Biometric Solvency Risk for Portfolios of General Life Contracts (III) Dependent Lives

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We consider the endowment contract on two lives under mortality risk. In practice actuarial values of the tariff book are calculated under the simplifying assumption of independent future lifetimes. It is known that this assumption overestimates the joint-life net single and level premiums and underestimates the last-survivor net single and level premiums, where the maximal deviations are obtained by perfect positive dependence using the Höffding-Fréchet upper bound. As a novel application, we discuss the impact of positive dependent lives on solvency calculations using a stochastic approach to the insurance risk and compare results with those of the current QIS4 standard approach. For a portfolio consisting of a single cohort of last survivorship endowment contracts on two dependent lives, we show that the Independence assumption underestimates insurance risk economic capital and calculate a non-parametric approximation of it based on the knowledge of the Spearman’s correlation coefficient as well as its maximal deviation from the independence assumption.

Keywords: endowment insurance, joint-life, last-survivorship, Spearman’s coefficient, solvency capital