

CAS DATA VISUALIZATION CASE STUDY DETAILS



Case Overview

You are the team lead for Catastrophe Insurance Technology (C-IT), a consulting firm specializing in creating graphical actuarial reports from client data. Your current client is a mid-size insurance firm, Harbor Enterprise Liability & Property (HELP). HELP is looking for assistance understanding their commercial property book of business; especially risks in catastrophe prone regions.

Company Background

The group of customers to which HELP sells insurance has been the same since HELP began in 1975. HELP provides property coverage to these insureds, including coverage for hurricane and tropical windstorms. Currently, only the buildings themselves are insured by HELP, and no coverage is provided for the contents inside of the structures.

Data

Policies

Conveniently, all insureds' policies start on January 1st which saves HELP the headache of numerous dates to keep track of. Additionally, each insured has only one location and as such, the insured can be tracked over time by the location number.

Premium

This is the amount of money paid for the insurance coverage provided in the year. For commercial property coverage, this is typically charged per \$100 in Total Insured Value. HELP has routinely collected this since 1985.

Total Insured Value

This is the estimated valuation of the building and is typically the most the insurer will need to pay should the entire building need to be replaced. This value generally changes over time for a given building due to economic forces such as inflation. HELP has routinely collected this since 1985.

Non-catastrophe losses

Losses are the amounts the insurer is obligated to pay due to damage to the property from covered causes. Non-catastrophe losses, for our purposes, mean losses that arise from everything except hurricanes, tropical storms, and earthquakes. These losses typically represent damage from fire, vandalism, and thunderstorm related wind and hail. HELP has routinely collected this since 1985.

Historic Hurricane Data

Two additional data sets have been provided that outline the location and windspeeds of

historical hurricanes that posed a potential threat to HELP's portfolio. As these were downloaded from external sources, data validation and cleaning must be carried out prior to utilization.

Deliverables

Your team's goal is to create a set of insightful reports that achieve the requirements set forth by HELP's management team, which combine numerical summarization and graphical representations. The primary assignment for your team is to produce the 'Underwriting Report' outlined in the supplementary Excel file. You will then present your results to the company's Chief Underwriting Officer (i.e., "the judges"). The following are some considerations you ought to cover in your presentation:

1. **Methods:** Provide a brief overview of any assumptions you needed to make and mathematical methods used in your communication to management. Document both your assumptions and why you relied upon your approaches.
2. **Additional Considerations:** Your presentation should discuss the following:
 - a. Areas of uncertainty identified by relying on the given data
 - b. Tailoring the visualizations for different technical and non-technical audiences
3. **Communication Style:** Your communication, especially all of the visualizations, should be clear and easy to follow. The power of a good visualization depends on clarity! Be sure to document your assumptions and show your calculations clearly.

Suggested Resources

Below are some helpful Microsoft Excel references, however, your analysis may be done in any software you deem appropriate.

Microsoft Excel Tutorials and Tips

- <https://support.microsoft.com/en-us/excel>
- <https://support.office.com/en-us/article/trend-function-e2f135f0-8827-4096-9873-9a7cf7b51ef1>
- <https://support.office.com/en-us/article/logest-function-f27462d8-3657-4030-866b-a272c1d18b4b>

Data Visualization Tutorials and Tips

- <https://www.cmu.edu/student-success/other-resources/resource-descriptions/data-viz.html>
- <https://www.datavizforall.org/chart>

Glossary of Insurance Terms

Claim - A formal request by a policyholder to an insurance company for compensation for a covered loss or policy event. The insurance company validates the claim and, once approved, issues payment to the insured or an approved interested party on behalf of the insured.

Combined Ratio - The total of all losses and operating expenses represented as a % of earned premium

Earned Premium - The amount of premium that can be recognized on the financial statements in the reporting period due to the services agreed upon being provided. For example, in a multi-year policy with all the premium collected upfront, the premium is “earned”, or recognized as revenue, over the life of the policy, not all at once.

Exclusion - Part of an insurance contract that removes coverage in specific cases

Exposure - Measurement of the risk of a possible loss (e.g., total insured value)

Frequency - The (expected or observed) number of losses for a specified group of exposures over a specified time period, expressed as a proportion: $\# \text{ losses} / \# \text{ exposures}$

Insured/Policyholder - Party/parties covered by an insurance contract

Loss Cost - The (expected or observed) amount of money per exposure necessary to cover the cost of loss and settlement

Premium - The amount charged to the insured to cover all future expected costs and a reasonable profit

Severity - The (expected or observed) average loss amount per claim, expressed as a proportion: $\text{total } \$ \text{ loss} / \# \text{ losses}$

Ultimate Losses - The final dollar amount necessary to pay all valid claims for a certain time period. An estimate until enough time has passed that all claims are settled, paid and closed.