

**University of Minnesota**  
**Department of Economics**  
**Econ 4821: Public Economics**  
Midterm Examination

**The rules of the test:** You will have 50 minutes to complete this exam and a calculator is needed. **Please leave your exam with me. Good luck!**

## 1 Health Insurance (32 Points)

Consider an agent with an income equal to \$45,000 per year and utility  $u(i) = \log(i)$  where  $i$  is income. This agent gets sick 15 percent of the time and when this happens, the agent loses \$27,000 in income due to lost work and expenses.

- (a) (4 Points) What is this agent's expected utility without full insurance?
- (b) (2 Points) What is the actuarially fair premium for full insurance?
- (c) (8 Points) What is the most that the agent would be willing to pay for full insurance?
- (d) (4 Points) What is the agent's expected utility with full insurance paid if it costs \$5000?
- (e) (6 Points) If you had an insurance company, would you rather insure 20 agents like the one above or 200? Why? (Short Explanation)
- (f) (4 Points) Why do companies in the US provide health insurance? (Short Explanation)
- (g) (4 Points) Why is it not too risky for these companies to provide this insurance? (Short Explanation)

## 2 Externalities (41 Points)

Suppose that two firms emit a certain pollutant. The marginal cost of reducing pollution for each firm is  $MC_1 = 200e_1$  and  $MC_2 = 300e_2$ , where  $e_1$  and  $e_2$  are the amount of emissions reduced by the first and second firms, respectively. **ASSUME** that in the absence of government intervention, Firm 1 generates 30 units of emissions and Firm 2 generates 140 units of emission.

- (a) (9 Points) Suppose regulators decide to reduce total pollution by 50 units. In order to be cost-effective, by how much should each firm cut its pollution?
- (b) (8 Points) What emissions fee should be imposed to achieve the cost-effective outcome?
- (c) (6 Points) How much would each firm pay in taxes?
- (d) (6 Points) What is the biggest problem for the government in setting an emissions fee? (Short Explanation)

- (e) (4 Points) In this economy, a politician wants to propose a cap and trade system with tradable permits. How many permits would the politician generate to achieve the same affect as part (a)?
- (f) (8 Points) Suppose the politician's rival wants to cut pollution in half. He proposes a cap and trade system with 85 permits where Firm 1 gets 30 permits and Firm 2 gets 55 permits. How many permits will be traded and at what cost?

### 3 Education (27 Points)

Suppose you are modeling an economy for education reform. All agents have strictly increasing utilities functions in your model. (Hence, more of anything without giving up anything, always increases utility.) Society wants everybody to obtain higher levels of education and one politician states that increasing the amount of free public education increases the amount of education consumed in the economy. **ASSUME** that private and public education are of the same quality.

- (a) (9 Points) Show a model in which this politician's statement would be false. Be sure this model is labeled completely.
- (b) (5 Points) What else must be true in order for the politician's statement to be true? (Short Explanation)
- (c) (9 Points) Suppose instead that a politician's rival proposes using education vouchers. Model this using our same setup and assumptions from earlier.
- (d) (4 Points) Will education obtainment increase according to the model?

### 4 US Financial Situation (10 Bonus Points)

Please provide a short essay explaining the current US financial crisis. What is the problem according to the media? Be sure to mention the guest lecturer's theories of why this may be the case and explain how this can cause a problem. Additionally, mention his opinion on the culprit. Do you agree with him? Why do you think this is happening?