

PREMIUM EVALUATION FOR DIFFERENT LOSS DISTRIBUTIONS USING UTILITY THEORY

HARMAN PREET SINGH KAPOOR

AND

KANCHAN JAIN

Department of Statistics
Panjab University, Chandigarh-160014, India

e-mail: harman.pu.87@gmail.com

e-mail: jaink14@gmail.com

Abstract

For any insurance contract to be mutually advantageous to the insurer and the insured, premium setting is an important task for an actuary. The maximum premium (P_{max}) that an insured is willing to pay can be determined using utility theory. The main focus of this paper is to determine P_{max} by considering different forms of the utility function. The loss random variable is assumed to follow different Statistical distributions viz Gamma, Beta, Exponential, Pareto, Weibull, Lognormal and Burr. The theoretical expressions have been derived and the results have also been depicted graphically for some values of distribution parameters.

Keywords: utility function, insurance, premium, loss distribution.

2010 Mathematics Subject Classification: 62P05.

REFERENCES

- [1] K.J. Arrow, The theory of risk aversion, Reprinted in: *Essays in the Theory of Risk Bearing* (Markham Publ. Co., Chicago, 90109, 1971).
- [2] K. Borch, *The Mathematical Theory of Insurance* (D.C. Heath and Co., Lexington, MA, 1974).

- [3] K. Borch, *Economics of Insurance* (North-Holland, Amsterdam, 1990).
- [4] N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones and C.J. Nesbitt, *Actuarial Mathematics* (Society of Actuaries, 1997).
- [5] D.C.M. Dickson, *Insurance Risk and Ruin*, International Series on Actuarial Science (Cambridge University Press, 2005).
- [6] M.J. Goovaerts, F. De Vijlder and J. Haezendonck, *Insurance Premium: Theory And Application* (North-Holland, Amsterdam, 1984).
- [7] L. Haim, *Stochastic Dominance: Investment Decision Making under Uncertainty* (Springer, 2006).
- [8] C. Huang and R.H. Litzenberger, *Foundations for Financial Economics* (Prentice Hall, Englewood Cliffs, NJ, 1988).
- [9] R. Kaas, M. Goovaerts, J. Dhaene and M. Denuit, *Modern Actuarial Risk Theory* (Kluwer Academic Publishers, 2004).
- [10] R. Kaas, M. Goovaerts, J. Dhaene and M. Denuit, *Actuarial Theory For Dependent Risks: Measure, Orders And Models*, Vol. 10 (John Wiley, 2005).
- [11] J. Von Neumann and O. Morgenstern, *Theory of Games and Economic Behaviour* (Princeton University Press, 1944).
- [12] H.H. Panjer, (ed.) *Financial Economics, with Applications to Investments, Insurance and Pensions*. Actuarial Foundation (Schaumburg, IL, 1998).
- [13] J.W. Pratt, *Risk aversion in the small and in the large*, *Econometrica* **32** (1964) 122–136. doi:10.2307/1913738
- [14] U. Schmidt, *Axiomatic Utility Theory under Risk*, *Lecture Notes in Economics and Mathematical Systems*, 461 (Springer-Verlag, Berlin, 1998). doi:10.1007/978-3-642-58877-8
- [15] C.L. Trowbridge, *Fundamental Concepts of Actuarial Sciences*. Actuarial Education and Research Fund (Itasca, IL, 1989).
- [16] S. Wang, *Insurance pricing and increased limits ratemaking by proportional hazard transforms*, *Insurance: Mathematics and Economics* **17** (1995) 43–54. doi:10.1016/0167-6687(95)00010-P
- [17] S. Wang, *Premium calculation by transforming the Layer premium density*, *ASTIN Bulletin* **26** (1996) 71–92. doi:10.2143/AST.26.1.563234
- [18] S. Wang and V.R. Young, *Ordering risks: utility theory versus Yaari's dual theory of risk*. IIPR Research Report 97–08 (University of Waterloo, Waterloo, 1997).
- [19] D. Zwillinger and S. Kokoska, *CRC Standard Probability and Statistics Tables and Formulae* (Chapman and Hall, 2000).

Received 11 March 2011