

Limited expected value function and its applications in insurance mathematics

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One of the common problems in insurance mathematics is that we usually do not see the actual loss variable but certain truncated version of it: the claims payments are limited by the sum insured, reinsurance treaties limit the actual claim size for initial insurer, also (fixed amount) deductibles set limits for policy holders, etc. In all these cases a function called *limited expected value function*, defined by

$$E[X; x] = E \min(X, x),$$

where X is a random variable (claim size), plays an important role. There are many well-known characteristics in insurance that are calculated using this function, which motivated us to study this topic more closely. We reveal some essential properties of this function and describe some important practical applications where it is used.

We also introduce the method of limited expected value function for measuring the goodness of fit between empirical and theoretical distributions. This is one of the many uses of the limited expected value function and it suits particularly well to the insurance data as it can also take into account censored data (if necessary). Also, this method can be used as an alternative or additional tool in case the data is complex and other goodness of fit tests do not give reliable results. The main disadvantage of this method is that the behavior of corresponding test statistic is not thoroughly studied, there are no certain criteria to tell us when the value of this statistic is good enough to say that a proposed distribution fits empirical data well. This problem is of our special interest, several simulations with different distributions are carried out to find out the reference values.

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