

Problem Sets 3 and 4
Economics 40565
(Due: Thursday, November 30, 2007)

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1. Graphically illustrate how the movement to fluoridated public water has altered the market demand for dental visits?
2. In the slides for the section on moral hazard, use the specifics of the Medicare Part D prescription drug plan and graph a senior's out of pocket expenses for prescription drugs (horizontal axis) versus the total expenditures on prescription drugs (vertical axis). Your graph should look similar to the one on slide ## in the same set of class notes.
3. In some state Medicaid programs, the coinsurance rate for prescription drugs is 0 (recipients have no out-of-pocket expenses for prescription drugs). Assume the inverse demand for the number of prescriptions filled per month without insurance is $P=45-5Q$. Graph the demand curve with and without insurance. Over the past 20 years, many state Medicaid programs have adopted some form of cost sharing for prescription drugs. Suppose a state adopts a copayment rate of \$9 per prescription. Graph the demand curve in this case. Suppose the average prescription is \$15. What is demand under i) no insurance, ii) 0% coinsurance, and iii) \$9 copayment.
4. Suppose that in the absence of insurance, the inverse demand for office doctor visits is given by the equation $P_1 = 150 - 30Q$. Graph the demand curve. Graph the demand curve when the person has health insurance with a coinsurance rate of 25%. What is demand for visits with and without insurance when doctors receive \$60/visit?
5. The market demand for a particular doctor visits is given by the inverse demand curve $P_d = 100 - 5Q$ and the market supply is $P_s = 20+5Q$. Graph the market supply and demand and indicate the market equilibrium values for price and quantity. Suppose that the consumers in this market are then provided health insurance that pays for all services after consumers pay a 20% coinsurance rate for every visit. On the same graph, graph the demand for doctor visits generated by this insurance plan. What is the market equilibrium price and quantity with a 20% coinsurance rate. What is the dead weight loss of moral hazard under health insurance?
6. Not all medical costs for the elderly are covered by Medicare. For example, there is a yearly deductible that all recipients must pay, plus copayments on services like hospital visits. Medicare also does not cover prescription drugs (it will start covering prescriptions drugs next year). Many seniors purchase supplemental insurance policies called Medigap insurance that cover these "gaps" in Medicare's coverage. The most popular policies actually only provide coverage against the copayments and deductibles. Is the purchase of these types of policies consistent with economic theories of the demand for insurance? One piece of information that may be helpful -- a large fraction of elderly meet the deductible payments each year.
7. Do you think the elasticities of demand for the following health services will be "high" or "low" in absolute value and explain your answers:
 - a) diagnostic x-rays, such as those for broken bones
 - b) mammographies
 - c) *length* of hospital stays
 - d) plastic surgery

8. Looking at slide 93 in the lecture notes on moral hazard, use the data on the movement from free care to 50% coinsurance rate to estimate the arc elasticity of demand for a) doctor visits, b) dollars spent on hospital care, and c) total dollars spent on all medical care.
9. Starting in 2006, seniors could for the first time receive a prescription drug benefit through the Medicare program. For the purposes of this problem, assume that under this new plan, seniors will have to pay a 25% coinsurance rate on all prescription drugs. The program was passed as part of the “Medicare Modernization Act” and the new insurance plan is referred to as “Medicare Part D.” In the year prior to when the law became effective, about half of all seniors had some prescription drug coverage and their coinsurance rate was roughly about 25%. Also, half of all seniors had no coverage so their coinsurance rate was 100%. In 2005, spending on prescription drugs was estimated to be about \$29 billion annually among seniors without insurance and \$73 billion annually among those with insurance. Assume the elasticity of demand for prescription drugs is -0.4. With these numbers, please answer the following questions about the new prescription drug plan.
- A) Under the new plan, what will be aggregate annual spending on prescription drugs among those who previously had insurance? Among those who previously did not have insurance?
 - B) Once the plan is fully implemented, what will the Federal government end up paying for prescription drugs? Remember, everyone previously insured on a private plan will now be covered by Medicare.
 - C) Some of the cost of the prescription drug benefit will be paid for by premiums paid by seniors and by state governments. It is estimated that these revenues will generated about \$22 billion in revenues. Using this and your estimate from B), once the benefit is fully implemented, by how much will Federal outlays increase as a result of this program.
 - D) The Congressional Budget Office has produced some cost estimates of the Part D program. Do a web search and find out what the CBO estimate the Part D program will cost the federal government program in 2007 (1st year of full implementation). How close did you get to this estimate?
10. In the previous problem, why is current annual spending on prescription drugs so much larger for those with insurance than those without. Explain.
11. In the early 1990s, an experiment was run in the Mississippi Delta where 500 rural school-aged children were provided health insurance through a program called *Get Smart*. Students were randomly selected to participate in the program. The program was designed to estimate how health insurance would alter the demand for medical care in a poor rural population. To evaluate this question, the authors of the study collected two years worth of data on health care use for the 500 children before the program was instituted and examined how these numbers changed over the next four years after the students were enrolled in the health insurance plan. The authors showed that four years after the program was started, medical expenditures increased by 35% in the four years after students began being enrolled in the program. Please answer the following questions:
- A) The students enrolled in the program were picked at random from a population of uninsured children. What problems does the random selection of participants solve when one is interested in estimating the impact of insurance on medical care use?

- B) Even with the benefits of random assignment, why might the statistical model used by the authors systematically over or understate the impact of health insurance coverage on medical care use? How could the authors correct this shortcoming in their research design?
12. Suppose a worker is currently receiving health insurance through their employer and the policy is valued at \$4200/year. Suppose also that adding all state and federal incomes together, this person's marginal tax rate is 36%. How much before-tax income would this person have to receive if they wanted to purchase a health insurance policy at \$4200 with after-tax dollars?
 13. Utility maximization review. Suppose Bob spends his income (I) solely on goods X and Y . Initially, Bob has \$1000/week to spend on consumption and the prices of these goods are $P_x = \$4$ and $P_y = \$2$. Graph the budget constraint for this problem. Given these prices and income, Bob maximizes utility by consuming X_1 and Y_1 . On the same graph, indicate this utility maximizing bundle. Suppose that the price of Y falls to \$1/unit. Illustrate how this changes Bob's budget constraint. Suppose that after the price change, consumption of Y has increased to Y_2 but the consumption of X stays the same at X_1 . Graphically illustrate the income and substitution effects for both Y and X generated by the price change.
 14. Suppose a firm is willing to pay an employee \$600/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%. 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/week. Suppose that wages remain taxable but health insurance is now a tax preferred fringe benefit. Graph the new budget constraint.
 15. Continuing with problem 14. Suppose that as insurance moves from a taxable to a non-taxable benefit, the person increases both the consumption of health care and after tax income. In this situation, decompose the income and substitution effects for health insurance and after-tax income.
 16. Continuing with problem 15. Suppose that the marginal tax rate increases from 30 to 15%. What has happened to the relative price of health insurance? Graphically illustrate how this alters the budget constraint. What are the income and substitution effects for health insurance generated by the tax hike? Isolate these on a graph.
 17. Joe works for a company that has a generous health insurance plan and the firm self-insures. The firm estimates that it pays on average \$4000/worker per year to provide insurance. Joe suggests to his boss that he is willing to give up his insurance if the firm will increase his before-tax salary by \$4000/year. The firm refuses Joe's offer. Why do firms that provide insurance typically not let people trade insurance for salary?
 18. Researchers are concerned about the problems of adverse selection in health insurance markets but they are less concerned about adverse selection for automobile insurance? Why? HINT. Think about what types of information is available in each market.