020. However, outside of the top 5 carrier groups, exposures have been materially shrinking since 2020-Q4.
- Growth in the overall industry & Top 5 carrier groups has leveled off, just reaching 0% growth for the first time in 2022-Q3. Larger concerns may lie ahead if the largest carriers are also starting to reassess their appetite.
- A market consolidation appears to be taking place in Colorado, with the largest carriers taking a bigger piece of the pie.

A majority of carrier groups have been shrinking their exposures in the state in 2022 (YTD-October)



Distribution of carrier-level variation in written units - 2022 year-to-date

Through October 2022 year-to-date, 76% of carrier groups have written fewer policies than during the same period last year.

Furthermore, a material 32% of carrier groups are even down more than 10% over the period.

At the industry level this is offset by some larger carriers picking up a portion of the risks left out by others.

Source: Colorado "Homeowners MP" data surveyed from carriers as-of October 2022, filtered on "Homeowners" policy type, Oliver Wyman Analysis © Oliver Wyman

### **KEY FINDINGS: CORRELATION WITH WILDFIRE RISK**

#### Average premium increase vs wildfire risk in the ZIP code – 2022 YTD



Portion of buildings in "high-or-above" wildfire area

Although this graph highlights a positive correlation between the size of premium increases and the exposure to wildfire risk, it is important to note that the **amplitude** between the smallest and the largest increases remains relatively small (+14% to +17%).

This suggests that the rating actions currently taking place in Colorado are probably much broader in scope than the wildfire peril alone, although there seems to be some segmentation with respect to the wildfire peril.

#### Growth in written units vs wildfire risk in the ZIP code – 2022 YTD



Portion of buildings in "high-or-above" wildfire area

It does not seem like high-risk areas have been subject to greater shrinkage in exposures in 2022.

While some policyholders may be facing significant restrictions in these areas at the carrier level, this is not the case at the industry level.

Source: Colorado "Homeowners MP" data surveyed from carriers as-of October 2022, filtered on "Homeowners" policy type, Guy Carpenter's wildfire risk score, Oliver Wyman Analysis © Oliver Wyman

### **POSSIBLE ADDITIONAL AREAS OF RESEARCH**

Findings stemming from this first analysis on the topic have sparked interest for additional analysis ideas on future iterations.

#### **Timely Data Refresh**

Insurance availability/affordability is a timesensitive topic that can take quick and significant turns.

Depending on market signals, it might be beneficial to have timely refreshes to assess the emerging trends in 2023.

#### More Granular Exposure Data

Our first iteration was focused on creating a streamlined process to obtaining structured and accurate information from all carriers.

Now that this has been achieved, it might be interesting to enhance the data collection to obtain more targeted answers, for example by collecting new business, renewal, and non-renewals data.

#### Inflation-adjusted metrics

The current high-inflationary environment certainly has an impact on the premium movements currently observed in the state.

It would be interesting to identify what share of rate changes/premium increases is driven by inflation vs other factors.



foundation of a structured data collection framework.

3

It can now be updated to enhance or refresh the analysis data Now that the current market conditions are better understood and the a priori hypotheses have been tested, additional research might be of interest to understand the underlying causes. 2

3

#### Exposure to Other Perils (e.g., Hail)

Our study has shown that the premiums and exposure swings go beyond the regions at high risk of wildfire, which highlights other types of exposures may have played a role.

Hail risk might be an interesting area to examine, given it has led to multi-billion dollars losses in the state as recently as 2018.

#### Historical Profitability Within the State

The current study looked at historical profitability at the state level in order to answer the most pressing questions on the topic.

Given the results, in future iterations it might be interesting to assess to which extent the underwriting results vary across the geographic regions of the state.

#### **Exposures Growth and Housing Developments**

To help understand the industrywide trends in exposures by county and/or ZIP code, it would be beneficial to obtain measurable data on the number of new houses to insure in each region.

This would also allow to assess to which extent new development are taking place in "high risk" areas.





# **DISCLAIMERS AND LIMITATIONS**

### **DISCLAIMERS REGARDING DATA LIMITATIONS**

- Missing Carriers: Oliver Wyman had initially surveyed 97.3% of Colorado's "Homeowners Multi-Peril" market shares to produce this study. Some of the surveyed carriers either because they did not respond or because material data integrity concerns were identified had to be excluded from the data analysis. This brought us down to 95.3% market share available for our analysis, which we feel is sufficient to depict an adequate portrait of the industry in this state. However, we recognize that in the event where significant movement would be happening within the remaining 4.7% (e.g., significant growth in 2022), this could have an impact on our findings.
- Discrepancies with NAIC Statements: All carriers were instructed to report premium volumes that reconcile with their NAIC annual statements for "Homeowners Multi-Peril" in Colorado. We performed a reconciliation, and where the discrepancies were completely unrealistic (in multiples of the NAIC-reported volume), we contacted the carriers for revision. Smaller discrepancies – which could range from -22% to +22% depending on the carriers & years – have been observed as well. Depending on the nature & magnitude of volume missing or in excess, findings could be materially impacted by this issue.
- Reliance on Guy Carpenter's wildfire score: In order to assess the wildfire exposure in the state, we have relied on the wildfire score developed by our sister company Guy Carpenter. We recognize that different vendors may come to different assessments of the wildfire risk in the state. Also, due to the granularity of the surveyed data, we represented wildfire exposure at the zip code level. This is an important simplification, as in practice the wildfire risk may vary greatly within a zip code. Insurers may even rely on geo-coding to properly assess the risk of each policy.
- Data Validations: While we have made several reasonability checks of the data received and created a process that allows for reconciliation of some of the figures with NAIC statements, this analysis still largely relies on the assumption that insurers answered the survey accurately and in good faith.
- Data Confidentiality: To produce this study, Oliver Wyman surveyed granular data from insurance carriers, and collected detailed information regarding the companies' pricing & underwriting methodologies. As our goal was to depict industrywide trends, all the exhibits & findings presented throughout this report are always aggregated in some way. We did <u>not</u> highlight information from individual carriers anywhere in this report.

### **QUALIFICATIONS, ASSUMPTIONS, AND LIMITING CONDITIONS: OLIVER WYMAN**

Oliver Wyman Actuarial Consulting, Inc. (Oliver Wyman) prepared this report for the State of Colorado's Division of Insurance (the Agency), to support the Agency in fulfilling the requirements of SB22-206, C.R.S. § 10-1-143, which requires the commissioner of the Agency to conduct a study and prepare a report concerning methods to address the stability, availability, and affordability of homeowner's insurance for Coloradans with a focus on stabilizing the current market.

This report includes important considerations, assumptions, and limitations and, as a result, is intended to be read and used only as a whole, and may not be separated into, or distributed in, parts.

This report is being provided strictly for information purposes and, in the case of regulators and officers of the Agency, is intended to be used by them solely for the purposes set forth in SB-22-206 and to fulfil their related legislative, regulatory, administrative, and official functions. This report may not be reproduced, quoted, or distributed for any other purpose or to any other third party without the prior written permission of Oliver Wyman. All decisions in connection with the implementation or use of the results, advice or recommendations contained in this report are the sole responsibility of the Agency. Oliver Wyman shall not have any liability to any third party in respect of this report or any actions taken or decisions made as a consequence of the results, advice or recommendations set forth herein.

The opinions expressed herein are valid only for the purpose stated herein and as of the date hereof.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been verified. No warranty is given as to the accuracy of such information. Public information and industry and statistical data are from sources Oliver Wyman deems to be reliable; however, Oliver Wyman makes no representation as to the accuracy or completeness of such information and has accepted the information without further verification. No responsibility is taken for changes in market conditions or laws or regulations and no obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

### **QUALIFICATIONS, ASSUMPTIONS, AND LIMITING CONDITIONS: GUY CARPENTER**

The data and analysis provided by Guy Carpenter herein or in connection herewith are provided "as is," without warranty of any kind whether express or implied. The analysis is based upon data provided by the Agency or obtained from external sources, the accuracy of which has not been independently verified by Guy Carpenter. Neither Guy Carpenter, its affiliates, nor their officers, directors, agents, modelers, or subcontractors (collectively, "Providers") guarantee or warrant the correctness, completeness, currentness, merchantability, or fitness for a particular purpose of such data and analysis.

The data and analysis are provided strictly for information purposes, may not be separated into, or distributed in, parts, and may not be reproduced, quoted, or distributed for any other purpose or to any other third party without the prior written permission of Guy Carpenter. In no event will any Provider be liable for loss of profits or any other indirect, special, incidental and/or consequential damage of any kind howsoever incurred or designated, arising from any use of the data and analysis provided herein or in connection herewith.

There are many limitations on actuarial or modeling analyses, including uncertainty in the estimates and reliance on data. We will provide additional information regarding these limitations upon request.

As with any analysis, the results presented herein are subject to significant variability. While these estimates represent our best professional judgment, it is probable that the actual results will differ from those projected. The degree of such variability could be substantial and could be in either direction from our estimates.



A business of Marsh McLennan