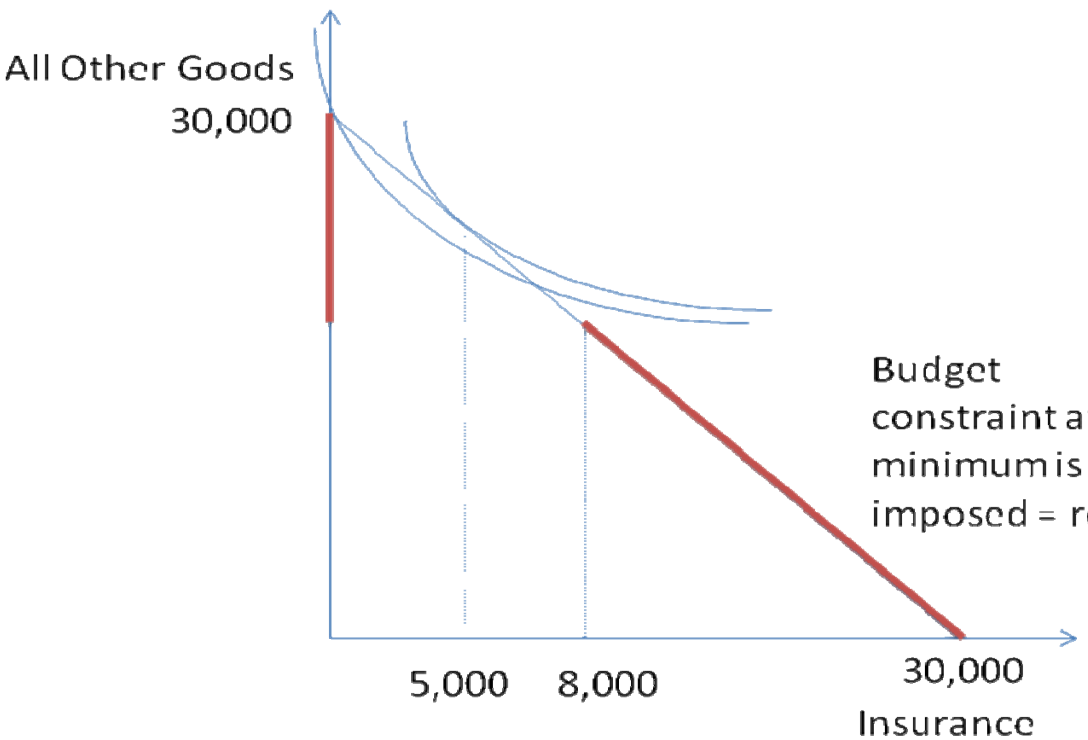
Suggested Answers for Problem Set #2

Econ 441 – Fall 2001

Chapter 10 #3

The rationale is that by requiring everyone to sign up right away, the government avoids adverse selection problems. If individuals can sign up at any time, they might only choose to sign up when they know they will be needing expensive drugs (making the program very expensive).

Chapter 10 #4



2. In Eden, Eve does the fishing and Adam makes the clothes – they then barter clothes for fish. Adam dumps dye into the lake, which lowers Eve's fishing yield. There is no need for a higher power to intervene to address Adam's negative externality on Eve.

UNCERTAIN: If the property rights to the lake are clearly assigned either to Adam or to Eve, then there is no need for intervention. We know they have costless bargaining, since they already engage in trade. If the property rights are no assigned (or if you think the higher power would be needed to assign the rights), then there is need for intervention. Note that the fact that dumping raises the price Adam faces for fish does *not* mean that he internalizes the externality. He internalizes only the effect of dumping on his consumption of fish, not the effect on Eve's consumption of fish.

b) There is no reason for state or federal subsidization of education, since people who live in areas with low educational spending prefer low taxes to high education spending.

FALSE We might want to subsidize education since education creates a positive externality.

3. Your expected utility without insurance is EU =.9log (2*50) +.1log(2*20) = 1.960. The actuarially fair price for insurance is the probability of loss times the amount of the loss, so .1*30,000 = $3,000. Your expected utility if you buy the insurance is EU = log(2*47) = 1.973. Let the amount you pay for full insurance be x. Then your expected utility from insurance is log(2*(50-x)). So the most you will pay for insurance is the solution to log(2*(50-x))= 1.960, x =$4,399.45

4.

1) Each superhero's utility exhibits diminishing marginal returns (you can see this by simply plotting the level of utility against consumption, or by finding that the second derivative is negative). This is equivalent to saying that the individual is risk averse. Since this is true, and since insurance is fair, the price that each type pays for a unit *of* insurance will be equal to the probability that they get caught - and further, we know from class that risk-adverse individuals (i.e. utility with diminishing marginal returns) will fully insure if insurance is fair.

You could also get this result by solving for the optimal level *of* insurance that each type will choose. For clumsy superheros, the problem would be:

$$Max\ pU_{accident} + (1-p)U_{NoAccident} \Rightarrow Max .9(100-50+b-.9b)^{.7} + .1(100-.9b)^{.7}$$

$$so\ \frac{\mathrm{dU}}{\mathrm{db}} = \frac{(.9)(.7)(.1)}{(50+.1b)^{.3}} - \frac{(.1)(.7)(.9)}{(100-.9b)^{.3}} = 0$$

$$\Rightarrow b = 50$$

Where *b* is the amount *of* insurance the clumsy superhero buys (which is equal to the amount he gets from the insurance company if he is caught). The procedure is similar for skilled superheros.

So, to answer the specific questions, ACME will charge the clumsy $0.90 for every dollar of insurance and will charge the skillful $0.30. Since they are risk averse and the insurance is priced fairly, they will both purchase $50 of insurance. The clumsy will consume $55 in both the accident and no accident state. The skillful will consume $85 in both states.

B, part a) the maximum amount that each would be willing to pay for insurance is equal the amount that makes him or her exactly as well *off* with insurance as without. Without insurance, the expected utility of each type is

$$EU_{clumsy} = .9(100-50)^{.7} + .1(100)^{.7} \approx 16.428$$
$$EU_{skillful} = .3(100-50)^{.5} + .7(100)^{.5} \approx 9.121$$

Full insurance would mean that the superhero receives full compensation for injury if injured, resulting in complete consumption smoothing across the two possible states (caught or not caught). Hence, his income in each state is simply his full income less insurance costs. So to solve for the maximum each type would be willing to pay for full insurance, solve the following:

$$EU_{clumsy,\ no\ insurance} = EU_{clumsy,FI} \Rightarrow 16.428 = (100-X)^{.7} \Rightarrow X = 45.48$$
$$EU_{skillful,NI} = EU_{skillful,FI} \Rightarrow 9.121 = (100-X)^{.5} \Rightarrow X = 16.80$$

So the clumsy type is willing to spend 45.48 for full insurance (for a per-unit price of .910) and the skillful type is willing to spend 16.80 (for a per-unit price of .336). Note that each is willing to pay more than the actuarially fair price - this is because their utility function exhibits diminishing marginal returns to consumption (risk aversion):

B, part b) If ACME is looking for a single market price such that everyone will fully insure, it will have to offer the maximum price that the skillful are willing to pay: 16.80. However, when it does this it will collect 12*16.80=201.6 in revenue for every 11 * .3*50+.9*50=210 it expects to payout - since expected revenue is less than expected payout, ACME won't stay in business if it offers this plan. Hence, there's a market failure: we know that each type is willing to pay *more* than the actuarially fair price for full insurance, and ACME is certainly willing to offer insurance at a greater-than-fair price. The problem is that types are unobservable (that is, asymmetric information exists in this insurance market), so this arrangement cannot occur. Because there are transactions that would occur under full information that would make everyone better off, a market failure exists.

c) Now, let's consider the expected utility that each type would receive under each plan:

$$EU_{clumsy,PlanA} = .9(100-50+20-7)^{.7} + .1(100-7)^{.7} \approx 18.747$$
$$EU_{skillful,PlanA} = .3(100-50+20-7)^{.5} + .7(100-7)^{.5} \approx 9.132$$

$$EU_{clumsy,PlanB} = .9(100-50+50-34)^{.7} + .1(100-34)^{.7} \approx 18.779$$
$$EU_{skillful,PlanB} = .3(100-50+50-34)^{.5} + .7(100-34)^{.5} \approx 8.124$$

Comparing these expected utilities to those without insurance, as calculated in (b, part a), we see that clumsy types prefer plan B to plan A, and are better off by purchasing insurance than not purchasing insurance. The skillful types prefer plan A to plan B, and are also better off by purchasing insurance. So if these packages were offered, all the clumsy would purchase type B, and all the skillful would purchase plan A. ACME revenues are 11 *7+1 *34=111. ACME expected payout is 11 *.3*20+.9*50=111. ACME would make zero economic profit from this package, but since zero economic profit allows the company to earn market rates of return on all factors of production it is willing to offer the insurance. Now everyone has some insurance However, there is still a market failure for the same reason as before - the skillful types still wish to purchase full insurance at actuarially fair prices, and the insurance company would offer insurance for those prices - but due to asymmetric information, this is impossible. The outcome may be more favorable than before, since now everyone gets some insurance, but a market failure still exists.

D part a) There might be an incentive here for the skillful type to purchase the test. Consider what happens if the skillful pay for the test and reveal their type: given that there is perfect competition in the insurance market, the skillful will be offered actuarially fair insurance, so they would fully insure. The clumsy type would never purchase the test, because if they do their type will be revealed, and they will receive actuarially fair insurance - which is more expensive than the insurance plan they receive from c! To determine whether the skillful types will purchase the test, consider their expected utility if they do:

$$EU_{skillful,NoIns} = .3(100-50)^{.5} + .7(100)^{.5} \approx 9.121$$
$$EU_{skillful,PlanA} = .3(100-50+20-7)^{.5} + .7(100-7)^{.5} \approx 9.132$$
$$EU_{skillful,test} = (100-1.5-.3*50)^{.5} \approx 9.138$$

Since the skillful are slightly better off by paying $1.50 for the test, receiving fair insurance and fully insuring, they will be willing to pay for Dr. Brain's test. Now, ACME will offer two insurance packages. The first will be for those revealed to be skillful, who will be able to purchase insurance for a per-unit of coverage cost of .3. The second will be available only to those who haven't revealed themselves with a test (i.e. the clumsy), who will be able to purchase insurance for a per-unit of coverage cost of .9. Both types will fully insure!

D, part b) The skillful are better off than in (c), because they are now fully insured. The clumsy are worse off, because although they are still fully insured, they have to pay more in order to be fully insured.

D, part c) Now there is no longer a market failure. The presence of the market for blood tests has eliminated the asymmetric information problem, and everyone is fully insured at actuarially fair prices (although the skillful are technically paying more than actuarially fair prices to receive full insurance, since they first have to purchase the test).