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Public Economics
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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) The best way to overcome the iron triangle of poverty-alleviation programs is to include ordeal mechanisms.

It is impossible to reduce the costs of a poverty-alleviation program while simultaneously encouraging work and redistributing more: this is the iron triangle. One possibility to avoid this is, in fact, ordeal mechanisms (such as workfare), since they may prevent moral hazard. The ordeals should be more costly to those who should not take advantage of the program, and there are also alternatives that can be considered (such as a mix with categorical programs).

Grading: 0.5 for the description of the iron triangle; 0.375 for the concept of ordeal mechanism; 0.375 for the discussion and conclusion

(b) (1.25 points) Magnitude and predictability of the loss should be the key drivers of the difference in replacement rates between disability insurance and worker compensation policies.

Unpredictability and magnitude are key drivers of the determination of the consumption smoothing value in disability insurance and worker compensation policies (when compared to self-insurance). An argument could be made that this added value is greater under disability insurance.
However, for efficiency, another key driver would be moral hazard, that tends to be lower in disability insurance 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. Moreover, fairness concerns may contribute towards the design of these policies as well.

Grading: 0.5 for the link of consumption smoothing value, magnitude and predictability; 0.5 for moral hazard; 0.25 for the discussion and conclusion

(c) (1.25 points) If there is only one cake to divide among two agents who desire more cake, the utilitarian choice will satisfy the equal-division lower bound.

False. If two agents are splitting a cake and agent 1 has utility x_1 and agent 2 has utility

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$2x_2$, the utilitarian choice would be to give 0 to agent 1 and 1 to agent 2 – and this violates the equal-division lower bound (since agent 1 would strictly prefer equal division).

Grading: 0.25 for the notion of utilitarian choice; 0.25 for the notion of equal division lower bound; 0.5 for the counterexample and 0.25 for conclusion

(d) (1.25 points) Due to the concern with intergenerational fairness, increasing the minimum retirement age is not the best way to promote 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 intergenerational fairness; 0.5 for comparison with other measures and conclusion

II (4 points)

Suppose that your neighborhood association is considering building a park (that will be freely accessible to all people in the neighborhood). Let Q denote the number of hundreds of square meters of the park.
There are two groups of people in the neighborhood, with different preferences. There is a group of 10 (lower income) people where each person has a demand given by Q = 10 – 2P and a group of 5 (higher income) people where each has a demand given by Q = 10 – P. The cost of building each hundred square meters is 50.

   a.   (1.25 points) What is the socially optimal size of the park?

Pa=5-Q/2 ; Pb= 10-Q

Samuelson Condition: 10(5-Q/2)+5(10-Q)=50 (=) Q*=5

Grading: 0.5 for identifying this is a public good and naming the Samuelson condition, 0.5 for calculation, 0.25 for conclusion.

   b.   (1.75 points) One of the members claims that the association will not be able to charge Lindahl tax-prices and instead suggests setting a unit tax of 3 for lower-income people and a unit tax of 4 for higher-income people, allowing a majority to decide on the size of the park. Comment on the initial statement (max 5 lines) and determine the size that would result from the proposal.

The attempt to charge Lindahl tax-prices would require all agents announcing their true preferences and they would have an incentive to free ride (and understate their values for the park).
Based on the proposal, lower income agents would choose a quantity of 10-2*3=4, whereas higher income agents would choose a quantity of 10-4=6. Majority decision would lead to 4 being chosen.

Grading: 0.75 for the comment on Lindahl tax-prices, 1 for calculations and conclusion.

  c. (1 point) The park also generates clean air and has an additional effect on the neighborhood, estimated as a (total) benefit of 40. What would the efficient size of the park be in this case?

Since there is now a positive externality, efficiency requires incorporating the marginal external benefit. However, if the benefit happens regardless of the size of the park, there should be no change to the size determined in a).

Grading: 0.25 for identifying the positive externality, 0.75 for the conclusion.

III (5.5 points)

Country X has two equal-sized groups of people: men (M) and women (W).
Without medical expenses, each person will consume the entire income of 25. However, 25 is also the amount to be spent on medical care, in case it is needed.
Each person requires medical care with different probabilities, depending on the group: probability 10% for men, and 50% for women.
We are given the following information for each person's willingness to pay for full insurance, and risk premium:

	M	W
AFP	2.5	12.5
WTP	4	18.75
Risk Premium	1.5	6.25

  a. (2 points) Knowing that each woman has a utility function of $U=\sqrt{C}$, where C is the amount of consumption, fill in the missing elements of the table.

$AFP\_M = 0.1*25 = 2.5$
Since WTP=AFP+RP, $WTP\_M = 4$

$AFP\_W = 0.5*25 = 12.5$
For women, the Certainty Equivalent (CE) is such that: $U(CE)=0.5*U(0) + 0{,}5*U(25) \Leftrightarrow$
$\sqrt{CE} = 0.5*\sqrt{25} \Leftrightarrow CE = 6.25$
$RP\_W = E(X\_W) - CE\_W = 0.5*25 - 6.25 = 6.25$
So: $WTP\_W = 12.5 + 6.25 = 18.75$

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b. (1 point) The law forbids discrimination based on gender in the provision of insurance. What do you expect to happen in this market (assume that the insurance market is perfectly competitive)?

If the insurance company cannot distinguish among agent's types, it will initially charge a pooled AFP: $AFP\_Pooled = 50\%*AFP\_M + 50\%*AFP\_W = 0.5*2.5 + 0,5*12.5 = 1.25 + 6.25 = 7.5$
At such price, since $WTP\_M < AFP\_Pooled$, men will not buy insurance. The insurance firm will start making a loss and increase its AFP until AFP_W.
Since men leave the market, only women will remain. This is a situation of Adverse Selection.

c. (1.25 points) One of the reasons for the different probability of requiring health care between men and women is reproductive care. Also taking into consideration implications on the pension system, should the law banning discrimination in the provision of insurance remain in place? (max 10 lines)

Efficiency vs. equity arguments: without discrimination, not all agents are able to get full insurance due to adverse selection. Thus, if the law allowed for different premiums based on gender, efficiency might be achieved. However, this may be deemed as unfair and would further aggravate gender inequality.
Implication on the pension system: aging population and declining birth rates hinder the sustainability of the pension system. So, ensuring equitable access to healthcare for women can help maintain their health and productivity, while fostering their greater economic participation and social contributions, without jeopardizing their family decisions. This, in turn, would benefit the overall economy and contribute to a more sustainable pension system, which also means an efficiency argument (and not just fairness) for the law.

d. (1.25 points) Comment on the following statement: "There are efficiency and fairness arguments for the government to provide health insurance for all." (max 10 lines)

As seen in b), asymmetry of information leads to a situation where men would leave the market and would prefer facing the risk instead of getting full insurance. This is a typical case of Adverse Selection. As such, solely for efficiency purposes, there is room for government intervention, as insurance allows agents to increase utility by being able to smooth consumption and transfer risk to the insurance firms. Moreover, on

fairness grounds, further arguments can be done, such as the government intervening for paternalistic concerns or to do redistribution. Government intervention can thus be done by mandating or providing the insurance, such that efficiency and fairness are reached. Also, to minimize Moral Hazard issues, the government can introduce 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.

Grading: 0.5 for efficiency arguments (adverse selection and consumption smoothing), 0.25 for fairness arguments, 0.5 for moral hazard vs. consumption smoothing.

IV (3 points)

Assume that there are only two equal-sized groups of people in this economy and let t_1 and t_2 represent the tax rate charged on each group's income. The deadweight loss associated with taxing each labor income in group 1 is $DWL_1 = t_1^2$ and in group 2 it is $DWL_2 = 2t_2^2$

a. (1.5 points) A government official claims that t_1 should be twice as high as t_2, because that is what would maximize efficiency. As a policy advisor for the government, what would you suggest? (Max. 10 lines)

To maximize efficiency, the optimal tax rates would be such that:

Min DWL1+DWL2 s.t. R1+R2=Revenue goal

We would use the Ramsey rule to solve:

$$\frac{MDWL_1}{MR_1} = \frac{MDWL_2}{MR_2} \iff \frac{2t_1}{MR_1} = \frac{4t_2}{MR_2} \iff t_1 = 2t_2 \frac{MR_1}{MR_2}$$

Hence, to maximize efficiency t1 should be twice as high as t2 only if $MR_1 = MR_2$, but this information is missing. To optimally advise the government, we need to know the Laffer curve.

Grading: 0.25 for setting the problem, 0.25 for the Ramsey Rule, 0.5 for solving to find t1=2t2 only if MR1=MR2, 0.5 to say there is information missing regarding the Laffer curve.

b. (1.5 points) Based only on the information on the deadweight loss, explain why group 2 could be the higher-income group in this economy. The government needs the proposal to be approved by an opposition party that has expressed fairness concerns. How would your suggestion from a. change? (max 8 lines)

Group 2 might be the higher-income group in this economy as the DWL increases more with income taxation than group 1. This can be explained by a greater elasticity of their labor supply and stronger behavioral responses to income taxation.

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The suggestion in a) was based solely on the Ramsey Rule, which only accounts for efficiency concerns, i.e., it only cares about minimizing the sum of the deadweight loss, with no concern for fairness or equity. Hence, the suggestion in a) should change if one also wants to consider fairness and equity concerns.

On fairness and equity grounds, the government could value Horizontal Equity – make sure that similar individuals are treated equally by the tax system, despite different economical choices – or Vertical Equity – make sure that higher income individuals pay more income taxes.

To respect vertical equity and if group 2 is the higher-income group, the government should not follow the suggestion in a) – taxing more heavily the lower-income group. Instead, the government might charge progressive income taxes, where the average tax rate rises with income. Alternatively, the government could maximize some sort of social welfare function instead of minimizing the deadweight loss.

Grading: 0.25 for why group 2 might be higher-income group; 0.25 for acknowledging that the Ramsey Rule only cares about efficiency, 0.5 for discussing how can fairness/equity be defined in this context, 0.5 for presenting at least one policy suggestion.

V (2.5 points)

Taking into account the role of the government in the provision of higher education, do you think you should pay more tuition? Discuss your reasoning on efficiency and equity grounds. (Max 20 lines)

Education is a mixed good and therefore private provision will not ensure efficiency. The extent to which the government should intervene and subsidize the higher education market is directly related to how large the public component of this good is in comparison with the private one.

Many points could be made for government intervention in education – e.g. increased productivity, spillovers/externalities, citizenship, educational credit market failures, failure to maximize family utility and redistribution – but these should be discussed in terms of how relevant they are at the university level. Moreover, it would be important to discuss if labor market gains from additional years of 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. Regarding equity, several arguments could be made, including individuals' ability to pay and income mobility.

Grading: 0.5 for acknowledging higher education is a mixed good; 0.5 for pointing the arguments for government intervention on education; 0.5 for the discussion of the relevance of these arguments at higher education level; 0.5 for discussion on returns to higher education (human capital theory vs. screening); 0.5 for discussing fairness/equity arguments in this context.