

# **California Department of Insurance (CDI)**

## **Model Review Checklist Instructions**

### **1. Scope of the analysis**

Explain the scope and intended use of the analysis being performed. Include explanation of the following items?

- a. Intended application of the model;
- b. General operation of the model;
- c. Major sensitivities and dependences within the model; and
- d. Key strengths and limitations of the model.

### **2. Data**

- a. Provide documentation regarding the data source(s) used and the scope of the data (years, companies, geographies, etc.).
- b. Identify reliance on data, models, and/or other information supplied by others. If using catastrophe model output, identify the vendor and the model settings/assumptions used. If using output of scoring algorithms, provide a list of the variables used in the score and the source of the data used to calculate the score.
- c. Document the process for reviewing the appropriateness, reasonableness, consistency, and comprehensiveness of the data.
- d. Document the findings of the data review and identify potential material limitations, defects, or unresolved concerns found or believed to exist in the data.
- e. Describe any limitations of the analysis resulting from data limitations.

### **3. Variables and Adjustments**

- a. Please describe the target variables used in the analysis, provide the formulae for computing the target variables, and show how the calculations were checked.
- b. Provide definitions of each predictor variable used in the analysis, and describe the process for identifying questionable data values and improving the quality of the data.
- c. Please describe the calculation of any offset, weight, or other variable used in the model (other than the predictor and target variables)
- d. Describe any adjustments or modifications made to the data (for example, trending, development, exclusion of catastrophe losses, capping), and the rationale for the adjustments and modifications. Show the effect of the adjustments on the target variables and how the adjustments were checked.
- e. Provide a report reconciling of raw data to modeling data.

#### **4. Assumptions and Modeling**

- a. Describe the type of model (GLM, decision tree, GBM, etc.) and the general framework for model selection (e.g. selection of predictor variables, selection of parameters). Identify the software used to fit the model (e.g. SAS, R, Emblem, etc).
- b. List the assumptions made and provide support demonstrating that assumptions are appropriate (for example in GLM, the choice of error distribution, link function, predictor variables are linear, etc.).
- c. Describe any filters applied to exclude observations from the model fitting process.
- d. Provide the model coefficients and p-values (if applicable) and describe any “reversals” or other results that were not expected a priori. Identify any adjustments/selections that were made to the indicated model to derive the final proposed model.
- e. Describe the methods used to validate the assumptions used and assess the statistical significance/goodness of the fit of the model, such as lift charts, statistical tests, and holdout samples. Ensure that it includes model projection results compared to historical actual results to verify that modeled results bear a reasonable relationship to actual results. Discuss the results.

#### **5. Regulatory Compliance**

- a. Verify whether credit was used or considered.
- b. For auto, please confirm that:
  - i. mandatory variables were included
  - ii. optional variables are allowable
  - iii. frequency and severity bands are compliant, and last in sequential
  - iv. variable factor weights are compliant
- c. Verify that no form of price optimization (as defined by the CDI<sup>1</sup>) was applied in the models.
- d. Please confirm that CDI checklists were adhered to.

#### **6. Changes from Prior Analysis (if applicable)**

- a. Describe any material changes to the model.
- b. Provide reconciliation of the results to the prior model given the changes in assumptions, parameters and data.

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<sup>1</sup> 2/18/15 notice regarding unfair discrimination in rating: price optimization, from the CDI defines price optimization as “any method of taking into account an individual’s or class’s willingness to pay a higher premium relative to other individuals or classes. Price optimization does not seek to arrive at an actuarially sound estimate of the risk of loss and other future costs of a risk transfer.”