Comment #4 – 10/10/16 – 11:05 a.m.

Comments on Proposed ASOP for Modeling

I have a PhD in statistics and I am an FCAS and a CERA. I have been doing modeling for P&C insurers for 18 years. Based on that experience, I have some concerns with this standard.

I see simulation modeling and predictive modeling as opposite approaches (which I will explain below). This proposed standard deals exclusively with simulation modeling and ignores predictive modeling. I think that you should either narrow the focus to simulation modeling or make extensive changes which I will discuss after I explain my view.

Probability and Statistics are similar fields but view problems from opposite directions. Probabilists assume a distribution of random underlying events and then discuss the likelihood of various resulting scenarios. For example, they might ask the probability of getting three heads in a row with a fair coin. This approach is used in Cat Modeling, ERM, and evaluating pensions and life insurance. In the last example, the model might assume distributions for underlying events such as mortality, interest rates, and investment returns and then calculates the likelihood of a portfolio being profitable. I refer to this as simulation modeling though there are other names. The proposed standard is focused on this type of modeling.

Statisticians look at observations and make inferences about the underlying phenomenon. A statistician might look at that interest rate behavior over the last fifty years and build an economic scenario generator that is used in the simulation model discussed above. This approach is also used by insurers to develop rating plans, such as those used to price personal auto insurance. The model would be based on loss experience for a book of business and it would estimate the difference in prices that men and women should pay, that 16 year olds and 40 year olds should pay, etc. I refer to this as predictive modeling, though there are other names. I think that the proposed standard ignores this type of modeling.

Since I do predictive modeling, I am concerned that if this standard is adopted in its current form, it will cause a great deal of unnecessary confusion about what standard I and others in similar roles should follow in our work. This outcome will be worse than the status quo of having no standard. Below, I will point out a number of examples where I think the standard does not address predictive modeling. I will also list a few other concerns. If it's not feasible to address all of these, it might make sense to narrow this standard to "simulation modeling" and write a new one for "predictive modeling".

Concerns:

2.1 – Assumptions: For me an assumption might be that the relationship between my predictors and loss cost is multiplicative – e.g. that men always have expected losses 50% higher than women, independent of other traits. Another assumption might be that the number of losses for an individual follows a Poisson distribution. These don't sound consistent with the definition provided.

2.11 – Parameters: Your examples sound like inputs to a simulation model, i.e. wind speeds in a hurricane model or the speed of mean reversion in an inflation rate generator. In predictive modeling, parameters are the output of the model. For example, the ratio of men's and women's expected losses is a parameter. Also, "mathematical distribution" should be "probability distribution". Distribution has an alternate definition in mathematics. https:/en.wikipedia.org/wiki/Distribution_(mathematics)

2.12 Simple Models: What are examples of simple models? Is a linear regression model simple because we can predict output easily once we estimate the parameters? As we move to Generalized Linear Models or Generalized Additive Models, does it stop being simple? As we use transforms of our predictors does it stop being simple?

2.13 Specification: This seems awkward if we apply it to predictive modeling. We rarely if ever discuss model outputs. Our model produces parameter estimates, i.e. the coefficients applied to each predictor. Also, I would think of specification as the relationship and the error structure, i.e. the number of losses follows a Poisson distribution where Lambda is 0.05 for men and 0.03 for women.

3.2 Models Developed by Others: You list four things the actuary should do. I would add

e. check reasonability of results.

3.3 What happens if this work was done by someone who is not an actuary? What can/should the actuary do? It seem like we would be somewhere between 3.2 (having limited ability to understand the model) and 3.3 (relying on another actuary).

3.4.5a – It's not obvious to me that this will always apply. Perhaps you could add "if any" at the end of this item.

3.4.5d – A model of expected losses to support a rating plan would not include any options. Neither party has options once the policy is written. If the insured has an accident, the insurer is obligated to make some third party whole. You should add "if any" to this item as well.

3.4.6 – We don't "derive an assumptions", though we might check that our data is consistent with an assumption. For example, I might confirm that the data is consistent with losses following a Poisson distribution, but I wouldn't say that I had derived that assumption. Also, I would think in terms of "estimating parameters". Perhaps this could end with "deriving, estimating, or testing any assumptions and parameters".

3.4.7.b Margin should be defined in Section 2.

3.4.7.c Model runs doesn't make sense in terms predictive modeling. Many methods for fitting a model are deterministic, so if I fit a linear regression 1,000 times I will get the same answer 1,000 times.

3.5.1 What is the operating environment of a model? What is a control? These should be defined in Section 2.

3.5.1 Model runs and projection results do not make sense for predictive models.

3.6.4 Why are laws not subject to 3.6.4? The actuary should opine on whether the legally required inputs are conservative or optimistic.

3.6.4 It's not clear what conservative and optimism mean for predictive models. How will I know if my estimate that women have 50% more losses than men is conservative or optimistic?

Thank you for considering my concerns.

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