Canadian Institute of Actuaries
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Territory Pricing Considerations in Property and Casualty Insurance

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Territory, a cornerstone rating variable for many property and casualty lines of business, is typically defined based on basic geographic building blocks, including a postal code block, a forward sortation area (FSA) block and a census block. These building blocks offer a canvas for crafting unique approaches to territories across various coverages and perils. This practice resource document explores territorial ratemaking considerations, emphasizing the need for an adaptive approach.

Feedback

Comments on the document should be forwarded to practice@cia-ica.ca.

1. Overview

Territorial ratemaking generally involves two distinct phases – the first is to determine the boundaries of each territory, the second is to determine the rate relativities for these territories.

1.1 Considerations in determining territorial boundaries

- Size/Credibility: A delicate balance between territory size and credibility is needed. Territories should be granular enough to capture nuanced variations in expected loss costs, yet expansive enough to allow a credible dataset. Metrics such as earned exposure, claim count and grow written premium can be used to develop credibility. There may also be practical limits to the total number of territories that can be implemented in a rating system, and adherence to regulatory guidelines.
- Intuitive link to risk: There should be an intuitive direct connection between territory definitions and level of riskiness. In the context of auto insurance, where urban and rural areas exhibit distinct risk profiles and varying traffic volumes between areas that can be geographically close, establishing an intuitive connection between territory definition and riskiness becomes crucial. While direct connections are desirable for the explainability of territories, making such connections may not always be possible due to practical limitations, and should not be a necessity for the use of a particular territory definition.
- Regulations: Regulatory constraints may add complexity to territorial considerations. For example, territories need not be contiguous or uniform across different coverages or perils. But mandates for contiguity or limitations on the number of permitted territories may impact the overall structuring of territorial boundaries.

1.2 Considerations in determining territory relativities in addition to considering the expected loss cost in a particular territory

- Competitiveness and business strategy: Evaluating the competitiveness of current rates and anticipating shifts in the business mix within a territory due to strategic decisions are crucial components.
- Dislocation and impact: Balancing profitability and its potential impact on customer retention and new business sales volumes requires careful consideration.

2. Technical modelling considerations

When defining territory boundaries, a common approach is to assume that all risk characteristics not captured by other rating variables are attributed to territory. The following steps are then used to define the territory boundaries:

- Build a non-territory model. Create a model that includes all rating variables except for geographic information.

- Calculate territory residuals. At the territory building block level (e.g., FSA if territories are going to be defined at the FSA level), calculate the residual loss cost (e.g., the ratio, or difference, between total actual loss cost and the model expected loss cost for each FSA).
- Model the residuals. Create a model that groups similar residuals to define the territory boundaries. This typically involves making judgments as to how best to balance the credibility of the experience of each territory building block with that of neighbouring building blocks.
- Finalize territory boundaries, considering a balance between credibility and differentiating based on loss cost, and market positions. Involving non-actuarial teams, such as claims or business development teams, can often provide valuable insights during the finalization of territory boundaries.

3. Lifecycle

Territory boundary definitions and rate relativities should be reviewed regularly. While pricing models are commonly reviewed on a set schedule to assess their continued accuracy, territory boundaries usually don't need to be refreshed as often. The frequency of territory boundary reviews depends on factors such as changes to the population size, the size of and shift to the portfolio, the evolvement of risk profiles in the territory, etc.

4. Third-party data and models

For some perils/coverages, third-party data can enhance the understanding and determination of the underlying drivers of risk, and thus can be helpful in determining territory boundaries and/or rate relativities. For example:

- topography data for some natural catastrophe perils;
- accident location for auto coverages;
- crime data for auto comprehensive coverage or property theft peril;
- weather data for water/sewer back-up/flood/hail perils; and
- public transportation data.

It is important to consider the appropriateness and accuracy of any such data used in a territory analysis.

For some natural catastrophe perils, such as flood and earthquake, using only internal historical loss data for pricing purposes may not be appropriate. Territory boundaries, or catastrophe zones, using a third-party model can be more accurate. The following considerations are recommended when relying on third-party models to define territory boundaries and rate relativities:

- Due diligence. Understanding the model's construction and its relevance to the specific risks being priced is crucial. For example, if ice jamming isn't part of a flood model but is part of flood coverage, this needs to be considered in the pricing.
- Model validation. Internal and/or publicly available data should be used to the extent possible to validate model results are reasonable before a model is used for pricing.

5. Additional considerations on using postal codes to define territories

The advantages and disadvantages of other methods to group geographic building blocks to define territories should be similarly considered.

Advantages of postal codes:

- Completeness. Every address in Canada has an associated postal code.
- Related data is provided. Statistics Canada releases data of interest to insurers at the postal code level including population density and socio-economic information, which can be included as part of any territory analysis.
- Allows for easy high-level review of any territory analysis. For example, the first digit of the postal code indicates the province/region (e.g., V indicates British Columbia, and H is the Montreal area) and the second digit indicates if an address is in an urban or rural area.
- Level of granularity. Many postal codes are small enough that the risks being analyzed (e.g., auto collision risk, flood risk in urban areas) are expected to be somewhat homogenous within the postal code.

Disadvantages of postal codes:

- Level of granularity. Postal codes are defined based on the number of dwellings (average of 20 addresses per postal code). Thus, the geographic area covered by a single postal code can vary greatly between urban and rural regions. In urban areas, postal codes tend to be quite granular and cover a small area, but in rural areas, a single postal code can often cover 15-20 square km or more. This can create challenges when trying to create territories for certain coverages/perils (e.g., flood risk).
- Regular updates. Postal code definitions are updated every month. If the postal code assigned to a particular address changes as a result of such an update, insurers need to be sure that their system is still able to calculate the correct premium for the policy.
- Not defined for insurance purposes. Postal codes are defined to meet delivery route planning needs of Canada Post. They do not consider elements that may be relevant for insurance risk such as terrain or geographical boundaries.

6. Fairness considerations

Territory definitions may intersect with sociodemographic factors, and therefore should be put through an exam of the following elements:

- Regulatory concerns around fairness, often rooted in legislation or regulations, must be factored into the determination of territory definitions and/or rate relativities. This is an area that has received increased scrutiny from regulators in recent years and is likely to remain an important element of regulatory reviews of rate filings.
- Company internal guidelines regarding fairness play a crucial role in shaping territory definitions and rate relativities. The alignment of territories with organizational values needs to be achieved.
- The CIA publication (2023) ***Bias and Fairness in Pricing and Underwriting of Property and Casualty (P&C) Risks*** provides guidance on this topic.

In conclusion, territory pricing is a holistic and adaptive approach. Insurers are required to balance technical modelling, market dynamics, external regulatory and fairness considerations, and organizational guidelines.

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