Exam 4: Introduction to Catastrophe Risk Management
Learning Objective No. 13
Study Note

Learning Objective 13: Explain the concept of centroid and average property.

Describe the concept of average property and disaggregation.

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When dealing with aggregate data in catastrophe modeling, whether to run the analysis with average property and if aggregate data should be disaggregated to a more granular level, are two important considerations.

1. Average Property:
   - Catastrophe analysis output depends heavily on physical property (e.g., ground elevation, soil type, distance to coast, distance to fault line) of the risks. This functionality in catastrophe models can help run more reasonable analysis of underlying exposure, when that risk is geocoded at postal code level or worse.
   - When running an analysis with average property feature, catastrophe model estimates the loss based on the hazard estimated using average values of physical properties at that geographic resolution, regardless of the geocode resolution. For example, if a risk is geocoded at postal code level in costal Florida, the model will use the average values of elevation factors from that zip code, when modeling the risk in a hurricane event.
   - When analysis is run without average property feature, the loss is based on the hazard at the geocode of the risk. For the same example above, a risk geocoded at postal code level will be modeled as at the postal code centroid.

2. Disaggregation:
   - When dealing with different level of details available in exposure dataset, analysts usually have three primary approaches.
     1) Exposure data (usually sum insured or policy limit) is summarized at a low geographic resolution (e.g., at a CRESTA or state resolution), with very limited information of policy conditions or any primary building characteristics. These data are mostly missing detailed information about construction, occupancy, or the policy. They are better analyzed in aggregate catastrophe models.
     2) Information about each risk is available, including specific location, insured values, construction, occupancy, and policy details. These data are better analyzed in detailed catastrophe models, where each risk at its precise location is evaluated, along with the detailed information provided by users.
     3) The last case is when the exposure data have been summed or aggregated to a coarse geographic resolution, but also contain site-specific information, such as construction and occupancy information and policy details. It would not be a best practice to analyze them using aggregate catastrophe model as in 1), since the models will not take advantage of the detailed site-specific information. A better approach would be to analyze the exposure in detailed catastrophe models as in 2), but with disaggregate feature.

- Disaggregation takes exposure at a coarse resolution and allocate it to a finer resolution to locations where exposure is likely to be located. For example, disaggregation process will take the sum insured at state level and distribute it to county level, based on industry exposure or other weighting measure.