

Suggested Answers to Midterm

Econ 441 – Fall 2007, Brown/Ritz

1. True.

(i) The utility function is linear, so individuals are risk neutral. They will only buy insurance contracts when the expected payout is greater than or equal to the premium.

(ii) PoolCo will only break even or profit on insurance contracts if the expected payout is less than or equal to the amount of the premium.

Together (i) & (ii) => only insurance contracts in which the E payout = the premium will be both purchased by superheroes and allow PoolCo to break even.

(iii) In any insurance contract, the expected payout to the clumsy is greater than the expected payout to the skillful.

The question is whether there exists a pooling contract that all will buy and on which PoolCo breaks even. Since E payout for clumsy \neq E payout for skilled and yet we require E payout = premium on any contract that all superheroes buy and on which PoolCo does not make losses, (i), (ii) & (iii) together imply that there does not exist a contract that PoolCo can sell to all unknown types and not make losses.

2. Uncertain. If the return to health expenditures is only through longer life and lower infant mortality, then maybe. Two other explanations:

a. Returns are in quality of life, so while we don't live longer, we feel better, or we get away with worse health habits and we enjoy it.

b. The US spends a lot on health R&D. External benefits of this accrue to the US & the world, so there is a potentially larger social return than measured by US life expectancy or infant mortality.

Other explanations certainly exist, and reasonable arguments were given credit.

3. False. The Second Fundamental Theorem of Welfare Economics states that society can attain any pareto efficient allocation by suitably redistributing income (or initial resources) and letting people trade freely until the efficient allocation is reached. Its point is NOT that unfettered markets allocate goods fairly, but instead that from a fair allocation of initial resources unfettered markets can generate an efficient outcome.

4. True. Inflation tax is the decrease in the real value of a government's repayment on its debt as a result of price inflation in its currency. In this case inflation tax deducted $.034 * 4300\text{bil} = \146.2 billion from government repayments.

5. False. A pure private good is one that is excludable and rival. The MRS between that good and the relevant alternative is the same for all consumers of the good, but all consumers of the good need not consume the same amount.
6. True. A Pareto Efficient allocation is an allocation such that one cannot reallocate to make one agent better off without making another worse off. As long as both agents value the one good, one can never give more to one agent, the only means of making him better off, without taking from the other agent, making her worse off.

Essays

1.
 - a. $x > 14$. Maximum payoff = $10 \cdot x \cdot 14 / 14 = 10x$. For the maximum payoff all agents must contribute all \$10 to the common pot. Note that this action also maximizes one's private payoff in any case as long as $x > 14$.
 - b. $1 < x \leq 14$. At $x = 1$, there's no increase in total payoff to be had from everyone contributing. At $x < 1$, subjects can only decrease their payoffs by contributing. At $x > 14$, even non-cooperative/purely selfish payoff-maximizers increase their payoffs by contributing. At $1 < x < 14$, a selfish individual payoff-maximizer can do better by not contributing each dollar than by contributing it. However, if the group of subjects is able to cooperate in a way that leads each to contribute \$10 then each individual subject's resulting payoff will be larger. For example, \$1 contributed returns $\$x/14 < \1 to the individual contributor but $\$x > \1 to the group.

The maximum payoff an individual can get is $\$10 + \$10 \cdot 13 \cdot x / 14$. This is the payoff to a subject who doesn't contribute when everyone else contributes all \$10.

The minimum payoff is $10x/14 \leq \$10$. This is the payoff to a subject who gives all \$10 when no one else does.

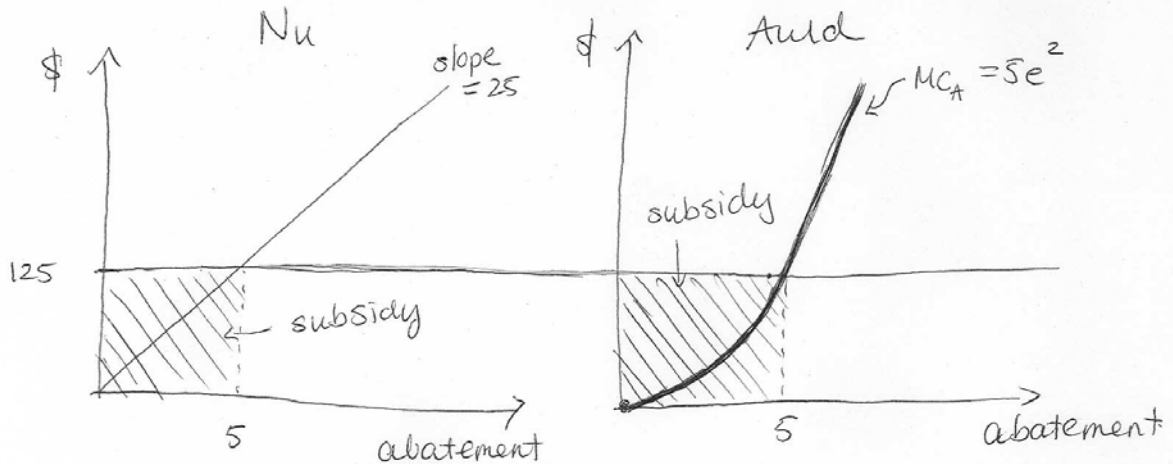
- c. Cooperation is irrelevant at values of $x \leq 1$ because there's no gain to the group from contributing to the pot. Also, at values of $x > 14$, cooperation is irrelevant, because whether you want to cooperate or just maximize your own payoff, you will contribute.

- d. The purpose of the experiment is to study contributions to public goods. Typically we think that values of x between 1 and 14 would make the most interesting experiment, because then contributing harms the individual but benefits the group. [Note that there exist other reasonable answers to part (d).]

2. (a) $MB = \text{social cost of 1 unit of pollution} = \125

$$MC_{Nu} = \frac{dC_N}{de} = 2 \cdot \frac{25}{2} e^{(2-1)} = 25e$$

$$MC_{Auld} = \frac{dC_A}{de} = 3 \cdot \frac{5}{3} e^{(3-1)} = 5e^2$$



b. $MB = MC_N$
 $\Rightarrow 125 = 25e$
 $e_N^* = 5$

$MB = MC_A$
 $125 = 5e^2$
 $25 = e^2$
 $e_A^* = 5$

2.

c. Governor mandates socially efficient abatement levels- whether this is fair or not is a matter of opinion. Credit was given for any well-reasoned answer based on an understanding of the efficient outcome. For example, yes, it's fair because they abate the same amount, or no, it's not fair because Nu's costs of abatement are higher than Auld's.

d. Now Nu's private MB of abatement = \$125. Nu's sets $125 = 25e$ so he will abate 5 units. Auld's private marginal benefit is also \$125. He sets $125 = 5e^2$, so

he will abate 5 units. These are the socially efficient levels of abatement. See graphs for subsidies.

e. Nu's and Auld's originally pollute 10 units' worth. 10 permits are given to Nu's. With no trade Nu's abates 0. The cost of the first unit of abatement to Nu = Nu's benefit from the 10th permit = $25 \cdot 1 = 25$. With no trade, Auld abates 10 units. His willingness to pay for the 1st permit = cost of abating the 10th unit of pollution = $3 \cdot 5 / 3 \cdot 10^2 = 500$. We expect Nu's to sell permits to Auld's until the benefit to Nu's from the last permit sold = Auld's willingness to pay for the permit. This occurs when 5 permits are traded. The result is socially efficient.