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On Simulating the Total Claims Distribution

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ABSTRACT

It has long been recognized that the total claims distribution under the collective risk model can be approximated by generating a random sample of claim amounts. Other approaches have generally been preferred due to the computing time required to obtain a sufficiently large sample. However, advances in computer technology and research on simulation methods have made this approach a very reasonable option. It also has the advantage of flexibility.

This paper briefly reviews the basic procedure for approximating the total claims distribution by simulation. Variance reduction techniques are then discussed. In particular, stratified sampling and the use of antithetic variables produce a more representative sample of the total claim amounts and also reduce the variance of the resulting values of the empirical distribution function. The use of a control variate leads to an alternate estimator of the distribution function. To illustrate these techniques, the paper includes a numerical example involving a compound Poisson distribution with discrete claim amounts.