Optimal Capital Allocation for Non-Life Insurance Based on The Probability of Insolvency

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Abstract

In the last decade, many papers were dealing with the capital allocation problem. Cummins (2000) discusses the advantages and disadvantages of some methods of capital allocation, as the marginal capital allocation. Denault (2001) consider a capital allocation based on methods of game theory. Other papers as Wang (2002) and Landsman and Valdez (2003) use the tail conditional expectation to compute capital requirements. Zaks et al. (2006) and Dhaene et al. (2009) derive the capital allocation as a solution of some optimization problem. These papers and others, find the required capital allocation for a single time period, i.e. in a non-life insurance. In this paper we deal with the long run model and we obtain the optimal capital allocation in the quadratic optimization problem as in Zaks et al. (2006) and Dhaene et al. (2009, section 3.2). An implementation to life-insurance is given. In addition, we suggest a new method to determine the premium in life-insurance. We analyze the relation between the discount factor and the probability to insolvency and show how to determine the premium according to this relation.

References

[1] Cummins J.D. (2000), Allocation of capital in the insurance industry. Risk Management and Insurance Review, Vol.3, pp. 7-28.

[2] Denault M.(2001), Coherent allocation of risk capital. Journal of Risk, Vol. 4 (1), pp. 7-21.

[3] Dhaene J., Tsanakas A., Valdez E.A. and Vanduffel S. (2009), Optimal Capital Allocation Principles, SSRN.

[4] Landsman Z. and Valdez E.A. (2003), Tail conditional expectations for elliptical distributions. North American Actuarial Journal, Vol. 7, pp. 55-71.

[5] Wang S.S. (2002), A Set of New Methods and Tools for Enterprise Risk Capital Management and Portfolio Optimization, Working paper, SCOR Reinsurance.

[6] Zaks Y., Frostig E. and Levikson B. (2006), Optimal pricing of a heterogeneous portfolio for a given risk level. ASTIN Bulletin, Vol.36(1), pp.161-185.

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