PREDICTIVE MODELING: PITFALLS AND POTENTIALS
A CONSULTANT’S VIEWPOINT

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CAS Annual Meeting
AGENDA

- Purpose of Predictive Modeling
- Benefits of Predictive Modeling
- Pitfalls of Predictive Modeling
Purpose of Predictive Modeling

- To predict a response variable using a series of explanatory variables (or rating factors)

- **Independent/Predictors**
  - Age
  - Limit
  - Territory

- **Weights**
  - Claims
  - Exposures
  - Premium

- **Dependent/Response**
  - Losses
  - Claims
  - Retention

**Statistical Model**

**Model Results**
- Parameters
- Validation Statistics
Benefits of Predictive Modeling

✓ Multivariate pricing has significant advantages over traditional techniques
  - Corrects methodological flaws
  - Does more with limited data
  - Provides better diagnostics to support decision-making
  - Eliminates time-consuming adjustments

✓ Predictive modeling is being successfully applied within the insurance industry for a wide variety of applications including
  - Pricing
  - UW
  - Marketing
  - Claims
Uses of Predictive Modeling

Predictive modeling can be used by all operational areas

- Determine underwriting rules
- Perform credit analysis
- Create profitability curves
- Evaluate agents/regions
- Target inspections
- Predict response rates
- Perform conversion analysis
- Determine retention
- Set base rates
- Identify predictors
- Quantify relationships
- Enhance current programs
- Special scores
- Set reserves
- Predict fraud
- Predict lawsuits
Pricing can…

- Set base rates
- Identify predictors
- Quantify relationships
- Enhance current programs, e.g. make and model
- Special scores – e.g. fire protection score
Underwriting can...

- Determine underwriting rules
- Perform credit analysis
- Create profitability curves
- Evaluate agents/regions
- Target inspections
Marketing can...

- Predict response rates
- Perform conversion analysis
- Determine retention
Claims can...

- Set reserves
- Predict fraud
- Predict lawsuits
Multivariate Analysis Makes a Difference

Purpose

Benefits

Pitfalls

Total Auto Loss Ratio

Difference Predictive Modeling

- Group Yes Predictive Modeling
- Group No Predictive Modeling
Pitfalls of Predictive Modeling

- Reliable Data
- IT Availability
- Shortcutting the Process
- Treating Predictive Modeling as a Black Box
- Senior Management Understanding/Buy-In
Pitfalls of Predictive Modeling

Reliable Data

- What is available?
- Where do I go for additional items?
- How soon can I have data ready for analysis?
- Failure to make incremental improvements?
Pitfalls of Predictive Modeling

IT Availability

❖ True Pitfalls

- Changes are likely to occur
- Eventually, significant changes occur
- Must be part of the process

❖ False Pitfalls

- All changes must be a monumental task
- Nothing can be accomplished in the current framework
Predictive Modeling: Pitfalls/Potentials

- Purpose
- Benefits
- Pitfalls

Pitfalls of Predictive Modeling

Shortcutting the Process

- Modelers should get proper training on the tools to be used

- Practitioners performing loss ratio modeling sacrifice valuable information that can be gleaned from proper analysis
  - Made worse by failure to put premiums on level at the “cell” level
  - Best to perform analysis on underlying frequency and severity for same reasons actuaries select loss trends on this basis
  - Diagnostics are compromised as practitioner cannot have an a priori expectation

- Predictive modeling should not be considered an automated process. For example, stepwise regressions should compliment not replace proper modeling
Pitfalls of Predictive Modeling
Treating Predictive Modeling as a Black Box

- Practitioners should apply appropriate judgment and understand the model.

- Modelers oftentimes build models that are unnecessarily complex.
  - UK models (and rating algorithms) tend to be much simpler.

- Appropriate diagnostics can ensure model is not just explaining the past, but will be predictive of the future.
Pitfalls of Predictive Modeling
Treating Predictive Modeling as a Black Box

Some companies implement results blindly
- Do the indications make sense?
- What is the impact on the policyholder?
- What will the changes do to competitiveness? Profit level?
- Would the “problem” be better addressed by another action?
Pitfalls of Predictive Modeling
Senior Management Understanding/Buy-in

- Need to be informed throughout process
- May not understand cultural changes to be made, e.g. some risks previously considered uninsurable may now be insurable
- Still have “favorite” risks that they want to heavily discount
- Desire to “tinker” with the results
Predictive Modeling – Pitfalls and Potentials

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