Risk Theory with the Generalized Inverse Gaussian Lévy Process

Manuel Morales[1]

Abstract

Dufresne *et al.* (1991) introduced a general risk model defined as the limit of compound Poisson processes. Such model is either a compound Poisson process itself or a strictly increasing Lévy process. Their construction is based on a non-negative non-increasing function Q that governs the jumps of the process. This function, it turns out, is the tail of the Lévy measure of the process. We discuss an illustration of their model using a generalized Inverse Gaussian (GIG) Lévy process. This increasing Lévy process has the gamma and the inverse Gaussian process as particular cases. Although mathematically more complex, the GIG Lévy process keeps some of the nice properties of the simpler gamma process.

KEYWORDS

Risk Theory, Ruin Probabilities, Lévy Process, Gamma Process, Generalized Inverse Gaussian Process.

References

[1] Asmussen, S. (2000). *Ruin Probabilities.* Advanced Series on Statistical Science and Applied Probability. World Scientific.

[2] Barndorff-Nielsen, O.E., Mikosh, T. and Resnick, S., editors. (2001). *Lévy Processes-Theory and Applications.* Birkäuser.

[3] Bertoin, J. (1996). *Lévy Processes.* Cambridge Tracts in Mathematics. **121**. Cambridge University Press.

[4] Cai, J. and Garrido, J. (1998) Aging Properties and Bounds for Ruin Probabilities and Stop-loss Premiums. *Insurance: Mathematics and Economics.* **23**. pp. 33-43.

[5] Dufresne, F.; Gerber, H.U. and Shiu, E.S.W. (1991). Risk Theory with the Gamma Process. *ASTIN Bulletin.* **(21)**2. pp. 177-192.

[6] Jacod, J. and Shiryaev, A. (1987). *Limit Theorems for Stochastic Processes.* Springer-Verlag.

[7] Jørgensen, B. (1982). *Statistical Properties of the Generalized Inverse Gaussian Distribution.* Lecture Notes in Statistics. **(9).** Springer.

[8] Morales, M. and Schoutens, W. (2003). A Risk Model Driven by Lévy Processes. *Applied Stochastic Models in Business and Industry.* **(19)** pp. 147-167.

[9] Schoutens, W. (2003). *Lévy Processes in Finance: Pricing Financial Derivatives*, Wiley.

[10] Yang, H. and Zhang, L. (2001). Spectrally Negative Lévy Processes with Applications in Risk Theory. *Advances in Applied Probability.* **(33)**1. pp. 281-291.

[1]Manuel Morales. Post-Doctoral Fellow at the Department of Mathematics and Statistics, Concordia University and Assistant Professor at the Department of Mathematics and Statistics, York University.