

Econ 149: Health Economics  
Problem Set IV (Extra credit)  
Answer Key

1. Your utility function is given by  $U = \ln(4C)$ , where  $C$  is consumption. You make \$30,000 per year and enjoy jumping out of perfectly good airplanes. There's a 5% chance that, in the next year, you'll break both legs and will incur medical costs of \$15,000 and will lose an additional \$5,000 from missing work because of the loss of a working pair of legs for some time.

- (a) What is your expected income without insurance? What is your expected utility without insurance? (See Chapter 8 for a review.)

$$E(C) = 0.95(30,000) + 0.05(30,000 - 15,000 - 5,000) = 29,000$$

$$E(U) = 0.95 \ln[4(30,000)] + 0.05 \ln[4(30,000 - 15,000 - 5,000)] = 11.640316$$

- (b) Suppose you can buy insurance that will cover the medical expenses but not the foregone part of your salary. How much is an actuarially fair policy, and what is your expected utility if you buy it? (Hint: you'll need to calculate the utility of income in each state.)

First, we need to calculate the actuarially fair premium which is defined as the expected loss for the insurance company. This insurance only covers the medical loss, so the expected loss is  $E(\text{loss}) = 0.95(0) + 0.05(15,000) = 750$ .

Now, we can use this premium to calculate expected income and utility if you buy this type of insurance.  $E(C) = 0.95(30,000 - 750) + 0.05(30,000 - 5,000 - 750) = 29,000$

$$E(U) = 0.95 \ln[4(30,000 - 750)] + 0.05 \ln[4(30,000 - 5,000 - 750)] = 11.660556$$

- (c) Suppose you can buy insurance that will cover your medical expenses and foregone salary. How much would such a policy be if its actuarially fair, and what is your expected utility if you buy it?

This insurance covers both the medical loss and the loss of income, so the expected loss is  $E(\text{loss}) = 0.95(0) + 0.05(15,000 + 5,000) = 1,000$ .

Now, we can use this premium to calculate expected income and utility if you buy this type of insurance.  $E(C) = 0.95(30,000 - 1,000) + 0.05(30,000 - 1,000) = 29,000$

$$E(U) = 0.95 \ln[4(30,000 - 1,000)] + 0.05 \ln[4(30,000 - 1,000)] = 11.661345$$

2. How do fee-for-service and capitation payment systems affect the alignment of physician and patient desire? Under which system would we expect to see more supplier-induced demand? What impacts do the different payment systems have on the amount of care the patient receives?

Fee-for-service is a method of payment under which the provider is paid for each procedure or service that is provided to a patient. Capitation is a method of reimbursement in managed care plans in which a provider is paid a fixed amount per person over a given period regardless of the amount of services rendered. Under fee-for-service the physician has an incentive to over provide service, because she is paid per procedure, but the physician's incentives are fairly in line with the patients (if the patient requests a procedure the physician is likely to give it). Under capitation the doctor's actions are not in line with the patients desires. The doctor has an incentive to deny care to minimize costs.

Capitation discourages SID because the provider will no longer increase his income by encouraging additional demand.

3. In 1986, the U.S. federal income tax system changed marginal tax rates so that the top marginal rate fell from 50 to 33 percent. Given the way fringe benefits are negotiated, what would you expect to happen to the demand for employer-provided health insurance? (Please note that fringe benefits include health insurance and pensions.)

The demand for employer-provided health insurance would decrease. Health insurance obtained from one's employer is not subject to taxation. If obtained from your job you get insurance at a discount equal to your marginal tax rate. So when the marginal tax rate falls the discount falls and people desire less (or less generous) insurance from their employers. The smaller the tax bracket, the smaller the discount on health insurance.

4. What is "job lock" and why is it bad? Discuss a solution to the problem of job lock.

Job lock is the phenomenon in which workers with employer-provided health insurance suffer reduced job mobility due to fear of not being able to obtain health insurance in their next job. It is especially problematic for people with pre-existing conditions. The problem with job lock is that it can discourage workers from moving to more suitable employment where they can be more productive and receive better pay and working conditions. In other words, job lock tends to undermine overall social and economic development.

A solution to job lock could be the implementation of a program called COBRA, which allows people to buy insurance from the old employer for 18 months at full price. Another solution is if all jobs (or no jobs) provided health insurance.

5. Some people advocate requiring employers to offer all workers the same comprehensive health insurance plan.

- (a) Discuss one source of inefficiency that would arise from requiring all citizens to have the same comprehensive health insurance from their workplace.

There are lost tax revenues which could be spent on more productive things than health insurance (assuming that the current tax deductibility remained). It would further discourage the hiring of old, sick, expensive to insure people. Some people prefer wages to insurance (the "rationally uninsured") these people are worse off if you force them to give up wages for insurance. The comprehensive plan would cover low-risk or low-cost events like prescription drugs that have low insurance value.

- (b) Discuss one problem in the market for health insurance that would be alleviated by the universal insurance?

This would reduce the problem of adverse selection because you can't opt out. So not just the insurance needy people would purchase it. It also minimizes cream skimming because employers have to cover everyone. It would also encourage job mobility by discouraging job lock. It would reduce the ER externalities as some people who use the ER would now be required to have insurance to cover the expenses they impose on the rest of us. Similar increased insurance would provide a consumption externality.

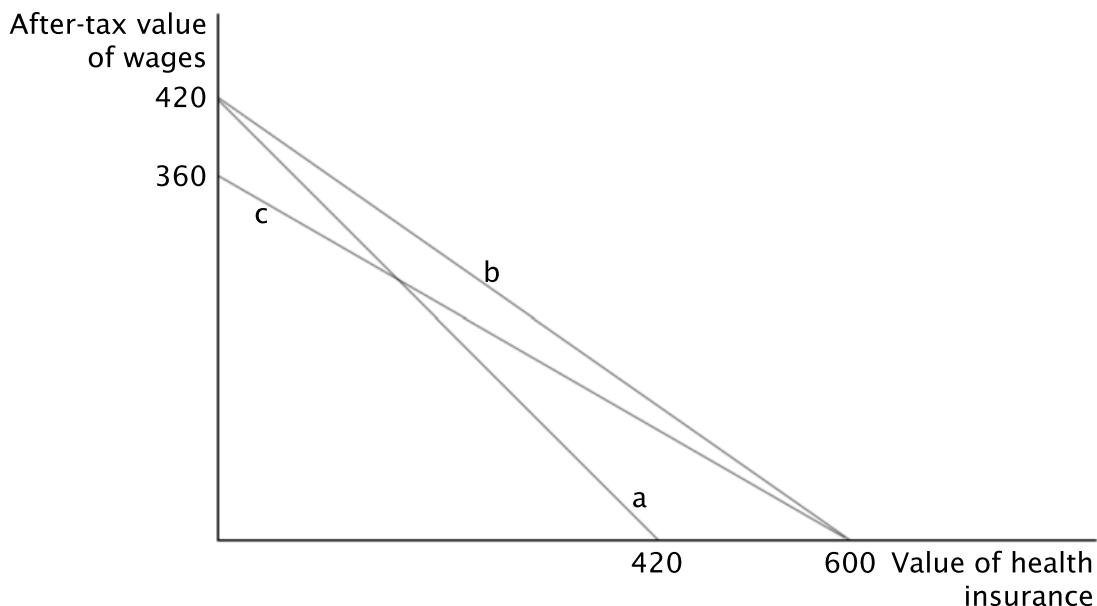
- (c) If we switched from our current system to this system which groups of people would benefit?

People who work for small firms. Sick working individuals who would have their healthy co-workers share some of the insurance costs. These workers also benefit by the removal of job-lock.

6. Suppose a firm is willing to pay an employee \$600 per week in total compensation. The worker can either receive the compensation in wages or health insurance. Assume initially that all compensation received by workers is subject to a marginal tax of 30%.

- (a) Placing after tax wages on the vertical axis and the value of health insurance on the horizontal axis, graph the budget constraint faced by the consumer—what are the possible combinations of after-tax wages and insurance that the firm can pay the worker that only cost the firm \$600 per week?

With a 30% tax rate on both money compensation and health insurance compensation, the total value of total compensation must sum to  $(1 - 0.3)600 = 420$ . In the graph below, the line marked (a) shows the employee's budget constrain in this case.



- (b) Suppose that wages remain taxable but health insurance is now a tax preferred fringe benefit. Graph the new budget constraint.

Now, compensation in health insurance is not taxed, so if the employee wanted to be compensated only in health insurance, she could get \$600 worth of it. The budget constraint in the graph above marked (b) shows this new set of compensation options.

- (c) Suppose that as health moves from a taxable to a non-taxable benefit. Graphically illustrate how this alters the budget constraint.

[Sorry, but this is a typo and asks exactly what part (b) asks.]

- (d) Suppose that the marginal tax rate increases from 30 to 40%. Graphically illustrate how this alters the budget constraint from part (b).

Note that this change will only affect money compensation, since health insurance is not taxed. Then, if the employee wanted only money compensation, the vertical intercept will shift down to  $(1 - 0.4)600 = 360$ . This is shown in the graph above as budget constrain (c).

7. This question is about the effects of medical malpractice lawsuits.
- (a) Provide an economic rationale for having both compensatory and punitive damages as part of the medical malpractice damage award.

There is probably imperfect monitoring of doctors. Part of it goes back to agency problem: I am not an expert in medicine, so I don't know if the reason that I feel worse after surgery is because it just happens in 10% of cases or because my doctor was negligent. But our criminal justice system also doesn't have the resources to monitor all malfeasance. Now, consider an income-maximizing doctor who can choose to be extra careful or sort of careful. He knows that he won't be caught each time he makes a mistake when he's sort of careful, so awards limited to compensation may not create enough incentive for doctors to be extra careful. Moreover, he may have more than enough insurance to protect against compensatory damages. Punitive awards (any award greater than a compensatory award) are meant to provide enough incentive for doctor's to be careful.
  - (b) How does medical malpractice insurance affect physician incentives to provide an efficient level of care that are provided by a negligence rule of law? What feature of malpractice insurance is important to your analysis?

If malpractice insurance is too extensive, then the threat of lawsuits will not discourage careless care. Most malpractice insurance caps total reimbursement (per suit and per year) in the case of a malpractice suit. With caps, the doctor still assumes some of the risk, and should perform more carefully than he would under total reimbursement of malpractice awards.
  - (c) What is defensive medicine and why might physicians practice it in the US?

Medical practices designed to avert the future possibility of malpractice suits. In defensive medicine, responses are undertaken primarily to avoid liability rather than to benefit the patient. Doctors may order tests, procedures, or visits, or avoid high-risk patients or procedures primarily (but not necessarily solely) to reduce their exposure to malpractice liability. Defensive medicine is one of the least desirable effects of the rise in medical litigation. Defensive medicine increases the cost of health care and may expose patients to unnecessary risks.
  - (d) What evidence of defensive medicine did we talk about in class?

Kessler and McClellan (2002) look at Medicare claims for AMI (heart attack) and ischemic heart disease patients from 1984–1994. They look at expenditures, mortality, and subsequent readmissions (cardiac complications). They look before and after tort reform (controlling for managed care and other factors). Evidence from the 1980s suggested some defensive medicine (lower increase in expenditures/intensity of treatment) after reform, little change in health. More recent evidence suggests HMOs have also reduced defensive medicine, less of an effect of reforms but still an effect, managed care substitutes for liability reform. Other evidence suggests malpractice induced defensive medicine is responsible for 5–9% of total expenditures.
  - (e) Have rising premiums caused providers to leave medicine? What did the paper by Baicker and Chandra say about it?

Baicker and Chandra found that increases in malpractice costs did not seem to affect the overall size of the physician workforce, although they may have deterred marginal entry, increased marginal exit, and reduced the rural physician workforce.

8. A new drug that cures cancer is developed and is called X. Suppose the demand for X is given by  $P = 160 - 2Q$ . The marginal cost of producing X is given by  $MC = 6Q$ .

- (a) Big Pharma Inc. has a patent on the production of X. How much X will BPI produce? What price will BPI charge for X?

The firm will set output where marginal cost equals marginal revenue. First, total revenue is  $TR = P \cdot Q = 160Q - 2Q^2$ . Then,  $MR = \partial TR / \partial Q = 160 - 4Q$ . Equating  $MR = MC \Leftrightarrow 160 - 4Q = 6Q \Leftrightarrow Q^* = 16$ .  $P^* = 160 - (2 \cdot 16) = 128$ .

- (b) Suppose BPI's patent is going away next year. What might BPI do to extend patent life?

BPI could develop a newer version of X that has slightly better curative properties, but is just different enough to warrant a new patent.

- (c) Suppose that in Canada, the price of X is 1/2 the price of X in the US. Would Canadian user's of X mind if US citizens come and buy X? Why or why not? What about BPI?

It depends how the price is set in Canada. If the price is low in Canada because the government caps the price, then, no, Canadian users won't care. But if the price is lower there simply because demand is lower, then those users will be upset because the increased demand might lead to a rise in the price. From BPI's perspective, it's better to have two distinct markets because we know that monopolists make higher profits when they can price discriminate.

9. During the mid to late 1990s, all states filed civil law suits against tobacco manufacturers seeking to recover the increased costs of operating Medicaid programs that can be attributed to smoking. In December of 1998, cigarette manufacturers and the states agreed to an out-of-court settlement that ended these suits. As a result of a agreement, cigarette manufacturers increased cigarette prices by \$0.55 per pack. Before the agreement, the average retail price of cigarettes was \$1.90 and 21 billion packs of cigarettes were sold per year. If the elasticity of demand for cigarettes is -0.40, how much will smoking fall as a result of the settlement?

This question is a review of elasticities of demand. The price of cigarettes was \$1.90/pack before the settlement and an increase in prices of \$0.55/pack is a 28.9% increase in price. We are given that the elasticity of demand for cigarettes is  $\varepsilon = -0.40$  and  $\varepsilon \equiv \% \Delta Q / \% \Delta P$ . Therefore,  $\% \Delta Q = \varepsilon (\% \Delta P) = -0.40(0.289) = -0.116$ . The price hike reduced demand by 11.6% or by  $(21 \text{ billion})(0.116) = 2.43 \text{ billion packs per year}$ .

10. The goal of the SCHIP program was to increase insurance coverage among children under the age of 18. A number of states have however restricted the availability of SCHIP insurance to people who have been uninsured for a minimum of 3 or 6 months, depending on the state. Why did some states adopt these "waiting periods" before people can become eligible for SCHIP?

One concern about SCHIP and other Medicaid-type expansions is "crowd-out" where people eligible for employer-sponsored insurance refuse coverage in order to qualify for Medicaid-type insurance. The waiting periods in SCHIP are designed to reduce crowd-out. With a waiting period, a family with insurance must become uninsured for the waiting period in order to qualify for SCHIP coverage. Since many would be unwilling to expose their family to this type of risk, the waiting periods help reduce crowd out.