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An Update on Stochastic Reserving Methods and Associated Measures of Reserve Variability

Workshop Outline

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In recent years a number of papers have been dedicated to the search for the definitive stochastic version of the Chain-Ladder projections. Significant landmarks in this search include:-

- the establishment of the nature of the parameterised model structure inherent in the Chain-Ladder method (Kremer, 1982) Kremer chose to fit a structure (in the form of a linear predictor) to the run-off data by applying the log-transformation to the incremental data, together with a Normal error structure
- several papers - Renshaw (1989), Verrall (1989, 1990, 1991a, 1991b) - which went on to investigate further the ideas laid down by Kremer
- the derivation of a generalised linear model which is exactly equivalent to the Chain-Ladder model (Renshaw and Verrall, 1994)

This workshop draws heavily on the Renshaw and Verrall 1994 paper to present a stochastic Chain-Ladder model which reproduces exactly the link ratios and reserve estimates which are obtained from the standard volume-weighted Chain-Ladder model

The model presented fits within the generalised linear modelling framework, and can cope with a small number of negative incremental claims without difficulty

The model will be extended to incorporate smoothing of link ratios by implementing the model as a generalised additive model in which the relationship over development time is semi-parametric This can be contrasted with the fully-parametric approach outlined by Wright (1990)

A key advantage of using stochastic models is that reserve variability can be estimated Two methods of estimating reserve variability will be considered. an analytical approach and a Bootstrap approach Repeated re-sampling from residuals is a key ingredient of the Bootstrap approach used. We go a step further than recent GISG coverage of the Bootstrap (Lowe, 1995) by considering an extended definition of residuals appropriate to the stochastic model underlying the Chain-Ladder The chosen form of the residual avoids acknowledged difficulties associated with the use of standard Normal residuals

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