Till Stowasser

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Exercices for Chapter 2

1. **Demand for insurance and risk aversion**

   (a) Consider an individual with utility function $u(y) = ln(y)$ and calculate the Pratt-Arrow coefficient of absolute risk aversion.

   (b) The individual has an initial endowment W and suffers a loss L with probability π. She can now buy insurance cover C for a premium rate p. Calculate the optimal demand for insurance C^* and verify that she opts for full insurance if the premium is fair.

   (c) Show, and give an intuitive explanation, under what conditions the optimal demand for insurance can be negative.

   (d) How does the optimal demand for insurance change (i) if L increases; (ii) if π increases, (iii) if W increases?

   (e) The insurance company demands in addition to the actuarially fair premium rate $p = \pi$ a constant payment k in order to cover fixed costs. Using a diagram, show that if k is small, full insurance is still the optimal choice for the individual. What is the maximum k_{max} such that the individual still buys insurance?

2. **Comparison of coinsurance and deductible**
   In the real world, deductibles are the much more commonly observed form of partial cover than a proportional coinsurance contract. Show in a diagram that risk averse utility maximizers strictly prefer contracts with a deductible (as long as both contracts create the same expected wealth). Why is that? [Draw an appropriate graph and recall what you know about SOSD (Second Order Stochastical Dominance)]

3. **Pareto efficient risk allocation; Borch-condition**
   Think of an economy consisting of two risk averse individuals, a and b. They face two possible states of the world. The probability for the realization of state 1 is π, the probability for state 2 is $(1 - \pi)$. In state 1, a's (b's) wealth is w_{1a} (w_{1b}), in state 2 it is w_{2a} (w_{2b}). The society's wealth in the two states of the world is simply defined as the sum of the individuals' wealth ($w_1 = w_{1a} + w_{1b}$

and $w_2 = w_{2a} + w_{2b}$). The two agents can now write a contract, in which they reallocate their wealth in both of the two possible states of the world.

(a) Draw the situation in an Edgeworth-Box and show the set of Pareto-efficient risk allocations when there is

(i) no social risk (i.e., social wealth is the same in both states of the world: $w_{1a} + w_{1b} = w_{2a} + w_{2b}$)

(ii) social risk (i.e., social wealth differs in the two states of the world, respectively). Analyze the situation if one of the agents is risk neutral!

(b) Write the social planner's maximization problem and show that in the optimum the Borch-condition $[\frac{\pi u_a'(1)}{(1-\pi)u_a'(2)} = \frac{\pi u_b'(1)}{(1-\pi)u_b'(2)}]$ holds. (*Hint:* Think of the definition of Pareto efficiency. It is sufficient to give one agent her outside option and, subject to this, to maximize the other's utility)