Worst-Case-Optimal Dynamic Reinsurance for Large Claims

Ralf Korn, Technical University of Kaiserslautern, Germany
Olaf Menkens (Speaker), Dublin City University (DCU), Ireland
Mogens Steffensen, University of Copenhagen, Denmark

Keywords: Theory of differential games, Financial markets, worst–case scenario approach

This presentation considers the problem of an insurance company to optimize its reserve process by using dynamic proportional reinsurance. Usually, the reinsurance level will be determined by a ruin probability constraint or by minimizing the ruin probability (see e.g. Hipp and Vogt (2003), Schmidli (2001, 2002, and 2004), or Eisenberg and Schmidli (2008)). Another method is to maximise the expected discounted sum of dividend payments until ruin occurs (see e.g. Gerber (1969), Azcue and Muler (2005), Albrecher and Thonhauser (2008), Schmidli (2008)). Instead of conditioning on the ruin probability, this presentation will introduce a new approach in optimizing reinsurance. This new approach will maximize the controlled reserve process by a worst–case scenario approach.
The worst–case scenario approach has been introduced in the context of portfolio optimisation by Korn and Wilmott (2002). This approach has been extended so far in various ways (e.g. considering different utility function (Korn and Menkens (2005)), optimizing investment portfolio of an insurance company (Korn (2005)), in a stochastic differential game context (Korn and Steffensen (2007))).
The large claim case (also known as Cramér–Lundberg model) is investigated where finding the optimal reinsurance strategy is considered in a differential game setting. Optimality in this context means that the reinsurance strategy is chosen which maximizes the expected worst–case possible. To do so, no utility approach is needed in this set up. Results will be computed and analyzed.
This is work in progress and joint research with Ralf Korn (TU Kaiserslautern) and Mogens Steffensen (University of Copenhagen).

References

[1] Ralf Korn and Paul Wilmott. Optimal portfolios under the threat of a crash. *International Journal of Theoretical and Applied Finance*, 5(2):171 – 187, 2002.

[2] Hanspeter Schmidli. On minimizing the ruin probability by investment and reinsurance. *The Annals of Applied Probability*, 12(3):890 – 907, 2002.