

Premiums and Reserves in Life Insurance: the Worst-Case Scenario and Solvency II

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Reserves are a fundamental tool in insurance risk management since they are used to determine the economic or regulatory capital required for insurers to remain solvent. As the values of reserves and premiums are strongly dependent on the actuarial assumptions used, the choice of the adequate elements of the technical basis is a major concern of both regulators and insurance companies. In life insurance, policies are often described by the multi-state Markov model of life contingencies and reserves are computed using Thiele's differential equation.

Following the essential works of Christiansen (2010) and Milbrodt & Stracke (1997), the main purpose of this work is to study a method for the construction of biometric worst-case scenarios that allow premiums and reserves to be on the safe side, with respect to given confidence bands for the biometric second-order basis. These scenarios are obtained by solving maximization problems for the prospective reserve, in order to find the worst-case biometric valuation basis from the insurer's point of view.

The new solvency regime of the European Union, Solvency II, also uses worst-case scenarios, although constructed in a different way, in order to quantify the solvency capital requirements for life insurance business. Thus, a further important purpose of this work is to integrate the method in study under the Solvency II framework.

Key-words

Life insurance, Premiums, Reserves, Worst-case Scenarios, Sum-at-Risk, Solvency II