

Risk assessment under Solvency II: Application of genetic algorithms

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Abstract

Solvency II is a new directive for insurance companies, which represents a real difference of perception, understanding and evaluation of risks that all insurance companies in Europe will be soon submitted. This paper presents a proposal for management and risk assessment using optimization techniques multi-objective drawing on meta-heuristic algorithms. The objective is to estimate the levels of capital required for the solvency of an insurance company. The different future cash flows of assets and liabilities of an insurance company are submitted to various regulatory requirements and market constraints. Solvency II presents a modular approach of risks evaluation and standards closed methods, in order to measure the levels of required equities: the MCR (Minimum Capital Requirement) refers to the minimum of financing equities, which below it, the intervention of the control authorities will be automatic; and the SCR (Solvency Capital Requirement) refers to the equity target required in order to handle the shocks caused by unexpected events. We will explain in this work an application of genetic algorithms used to estimate the needed equities for the reduction of the probability of ruin taking into consideration correlations between risks. The assessment of the required equities (minimum equity and required equity) is based on a definition of an appropriate measure of risk which helps to aggregate and quantify implicit risks. Among the measures of risks, we have the standard deviation, The value at risk “VAR” and The “TailVar (Tvar)”. The purpose of this paper is to present a method to apply genetic algorithms in the way insurance in order to solving a complex optimization program under non-linear constraints.

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