

# Optimal reinsurance under multiple attribute decision making

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## Abstract

In this paper, we apply methods from multiple attribute decision making (MADM) to the problem of selecting an optimal reinsurance level. In particular, we apply the TOPSIS method with Mahalanobis distance. We consider the classical risk model under a reinsurance arrangement either excess of loss or proportional and we consider scenarios that have the same finite time ruin probability. For each of these scenarios we calculate three quantities: capital released, expected profit, and expected utility of resulting wealth. Using these inputs, we apply MADM to find optimal retention levels. We compare and contrast our findings with those when decisions are based on a single attribute.

**Keywords** Reinsurance; ruin probability; utility theory; expected profit; release of capital; translated gamma process; multiple attribute decision making; TOPSIS.