

Econ 149: Health Economics  
 Problem Set III  
 Answer Key

1. Consider the following information on Alfred's demand for visits per year to his health clinic, if his health insurance does not cover clinic visits (100% coinsurance rate).

P	Q
5	9
10	9
15	9
20	8
25	7
30	6
35	5
40	4

- (a) Alfred has been paying \$30 per visit. How many visits does he make per year? Draw his demand curve.

Before insurance, Alfred will consume 6 visits at  $P = \$30$ .

- (b) What happens to his demand curve if the insurance company institutes a 40% coinsurance feature (Alfred pays 40% of the price of each visit)? What is his new equilibrium demand?

After insurance Alfred will consume 9 visits, up to a price of \$37.50; ( $0.4 * \$37.50 = 15$ ). Above \$37.50, he will reduce quantity. For example, at  $P = \$50$ , Alfred's cost is \$20, so that he will make 8 visits.

2. Consider the market demand for labor  $L_D = 1000 - 20W$  and the supply of labor  $L_S = -200 + 40W$ , where  $W$  is the market wage.

- (a) What are the equilibrium market wage and employment level?

$W = 20.00$  and  $L = 600.00$

- (b) Calculate the equilibrium market wage and employment level if the workers negotiate a benefit worth \$1 that costs the employers \$2.

Employers will consider the cost of the benefit in hiring decisions, so the demand curve will shift so that  $L_D = 1000 - 20(W + 2)$  and the benefit will increase the real compensation for working so that labor supply will increase:  $L_S = -200 + 40(W + 1)$ . These new curves give the new equilibrium of  $W = 18.67$  and  $L = 586.67$ .

- (c) Calculate the equilibrium market wage and employment level if the workers negotiate a benefit worth \$2 that costs the employers \$1.

The new labor demand is  $L_D = 1000 - 20(W + 1)$  and the new labor supply is  $L_S = -200 + 40(W + 2)$ . The new equilibrium is  $W = 17.33$  and  $L = 613.33$ .

3. Suppose that Charlie's Pizzeria in Kalamazoo, Michigan, employs 10 workers at a wage level of \$8 per person. All other costs (ovens, rent, advertising, return to capital) total \$40 per hour, and the pizzeria sells 12 pizzas per hour at a cost of \$10 per pizza. Suppose the state of Michigan mandates health coverage that can only be covered at a cost of \$1 per hour, if it is offered at all. Charlie finds that if he offers insurance, he could maintain production

by letting one worker go and running his pizza ovens a little hotter, leading to costs of \$45 per hour.

- (a) What are Charlie's original profits?

$$\text{Original profits} = \text{Revenues} - \text{labor costs} - \text{non-labor costs} = 12 \cdot 10 - 8 \cdot 10 - 40 = 0.$$

- (b) What is Charlie's elasticity of demand for labor? How is this calculated?

Because we can't calculate derivatives here, we'll need to calculate an arc elasticity, which is an average across the two levels of labor inputs and wages. This arc elasticity of demand for labor is  $= \frac{\Delta L/L}{\Delta W/W} = \frac{\frac{-1}{(9+10)/2}}{\frac{1}{(8+9)/2}} = \frac{-1/9.5}{1/8.5} = -8.5/9.5 = -0.895$ .

- (c) What will happen to Charlie's profits in the short run if he chooses to pay for mandated insurance?

$$\text{New profits} = 120 - (8 + 1) \cdot 9 \text{ workers} - 45 = -6.$$

- (d) What will Charlie's long-run decision be? Why?

Charlie's long run decision would be not to offer the insurance. If he does he cannot make enough profits to stay in business. This is assuming that wages do not adjust from an increase in the supply of labor (i.e., real compensation is higher, so more people will want to work for this firm).

4. We have discussed the fact that many Americans do not have health insurance (either public or private).

- (a) Give three characteristics of the uninsured population (as compared with the rest of the population).

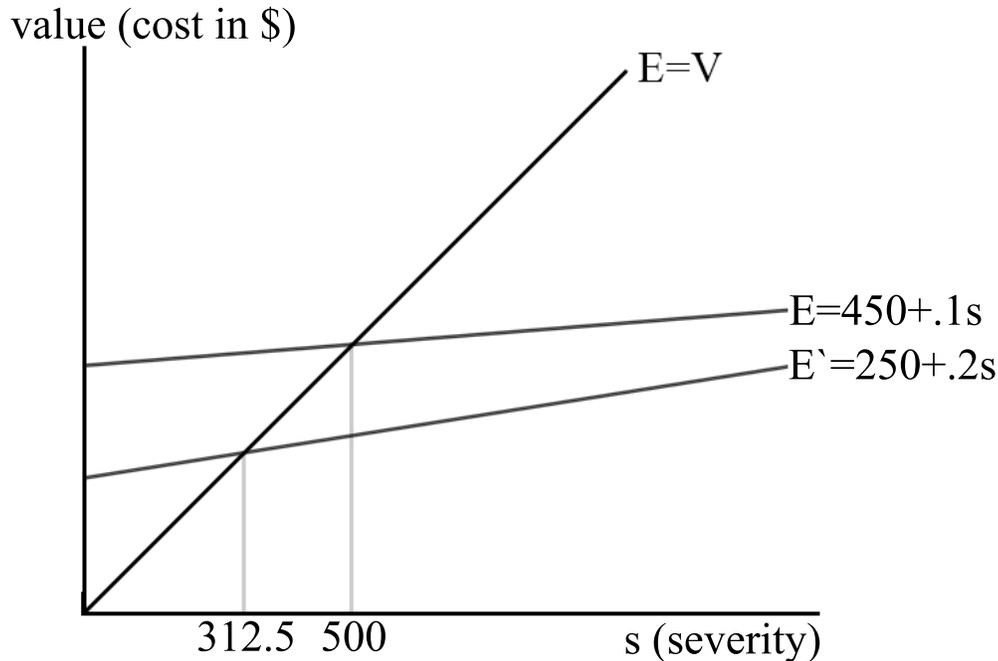
They are, for example, more likely to be younger, more likely to be black or Hispanic, less likely to work full time, and more likely to work for smaller rather than larger companies.

- (b) Name two ways that having a large uninsured population may affect the rest of the population (e.g., through the price of health services or the spread of disease).

Having more uninsured may increase the cost of health care and the cost of insurance for everyone else if their care is not reimbursed. This might be exacerbated by the type of care the uninsured receive (e.g., emergency room care rather than preventative care), although the empirical evidence is mixed here. The uninsured may also be less likely to receive care for diseases that pose a public health concern. For example, uninsured children may not get the recommended vaccines, and this may put the rest of the population at some risk.

5. Consider the discussion on adverse selection into HMOs and fee-for-service (FFS) care, as noted in equation (12.2) and Figure 12-4 in the book. Suppose that, on average, FFS clients bought \$2000 in services and HMO clients bought \$1500 in services, with an efficiency factor of 0.9. The FFS plan charges a 10% coinsurance rate.

- (a) Set up this problem graphically, labeling the E and V curves.



See figure above. The extra cost of the FFS plan is defined as  $E = \text{FFS deductible} - \text{HMO payment} + \text{FFS copay} = [(1-r)\bar{s}_{FFS} - a\bar{s}_{HMO}] + rs$ , where  $r$  is the coinsurance rate,  $\bar{s}_{FFS}$  is the average severity for FFS clients,  $\bar{s}_{HMO}$  is the average severity for HMO clients, and  $a$  is the efficiency factor for the HMO (i.e., the degree to which the HMO restrains costs by internalizing services and insurance). Ok, so for the information given,  $E = [(1 - .1)2000 - .9 \cdot 1500] + .1s = 450 - .1s$ . To plot this, set  $s$  equal to  $E$ , and solve for  $s$ , so the lines intersect at  $s_* = 450/.9 = 500$ . Below \$500, clients choose the HMO. Above \$500, clients choose FFS.

- (b) If a client expects to spend \$250 on care, will he or she choose an HMO or an FFS plan?

At  $s = \$250$ , client chooses HMO.

- (c) At which value of  $s$  would the client expect to be indifferent between an HMO and an FFS plan? Why?

Client is indifferent at  $s = \$500$ .

- (d) How would your answer to parts (b) and (c) change if the HMO adopted a 20% coinsurance rate?

Ok, so for the information given,  $E = [(1 - .2)2000 - .9 \cdot 1500] + .2s = 250 - .2s$ . To plot this, set  $s$  equal to  $E$ , and solve for  $s$ , so the lines intersect at  $s^* = 250/.8 = 312.5$ . Below \$312.50, clients choose the HMO. Above \$312.50, clients choose FFS.

6. State and assess two explanations for the rapid growth in hospital expenditures over the last few decades.

Explanation: Medical technology has improved and patients want more technology, so they spend more on it. Assessments: Because of agency issues, it's not clear that patients can judge what technology is necessary for improving health. And empirical evidence suggests that not all technology has greatly improved health (although it seems to have for some chronic conditions like heart problems).

Explanation: Demographic changes have increased the subset of the population (i.e., older people) that gets its care through hospitals. Assessment: This seems like a reasonable explanation.

Explanation: The expansion of private and public insurance has created an incentive for hospitals to induce demand for services. Assessment: Evidence on this is mixed.

7. Informal care provided by children and other family members are good substitutes for long-term care (LTC) for parents.

- (a) Describe some potential social and demographic changes that may reduce the availability of such informal care.

Married women are more likely to work now than in the past, which makes it less likely that there is an available care giver at home. Adult children are more likely to live in a different area than their parents, and the parents may not want to move for long-term care. Finally, people live longer, so there may be a heavier burden of providing informal long-term care than in the past.

- (b) Explain how Medicare reimbursement policies may affect the use of informal care and how this may, in turn, affect budgetary considerations for Medicare.

Before Medicare, there was no subsidy for formal long-term care. The introduction of Medicare created an incentive for people to use formal care and crowd-out informal care. Recently, Medicare shifted from fee-for-service reimbursement to a prospective billing system with a fixed per-diem payment for LTC and a time limit on care. This increased the relative price of formal care, and led to some crowd in of informal care.

8. If physician fees are fixed so that they do not adjust to changes in supply, explain how supplier-induced demand can be manifested.

Supplier-induced demand is suggested as a possible increase in patient demand for certain health services that result from the agency problem (i.e., patients go to doctors because they have imperfect information about how to diagnose health problems). Even if the doctor does not gain monetarily by prescribing more services than necessary, the doctor does not also face any incentive to restrain costs (unless she is in an HMO perhaps). Suppose also that the doctor is risk averse because of malpractice lawsuits. Then, the doctor has an incentive to over-test.

9. Using supply-and-demand analysis, model the equilibrium level of physicians' incomes. What would be the impact of physicians' incomes of more stringent policies on the employment of foreign medical school graduates?

This suggests a decrease in supply for physician services, leading to higher levels of physician incomes.