

# Optimization of transition rules in a Bonus-Malus system

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## **Abstract.**

Optimizing Bonus-Malus systems is a well-known problem in actuarial sciences. In Bonus-Malus systems (BMS) there are several classes and the classification of the policyholders depends on the class in the previous period and the number of claims reported in the present period.

Designing a BMS requires choosing the transition rules between the classes and their number, the scale of premiums and the initial class. Usually the number of classes, the transition rules and the initial class are fixed while the scale of premiums are considered in the optimization process.

We present an Integer Programming model for designing an irreducible Bonus-Malus system where the transition rules are considered in the optimization process with a fixed scale of premiums.

Furthermore we extend the scope of our investigation to the joint optimization of the transition rules and the number of classes.