



SOCIETY OF ACTUARIES

Article from:

ARCH 2013.1 Proceedings

August 1- 4, 2012

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Experience Rating in Motor Insurance

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The fact that the number of the motor vehicles registered in the world increased has caused an increase in the number of the accidents as well as in the number of the death and injured which are resulted from these accidents. This situation has confronted all actuaries with the problem of how the structure of the tariff, which fairly allocates the burden of the damage for the policy owners. Furthermore, the improper models adopted in the calculation of the premiums lead to the determination of the low amount of the premiums and thus rise in the risk of the sector failure. In fact, the accurate calculation of the premiums which is the keystone of the sector plays a key role with regard to the prevention of suffering loss of the insurance sector. Thus, the presence of an implementation that will not damage the sector is possible by procuring every policyholder with the payment of the premium equaled to the risk group to which the policyholder belongs. One of the basic models, which provides this implementation is bonus-malus system, and the other one is credibility theory.

In many European and Asian countries, as well as in North-American states or provinces, insurers use experience rating in order to relate premium amounts to individual past claims experience in auto insurance. In experience rating systems such as bonus-malus systems, bonuses can be earned by not filing claims, and a malus is incurred when many claims have been filed after a basic premium is determined using rating factors like age, profession, and capacity of the car. This a posteriori ratemaking is a very efficient way of classifying policyholders according to their risk. On the other hand, the trend towards more classification factors has led the authorities to exclude certain risk factors from the tariff structure although they may be significantly correlated to losses, whereas many states consider items that are beyond the control of the insured, such as gender or age. This situation causes that individuals appear to be bad drivers even if they are in reality good drivers who will never cause any accident. Thus, actuarial credibility models make a balance between the likelihood of being an unlucky good driver and the likelihood of being a truly bad driver.

The purpose of this study is to set up an experience rating system to determine next year's premium, taking into account not only the individual experience with the group, but also the collective experience. Many problems in actuarial science involve the building of a mathematical model that can be used to forecast insurance costs in the future. Hence, model selection is based on a balance between simplicity, which is measured in terms of such things as the number of unknown parameters, and fit, which is measured in terms of the discrepancy between the data and the model. Also in this study, an adequate model will be selected by looking into the results of statistical analysis on real insurance data obtained from Canada, and insurance premiums in the future will be determined according to this selected model.