Mgmt 444

Health Care Economics Homework Problems

You should prepare solutions to each assigned problem, but you are not expected to turn in your solutions. Detailed solutions to most of the problems are posted to the course page.
(Note: Questions marked by a * may be especially challenging. Don't spend more than 30-45 minutes on them unless you are making progress. We will review these questions in class.)

Week 1: September 22

1) Prior to the 1980s, health care payers in the United States all but guaranteed that hospitals would make a modest profit, regardless of their costs. In the past two decades, low cost hospitals have been able to profit from their efficiencies, yet new technologies continue to drive costs higher. Is the quadrilemma wrong? Why do technology-related costs continue to climb?

2) Suppose you wished to assemble research evidence showing that drug price controls in EU nations are harmful to consumers. What evidence would you like to present? Based on the class discussion and readings, what evidence is currently available?

3*) Vaxis Pharmaceuticals has one product, Vaxim, that it sells in two nations, Northland and Southland. The marginal cost of producing Vaxim is 0.

Northland is a small country with a regulated health care system. Patients obtain all prescription drugs free of charge. Northland's government purchases exactly 200 units of Vaxim and agrees to pay Vaxis $100 per unit. It distributes Vaxim to local retail pharmacies which receive an additional $10 fee for each prescription filled (making the effective price $110).

Southland has an unregulated healthcare market. Vaxis sets its own price in Southland, where the demand curve for Vaxim is P = 1000 – Q.

    a) Suppose that there is no importation of Vaxim from Northland to Southland. What price should Vaxis charge in Southland?

Suppose that Southland permits "importatation" of Vaxim from Northland. Southland pharmacies may purchase Vaxim from Northland pharmacies at the low Northland price of $110 (or close to it) and then sell it in Southland at whatever price the market will bear. The only constraint on importation is the willingness of Northland pharmacies to sell to Southlanders.

    b) Southland pharmacies are able to import half the Vaxim intended for the Northland market (100 units). They sell it at just below the price that Vaxis sets in Southland, so as to be certain to sell all 100 units. What price should Vaxis set in Southland?

    c) Would Vaxis be better off refusing to ship any drugs to Northland? Explain.

4) Refer to the individual's wage/risk indifference curve in the Thaler/Rosen type analysis of job risk to show the following:

An individual's willingness to pay to avoid a .10 risk of death is *more than ten times larger* than the willingness of that individual to avoid a .01 risk of death.

What is the implication for attempts to estimate the benefits of different types of medical interventions?

5*) Patients prefer hospitals with low prices and low mortality rates. Hospitals may hire staff to reduce mortality rates, but incremental reductions in mortality are increasingly costly.

Suppose that the hospital market is perfectly competitive, hospitals seek to maximize profits, and patients and hospitals are fully informed about costs, prices, and mortality rates.

a) Use the hedonic pricing framework developed by Thaler and Rosen to show the optimal level of staffing of a hospital and a patient who selects it. Draw an appropriate graph. Be sure to label your axes and curves correctly and think carefully about how to draw the relevant curves.

b) Explain why the staffing level you have identified is optimal. Specifically, show that social welfare is reduced if some other staffing level is required by law.

Week 2: September 29

6) Explain why jobs created as part of a public project are not included in the benefits.[1]

7) Suppose that a hospital receives a fixed daily payment for each inpatient, and that the amount of the payment usually exceeds the cost of keeping a patient in the hospital an extra day. It has been argued that in such a situation, hospitals have an incentive to unnecessarily extend lengths of stay. Use the efficient markets argument to explain why the hospital might consider taking the societal viewpoint and decline to keep the patient any longer than necessary. Do you think such market efficiency is achievable?

8) How will properly accounting for future benefits and costs affect the relative rankings of the following interventions:

a) Hip replacement surgery improves the quality of life but does not extend life
b) Chemotherapy extends life but does not improve its quality
c) Bariatric surgery (stomach reduction) on obese young adults extends lives, but at a considerable cost

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[1] This question taken from Folland, Goodman, and Stano, *Economics of Health and Health Care* Prentice Hall,(2007)

9) Use the following information to evaluate the relative cost-effectiveness of:

    (i) a hair-weave on an otherwise healthy 50 year old, versus
    (ii) a hip replacement for an otherwise healthy 50 year old.

    · The hair weave "cures" baldness.
    · The hip replacement allows an individual to walk without a limp.
    · All individuals referred to in this question have a 20 year life expectancy, after which time they die instantly.

    · Thirty people were asked: "How many years (X) of fully-haired life are equivalent to 20 years of baldness?" Ten people said X = 20; Ten said X = 19; Ten said X = 18.
    · Thirty people responded to a survey question: "How many years (Y) of fully able life are equivalent to 20 years of walking with a limp?" Ten people said Y = 16; Ten said Y = 15; Ten said Y = 14.

    · Cost of hair-weave (includes lifetime maintenance) = $10,000
    · Cost of hip-replacement (includes lifetime follow-up care) = $75,000

Suppose that there is no discounting. What is the *cost per QALY* for each procedure?

Suppose that future lives are discounted. Which intervention will this tend to favor?

Week 3: October 6

10*) Suppose that all individuals have the same risk of illness, but there is a fixed cost of supplying insurance. Specifically, insurers must incur a cost of F dollars per policy, regardless of the extent of coverage or whether the individual falls ill.

    a) Use the model of Rothschild and Stiglitz to determine if individuals will still prefer to purchase complete insurance. (Hint: You must redraw the "breakeven line.")

    b) What implications, if any, do you draw from this analysis for the viability of a market for insuring iPods against theft?

11) The market for long-term care insurance in the U.S. (i.e., insurance that pays for care in nursing homes and other long term care facilities) is very small.   One possible explanation is that individuals expect Medicaid will pay for their care.   Another explanation is that individuals systematically underestimate the probability that they will need long-term care.   This question considers other explanations.

    a) Offer an explanation for why this market is so small based on *adverse selection*.   Do you think that adverse selection is likely to be more severe in the long term care market than in the acute hospital care market?

b) Another explanation for why this market is small is based on *moral hazard* – that is, the concern that offering insurance for a service will greatly drive up utilization of that service. Do you think that moral hazard is likely to be more severe in the long term care market than in the acute hospital care market?

12) The following is excerpted from a letter to the editor of the 8/30/2003 *Chicago Tribune*:

> Millions of Americans with past or current health problems have difficulty obtaining health insurance. The problem revolves around what insurers call "adverse selection." Sick people cost insurers more than healthy people. If one insurer offered equally affordable policies to everyone, sick or healthy, sick people would gravitate to that company. The cost to insure all those sick people either would bankrupt the company or require the company to raise its rates. Healthy people, able to obtain cheaper coverage elsewhere, would change insurers. If insurers were precluded from considering health, there would be no adverse selection. … If insurers could eliminate the costs of investigating and record keeping, they actually might be able to lower rates.
>
> Many of America's health insurance problems would disappear if Congress passed a law stating that "No health insurer may consider any applicant's past, current or future health or age." By eliminating adverse selection, such a law would put all insurers on the same plane, reduce insurance costs and make health insurance available to more people. A serious social problem could be reduced with a one-sentence law.

Comment on this recommendation. Does the letter write do a good job of explaining the problem of adverse selection? Would the law work to eliminate adverse selection? Does guaranteed renewal coupled with community rating accomplish what the author is aiming for?

13) Use the following data to estimate the rate of "retirement lock," that is, the decrease in the probability of early retirement associated with the fear of losing insurance. Note that the data in the cells are the early retirement rates for workers in each category.

	Spouse has Employer-Provided Health Insurance	
	Yes	No
Has Own Insurance	.20	.15
Does not have insurance	.17	.17

14) Physicians are organized into specialty societies (E.g., the American Academy of Obstetricians and Gynecologists). What role might these societies play in establishing the trust relationship described by Arrow?

15) Use the Hansman/Weisbrod theory to explain why there are so few nonprofit organizations involved in drug development. Thinking more broadly, why do you suppose there are both nonprofits and for-profits involved in basic pharma research?

16) Determine if each of the following situations is an example of economic moral hazard, insurance moral hazard, or neither.

  a) After parking your Porsche convertible outside of the Opera House, you leave the top down (for everyone to admire it) and go inside to see Mozart's Don Giovanni.

  b) On your way home, you scrape your Porsche convertible against a rose bush, leaving an imperceptible scratch along the rear fender. You take it in to be repainted, with your insurance footing the bill.

  c) You trade your Porsche for a new Ferrari Testarosa, paying the difference in cash.

  d) You drive to the health club. You notice that they have added a new cardiovascular clinic, staffed by emergency medical personnel. Feeling reassured, you play basketball for the first time in ten years, even though you know that you have a weak heart.

  e) You have a heart attack. The medical personnel at the club save your life. You consent to minimal follow-up treatment, which you correctly believe leads to a full recovery.

17) Suppose that the market demand and supply for medical care are given by the following functions:[2]

$$Q_d = 100 - 2p$$
$$Q_s = 20 + 2p$$

  a) What is the equilibrium price and quantity?
  b) Suppose that consumers have health insurance with a coinsurance rate of 20 percent. What is the new equilibrium price and quantity?
  c*) What is the deadweight loss from insurance?

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[2] This question is taken from Folland, Goodman, and Stano (2007)

18) Suppose that when deductibles for hospitalization increase from $0 to $1000, hospital utilization falls by 15%. Estimate the arc elasticity of demand for hospitalizations.

19) Many policy analysts cite the RAND study as evidence that health insurance plans with large deductibles will drastically reduce costs. How relevant is the RAND study to forecasting the effects of large deductibles in today's environment? If you could design an insurance plan based on the RAND evidence, what cost sharing features would you include?

Week 5: October 20

20) Health policy analysts have hypothesized that practice variations begin during medical school and residency training, where students in different programs are taught different approaches to delivering care. For example, some obstetrics training programs teach residents to perform vaginal deliveries whenever possible, whereas others emphasize caesarian delivery. This would explain why individual physicians have different styles but is not sufficient to explain regional variation. What else must occur for "training variation" to become "regional variation?"

21) Suppose that if individuals valued a particular medical service correctly, their demand would be $P = 100 - Q$. Due to misperceptions, they actually have demand of $P = 150 - Q$. If the price of care equals the cost of care equals 50, what is the loss in total surplus that results from the misperceived value?

22*) You are studying practice variations for two interventions, A and B. The mean rates of each intervention are identical. So are the coefficients of variation. Intervention A has much more elastic demand than intervention B. Use the model of practice variations to determine which intervention experiences the larger deadweight loss.

23) Suppose you wanted to know the effect of education on lifetime earnings, holding constant all other predictors of earnings. The <u>true</u> model relating education to earnings is:

$$Y = 1000 + 50(\text{Schooling}) + 50(\text{Sex}) + 100(\text{Mental Health})$$

where Y = lifetime income (in thousands),
         Schooling = years of schooling,
                Sex = dummy indicating sex (0 = female, 1 = male),
    Mental Health = a measure of mental health status (larger values correspond to better health)

You do not have any data on mental health status so you run the following regression:

$$Y = B_0 + B_1(\text{Schooling}) + B_2(\text{Sex})$$

and obtain $B_0 = 1000$, $B_1 = 100$, $B_2 = 50$. Why is your estimate of B_1 bigger than it ought to be?

24) The US has twice as many medical specialists per capita than virtually any other nation. The US also spends twice as much per capita on specialized medical treatments than virtually any other nation.

> a) Some critics contend that this is proof of demand inducement. How does the implied inducement magnitude compare with that of the published research literature?

> b) Can you offer an explanation for the specialist data that does not depend on inducement?

> c) How might you go about sorting cause and effect?

25) The theory of yardstick competition suggests that production will be efficient if the government sets a common price for all patients in a given DRG category. Consider the possibility that the medical needs of patients within each DRG category can vary widely; the coefficient of variation within some categories exceeds 0.5

> a) What potential problems might arise if all hospitals are profit maximizing?

> b) Suppose that some hospitals are profit maximizing but others will accept all patients. Does the DRG system still generate efficient production?

> c) How might you modify the DRG system in light of this problem?

Week 6: No Homework

Week 7: November 3

26) Research shows that HMO patients receive more preventive care than indemnity patients.. HMO advocates claim that prevention saves HMOs money. Doesn't prevention also save money for indemnity plans? Offer better explanations for the discrepancy in preventive care.

27) Some evidence suggests that managed care produces "one time savings" over traditional insurance, but that the rate of growth of costs is the same for managed care and traditional plans.

> a) If this is true, then what is the relationship between changes in managed care penetration and the rate of growth of health care costs?

> b) Does this imply that the nominal difference in costs between managed care and traditional plans will remain the same year after year?

28) During the 1990s, some insurers considered capitating specialists but paying PCPs on a fee for service basis. What problems would you see this creating?

29) Predict how each of the following changes would affect provider choice of quality:

   a) Medicare lowers its PPS payments to hospitals

   b) Medicare publishes rankings of the quality of nursing homes, specifically focusing on nurse staffing levels and patient complaints

   c) Physicians obtain antitrust exemptions, permitting collective bargaining with payers.

30) Many insurers currently pay hospitals a fixed fee for a hospitalization (where the fee depends on the DRG.) Hospitals may not charge more than this fixed amount.   Insurance plans have considered changing this policy. One proposal would continue to cap payments for insurer hospital stays, but allow hospitals to "balance bill" patients if their price exceeds the allowed cap. What effect, if any, do you think this will have on hospital quality?

31) Data from medical records is much better than administrative claims data at predicting health outcomes. If medical records data is available, should administrative claims data also be used to construct report cards?

32) One popular P4P metric is whether a pediatrician's patients are on schedule with their vaccinations.   What potential pitfalls do you see with this measure?

33) If report cards are successful, high quality providers will see an increase in demand. Is this necessarily a good thing?

Week 8: November 10

34) Entry is an important determinant of a market's competitiveness. How does the threat of entry affect the competitiveness of these markets: Physician? Hospital? HMO? PPO?

35) "Local systems may realize economies of scale that are not available to national systems." Explain. Are there economies of scale available to national systems but not to local systems?

36*) Recall the "make or buy" framework developed in Mgmt 431. How will improvements in clinical information systems affect the relative merits of integration versus reliance on arms-length relationships?

37) What are potential sources of economies of scale in the health insurance sector? Do you think these are likely to be substantial?

38) Providers often insist that insurers have monopsony power, as evidenced by their ability to extract discounts from charges. Is this evidence of monopsony? How does payer monopsony power affect enrollees?

39) Here is some demand, cost, and capacity information about a hospital. Note that the subscript "$_p$" refers to privately insured patients, and "$_g$" refers to government patients.

$P_p = 60-Q_p$ $(MR_p = 60-2Q_p)$
$P_g = 20$
$MC = 10$
Capacity limit $= 50$ (The hospital cannot treat more than 50 patients.)

a) What price should a profit maximizing hospital charge to its privately insured patients?

b) How many government patients should it treat?

40) Consider the following data showing a typical hospital's revenue and costs from privately insured and government patients:

Payer type	Total Revenue	Total Cost	Net Profit/Loss
Government	$10 million	$12 million	- $2 million
Private	$20 million	$18 million	$2 million
Total	$30 million	$30 million	$0

The data show that the hospital's net profits from privately insured patients offset its losses from government patients. Does this imply that a cutback in government payments will result in an increase in profits from private patients (i.e., that the hospital is engaging in "dynamic cost shifting"?) Explain.

41) Some large insurers require that contracting providers grant them "most favored nation" status. If an insurer has MFN status with a provider, then the provider must charge them a price that is at least as low as the lowest price charged to any other insurer.

a) Why would a provider be more eager to obtain the business of a large insurer as opposed to, say, several smaller insurers of the same aggregate size as the large one?

b) If an insurer has enough clout to obtain an MFN, why would it prefer the MFN (and the uncertain price that goes with it) instead of simply demanding a lower price?

c) State Medicaid plans have MFN status with pharmaceutical companies. Does your answer to (b) apply to Medicaid?

42) The past two years have witnessed the emergence of "consumer driven" health insurance plans. To contain costs, these plans impose a substantial increase in deductibles, to as much as $2000 annually. How will the growth of such plans affect competition among health care providers? (Note: your answer may depend on the type of provider.)

43) What are the two goals of a negligence system? In light of the performance of our current medical malpractice system, how would mandatory pretrial arbitration affect the accomplishment of these goals? What about the introduction of "no fault" medical malpractice insurance?

44) In a malpractice case, plaintiffs' attorneys generally receive 33 percent of the damages that are awarded (or agreed to in a settlement) and nothing if the case is lost. Lawyers argue that this aligns the interests of attorney and client. In what ways are the lawyers correct? To what extent are the interests still not perfectly aligned?

45*) Many analysts are concerned that rising malpractice premiums will force *some* physicians to stop performing *certain* surgical procedures. From a societal perspective, this seems like a bad trend. Why does the impact of this trend depend on the "some" and the "certain"? (In thinking about the "certain", be sure to consider the full cost of performing a high risk treatment.)