Exam

Insurance Economics

Please note:

- **Answer all three questions**.

- You have **90 minutes** for a total of **90 points**.

- You may use a non-programmable calculator.

- **Best of success!**

1. **[40 points] Insurance demand**
   Consider an individual, named Anna, whose utility function has the following properties: $u'(y) > 0$ and $u''(y) < 0$, where y denotes income. With probability π she loses her entire initial endowment W (i.e., the loss in this case will be $L = W$). Anna can buy insurance cover, q, at unit cost p.

   (a) [10 points] Write down Anna's expected-utility maximization problem and derive the first-order condition for an interior solution. Give an interpretation of this first-order condition. *(Note: In class, we introduced two alternative interpretations: An intuitive and a graphical one. Either one will do here.)*

   (b) [10 points] Assume that Anna's risk preferences satisfy CARA properties. Analytically determine the change in demand for insurance cover if W marginally increases (but L and all other parameters stay constant). Discuss if such a result is likely to hold in real life.

   (c) [10 points] Now assume for the remainder of this question, that Anna's utility function is given by $u(y) = \sqrt{y}$ and that $W = 16$, which continues to be entirely lost with probability $\pi = \frac{1}{2}$. Calculate

   (i) her expected utility, $E(u)$, **without** insurance.
   (ii) her expected income, $E(y)$, **without** insurance.
   (iii) her certainty equivalent, CE.
   (iv) the maximum premium, P^{max}, she would be willing to pay to insure against the risk of losing W.

   (d) [10 points] Anna has a risk-neutral friend, Birgit, with state-independent income of $W = 16$ who is willing to contractually insure her against the risk she faces.

   (i) Explain if this situation is associated with private risk and/or social risk and who of the two individuals is bearing these **before** signing the contract.
   (ii) Draw all Pareto-efficient insurance contracts between Anna and Birgit into an Edgeworth box.

2. **[20 points] Insurance supply**
   A common assumption in insurance economics is that insurance firms offer fair premia in perfectly competitive markets. In class, we talked about three potential reasons why this is unlikely to hold in real life: (i) insurance cost, (ii) risk-averse shareholders, and (iii) the risk of firm bankruptcy.

   (a) [7 points] Which of these three arguments is addressed by the idea of **risk-spreading**? Explain, in your own words, how this sort of economies of scale make the fair-premia assumption less unrealistic if insurance firms are sufficiently large.

   (b) [7 points] Which of these three arguments is addressed by the idea of **risk-pooling**? Explain, in your own words, how this sort of economies of scale make the fair-premia assumption less unrealistic if insurance firms are sufficiently large.

   (c) [6 points] Which of these three arguments is addressed by the **Raviv model**? Explain the intuition behind the result that competitive insurance firms will rather offer deductibles (instead of proportional co-insurance) when deviating from fair premia.

3. **[30 points] Behavioural insurance**

   (a) [7 points] A key takeaway from behavioural economics is that people deviate from rational behaviour when making decisions in real life. Explain why such behavioural biases are especially pervasive in insurance markets.

   (b) [8 points] Nudges are an increasingly popular tool to improve public policy. Explain what nudges are and how they differ from standard policy instruments such as regulation (bans and mandates), economic incentives, and information provision.

   (c) [8 points] At the same time, nudges are also hotly debated. Why do proponents see nudges as especially suitable in addressing the problems identified in sub-question (a)? And what are the main arguments against the use of nudges?

   (d) [7 points] Give an example (or examples) of nudges in insurance markets that illustrate/s the points made in sub-question (c).