

**Contribution of the thesis:**

(1) Considering the fact that long tailed right skewed distribution characterizing the probability models under consideration in this work, arises frequently in case of risk modeling in general insurance, our work may be useful for insurance practitioners and experts from the financial industry.

(2) Although, the work have not attempted to specify which clam severity distribution is suited for which category of insurance, yet each of these distributions owe some special features making it appropriate for specific use in various domain of risk analysis. Hence, the methodology concerned with the estimation of the parameters of these distributions by the method of maximum likelihood and the subsequent assessment of the adequateness of the models in describing the uncertainty in the situations under concern, can be beneficial to all realms of statistical analysis in the domain of actuarial science.

(3) The Probability of ruin is an important assessment criterion in judging whether the insurer’s assets match his liabilities sufficiently and hence, is an indicator of insolvency of the insurance company. Apart from issuing warning signals to the company about probable insolvency, it renders other benefits in terms of long range planning for the use of insurer’s funds. Also, it can be remarked that determining probability of ultimate \( \psi(u) \) amounts to solving an integro- differential equation which does not permit explicit solutions to most of the claim severity distributions. Therefore bounds and approximations to the ultimate ruin probability \( \psi(u) \) are required. Hence, this work deals with some of these algorithms aimed at
approximating the probability of ultimate ruin, establishing the consistency between these methods and to the extent possible, have made a comparative analysis between them.

(4) Since with the mixture of exponential distribution, it is possible to derive exact expressions for the probability of ruin and other actuarial quantities like the moments of the time to ruin, surplus prior to ruin and the deficit at the time of ruin, it abolishes the risk of taking vital decisions on the basis of the approximate values of these quantities as in the cases for other claim amount distributions. The methodology for fitting the mixture of exponential distribution might be beneficial in other domains of risk analysis where mixture of exponential emerges as a potential model. In fact, any claim amount distribution lying between zero and infinity, can be approximated as a mixture of two exponentials by virtue of what is known as Tijm’s approximation (Tijm, 1994).

(5) Some of the techniques discussed in the thesis like the method of product integration and Fast Fourier Transform are very powerful techniques having potentiality to be used for the computation of some of the other important determinants in Risk analysis and have vast applications in other domains of applied Mathematics.

(6) The computation of the quantiles of the aggregate claim models not only renders useful insight in aspects of reserving for the management but also have application in other domains like queuing theory where the computation of compound distribution is at times, required to have idea on aggregate service time of a server.
(7) The moments of the time to ruin and the deficit at the time of ruin and surplus just prior to ruin are important quantities in assessing the chance of insolvency. They not only guide the precautionary measures to be taken to avoid any chance of insolvency, but also guide the action to be taken for recovery in case of occurrence of the event of ruin.

(8) Computation of the Probability function until ruin with zero initial surplus enables assessment of the potentiality of a claim to cause ruin. The convolution of the claim severity distributions which we have computed as a requirement for evaluating this function, have scope for applications in other applied domains of statistics requiring the distribution of the sum of random variables generated from these distributions.

(9) Considering the fact that the influence of the interest rate and tax payments upon the surplus process is a more realistic assumption, the ideas of this surplus process can be generalized to deal with some systems of cash flows (Stochastic in nature) in other domains of Risk analysis.

(10) Simulating from the equilibrium distributions of the claim severity distribution might have applications in other domains like reliability analysis and the implementation of simulation aimed at evaluation of ultimate ruin probability via Pollaczek Khinchin formula renders utility in other domains like queuing theory.