Exam

Adv. PSE IV: Health Economics

Wirtschaftswissenschaftliche Fakultät der Friedrich-Schiller-Universität Jena
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First name:		Last name:	
Student ID number:		Course of study:	

Please note:

(a) The exam consists of 10 pages including this one. Please check whether your copy of the exam is complete.

(b) The exam consists of 3 questions. The maximum number of points receivable is 60. You have 60 minutes to complete the exam.

(c) Please answer the questions by writing into the boxes provided after each question. **Do not use your own paper!** Fill your name and student ID number into the form at the top of each page.

(d) If not defined otherwise, variables have the same meaning as in class. Please make sure that your answers are clearly legible and without any ambiguity. Your answers have to be tractable. If you use diagrams, make sure to label and explain them.

(e) You may use a calculator, but it must not have a text storage function. You may use a dictionary, but it must not contain any notes.

(f) It is your own responsibility to hand in your copy of the exam to the supervisory staff at the end of the exam.

Question	1	2	3	Sum	Grade
Points receivable	20	20	20	60	
Points received					

Question 1: Risk selection *(20 Points)*

Question 1(a) *(12 Points)*

Assume the health insurers practice *direct* risk selection on the basis of a signal $s = 0, 1$. The regulator uses a cost reimbursement scheme to prevent risk selection. This scheme reimburses the share γ ($\gamma \geq 0$) of an insurer's health care expenditures (HCE). The average HCE of a person with the signal s are given by

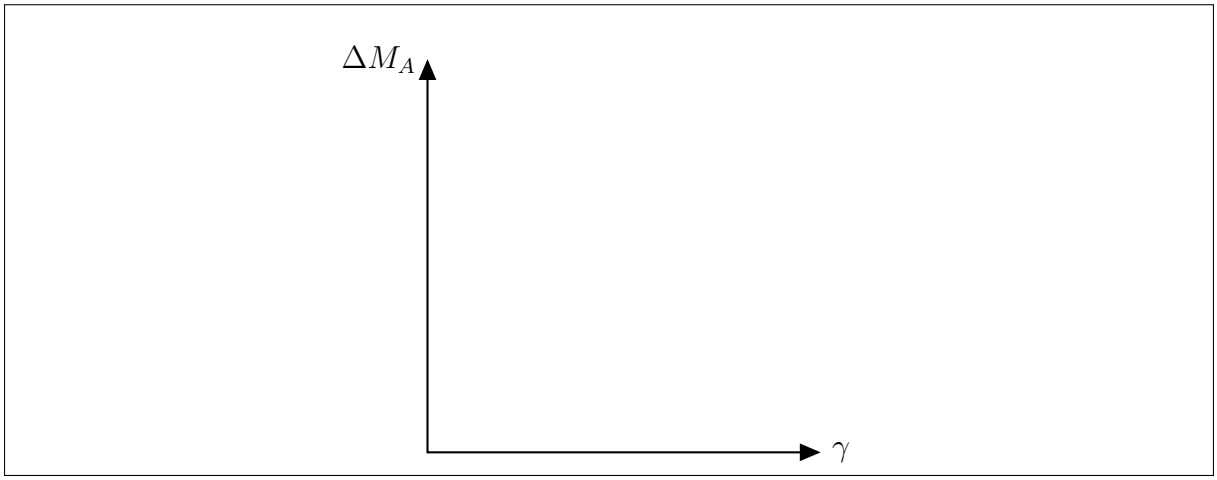
$$M_0(\gamma) = 110 + \alpha\gamma \qquad \text{and} \qquad M_1(\gamma) = 120 + \beta\gamma$$

Incentives for risk selection increase with the difference in HCE

$$\Delta M_A = (1 - \gamma)(M_1(\gamma) - M_0(\gamma))$$

(a1) Assume that $\alpha = 10$ and $\beta = 30$. Show how ΔM_A depends on γ. For which value of γ does ΔM_A reach its maximum? *(5 Points)*

(a2) Illustrate your results of question (a1) in the graph below. *(3 Points)*



(a3) When are incentives for risk selection lower than for $\gamma = 0$? Explain your findings. *(3 Points)*

(a4) What problem emerges if γ is increased? *(1 Point)*

Question 1(b) *(4 Points)*

Explain verbally how sickness funds may be able to engage in *indirect* risk selection even though they are unable to observe risk factors.

Question 1(c) *(4 Points)*

Consider a world where one-half of the individuals are high risks (h) and the other half of the individuals are low-risks (l). The probabilities of illness are $\pi_h = 0.5$ and $\pi_l = 0.2$. In the absence of regulation, both risk types ask for the optimal insurance with quantity $M^* = 4$ of medical care but pay different premiums. If the regulator requires community rating the risk types will buy contracts with different quantity, $M_h \neq M_l$.

How can the regulator achieve that both risk types receive the efficient quantity M^* of medical care while paying premiums independent of the risk type? Explain!

Question 2: Paying providers *(20 Points)*

There is a given group of patients who need health care (treatments). The total benefit of this patient group from treatment is denoted by $B > 0$. There is a payer that reimburses the provider for treating patients. Total reimbursement is denoted by P which has the following linear form:

$$P = F + \gamma C \tag{1}$$

with F denoting basic remuneration and γ denoting the share of actual treatment costs C borne by the payer.
There is only one risk neutral provider with utility

$$u(P, e) = P - C(e) - V(e) \qquad C'(e) < 0, C''(e) \geq 0; V'(e) > 0, V''(e) > 0 \tag{2}$$

with $C(e)$ denoting the monetary costs of treatment as a function of cost reduction effort e and $V(e)$ denoting effort costs. The reservation payoff is $\bar{u}$.

Treatment costs C are uncertain as there is some random disturbance that is beyond the provider's control. The expected treatment costs are given by $EC(e) \equiv E(C(e))$ with $EC'(e) < 0$ and $EC''(e) \geq 0$.

The first best solution comes from

$$\max_{e,P} EW = B - EP \text{ s.t. } EU(P, e) \geq \bar{u} \tag{3}$$

$$EU(P, e) = EP - EC(e) - V(e) \tag{4}$$

with EW denoting expected welfare and $EU(P, e)$ denoting expected utility.
The constraint must be binding. This implies an expected reimbursement of

$$EP = EC(e) + V(e) + \bar{u} \tag{5}$$

Question 2(a) *(18 Points)*

(a1) Explain the economic intuition of (3)! *(3 Points)*

(a2) Use (3), (4) and (5) appropriately to derive the first order condition with respect to e. Explain! *(5 Points)*

(a3) Formally state a penalty contract which can implement the first-best solution if effort e is contractible! Briefly explain it and name possible problems! *(5 Points)*

(a4) Which other type of contract can be used in order to implement the first-best solution if effort e is contractible! How does it look like? Briefly explain! *(5 Points)*

Question 2(b) *(2 Points)*

What is the trade-off if providers are risk averse?

Question 3: Multiple Choice Questions *(20 Points)*

You will be *awarded one point* for ticking a correct statement and for not ticking an incorrect statement. You will *neither receive nor lose points* for marking statements incorrectly.

Question 3(a) Economic evaluation of health and life *(5 Points)*

Correct?	
☐	The average cost-effectiveness ratio of alternative i is given by $$ACER = \frac{\text{money}}{\text{e.g. length of life in years gained}}$$
☐	The incremental cost-effectiveness ratio is given by $$ICER = \frac{\text{additional benefits}}{\text{additional costs}}$$
☐	The Cost-Effectiveness Analysis (CEA) is only suitable if an intervention has effects in more than one dimension.
☐	The method of the Cost-Benefit Analysis (CBA) tells how much money should be spent on an intervention that prolongs life / enhances its quality.
☐	In the human-capital approach the value of life is equal to the discounted sum of the individual's future contributions to the social product.

Question 3(b) Market failure *(5 Points)*

Correct?	
☐	A risk-averse individual will demand full insurance if the insurance premium is fair.

Answer the next two questions within the model world introduced in class: All individuals are risk averse, insurers are risk-neutral. Each individual belongs to one of two groups: those with a high probability of illness and those with a low probability of illness.

Correct?	
☐	Under symmetric information all individuals buy a full-insurance pooling contract.
☐	According to equilibrium concept by Wilson, any candidate for a pooling equilibrium is actually an equilibrium.

The next two questions are about premium risk. Again, please answer them within the same model world discussed in class. The world exists for two periods. In the first period all individuals have the same (low) probability of illness π_L. In the second period, the probability of illness of some individuals increases to a higher probability π_H.

Correct?	
☐	Constant premium contracts fail because individuals with π_H want to cancel their contract in the second period.
☐	Guaranteed-renewable contracts do not have an incentive problem. All individuals want to stay in their contract in the second period.

Question 3(c) Optimal health insurance contracts *(5 Points)*

Assume the same model world as in class: Individuals who prevent have a lower probability of illness than individuals who do not prevent.

Correct?	
☐	In a state-contingent income diagram (*with "Good State" on the horizontal axis*) an individual who prevents has a steeper indifference curve than an individual who does not prevent.
☐	With symmetric information, insurers will offer full-coverage contracts for those who prevent and for those who do not prevent.
☐	With asymmetric information, insurers will only offer a contract with a fair premium for individuals who do not prevent.

The following two questions are about co-payments.

Correct?	
☐	A proportional co-payment scheme, where the individual bears a fixed proportion of his or her own medical expenses, improves economic efficiency.
☐	An absolute per-period deductible, where the individual pays for his or her own medical expenses up to a certain threshold, improve economic efficiency irrespective of the value of the threshold.

Question 3(d) Supplier-Induced Demand *(5 Points)*

Correct?	
☐	The dual role of a physician as the one who diagnoses and treats patients may lead to supplier induced demand, i.e. to an inefficiently low level of demand for health care services.
☐	According to the model discussed in class, if physician density is very low so that primary demand per physician exceeds physicians' working capacity, the service volume increases with physician density one to one.
☐	Unless physicians have very strong objections against inducing demand, the service volume per patient, q, rises with physicians' density, δ, for large δ. The smallest δ for which this holds denotes a physicians' density where primary demand is just met when physicians work full time.
☐	Supplier-induced demand is more likely to occur with a payment system based on a fixed fee per patient and with patients with full insurance.
☐	Asymmetric information between physicians and their patients is a sufficient condition for demand inducement by physicians.