Public Economics

Spring 2023

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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 minimum income program should be means-tested, and the benefit reduction rate should be smaller than one.

Minimum income programs provide benefits intended for those who are below the poverty line. Categorical programs may fail to capture some people below the poverty line (and may capture others above it). Means-tested programs, based on verification of income and assets, may limit a moral hazard problem (access to benefits for those above the poverty line), but can generate other moral hazard costs, decreasing the incentive to work. The benefit reduction rate should be smaller than 1 to create that incentive, even though that will also increase the costs of the program for the same redistribution (an example of the iron triangle of poverty alleviation programs). Another feature that could help prevent moral hazard in means-tested programs is an ordeal mechanism (such as workfare).

Grading: 0.5 for the discussion of means-testing; 0.5 for the discussion of the benefit reduction rate mechanism; 0.25 for additional points with respect to the system

(b) (1.25 points) The choice made by a utilitarian social welfare function will satisfy the equal-division lower bound.

False. Let agent 1's utility function be $u_1=x_1$ and let agent 2's utility function be $u_2=2x_2$ Maximizing x_1+2x_2 s.t. $x_1+x_2=2$ yields $x_2=2$ and $x_1=0$ and this violates the equal divison lower bound.

Grading: 0.25 for notion of utilitarian SWF, 0.25 for notion of equal division lower bound, 0.5 for a counterexample, 0.25 for conclusion.

(c) (1.25 points) A disability insurance program should include different replacement rates depending on the type of disability.

Disability Insurance (DI) consists in benefits to those who suffer a permanent disability that prevents them from working. In order to determine the replacement rate(s), and for efficiency purposes, the trade-off between Consumption Smoothing and Moral Hazard should be assessed. DI covers an unpredictable event with high magnitude and

therefore high CS benefits. MH may be stronger for some disabilities and therefore it could make sense to think of targeting DI and adjust the replacement rates with respect to different types of disability. However, this would pose significant fairness concerns.

Grading: 0.25 for defining DI, 0.5 for efficiency argument, 0.5 for fairness discussion.

(d) (1.25 points) Workers should be able to opt out of Social Security.

Legacy debt and increasing life expectancy pose a challenge to the sustainability of unfunded pension systems. Retirement is predictable but the magnitude of the loss creates a significant consumption-smoothing value for social security (that also includes coverage for other risks). Sustainability of the system is therefore relevant for efficiency. Opting out might avoid crowding out, but it might aggravate the sustainability issue, since contributions would be reduced - especially if higher income agents are the ones that opt out, generating important fairness concerns as well. This would also change the nature of the system, potentially creating efficiency costs: a possible reduction in benefits and in consumption smoothing for those that remain in the system; possible myopia (and not enough self-insurance) by agents who opt out.

Grading: 0.25 for identification of challenges, 0.75 for the efficiency and fairness analysis of opting-out, 0.25 for additional points and conclusion

II (3.75 points)

Agent 1 likes to smoke and derives a total benefit of $20s-s^2$ from smoking s cigarettes. The unit price of cigarettes is 4.

Agents 2 and 3 do not like smoke and face a total cost of 6s each.

a) (0.5 points) How much would agent 1 smoke if there is a right to smoke?

PMB = PMC => 20-2s = 4 (=) s = 8

b) (1 point) What is the socially optimal level of smoke?

SMB=SMC => 20-2s = 4+6*2 (=) s*=2

c) (1 point) Find the Pigouvian tax that would lead to the socially optimal level.

Pigouvian tax = MD = 12

d) (1.25 points) Explain why smoke can be considered a public bad (or good) and suggest an alternative policy to get the agents to agree on the socially optimal level.

There is impossibility of exclusion (in this case, impossibility of rejection) and nonrivalry in consumption.

Lindahl tax-prices and subsidies:

- Subsidies to agents 2 and 3 in the value of 6 each (equal to their Marginal cost)
- Tax to agent 1 equal to the MB evaluated at the socially optimal level of s*=2: 20-2s*=16

Or Coase Theorem and negotiation (small number of agents), with quantification of payments for the given property rights.

Grading: 0.5 for explanation of public bad/good features; 0.25 for Lindahl/Coase and 0.5 for describing the policy (including quantification).

III (4.5 points)

In Salut County, there are two types of agents – the Healthy (H) and the Unhealthy (U). There are 50% of people of each type. All agents have an income of 100 to spend in consumption. However, if they become sick, they have to spend 64 in medical expenditures. Both agent types have the same utility function $u = 2\sqrt{x}$, where x is their income. However, while the healthy group only has a 25% probability of getting sick, the unhealthy ones have a 50% probability.

a. (2 points) Find the actuarially fair price and the maximum willingness to pay for full insurance, for each agent type.

 $AFP_H = E(loss) = 16; AFP_U = E(loss) = 32$ $U_H(CE_H) = E(U_H) \Leftrightarrow CE_H = 64; U_U(CE_U) = E(U_U) \Leftrightarrow CE_U = 81$ $RP_H = E(U_H) - CE_H = 3; RP_U = E(U_U) - CE_U = 4$ $WTP_H = AFP_H + RP_H = 19; WTP_H = AFP_H + RP_H = 36$

Grading: 0.5 for AFPs, 0.5 for CEs, 0.5 for RPs, 0.5 for WTPs.

b. (1.25 points) If insurance firms cannot distinguish among agent's types, explain what you expect to happen in this market.

Firm begins by charging AFP_Pooled = (AFP_H+AFP_U)/2 = 24 Since WTP_H < AFP_Pooled, H does not but insurance and exits the market. The firm starts experiencing losses, and increases the AFP up until AFP_U. Only the U are left in the market. We call this Adverse Selection.

Grading: 0.5 for AFP_Pooled, 0.5 for the explanation on the market adjustment, 0.25 for acknowledging adverse selection problem.

c. (1.25 points) Explain how the government could intervene in this market to promote efficiency and fairness (with no additional calculations, max. 10 lines).

As seen in b), asymmetry of information leads to a situation where the H type 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. Moreover, on fairness grounds, further arguments can be done, such as the government intervening for paternalistic concerns or to do redistribution (from the Healthy to the Unhealthy group). 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,* 0.25 *for fairness,* 0.5 *for recommendations.*

IV (4.25 points)

As a government advisor for your small country, you are asked to suggest arguments to address the opposition regarding income tax policy.

There are currently two income brackets: everyone who makes from 0 to 1000 has a tax rate of 10% (on total income); everyone who makes more than 1000 has a tax rate of 20% (on total income).

Moreover, there is a tax credit of 100 for education expenses.

a) (1.5 points) Is this tax system progressive? Justify your answer, including the appropriate calculations.

Tax function is: $T(y) = \begin{cases} 0.1y - 100, & 0 \le y \le 1000\\ 0.2y - 100, & y > 1000 \end{cases}$ Average tax function becomes: $\frac{T(y)}{y} = \begin{cases} 0.1 - \frac{100}{y}, & 0 \le y \le 1000\\ 0.2 - \frac{100}{y}, & y > 1000 \end{cases}$

The average tax rate increases with income, so the system is progressive.

Grading: 0.5 *for tax function,* 0.5 *for average tax function,* 0.5 *for conclusion.*

b) (1 point) An opposition party claims that the efficiency loss of this system is greater than the efficiency loss if there were a flat tax rate of 15% instead. How would you respond to this? (max 6 lines)

On efficiency grounds, since the DWL rises more than proportionally with the tax rate, it is true that a flat tax rate of 15% would yield a lower DWL (even though if most agents in this economy were in the first tax bracket, DWL could actually be higher). However, on fairness grounds, to promote vertical equity (those who earn a higher income should pay higher taxes) and to redistribute from the poor to the rich, it makes sense to have a progressive system.

Grading: 0.5 for the efficiency argument, 0.5 for the fairness argument.

 c) (1.75 points) Another opposition party recommends turning the tax credit into a tax deduction of 1000 for University tuition. How would you respond to this? Present (efficiency and fairness) arguments both with respect to the choice between credits and deductions, and with respect to the nature of the good associated to the deduction (max 16 lines)

Firstly, vertical equity requires high earners to pay more through a progressive tax system, where the average tax rate increases with income. Deductions are applied to taxable income and higher marginal tax rates in progressive systems lead to a larger

decrease in the tax amount, making the system more regressive. Credits are applied directly to the tax amount and are therefore more progressive – and recommended over deductions for vertical equity.

Secondly, regarding the nature of Education, one should acknowledge it is a mixed good and government intervention and subsidization is necessary for efficiency purposes. Education also has productivity gains, externalities for enhanced citizenship and there are educational market failures. However, especially in higher education, the discussion on whether education actually increases productivity (Human Capital Theory) or only serves as a screening mechanism (Screening Theory) becomes relevant. This latter hypothesis would not recommend much government intervention. On fairness grounds, we can think on several arguments on whether this is fair for income mobility and for redistribution, bearing in mind that this system would allow for the richer to benefit more of the tuition deduction than the poorer.

Grading: 0.75 for the fairness discussion on the difference between tax deduction and tax credit, 0.75 for discussing the efficiency considerations of higher education, 0.25 for fairness considerations on higher education (in association with the policy).

V (2.5 points)

Taking into account efficiency and equity concerns, describe the main features of an optimal unemployment insurance program. (Max 20 lines)

Regarding efficiency, an optimal UI policy should balance the benefits of this type of insurance with its costs (moral hazard). Agents value this insurance because it allows for consumption smoothing – unemployment is typically an unpredictable and costly event and as such, self-insurance against this adverse event is difficult.

The answer should describe features of an optimal UI policy (e.g. replacement rates over time, duration of benefits, among others), while simultaneously balancing its benefits (consumption smoothing and job-matching quality) with its social costs (moral hazard).

Regarding equity, several arguments could be made including equity across individuals with different income levels (and the possibilities of self-insurance of these different groups), across different occupations, different generations, young and old, and number of years worked (among others).

Grading: 0.5 for discussing CS benefits, 0.5 for discussing job-match quality benefits, 0.5 for discussing MH costs, 0.5 for discussing fairness issues, 0.5 for the specific recommendations (replacement rates, duration, etc.)