

florian.englmaier@lrz.uni-muenchen.de

Sprechstunde: Mittwoch 14:30 - 15:30 Uhr

Ludwigstr. 28 / III, Raum 312

Übungsblatt 7

- **7-1 Adverse selection: Single-Crossing-Property**

The Single-Crossing-Property says that, for every contract with premium P and indemnity I offered, the slope of the indifference curve of the low risks in a two-states-of-the-world diagram is steeper than the slope of the high risks. This implies that indifference curves cross only once.

Show that this property holds if individuals only differ in their risk types.

- **7-2 Adverse Selection: Categorical discrimination**

a) Suppose that the sex would be a perfect signal for the probability of facing a loss. A man's probability π_m is greater as a woman's probability π_f . Argue if it is pareto improving to allow discrimination with respect to the sex

- i) if there was a RS equilibrium. (use a graph for your argumentation)
- ii) if there was a WMS equilibrium. (use a graph for your argumentation)

b) How would your answers change if the sex would only be an imperfect signal for a persons loss probability? (use a graph for your argumentation)

c) Now we have a look on car insurances. There is some evidence, that even there insurers face adverse selection problems. After the market for car insurances in germany was de-regulated, insurers immediately tried to discriminate against the insurees according to many variables. Here we analyse a situation where two insurance companies are in the market and each of them chooses another variable to separate its customers. They either use the customers sex (company 1), or if they are younger or older than 35 (company 2). The tables below gives you the absolute numbers of insurees and the loss probability according to the categories.

		> 35		< 35	
sex	female	30		20	
	male	40		50	

absolute number of insurees

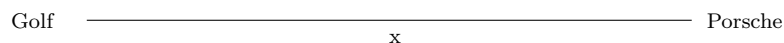
		> 35		< 35	
sex	female	0, 1		0, 15	
	male	0, 15		0, 24	

loss probability according to categories

The loss is either 100 or 0. After calculating the loss probabilities for each category assume that both insurance companies set the fair premium rate. Remember that company 1 only offers contracts discriminating with respect to the sex, while company 2 distinguishes only between the young and the elders. What contract are the customers going to choose? Name each types (women under 35, women over 35, and so on) optimal choice. Calculate the profits of the insurance companies. Is this an equilibrium?

• 7-3 Adverse Selection: Endogenous discrimination

We talk about endogenous discrimination if the insurers discriminate against the insurees with respect to variables the insurers can freely choose. We will examine a car insurance where there are only two different cars, the *Golf* and the *Porsche*. The individuals are equally distributed along a Hotelling-Street with respect to their like or dislike of the two cars. The *Porsche* and the *Golf* are the endpoints.



The insurance charges different premium rates for the two cars. The *Porsche*-driver has to pay p_P and the *Golf*-driver has to pay p_G . We define the *Golf* $\equiv 0$ and the *Porsche* $\equiv 1$. Then we can write a *Golf* buyers utility as $s - x - p_G$. A *Porsche* buyers utility is given by: $s - (1 - x) - p_P$

a) Calculate the x_c that is the cutoff between the *Porsche* and the *Golf* buyers and interpret the expression.

The probability of having an accident is correlated with the individuals preferences for one of the two cars x . The probability for every x is given by $\tilde{p}(x) = 0,1 + 0,1 \cdot x$

b) Characterize the social optimal x_c . You can either derive the solution formally or verbally.

c) What will happen in a market where insurances compete for customers?

d) What happens if insurances use the information revealed by the insurees choice of the car? First calculate the expected loss probability for a *Golf* and for a *Porsche* driver. After that calculate the cutoff x_c given the insurers charge the fair premium (not premium rate). Discuss your result.

e) The loss is now 20. Calculate the premia and the cutoff for this case. Is this an equilibrium? Namely could cross subsidizing improve welfare?