# **Public Economics**

Fall 2024

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You have a total of 120 minutes (2 hours) to solve the exam. Read each question carefully. If you need additional space to write, please use the back of the same page. Good luck!

I (5 points)

Discuss the following propositions (max. 10 lines for each).

(a) (1.25 points) A policymaker who wants to maximize a Rawlsian social welfare function will defend poverty-alleviation programs.

According to the Rawlsian social welfare function, welfare of a society is defined by the utility of the person who is worse off. Poverty-alleviation programs are meant to ensure that people are above the poverty line and are typically directed towards those who are worse off (in terms of income, which highly correlates with utility). Therefore, we can argue that this statement is true: poverty-alleviation programs will in fact promote welfare according to the Rawlsian view.

*Grading:* 0.5 *for the Rawlsian social welfare function,* 0.25 *for poverty-alleviation programs,* 0.5 *for the conclusion.* 

(b) (1.25 points) Increasing the minimum retirement age is the best way to ensure sustainability of social security.

Legacy debt together with increasing life expectancy pose a challenge to the sustainability of social security in unfunded systems. Increasing the legal retirement age has costs (in terms of productivity, labor disutility and labor market). Increasing the minimum retirement age (depending on the increase) will impact social security wealth and will therefore impact intergenerational fairness (depending on the concept of fairness), despite the progress in terms of health and life expectancy. Several possible alternative measures can be considered (and compared).

Grading: 0.25 for identification of the problem; 0.5 for the discussion of the measure; 0.5 for comparison with other measures and conclusion

(c) (1.25 points) The replacement rate for disability insurance should be higher than the replacement rate for worker compensation.

There is a strong argument for the consumption smoothing value in disability insurance (unpredictability, magnitude) and also for less possibility of moral hazard when compared to to worker compensation (where there is an additional difficulty in verification connected to the qualifying event, "on the job" injuries). That would lead to the recommendation, based on efficiency of a higher replacement rate for disability insurance.

*Grading: 0.5 for the consumption smoothing argument; 0.5 for the moral hazard argument; 0.25 for the conclusion and recommendation.* 

(d) (1.25 points) Lobbying can help achieve more efficient policy decisions.

In a representative democracy, elected officials may or may not represent the median voter's choice with respect to public good provision. Moreover, the median voter choice may or may not coincide with the efficient level due to concentration of costs and benefits. Lobbying might help convey information on intensity of preferences but it might improve or hinder efficiency, since it is generally promoted by a small number of economic agents.

Grading: 0.25 for the discussion of representative democracy issues, 0.5 for the connection between the median voter and efficiency and 0.5 for the discussion of the impact of lobbying.

II (5 points)

Consider a mixed good such that the aggregate demand curve for the *private component* is given by p = 10 - 2q.

Assume that there are 3 agents in this economy.

Let the individual marginal valuations for the *public component* of the mixed good be  $p_1 = 2 - 0.5q$  (for agent 1),  $p_2 = 2 - 0.5q$  (for agent 2), and  $p_3 = 4 - q$  (for agent 3).

The marginal cost is 10.

a. (1 point) How much would be consumed without government intervention?

Market Outcome:  $p^{Priv} = MC \Leftrightarrow q^{Priv} = 0$ 

*Grading:* 0.5 *for the identification of the relevant demand and supply;* 0.5 *for the correct calculation* 

b. (1.5 points) How would you aggregate the individual demands for the public component? What would the efficient quantity be?

We need to aggregate the individual demands for the public component vertically:

 $p^{Pub} = 2 - 0.5q + 2 - 0.5q + 4 - q = 8 - 2q$ 

Then, the public component is similar to a positive externality (marginal external benefit) and therefore the efficient quantity is such that:

 $p^{Priv} + p^{Pub} = MC \Leftrightarrow 18 - 4q = 10 \Leftrightarrow q^* = 2$ 

*Grading:* 0.75 *for the aggregation of demands for the public component,* 0.75 *for the reasoning and calculation of final result.* 

c. (1 point) Suggest one subsidy policy in order to achieve the efficient solution.

One possibility would be a Pigouvian subsidy to producers such that  $P^{Priv}(q^*) = MC - S \Leftrightarrow 10 - 4 = 10 - S \Leftrightarrow S = 4$ 

*Grading:* 0.25 *for mention of Pigouvian subsidy;* 0.75 *for explanation and calculation.* 

d. (1.5 points) In case this mixed good is primary education, would your preferred policy recommendation be the one in c. or would you recommend any alternative policy? What if the good were higher education? (max. 12 lines)

Education is a mixed good and therefore private provision will not ensure efficiency, but different solutions (including public provision and different degrees of public financing) can be discussed. For efficiency, the extent to which the government should intervene and subsidize the primary and the higher education market is directly related to how large the public component of this good is in comparison with the private one. It would be important to compare whether labor market gains from additional years of primary and tertiary education are in fact a result of increased productivity (human capital theory), or if instead, there are large signaling/screening effects – the latter hypothesis would not recommend as much government intervention in this market. Other arguments include additional spillovers/externalities (citizenship, health), educational credit market failures, failure to maximize family utility and redistribution. The role of education in income mobility has important fairness implications – and this should be discussed both for primary and higher education.

*Grading:* 1 for pointing the efficiency and fairness arguments for government intervention in education; 0.5 for the discussion of the relevance of these arguments at primary and higher education levels

## III (3.5 points)

Labor City is currently experiencing an economic crisis. Alfredo is 37 years old and lives and works in Labor City. Letting y denote income, Alfredo's utility function is  $u(y)=\sqrt{y}$ . If Alfredo becomes unemployed, he has an income of 0. If he remains employed, he has an income of 100.

a. (1 point) What would be the actuarially fair premium for the unemployment risk if the probability of becoming unemployed were 30%? How many units of insurance would Alfredo buy at that premium?

# (0.5 points) AFP for Alfredo: 0.3\*100=30 (0.5 points) Alfredo is risk-averse (u''<0) and will therefore want full insurance at the AFP.

Assume now that the risk of unemployment depends on age: it is 50% for workers older than 35 years old (that represent half of the population) and 10% otherwise.

b. (1.5 points) If the insurance company can only charge one premium, what would the actually fair premium be? Would Alfredo still want to take that insurance? What about his younger sister Bella, who is 29 years old (assume Bella has the same utility function and income as Alfredo)?

(0.35 points) AFP pooled: 0.3\*100=30
(0.35 points) Alfredo takes the insurance since it is actuarially favorable
(0.8 points) Bella's willingness to pay is 19 (the CE is 81) and will not take full insurance at a premium of 30.

c. (1 points) Do you think there might be a good argument for public provision of unemployment insurance in this city? (max. 8 lines)

(0.5 points) There is an efficiency issue: there is adverse selection and not all agents are able to get full insurance. (0.5 points) If the insurance provider were allowed to charge a different premium based on age, there would also be a fairness issue. Public provision would be a possible alternative.

#### IV (4 points)

Assume that the current income tax function has the following shape: T(Y)=5+0.25Y, where Y denotes income.

a. (1 point) Is this function progressive?

No. The average tax rate is 5/Y+0.25 and it is decreasing in income. Therefore, the function is regressive.

*Grading:* 0.5 *for the justification,* 0.5 *for conclusion.* 

b. (1.5 points) The government is considering allowing for a tax credit for rent expenditures. The credit will be of up to 6 monetary units regardless of income. Would this change your answer in a)? What if this were a tax deduction of the same amount?

Yes. The tax credit is subtracted from T and therefore the new tax function is -1+0.25Y. The average tax rate becomes -1/Y+0.25 and this is increasing in income, making the tax function progressive. A tax deduction of 6 would lead to a tax function of 5+0.25\*(Y-6)=3.5+0.25Y. This would still be regressive.

0.25 for each calculation, 0.25 for each conclusion.

c. (0.75 points) The government needs to collect additional revenue and is planning to increase the marginal tax rate to 0.5 next period and then bring it back to 0.25. Taking into account efficiency considerations, what would you recommend to the government? (max 6 lines)

The deadweight loss varies more than proportionally with the tax rate: the efficiency cost will be higher the farther away you are from the equilibrium quantity in the market (before taxes). Therefore, the recommendation would be to smooth the increase in taxes over time and to avoid sudden shifts: a constant tax rate of 0.375 for both periods would be better than 0.5 followed by 0.25.

*Grading: 0.5 for the connection of the deadweight loss with the tax rate; 0.25 for the right recommendation.* 

d. (0.75 points) If the government has fairness concerns as well, explain how your answer might change (with no additional calculations, max. 6 lines).
 The goal may be to maximize a social welfare function – and there may or may not be fairness reasons to collect more revenue in one period.

*Grading:* 0.5 *for the idea of maximizing a social welfare function;* 0.25 *for the discussion.* 

### V (2.5 points)

Taking into account efficiency and fairness considerations, discuss the need for public financing and/or public provision of health insurance (max 25 lines).

Efficiency arguments for public financing and/or provision include: asymmetry of information and possible adverse selection (and need for consumption smoothing); externalities (health is a mixed good); paternalistic concerns; economies of scale. Fairness arguments include: redistribution (from low-risk to high-risk), access regardless of income (Rawlsian social welfare function).

Efficiency arguments against public financing and/or provision include moral hazard: reduced precaution/increased odds/increased expenditure by patients, increased expenditure due to providers. The point would be to try to get to the flat of the health benefit curve (where one more euro of healthcare spending corresponds to one more euro of health benefit).

For efficiency, an optimal system would involve partial insurance: for example, deductibles for small expenses to try to balance the consumption smoothing benefits and the moral hazard costs. Full coverage in health insurance is usually not optimal if one were to only care about efficiency. For fairness reasons, partial insurance may be problematic under a Rawlsian social welfare function – since low-income agents might face a larger relative cost.