# Maxentropic approach to decompound aggregate risk losses

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**Abstract**

This work emerges as an interesting application in Risk and Insurance Mathematics. Here we examined the following problem: Suppose that we have a model $S = \sum_{h=1}^{H} S_h$ with at least two risk sources ($H > 1$), where each $S_h$ is a random sum that occurs with possibly different frequencies but with equally distributed individual losses. Furthermore, suppose that only the total loss $S$ and the frequency of events are observed. Here we combine a procedure to disentangle the frequency of each of the sources with a decompounding methodology to recover the individual loss density from the aggregate data.

The density of individual losses is obtained by means of Maximum Entropy approaches, which has as input the information of the frequencies obtained by a disentangling methodology and the numerical approximation of the Laplace transform of the total loss distribution. The well suited results of our procedure are validated through a simulation study, where we consider several cases and we establish the advantages and limitations of our methodology, as well as suggested directions for further work. The approach discussed here may be useful in the framework of Operational Risk to undertake an assessment on changes in the levels of risk of an institution, helping to control the higher areas of risk and to understand the reasons of those changes.

**Keywords:** Disentangling; decompounding; density reconstruction; maximum entropy

## References

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