

Public Economics

Final exam

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The exam lasts 90 minutes. Documents are not allowed. The use of a calculator is allowed. Any other electronic devices are forbidden. You can answer either in French or in English. Answer the *two exercises* and *one out of the two questions* below.

Exercise 1

6 points

Consider a large population of commuters. They can individually decide to use either their car or the train to commute. Commuting by train takes 70 minutes whatever the number of persons taking the train. Commuting by car takes $C(x) = 20 + 60x$ minutes, where x is the proportion of commuters taking their car, $0 \leq x \leq 1$.

1. Explain intuitively why travel time by car varies with x . 1
2. Show that, if everyone is taking her decision freely and independently so as to minimize her own commuting time, the equilibrium proportion of commuters who will travel by car is $x_m = \frac{5}{6}$.
Hint: Each individual chooses the mode of transport that has the lowest commuting time given x . In equilibrium, individuals are indifferent between the train and the car. 1
3. Show that the proportion of car users that minimizes the total (or average) commuting time is $x_e = \frac{5}{12}$. 1
4. Compare answers to the two previous questions. Why do they differ? How large is the deadweight loss? 1
5. Assume that commuters value their time as if 1 minute is priced 1 euro. How could a toll help to achieve social optimality? What fare should be charged on car users? 2

Exercise 2

8 points

Physicians choose the level of care x they provide to each of their patients. For the doctor, the cost (translated in monetary units) of providing x units of care is $C(x) = 5x^2 + 5$. For a representative patient, the benefit (translated in monetary units) of receiving x units of care is $B(x) = 90x - 10x^2$.

1. Define the socially optimal level of care x^* . Show that $x^* = 3$. 0.5

Let us assume that physicians have the following utility function:

$$U(x) = (1 - \lambda)P(x) + \lambda B(x) - C(x),$$

where $\lambda \in [0, 1]$, and $P(x)$ is the monetary payment received by the doctor from a third party—e.g. the state—when she provides x units of care to a patient.

2. What does λ represent? 0.5

Suppose first that there is no health system and that physicians are not paid when they provide care, i.e. $P(x) = 0$.

3. What will be the level of care x^a provided by physicians? 1
4. Discuss how x^a varies with λ . 1

From now on, assume that $\lambda < 1$. Let us suppose that the government want to use retrospective payments to pay physicians. Under such a setting, physicians choose the level of x and received K euros per unit of care provided, that is $P(x) = Kx$.

5. What will be the level of care x^r under this setting? 1
6. Compute the amount K^* that ensures that $x^r = x^*$. 1
7. What happens if the government sets $K \neq K^*$? 1
Note: Assume that, for some reason, K cannot exceed 90.

Assume now that the government uses a prospective payment system. Under such a scheme, a physician receives a given amount K_p per patient treated if at least \bar{x} of care have been provided. In other words, $P(x) = K_p$ if $x \geq \bar{x}$, and $P(x) = 0$ if $x < \bar{x}$.

8. What are the values of \bar{x} and K_p that the government needs to choose to ensure that physicians provide the socially optimal level of care x^* ? 1
Hint: The government must set \bar{x} and K_p such that physicians have incentives to provide care, and they provide the required level of care.
9. Discuss whether the government should use a prospective payment system or retrospective payments depending on λ . 1

Question 1

6 points

Consider a country where the largest part of health insurance is provided by private firms—e.g. the United States. Some health insurance companies would like to use genetic testing to have more information about the health status of their applicants. Should the government allow them to act so?

Hint: You might want to think about the following sub-questions. Would genetic testing help or hurt those who have bad health prospects? Would it help or hurt those who are have good health prospects? Would it exacerbate or mitigate the problem of adverse selection in the health insurance market? Would it increase the number of people without health insurance?

Question 2

6 points

You have been hired by the PACA region to evaluate a reform. This reform imposes harsh training requirements on those who receive unemployment benefits. These requirements may both increase employability of unemployed people and make unemployment benefits less “attractive” for cheaters. The local authorities would like to know whether this reform induced individuals to increase their labor supply, and hence earn more from labor income. This reform has been applied in 2012 to single male individuals living in PACA region. For your evaluation, you are provided with the following information on average weekly earning in euros of male residents living in PACA and Aquitaine regions.

Region	Year	Marital status	Labor income
PACA	2011	Single	170
PACA	2011	Married	200
PACA	2012	Single	210
PACA	2012	Married	230
Aquitaine	2011	Single	220
Aquitaine	2011	Married	240
Aquitaine	2012	Single	240
Aquitaine	2012	Married	270

Propose two difference-in-differences estimators of the impact of the reform. For each of them, give the assumption required for the estimator to be valid, and compute the value of the estimator. Finally, discuss which one you would consider as more valid.

Note: This question and the numbers provided are purely imaginary.