Insurance with heterogeneous preferences

Tim J. Boonen [*1] and Fangda Liu [†2]

[1]University of Amsterdam, The Netherlands.
[2]University of Waterloo, Canada.

Abstract

This paper studies an optimal insurance problem with finitely many potential policyholders. A monopolistic, risk-neutral insurer applies linear pricing, and cannot discriminate in the insurance premium rate. We allow for heterogeneity in the risk-aversion parameters of the individuals. We study two models. In the first model the exponential utility maximizing individuals can self-select their insurance coverage given the market premium rate. We find that partial or no insurance is generally optimal, and the premium optimization can be reduced to a piecewise concave problem. In the second model, the insurer offers only one insurance contract and individuals can either buy it or not. If individuals maximize a fairly general expected utility function, we show that it is optimal for the insurer to offer a full insurance contract. The premium optimization problem is reduced to a discrete problem, where the premium is an indifference premium of one individual in the market. Since the risk-aversion parameters of individuals are generally unobserved, we also present a simulation-based framework in which we simulate the risk-aversion parameters of the individuals. We show that the optimal premium and expected profit per individual for the insurer converge if the number of individuals increases, and we provide numerical examples.

Keywords: insurance contract theory, multiple policyholders, heterogeneous preferences, proportional insurance.

---

[*]E-mail address: t.j.boonen@uva.nl
[†]E-mail address: fangda.liu@waterloo.ca