

## Asymmetrical Information and Agency

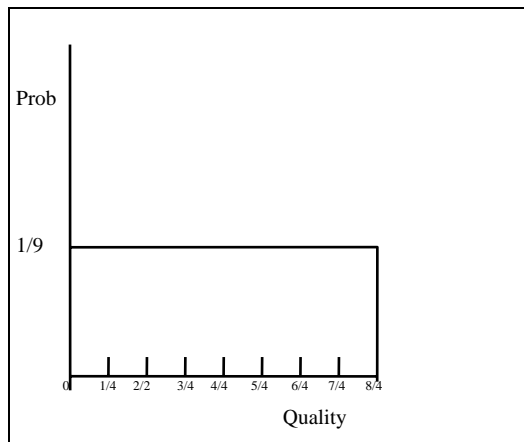
The assumption in economics is typically that individuals have perfect information about their relative choices. As we saw last time, if there is uncertainty, markets for insurance arise. One of the side effects of health insurance is the over consumption caused by the reduction in risk to the consumer (moral hazard).

In this section we will talk about two more problems that arise with lack of information: the case of information asymmetry is when one party of a transaction has private information. We will see that this causes problems in the market. This occurs in two places: in the market for insurance the consumer may have better information about his health than the insurer, and thus the market for insurance may operate inefficiently. Secondly, physicians may have better information about the health of the patient, and thus may be able to exploit this (this, known as Supplier Induced Demand (or SID) will be addressed later

## Asymmetric Information and the Lemons Principle

The guy who first described the problem applied it to the used car market, so it makes sense to begin there, then we will move to the market for health insurance.

Suppose there are 9 cars in the market, some are in mint condition (peach) and some are complete lemons. Suppose the sellers of cars know the true quality but the buyers do not. Further suppose that quality follows a uniform distribution such that of the nine cars, one has a quality of 0, then  $1/4$ ,  $1/2$ ,  $3/4$ , 1,  $1\ 1/4$ ,  $1\ 1/2$ ,  $1\ 3/4$ , and 2 or :



The horizontal axis shows the quality of the car and the vertical axis shows the probability of selecting a care of given quality (since there are 9 cars with diff probability the prob is  $1/9$  for all of them)

Suppose sellers value their cars at \$1 per unit of quality, so that if he had a car with quality  $1/2$  he would sell it for any price greater than \$.50. Buyers value cars at \$ $3/2$  per unit of quality so a buyer would be willing to pay \$.75 for the car. Since buyers are willing to pay more than the minimum acceptable price to the seller, the

market exists.

But how does asymmetric information change things? Suppose an auctioneer called a price of \$2. All owners would be willing to sell their cars, however, buyers would not be willing to pay \$2 for a randomly selected car, they would be willing to pay \$ $3/2$  the average quality or  $3/2 * 1 = 3/2$  or 1.50. But suppose now the auctioneer lowers the bid to 1.50, now what will happen? Note that the top two quality cars would no longer be offered for sale since owners value them at  $1\ 3/4$  and 2 respectively. But note this affects the average quality. By chopping off the top two cars average quality is now  $3/4$ , so buyers would only be willing to pay  $3/2 * 3/4 = 9/8 = \$1.125$  for a car and again the price called by the auctioneer is too high.

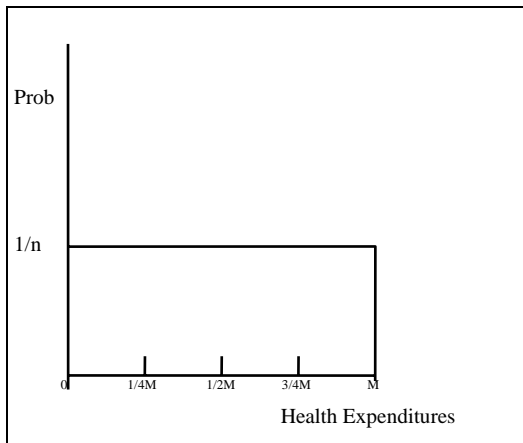
Will an equilibrium be found? No, not unless more information is given. The owners of the top quality cars are pushed out of the market by the lower quality cars; the bad drives out the good.

Note this is NOT the same as imperfect information, if both were in the dark about the quality of cars, the market would work just fine.

This problem is solved (or reduced) in the market of used cars through:

- Markets for information – you can pay a mechanic to give an assessment of a used car
- Reputation
- Warranties

How does this apply to health insurance?



Here the horizontal axis measures the level of health expenditures from 0 to \$M. And the vertical axis represents the probability of a given level of expenditures. Suppose the consumers know their own probability, but the insurance company only knows the distribution. For simplicity assume risk neutrality for both buyers and sellers. The addition of risk aversion does not change the basic conclusion and only complicates things. Suppose the auctioneer calls a price of \$0. All buyers would jump at the chance, but note that the company would expect to pay out 1/2M per policy so would

require at least this amount to supply policies, thus no policies are offered. Now suppose the auctioneer ups the price of coverage to 1/2M, then all potential buyers would expect to need more than 1/2M in care will buy the coverage, those expecting less will not, but the insurance company knowing this, changes its expected pay out to 3/4M, thus the higher risk individuals tend to push out the healthier people from the market, and since the insurers need the healthy to make money, the insurance market will fail under this type of asymmetric information.

How does the market solve this problem?

The main way is by the provision of insurance through the employer - this tends to pool risk and takes the adverse selection problem out of the buyer's hands, Individuals typically do not have the choice to accept or not accept the insurance.

People who obtain insurance outside of employment or some other type of risk pooling arrangement are typically given stringent screening tests and evaluations to determine an individuals probability. So no only are individual policies more expensive because they are riskier to insure (because they have a smaller risk pool than group policies), but also because they are susceptible to adverse selection problems.

Why do insurance companies not allow pre-existing conditions in new policies?

COBRA and adverse selection

Also high deductibles tend to screen out high risk individuals. Accepting a high deductible policy signals you as a low risk individual. High co-payments also serve this purpose.

Cream skimming

How do the elderly fit in to this analysis? Note that in the absence of Medicare, the elderly would be required to participate in private insurance markets. Would this work? It may be quite difficult to screen elderly patients adequately (note most will be retired) and thus the higher the price they charge the larger the portion at the top of the distribution that gets chopped.

Medicare+Choice vs. Medicare Advantage

Note to that to a certain extent insurance linked to employment creates its own adverse selection problem - only the relatively healthy (and young) are the ones who are employed, leaving the highest risk group without coverage, thus in order to get coverage, they must charge very high prices. This gives validation to the notion of government provision of health insurance to the poor and elderly. Note that these are not optional, everyone participates (by paying taxes) with community rating

Community Rating vs. Experience Rating.

Many insurance plans use experience rating systems. In the case of employer-provided health insurance, premiums are based on the past experience of the group, or other risk-rating systems to project expenditures. Automobile insurance, on the other hand, is individually experienced rated. It is important that any program that has a community rating aspect to it be involuntary. Since in a community rating system each person pays for some average of the total expenditure, a voluntary types system would give incentives for the "light" users to opt out of the system or to wait until they need it, etc. Thus it is important that participation be compulsory if rates are set at community rates. At the same time, though, experience rating plans will tend to separate out the heavy users from the light users as each person will pay his/her own costs. This alleviates adverse selection, but note that it makes it more difficult for the heavy users to pay for their care.

So Health savings accounts would tend to reduce adverse selection incentives (and moral hazard-types of behavior), but would create separating equilibrium between light and heavy users to the extent participation is voluntary.

The impetus of Managed care was to alleviate the over-consumption (or moral hazard) associated with fee-for-service insurance. But one of the criticisms managed care has received is that of "cream skimming" or "cherry picking." That is selecting out the most healthy patients so that expenditures are lower. Through experience rating the HMOs are able to share some of these savings with their enrollees. The problem then is that the more risky patients are left on their own, making it more expensive for them to obtain insurance.

Cream Skimming is a form of adverse selection  
Specialty Hospitals?

## Imperfect Information: Supplier Induced Demand

### I. The Principal Agent Problem

A big issue here is something known as the principal-agent problem. The idea is that there is a principal (the patient, etc) who has some objective (improve his or her health) and they hire individuals to help them achieve their goals -- agents (physician) who are supposed to represent the principal's interest. But a problem arises if the agents do not have the same incentive as the principal. Generally this requires asymmetric information.

Compensation for a worker could be based on inputs (hours of work), or out output (number of widgets produced per day, total sales, etc.), or some overall measure of company performance (stock options). What is the reasoning behind this?

*The Principal-Agent problem occurs when agents pursue some of their own objectives in conflict with achieving the goals of the principal.*

How do we know the physician is acting in the best interest of the patient? Often he/she is compensated based on the number of tests/procedures/visits (inputs) rather than based on some measure of output.

Marcus Welby Medicine.

Ideally we'd like to compensate physicians based on outcomes – did I get better? (this is true for teachers too!). But note there are measurement problems here, especially in tough to diagnose situations (back pain). Also, as we know, health care is not the only input into producing health and so the physician would have a tough time controlling these things.

The perfect agent physician chooses as the patients themselves would choose if the patients had the same information the physician does. Medical codes of ethics are intended to do this.

The problem for the principal is to determine that the agent is acting in the principal's best interest.

**Reputation good** – the idea is that is though to know ahead of time how much utility you will derive from the good before you consumer it. This is often the case, but we can figure it out over time through trial and error (experience goods), but this is expensive in health care. So we rely on the information from those around us to make our decisions.

Patients often establish long term relationships with the physician. This allows the patient to more carefully monitor the physician's behavior and referrals.

But this leads to another issue in health care dealing with information. Often the physician has better information about the good than do the patients. Thus health care

providers may be able to use their superior knowledge to influence demand for their own self interests. This is known as Supplier Induced Demand (or SID).

### Theory

Supplied-Induced-Demand (SID) - health care providers have and use their superior knowledge to influence demand for self-interest.

Doesn't only apply to health care -  
mechanics  
shampoo - lather rinse repeat  
advertising in general

The key idea is the asymmetric information of the market - physicians have a better understanding of the "good" than do consumers, thus suppliers are able to shift out the demand for their good.

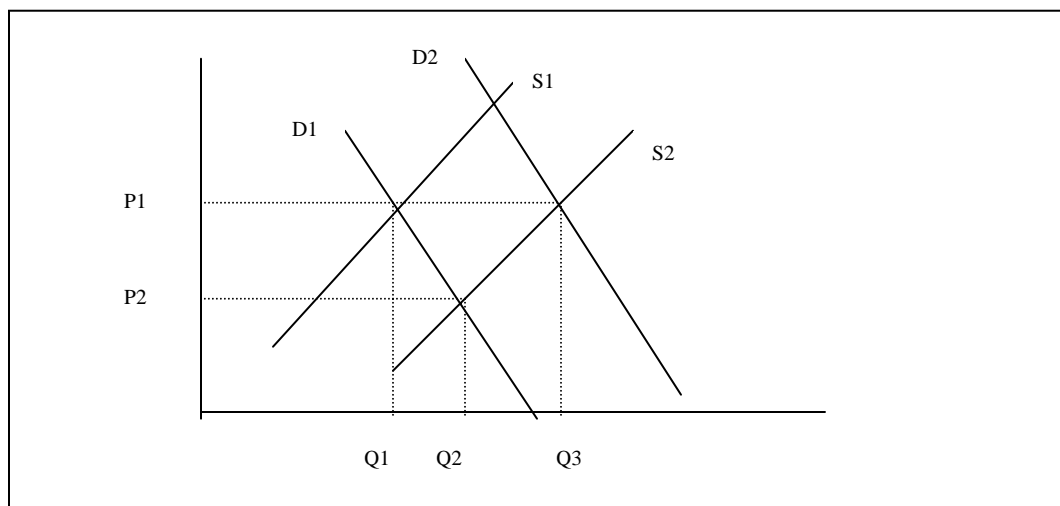
### SID and Economics

What is difficult for economists to explain is why we see an increase in consumption when the supply of physicians in an area increases. Often the conclusion is that the market becomes more competitive so physicians induce demand to increase their revenue and increase profits.

But why do providers not simply induce fully all the time? What is the mechanism through which they induce demand? How does inducement change in the face of increased supply?

### **Price Rigidities**

One factor that could allow demand inducement to occur would be price rigidity. Suppose prices do not adjust quickly to changes in demand or supply due to, say, insurance contracts or other institutional factors.



If we start at an equilibrium of  $S_1$ , and  $D_2$ , then the price is  $P_1$  and quantity is  $Q_1$ . If the supply of physicians increases to  $S_2$ , then the normal response of the market would be to lower price to  $P_2$  and quantity to  $Q_2$ . But suppose the price remains at  $P_1$ , then there will be an excess supply of physician services. This would give them the motive to induce demand. If they could they would induce demand so that the new demand curve is  $D_2$ , the market would be back in equilibrium.

### **Disutility**

One model to understand this incentive begins with the notion that physicians attempt to maximize their utility ( $U$ ) which is a function of income ( $Y$ ), hours of work ( $W$ ), and discretionary influence to induce demand ( $D$ ):

$$U = U(Y, W, D)$$

$Y$  has a positive effect on utility,  $W$  and  $D$  have a negative effect. Physicians prefer not to induce demand, but this is counterbalanced by the increase in utility from additional income. In this framework, a physician will induce demand to the point where the marginal utility of the additional income equals the marginal disutility of the added work plus the marginal disutility of the demand inducement.

In the end most economists are somewhat skeptical that physician-induced demand is an important phenomenon in health care.

- Markets for information
- Reputation Effects
- Competitive physician markets

Oncologists and chemo medication?

Doctors in Japan and prescription drug use

## II. Small Area Variations

Another area where imperfect information is potentially an important factor in health care, deals with physician's information about the relative effectiveness of various treatments. For certain conditions, physicians may well have different beliefs about the effects of various treatments. There are large geographic variations in treatment rates across many conditions. This is known as small area variations (SAV).

In a 1934 study the American Child health Association chose 400 schoolchildren to be examined by physicians to determine whether or not they should have their tonsils removed. The children were examined, and the physicians recommended that 45% of them have a tonsillectomy. The 220 that remained after the first round were examined by another group of physicians who recommended that 46% of them have their tonsils out. A third exam by another set of physicians on the 118 who were left provided recommendations that 44% of them have their tonsils removed.

The conclusion was that the decision to recommend a tonsillectomy was not based on signs or symptoms, but upon a generally held opinion among the doctors consulted that they should give tonsillectomies to one-third to one-half of all the children they had treated in that age range.

Note that SID occurs due to the asymmetric information between the patient and the doctor, differences in treatment patterns across areas may occur because of physician uncertainty or ignorance over the best method of treatment.

Lots of evidence showing large variations in practice style among physicians (within specialty) across geography and time. Even when one controls for differences in health status, education, and income, these variations remain.

Those conditions for which indications are not so clear, or for which there are good alternative forms of treatment, show large variations (knee replacement, spinal surgery for back pain, tonsillectomy, psychoses). However, where there is a clear indication and a generally accepted treatment, the range of variation is much smaller (hernia repair, open-heart surgery, lung resection).

Explanations:

1. legal incentives
2. small sample inference
3. ties to medical school
4. insurance coverage
5. social networks
6. patient demographics

There is work being developed now to develop more formal **clinical pathways** – sets of instructions developed by the medical staff, based on verified results of scientifically validated studies. These suggest how a particular illness should be managed. Of course

many doctors criticize such effort as cookbook medicine. Others argue they improve efficiency.

Many managed care organizations use “**provider profiling**” which tends to lower variation.

