Premium determination according to the risk appetite by means of simulation process

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Any insurer makes pricing decisions based on models and historical information to reflect the uncertainty inherent to the risk, the probability of occurrence of a loss and of the amounts derived from it.

Risk Theory models addressed in this paper will allow its user, among other things, to calculate an adequate premium to be charged to the insured, sufficient to meet the claims for accidents, according to the risk appetite of the Company. This paper proposes a methodology which an insurer may use to calculate premiums according to the volatility, based on historical information of claims, with a practical approach based on Risk Theory models, that has the ability to get to know the risks face and describe them using useful methodologies for decision-making. This is superior to the traditional frequentist methods of premium calculation, that does not take into account the full randomness of the portfolio losses, based on the calculation of the average frequency and average severity values that can stray too far from reality.

Specifically, the objectives proposed are:

- To model within probability distributions the random variables involved in the amounts that will be generated by an insured portfolio.
- Make inference about these random variables to determine premiums according with the volatility, likely to include risk margins that can afford possible deviations in the losses.
- Determine the level of sufficiency that meets the risk premiums and the risk margin that entails.

To achieve these objectives, we will use Monte Carlo Simulation applied at the Collective Risk Model to calculate the premiums with certain risk margin, in function of the Risk appetite of the Company.

Simulation methods are used in various scientific fields because it’s ease to perform using tools and computer programs, one of our challenges is to determine how many observations of simulations are necessary so that the sample reflects the behavior of the random variable of interest.

Simulate a sample of the cumulative amount of claims based on the Collective Risk Model requires the distribution of the number of claims (frequency) and the distribution of individual amounts (severity). In this paper we analyze some of the distributions that are often used to fit data in order to choose the best option.

Likewise, we will show the advantages of using simulations to generate the distribution of cumulative amounts, which describes the volatility of the risk that may be interpreted as the expectation of shareholder.

Key Words: Risk Theory, Simulation, non-life insurance, risk appetite, risk margins, Monte Carlo Simulations