

Answer EITHER question #1 OR #2. (not both).

1. (24) James Cutler (author of Your Money or Your Life -- I gave you the chapter "Pricing the Priceless" as a handout) finds that post-heart attack care has increased in cost (adjusting for inflation) from approximately \$10,000 to \$22,000 over the ten years from 1985-1995. He concludes that this dramatic increase in costs has been well worth it. Explain his argument, make sure you include an explanation of QALYs. What would Cutler say about the almost universal claim that health care's increasing share of GDP is a crisis that must be addressed?

While a cost increase of \$12,000 in ten years is significant, it has to be put in the context of the benefits of the higher quality care offered. In health care, benefits are usually stated in terms of QALYs (quality adjusted life years). For any given person, their QALYs is equal to the number of years of quality health they would just exactly trade for their expected remaining years of life at the expected quality given their health status. So someone with chronic back pain who is expected to live for 20 more years may say they would trade 12 high quality years for their current situation. So we would say they have 12 QALYs remaining. If a new treatment would be expected to extend their life by 1 year and improve the quality of each year moderately, the person may report that, post procedure, they now have 17 QALYs and the benefit of the procedure was 5 QALYs.

Using several different methodologies, researchers have found that one QALY is worth about \$100,000. Therefore, a procedure that has a benefit of 5 QALYs and costs \$70,000 would provide a net benefit of \$430,000. Not bad.

Cutler claims that given this type of analysis, the increasing cost of medical care in the context of increasing quality of care may be well worth it. That being said, there may be plenty of procedures which do not pass this type of cost benefit analysis.

2. Researchers have consistently found a strong statistical relationship between education and both health status and health behavior.

a. (12) In Chapter 5 of the text by Folland, Goodman and Stano (handout), the authors discuss two possible sources for this correlation. Explain them.

First, it may well be that more highly educated people are better able to utilize medical care and produce health (health productivity). This may be due to better communication skills with providers or it may be a result of being able to process information and behave in a way that promotes their own health or it may be that they are better able to follow doctor's orders.

Second, it may be that there are unobservable factors that drive both health and desire for education. E.g. those with a low rate of time preference (they value future benefits more than others), may be more willing to spend time in school (delaying income and consumption) and they may place a higher value on future health.

b. (12) In his paper on binge drinking, Alex Cowell advances a third option. Explain his argument and the statistical relationship he finds in the data to support his hypothesis?

He hypothesizes that those with more education will have higher future earnings (higher opportunity cost of being ill in the future) and will therefore enjoy higher consumption in the future and will therefore have a greater benefit of being healthy in the future. In the data, both years of education and degrees achieved are found to be significant determinants of healthy behavior. As future wages are generally more a function of degrees completed but health productivity is more a function of years of schooling. He takes the significant effect of degrees earned as evidence that future wages (opportunity cost of being less healthy in the future) also matter.

Answer question 3.

3. Sally Sikalot has \$22,500 in income. After a recent trip to Nieswiadomia, she discovers that there is a 25% change of acquiring Tieslautis. The disease is 100% curable but requires the Molinectomy procedure (at a cost of \$12,500). The Kim-Kim Insurance Company offers a policy that will cover the Molinectomy. The premium they charge is \$4,000.

Sally's utility function is the following: $U = \sqrt{I}$

a. (4) Explain the concept of the pure premium, what is the Pure Premium?

*The Pure Premium is the portion of the total premium that is based on the expected health expenditure by the person insured. In this case, the pure premium is $.25 * \$12,500 = \3125 .*

b. (4) Define "load" What is the load in this case?

The load is the part of the total premium above the pure premium -- based on the cost of administering the policy. In this case it is $\$4000 - \$3125 = \$875$.

c. (4) Explain the concept of risk premium, what is Sally's risk premium?

This is the dollar value of the risk-reducing benefit of the insurance. This is the most someone would be willing to pay for a given insurance policy. In this case it is \$468.75. You calculate this by subtracting the amount of income with certainty that would provide the same amount of utility as the expected utility from the risk from the expected income.

d. (12) Explain the decision to buy insurance. Will she buy the insurance or not?

If paying for the insurance leaves Sally with more utility (although less income) than her expected utility from the risk, then she should buy the insurance. I.e. if the Risk Premium + the Pure premium is $>$ the Load + the pure premium (equivalently, if $RP > Load$) then she should buy the insurance. So without the insurance, her expected utility is 137.5 and with insurance, 136.01. I.e., her $RP = \$468.75$ and the load is \$875. Either way, she is worse off with insurance.

e. (12) Assume that Sally's income is really \$30,000 (she is in a tax bracket that makes her pay 25% of all her income to the government in taxes – hence the \$25,000 stated above). Now assume that she has the option of buying the policy with pretax dollars. Explain how this affects her decision-making process and whether she will buy the policy now.

Now when she buys the insurance, she is only taxed on \$26,000 (tax = \$6500). So the option is not buying the insurance, facing the risk, and having utility of 137.5 vs. buying the insurance, and having a certain income of $\$26,000 - \$6,500 = \$19,500$, resulting in a utility level of 139.64. So she will buy the insurance. Alternatively, you can think of the insurance as only costing \$3000 as taxes are reduced by \$1000 by buying the insurance with pretax dollars. If the pure premium is \$3125 and the cost of the insurance is \$3,000, then the price (total premium – pure premium), is $-\$125$. So the insurance now has a negative price.

Answer EITHER #4 OR #5 (not both).

4. In the early 1990s, HMO's appeared to be the magic bullet for solving the rising health care cost problem. At the time, HMOs provided customer satisfaction on par with traditional fee-for-service insurance plans but enjoyed a significant cost advantage. Since 2000, HMOs have been generally disparaged by the public and have been increasingly losing money.

a. (15) Explain the concept of adverse selection (what causes it, and the process by which it affects markets).

Adverse selection is caused by asymmetric information between buyers and sellers of insurance. Insurance want to charge a premium to each buyer that is equal to the pure premium + a load. In a perfect world, each person is charged a different premium based on their different pure premiums. However, people seeking insurance benefit from looking like their pure premium is lower than it actually is. To keep profit from being negative, insurance companies charge a premium that is based on the average pure premium for those they insure. For the healthiest, this premium may be $>$ their pure premium + risk premium and they drop out of the insurance market (forego insurance). When a few of the healthiest drop out, the pure premium for the remaining insureds rises a bit, forcing more of the remaining healthiest to drop out. This cycle continues until only the least healthy and most risk averse still buy insurance. The healthiest are left without insurance.

b. (25) Use adverse selection to explain the seeming collapse of the HMO concept (the Pauly/Nicholson argument).

Pauly and Nicholson argue that when the healthiest left traditional insurance as part of the cycle described above, they joined HMOs that had lower premiums but also lower quality (in terms of provider choice and generosity of benefits). Once enough of the healthy left traditional insurance, premiums became quite high. Now the least healthy had to make a choice between generous (high cost) insurance and stingy (but cheaper) HMOs. Rising premiums eventually drove everyone to the HMOs. As a result, HMO costs began to rise and premiums had to follow. The healthy were unhappy with higher premiums and the less healthy were unhappy with less generous benefits. Once again, the healthiest are leaving the mainstream insurance product in search of lower premiums.

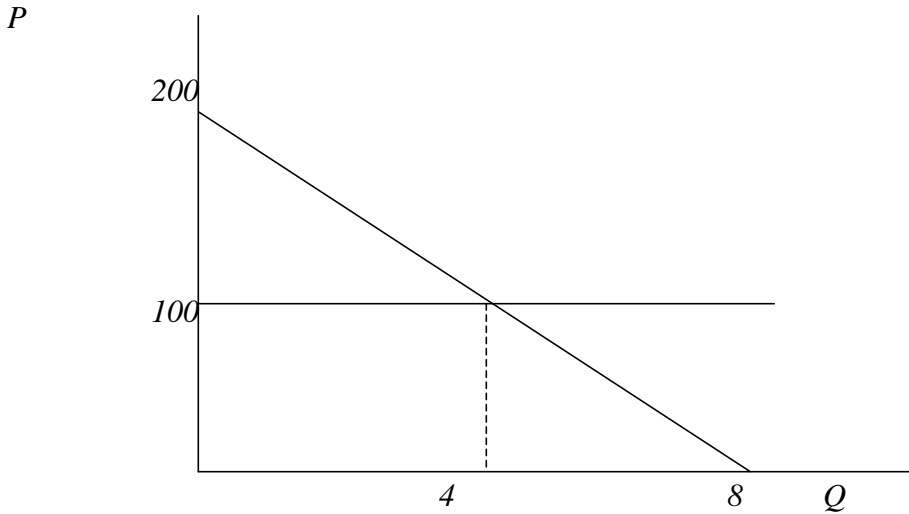
5. Greg Gingivitis has a 50% change of contracting gum disease (I don't think he flosses). If he gets sick, he will have the following annual demand for dental cleanings:

$$Q = 200 - 25P$$

The price of a dental visit is \$100.

a. (20)

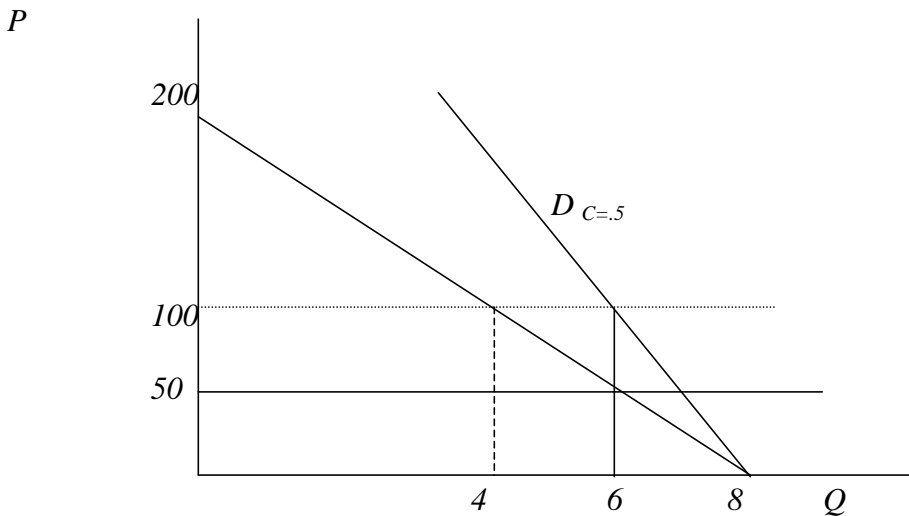
- Draw Greg's demand for dental care if he contracts gum disease.



- How much does he expect to spend on dental care?

$$.5 * 4 * 100 = \$200$$

- Now assume his employer offers a dental plan that pays 50% of all dental bills. Add to the graph his effective demand for dental care with the insurance policy.



b. (10) Assume Greg's dental plan (that covers 50% of all dental bills), has a \$30 load.

- How much is the premium?

$$\text{Pure Premium} = \$150, \text{ load} = \$30, \text{ Premium} = \$180$$

- Assume his risk premium from this plan is worth \$70 to him. Is he better off with the insurance or without it (and if so, how much better off is he)?

$$\text{Visits 4-6 create expected DWL} = .5 * \$50 = \$25.$$

Better off because the risk premium (70) > the load + DWL (\$55).

c. (10) Now assume he has the option to choose a dental plan that pays 100% of all dental bills, the load is still \$30.

- What is his premium now?

$$\text{Pure premium} = \$400, \text{ the load} = \$30, \text{ premium} = \$430.$$

- The risk premium from eliminating all risk is now \$110.
- Should he switch to the new 100% coverage option? Explain.

$$\text{No, now the expected DWL (from consuming 8 visits)} = \$100$$

So the risk premium (110) < the load + DWL (\$130).