

Managing Systematic Mortality Risk with Group Self Pooling and Annuitisation Schemes

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Abstract

Group Self-annuitisation Schemes (GSAs), or Pooled Annuity Schemes, are designed to share uncertain future mortality experience including systematic improvements. They have been proposed because of the significant uncertainty of future mortality improvement on pension and annuity costs. The challenges for designing group pooled schemes include the decreasing average payments when mortality improves significantly, the decreasing numbers in the pool at the older ages and the dependence of systematic mortality improvements across different ages of members in the pool. This paper assesses the impact of systematic dependence and reducing numbers in the pool at extreme ages on the efficacy of longevity pooling. Current proposals for pooling schemes are designed to insure against idiosyncratic risk while leaving systematic risk to be borne by individuals. The paper uses a multiple-factor stochastic Gompertz-Makeham model of mortality, calibrated to Australian data, to demonstrate the significance of these issues. The model produces analytical results from extreme value theory for survival distributions and approximate annuity computations. Simulations are used to show how the pooling can be made more effective and to quantify the limitations of these pooling schemes. The results quantify the impact of pool size on risk sharing, especially at the older ages, demonstrate the significance of systematic mortality risks and dependence on pooling effectiveness, and highlight the need for reinsurance, longevity bonds and solidarity between the young and old ages in the pool to improve the effectiveness of GSAs as a longevity insurance product solution.

Keywords: group self-annuitisation, pooled annuity, longevity risk, extreme value distribution, Gompertz-Makeham mortality

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