

Mgmt 444

Suggested Homework Solutions

1) The question may be restated as follows: Why does the market seemingly fail to reward cost reducing technologies? It could be that the benefits of improved health so outstrip the costs that consumers (especially insured consumers) are willing to pay any price. Related to this, perhaps it is technologically difficult to find ways to reduce costs without sacrificing quality. Another important consideration is that doctors dominate medical decision making; hospitals can stock cost reducing technologies but doctors must order them or they will go unused. If doctors and patients are immune from economic incentives, cost increasing technologies will thrive.

2) I would examine the comparative availability of drugs in the EU and US, including dates of introduction. This data is readily available from each nation's regulatory bodies. I would also examine utilization, because price regulations might affect the incentives of drug companies to promote drugs and the willingness of doctors/patients to use them.

I would also be interested in longer term effects. Despite substantial research, it is still unclear whether profits affect R&D incentives, and if so, by how much.

It would be helpful throughout these analyses to distinguish between breakthrough and me-too drugs.

3a) Because the marginal cost is constant ($MC = 0$) and there is no importation, the optimal price in Southland is independent of the price charged in Northland. Vaxis sets the profit maximizing price based on a demand curve of $P = 1000 - Q$ and $MC = 0$. Simple math gives us $P = 500$.

This gives profits of \$250,000 in Southland. Add to this the \$20,000 profits from Northland for a total profit of \$270,000.

3b) As a result of importation, Vaxis knows that whatever price it sets in Southland, it will sell 100 units less than it would otherwise. The effective demand for Vaxim in Southland (also called the "residual demand") is $P = 900 - Q$. The optimal price is 450.

Total profits is \$202,500 in Southland + \$20,000 in Northland = \$222,500.

3c) Vaxis is better off not selling to Northland at all! It should charge $P=500$ in Southland. It would enjoy profits of \$250,000, versus \$222,500.

Scenario	Pricing in Southland	Total Profit
No importation allowed; Vaxis sells to both nations	$P = 500$	\$270,000
Importation allowed; Vaxis sells to both nations	$P = 450$	\$225,500
Importation allowed; Vaxis does not sell to Northland	$P = 500$	\$250,000

4) Draw an indifference curve that is tangent to a market line. Beginning at the “job” represented by the tangency, begin to work your way up the indifference curve. The slope represents the increase in wages needed to offset the increase in risk. Because the curve is convex (it curves up and away from the origin), the change in wage grows faster than the change in risk. Thus, the value of .1 life is more than ten times the value of .01 life. The practical implication is that we will spend much more to save “identified lives” (where we know for sure that someone will benefit) than an equivalent number of “statistical lives” (where each potential beneficiary has only a small chance of benefiting.)

5) To be discussed in class

6) Payments to workers represent a transfer of wealth, which is neither a social benefit nor social cost. The social benefit is equal to the benefit enjoyed by the end users of the project. The cost is the resources foregone in undergoing the project. If workers were unemployed, then the cost might be very low, making the benefit/cost ratio very high. Thus, doing the accounting correctly can still lead one to conclude that it is cost effective to employ unemployed workers on a public project.

7) It certainly makes sense in the short run for the hospital to extend the stay, as the additional revenue will exceed the additional cost. According to the efficient markets hypothesis, market actors (patients and/or payers) will punish the hospital in the long run, thereby discouraging the hospital from abusing the short run price/cost discrepancy.

It is doubtful that individual patients would impose this discipline. Patients have insurance and this further insulates them from considerations of prices and costs. Payers may be better positioned to act. The payment rate is usually renegotiated at the end of the year. If a payer examines the overall cost of treating the patient at the hospital, it will see that the cost has gone up relative to other hospitals. It might renegotiate the rate or even direct patients to other hospitals.

8a) Hip replacement surgery provides immediate benefits and does not materially affect future spending on health or unrelated goods. It looks good when proper accounting is performed.

8b) Interventions that extend life without improving the quality of life are associated with higher spending on health and unrelated goods. They fare poorly under proper accounting.

8c) The life-extending benefits of bariatric surgery on young adults are not realized for many years. These benefits will be heavily discounted, making the surgery less attractive.

9) Based on the responses of the thirty individuals, baldness gets a QALY score of .95 (=19/20) and walking with a limp gets a QALY score of .75 (=15/20).

"Curing" baldness adds .05 QALYs for every year that the cure is effective, or 1 QALY for 20 years. Given a cost for hair-weaves of \$10,000, the cost per QALY for a hair-weave is \$10,000.

Curing the limp adds .25 QALYs for every year that the cure is effective, or 5 QALYS for 20 years. Given a cost for hip-replacements of \$75,000, the cost per QALY is \$15,000.

If future benefits are discounted, the benefits of both interventions will be discounted by the same amount, because life expectancies and the dates when benefits are enjoyed are identical. The benefit/cost rankings will not change.

10) The insurer must recoup this fixed cost F from every enrollee, regardless of whether or not they fall ill. This means that the premium must be higher by F , and the net payout must be lower by F . This shifts the breakeven contract line down and to the left (The amount of the shift is $\sqrt{2F}$ as I will show in class). Note that with such a shift, the breakeven line is still parallel to the old line, so it has the same slope. This means that the tangency of the indifference curve still occurs when there is full insurance. The difference between this situation and the original one is that full insurance costs F dollars more than it used to.

There is one additional crucial factor that needs to be considered. The "No Insurance" point is still on the old line! Thus, an individual may choose between points A and B below. Depending on the shallowness of their indifference curve and the size of F , they may prefer no insurance. The implication is that if F is large relative to the gain in utility that results from eliminating financial risk (as is likely for iPod theft insurance), there will be no market for the insurance product.

11a) Adverse selection occurs when individuals exploit their superior knowledge to disadvantage a trading partner. This naturally makes the less informed parties reluctant to engage in the transaction. For example, a potential buyer of a used car may reduce the amount they are willing to pay if they suspect that the seller is hiding some bad information about the car's quality. This, in turn, drives some sellers from the market because they do not feel they can get fair value for their cars.

In the case of long term care insurance, potential purchasers have some private information about their need for a nursing home. For example, seniors may know whether their children will allow them to move in when they can no longer support themselves. Those seniors who perceive that they will have no alternative but to enter a nursing home are most likely to buy long term care insurance. Sellers anticipate this and raise the price accordingly. This drives out of the market those seniors who perceive they have only an average or below average chance of requiring a nursing home. Unfortunately, some of those seniors will need a home, but they will not have bought insurance due to the pricing effects of adverse selection.

11b) If insurance causes seniors to purchase more long term care than they would have without insurance, then the price of insurance must increase. This makes the insurance a less attractive proposition for potential purchases. The extent to which insurance drives up demand depends on consumer price sensitivity. One might expect the elasticity of demand for long term care to be quite high compared to that for inpatient care, due to the potential substitutes (mainly care by relatives.) This suggests that moral hazard might be substantial.

12) The letter writer does a fine job of explaining the problem, but Rothschild and Stiglitz show that the recommended solution may not work. Insurers need not know anything about their enrollees to cream skim. They can cream skim through judicious choice of benefits package. They might offer a low coverage/low premium package that is cheap enough to skim off low risk enrollees, whose alternative would be to cross-subsidize the more costly/more generous package that was attractive to higher risks. Note that in this situation, the high risks are no better off than under experience rating (either way, they are in their own risk pool) but the low risks are actually worse off than before, because they are unable to access generous policies.

A combination of the letter writer's recommendation and strict controls over insurance benefits packages might limit the potential for cream skimming, but at the expense of tight government regulation over the insurance market.

13) The naïve estimate would compare the early retirement rate of workers with and without health insurance whose spouses lack insurance. These are the workers who would lose all coverage if they retired. This gives a "retirement lock" estimate of $.15 - .17 = -.02$. That is, workers who have insurance (and are worried about losing it) are .02 less likely to retire early.

But this ignores the possibility that workers who have jobs that provide insurance may be more or less willing to retire early for reasons that have nothing to do with insurance *per se*. We can control for this by considering workers whose spouses do have coverage. These workers can retire and still keep coverage through their spouses. We see here that when access to insurance is not a consideration, workers with insurance have a $.20 - .17 = .03$ higher probability of early retirement. Thus, the "retirement lock" is $-.02 - .03 = -.05$; that is, workers with insurance are .05 less likely to retire early due to fears of losing insurance.

14) The potential abuse of trust represents a commons problem for any professional society. Each specialist enjoys a level of trust based on the reputation of the profession. Each can exploit this trust for personal gain, but if all do so, the trust is destroyed and all members suffer. Professional societies can establish norms so as to increase the "ethical cost" of betraying the trust. They can also establish standards of care that through training and as legal precedent, can encourage physicians to act for the collective good.

15) The Hansman/Weisbrod conjecture is that consumers gravitate to nonprofit sellers when they are unable to easily measure product attributes and they believe that nonprofits will be less likely to skimp on these hard-to-measure attributes. Consumers usually have good information about drugs that reach the market. The FDA approves them and their physicians, who are rather well informed about drug quality, act as agents when making drug choices. Thus, consumers need not rely on the unselfishness of drug makers to be rather certain that the drugs they purchase are safe and efficacious.

When it comes to basic research, the issues have more to do with dissemination than trust. Basic research is a public good, so there is a need for government-funded research or there may not be sufficient research overall. (This is a classic commons problem in reverse. It is socially desirable to share the results of basic research but each company would prefer to free ride on other's basic research insights.) The government could conduct the research itself but might

prefer for much of it to be done in the private sector. By funding nonprofits, such as universities, there is presumably a greater chance that the research findings will spill over into many applications. (Recent university efforts to control research findings suggest that this theory may not always work out in practice.)

16a) Economic moral hazard. Assuming that you have theft insurance, you figure that even if someone steals your car, you will get insurance money to buy a new one.

b) Insurance moral hazard. It costs a fortune to get a paint job on a Porsche. You probably would not have repainted unless someone else footed the bill.

c) Neither (This is conspicuous consumption, however.)

d) Economic moral hazard. You figure that the penalty for overworking your heart is small because even if you have a heart attack, someone is close at hand to resuscitate you.

e) Neither. This is a prudent purchase that you would make whether you had insurance or not.

17a) Equating $Q_d=Q_s$ and solving the two equations simultaneously generates $p = 20$ and $Q = 60$.

17b) Because consumers only pay 20 percent of the price, we can write the new demand curve as $Q_d = 100 - 2 \cdot (.20) \cdot p$. Equating $Q_d = Q_s$ now gives us $p = 33.33$ and $Q = 86.67$.

17c) I will draw this in class. To compute the deadweight loss, we first need to draw the original supply and demand curves with price in the Y axis and Q on the X axis. Thus, instead of plotting $Q_d = 100 - 2p$ and $Q_s = 20 + 2p$, we must plot $P = 50 - Q_d/2$ and $P = -10 + Q_s/2$. These two lines intersect at $p = 20$ and $Q = 60$.

18) For convenience, let the original quantity equal 100. (Your answer will not depend on the actual value of initial quantity, as the “scaling” factor drops out of the calculation.)

According to the question, quantity falls from 100 to 85 after the deductible is introduced. Using the formula $\epsilon = (\Delta q/\Delta p) \cdot (\bar{p}/\bar{q})$, we note that $\Delta q = 15$, $\Delta p = 1000$, $\bar{p} = 500$ and $\bar{q} = 92.5$. Thus, $\epsilon = .081$. Note that this is somewhat smaller than elasticities estimated from actual data.

19) One important consideration is that the RAND study contrasted large deductible plans with standard indemnity plans. This by itself would result in an overstatement of the savings relative to managed care plans. On the other hand, RAND was a small scale study that probably did not evoke a response by providers. If large deductible plans are commonplace, providers might cut prices and otherwise become more efficient. In this way, RAND might understate the savings that large deductibles might afford.

20) Physicians of similar styles must come together in some fashion. Perhaps young physicians try to work at hospitals where treatments styles match their training. Or perhaps the hospitals

seek out physicians with copasetic styles. There may be dominant physicians at certain hospitals whose practice styles are emulated by others on staff.

21) If consumers have correct perceptions so that $P=100-Q$, then if $P=50$, it follows that $Q=50$. At this quantity, the total value is 3750 (the trapezoid under the demand curve) and the total cost would be 2500, for a total surplus of 1250.

If consumers overestimate value, so that $P=150-Q$, then $Q = 100$. The total value of these units is the area of the trapezoid under the actual demand curve and equals 5000. The cost of the services is also 5000, leaving a net surplus of zero. Thus, the loss due to misperceived demand is 1250.

22) I will show this in class.

23) Your regression omits a key variable -- *mental health*. This will cause the included variable *schooling* to suffer from omitted variable bias if (a) the omitted variable is an important predictor of income and (b) if it is correlated with *schooling*.

The true model confirms (a). Our intuition confirms (b) – we suspect that individuals with mental health problems will have fewer years of schooling. It follows that you are suffering from omitted variable bias. The included variable *schooling* picks up the effect of the excluded variable *mental health*. In this case, the effect of mental health on income is positive, and the correlation between mental health and schooling is positive. It follows that the bias is positive.

24a) The magnitude of inducement in most studies is quite low -- a doubling of suppliers "leads to" a ten percent increase in consumption. This is not nearly large enough to explain the specialist data described in the question, in which a doubling of suppliers is associated with a 100 percent increase in demand.

24b) If we restate this question with the terms "fast food preparers " and "spending on fast food" there would be nothing about which we needed convincing. We have more fast food chefs because we demand more fast food. The chefs do not induce demand for the food. Similarly, it is possible that the reason we have so many specialists is because we have a high demand for specialist services.

24c) Discussed in class.

25a) With DRG pricing, some patients must be unprofitable. If hospitals can identify who these patients are beforehand, they will refuse to treat them.

25b) Patients who are shunned by profit maximizing hospitals must obtain care from other hospitals. If profit maximizing hospitals are more efficient than average, then total treatment costs will be higher than if all hospitals took all comers. (The opposite is true if for-profits tend to be inefficient.)

25c) This problem can be mitigated if reimbursements are based partly on treatment costs (so that more costly patients within a DRG generate higher reimbursements.) The best way to do this is prospectively, by refining the DRG coding. This can be done retrospectively (i.e., pay hospitals a portion of their costs) but this dilutes the incentives to remain efficient.

26) Perhaps HMO enrollees have higher demand for prevention under any circumstances. Or it could be that HMO enrollees tend not to switch plans very often, giving HMOs the incentive to internalize future costs. Finally, open ended indemnity plans may be unable to control the amount that doctors spend on prevention; once they offer the benefit, the costs spiral out of control.

27a) As managed care penetration increases, the percentage of the population in lower cost plans grows, so that health care costs fall (or the rate of growth slows). This is the most likely explanation for the leveling of health care costs during the 1990s.

27b) The nominal difference increases, because growth occurs off a smaller base. (To see this, compare 9 percent growth of \$100 with 9 percent growth of \$80. After one year you are at \$109 and \$87.20 respectively. The gap has widened from \$20 to \$21.80. This tells us that even if health care costs are back on the rise, managed care may still be saving money.

28) The first problem is a simple one; how do you put this into practice? It will be necessary to come up with a “head count” so as to compute the capitation amount. Should each specialist get some fraction of the total enrollees? That would be unfair to the most popular specialists. At what point do you assign the enrollee to the specialist? What if two specialists see the same patient?

If these practical issues could be resolved, the system would likely impose tremendous risk on specialists. Compared with primary care physicians, specialists see relatively few patients and have highly varying costs. Note finally that PCPs would have little incentive to refer patients to specialists and specialists would have every incentive not to keep them.

29a) This reduces the price-cost margin, reducing the economic incentive to have good quality. This should decrease the quality of care provided to Medicare patients. It is interesting to note that Medicare is launching its pay-for-performance and report card initiatives at the same time it is cutting back provider payments.

29b) This should increase the responsiveness of demand to the published quality dimensions. But it might create a multitasking problem. Homes may shift resources to nurses and away from other staff (or food, or recreation, etc.) It might also create a “record keeping” problem if homes avoid reporting complaints. Some nursing home experts contend that complaints are often a sign of good quality, as the home is taking the time to get to know its residents!

29c) This may well enable physicians to increase prices. This may lead to higher quality provided that the physicians do not conspire to hold the line on quality. However, collective bargaining may enable physicians to resist attempts to measure quality, for example through report cards. This could reduce consumer quality sensitivity, and therefore reduce quality.

30) Balance billing would allow higher quality hospitals to obtain a higher payment. This assumes that consumers can identify higher quality and are willing to pay for it.

This will allow the best providers to use the price mechanism to ration access. Is this a good or bad thing? While the equity effects may be disturbing, note that this allows providers to cover the cost of boosting quality and gives them a financial incentive to boost quality.

31) More data should give more accurate risk adjustment. Moreover, if providers have data that is predictive of outcomes and is not used to construct report cards, then providers can use that data to select “favorable” patients and game the system. Unless it is costly to collect, or the data can be easily manipulated, it is valuable to use the administrative data.

32) Multitasking is always an issue but may be less of an issue with vaccinations, which are surely on the short list of required treatments. Assigning responsibility is not an issue because most children have a regular pediatrician who is unambiguously responsible for vaccinations. One problem that might arise is that the pediatrician alone cannot assure timely vaccinations. The parents must cooperate. Socioeconomic factors could come into play, causing doctors who treat patients in certain demographic groups to be punished financially.

33) Providers are asking themselves these questions. The best are working on systems of triage to make sure that they treat the patients for whom they can add the most value. High ranking providers are also advertising their position and using this as a point of departure in pricing negotiations.

34) Entry into the profession of medicine is limited by slots in medical schools and residency programs and restrictions on immigration. Even so, the number of new doctors continues to exceed the number entering retirement. There is even more entry into local markets; an estimated 10 percent of doctors in any given metropolitan area are new in that year. Thus, entry can discipline physician markets. (A barrier to entry can be access to a hospital staff or dominant specialty group. In some markets, a single specialty group in cardiology or radiology controls the market and restricts entry.)

Hospital entry requires considerable capital, new staff, and a reputation. It is not impossible, however, and we have witnessed construction of new general hospitals in high growth markets and new specialty hospitals for high stakes procedures like cardiac surgery. Regulations such as Certificate of Need may prove to be strong entry barriers.

PPOs must sign up provider networks and process financial transactions. These are not particularly difficult to master. PPOs need not do any medical underwriting if they stick to administrative services only contracts.

HMOs must also have systems to handle capitation and referral systems. These can be complex and, if poorly implemented, create enormous hassles for patients and providers. Both PPOs and HMOs that are successful in one state can often translate that success into other states. An exception is for a highly integrated HMO such as Kaiser which must have a dedicated provider network to replicate its core business model. This can be costly to create.

New HMOs must also work against negative brand image.

35) Local systems can integrate operations, share inventories and staff, and engage in local marketing efforts. National systems can grow larger than any local systems. This could permit development of management expertise, management systems, and purchasing economies. (Though purchasing groups help even small hospitals obtain clout.)

36) For discussion in class

37) The most important production efficiencies come from spreading of fixed costs, which appear to be minimal for insurance companies. Similarly, economies associated with inventory management, marketing, and the “cube square” rule seem minimal. (One “inventory” type saving may come from a more efficient use of the sales force; this is true for most businesses that rely on large face-to-face sales efforts.) Larger insurers do have purchasing clout, however, which gives them a cost advantage over smaller rivals. The magnitude of this advantage has not been well documented.

38) It is important to distinguish purchasing power from monopsony power. If you shop around on the phone to get a better deal on a new car, you are using your purchasing power. To the extent that insurers are price sensitive and can get better deals, this is the same thing. But if larger insurers can command larger discounts, and this is not just because they are more diligent shoppers, then this is consistent with monopsony.

Monopsony actually helps consumers in the short run, provided there is sufficient competition in the “output” market to force larger insurers to pass along some of the provider discounts in the form of lower premiums. In the long run, lower provider prices could affect quality and entry into medicine. Beware, as this argument can be used to “justify” arbitrarily high prices in any field of endeavor.

If one wanted to find more immediate tangible evidence of consumer injury, one might ask whether larger purchasers have smaller networks, or whether their MDs provide fewer services?

39a) Set $MR = P_g$ $Q_p = 20$. Thus, $P_p = 40$

39b) $Q_g = 50 - 20 = 30$.

40) The data are consistent with cost shifting, but also consistent with simple price discrimination, in which it may be natural to set some prices below average costs yet still be maximizing profits.

Because the data are consistent with profit maximization or cost shifting, one cannot predict from this data how the hospital would respond to a government price cut.

41a) Suppose a provider faces three small insurers with 30,000 covered lives each, and one large insurer with 90,000 covered lives. The question asks why it should be more eager to grant a

discount to the large insurer rather than the three small ones. I have posed this question to many providers without receiving an entirely satisfactory explanation.

It might be cheaper for the provider to negotiate one contract rather than three, but this difference is likely to be slight. Another possible explanation is that the provider is risk averse. If it offers a high price to three small insurers it may fail to get a contract with one or two of them, but it will still have enough patients to remain an ongoing concern. If it offers a high price to the large insurer it may fail to get that contract and then it will lose a substantial amount of business. This could threaten the very viability of the hospital.

41b) An insurer with MFN status is guaranteed to pay the best rate (or at least tie for paying the best rate.) This guarantees the insurer a competitive advantage in the insurance marketplace. Had the insurer negotiated prices, it would probably get the best deal but would never know for sure. By securing MFN, it never has to worry about being second best and avoids incurring any negotiation costs to boot. In addition, a rival insurer would know that it can never get a competitive edge by negotiating harder. This could deter entry by particularly hard-nosed negotiators.

41c) Medicaid plans do not have to worry about competition. But they may worry about bad publicity! MFN assures Medicaid administrators that they will not have to face the wrath of taxpayers should the media report that they are paying more than private sector payers,

42) High deductibles will make consumers more price sensitive, provided they do not exhaust them. This could increase price competition among, say, primary care providers. On the other hand, this should eliminate any price shopping for hospitals, where last dollar coverage will guarantee patients the same out of pocket price regardless of which hospital they select.

Another important issue is the extent to which patients can make intelligent choices based on often-opaque pricing. Unless MCOs intervene and negotiate discounts in their behalf, consumer driven health plans could lead to substantially higher provider prices.

43) The liability system should reduce negligence and compensate victims for damages (i.e., “insure” victims). Mandatory pretrial arbitration should reduce legal expenses by ending meritless suits before they go to trial. This would reduce the loading factor on the insurance aspect of the liability system. It might reduce negligence if providers believed there was a stronger correlation between quality and legal outcomes. By eliminating the adversarial component of the liability system, a no fault system would greatly reduce the loading fee for compensating victims. Deterrence would fall, of course.

44) An attorney who receives 33 percent of the award will bear all of the effort to prosecute the case but only one third of the reward. This necessarily leads to under-effort. On the other hand, the attorney is likely to take great care in accepting cases, as there may be no reward at all if the case proves to be frivolous. In this way, the experience of the attorney helps keep the system from being overwhelmed by plaintiffs out for a quick buck.

45) Regarding the “some”: if low volume or low quality MDs cut back, this might not be too bad. Patients may not get their “first choice” provider, but they could enjoy better outcomes.

The answer to the “certain” is not straightforward. Remember that high malpractice premiums reflect large malpractice awards, which in turn imply that patients receiving treatment have been injured or worse. The fact is that certain procedures do lead to injuries, whether the injuries are the fault of the provider or not. The costs of these injuries should be considered part of the cost of treatment. If this drives up prices and deters treatment, this is not obviously a bad thing. Why encourage treatments that routinely injure patients and create large associated costs? One important question is whether the malpractice premium increases reflect real increases in the costs associated with injuries. If so, then the premium increases may have a valuable deterrent effect. Another important question is whether the increases are targeting those providers most likely to injure their patients (and therefore most in need of deterrence), or whether they are borne by even the best providers who rarely if ever harm their patients. If the latter, then the increases may keep the best doctors from performing valuable procedures.