ABC Re Corporation

Linear Statistical Modeling for Actuaries

Outline of Preparation and Course

1. Course Preparation

2. First Morning of Course (3.5 hours)
    a. Review of preparation (1.5 hours)
    b. Construction of linear models (0.5 hours)
        i. Design matrix
        ii. Variance structure
    c. Solution of Homework Model (0.5 hours)
    d. Diagnosing the Solution (0.5 hours)
        i. How well are the observations explained?
        ii. Is the residual white noise?
        iii. Can we trust the prediction?
    e. Generalizing the model: heteroskedasticity and autocorrelation (0.5 hours)

3. First Afternoon (4 hours)
    a. Modeling the chain-ladder method (1 hour)
        i. Suitability to real data
        ii. Regression toward the mean
    b. Models versus methods (1 hour)
        i. The design matrix as a thought clarifier
        ii. Parameter estimation
        iii. Two-moment prediction
            1. Process versus parameter uncertainty
            2. What about model uncertainty?
        iv. Confidence Intervals
            1. Obtainable by method of moments
            2. Simulation with robust error distributions (advanced topic)
            3. Probabilistic answers always better than point answers
    c. Models of the BF/SB/Additive family of methods (2 hours)
        i. Simple example for illustration
        ii. First realistic loss triangle

4. Second Morning (4 hours)
    a. Additional BLUE Properties and Insights (1 hour)
    b. WC with even more realism (1 hour)
        i. Non-uniform variance by age (heteroskedasticity)
        ii. Extrapolation beyond the triangle
    c. Using knowledge other data sources (1.5 hours)
        i. Models with restricted parameters
        ii. Nth-to-Ultimate prediction
        iii. Simulation
        iv. Credibility
    d. Modeling a real ABC Re triangle (0.5 hours)
        i. Thought process in the design
        ii. Solution
        iii. Diagnosis
        iv. Prediction
        v. Testing in Hindsight

5. Second Afternoon (4 hours)
    a. Troubleshooting cantankerous models (1.5 hours)
        i. Adjusting the explanatory factors
        ii. Combining and weighting observations
        iii. A stochastic CL model useful when exposures are truly unknown
    b. Presentation of results to non-experts (0.5 hours)
        i. Deterministic methods as a crutch
        ii. Simplicity to 90% accuracy better than complexity to 99%.
        iii. Appealing diagnostics and graphs
    c. Advanced Directions and Miscellaneous (2.0 hours)
        i. Autocorrelation (see my 1996 *PCAS* paper)
        ii. Parallel triangles and correlation (e.g., loss and ALAE)
        iii. Conjoint models (e.g., paid and incurred losses, as in my paper in the Summer 1997 *Forum*)
        iv. Random prediction design
        v. ULAE Model