

## Mgmt 444

### Demand and Insurance

The title of Ken Arrow's seminal paper is "Uncertainty and the Welfare Economics of Medical Care".

- Welfare economics is the study of how well markets perform with and without government intervention.
- Arrow won his Nobel Prize in economics for his research on welfare economics
  - . Arrow discusses his "Second Theorem of Welfare Economics" early in the paper
  - . He states that competitive markets, *if they exist*, facilitate an "optimal state"
  - . Q: What does he mean?
- Arrow argues that market conditions are occasionally just right
  - . E.g. think wheat, stocks and bonds, or other markets organized according to the traditional textbook view of competition).
  - . Otherwise, free markets may be inefficient.
- Arrow has a sort of Darwinian view about what happens when market conditions are not just right
  - . Q: What is that view?

The paper is equally about uncertainty

- Q: Why the focus on "uncertainty?" What exactly were patients uncertain about?

Uncertainty is not unique to health care markets

- We are uncertain about whether our homes will be destroyed by fire; Airlines are uncertain about spot prices for fuel

- . Q: How do consumers and firms cope with uncertainty about expenses in these markets?

- . A: They use *secondary markets* (e.g. homeowners insurance, futures contracts) to mitigate the problem of *expense uncertainty*

- Health insurance can alleviate expense uncertainty

- But patients face uncertain quality and outcomes

- . Q: Is this unique to healthcare? What solutions do we see in other markets?

If we couple Arrow's two main theses, then it follows that health care institutions have evolved to help patients cope with this uncertainty

- The most important "institution" in all developed nations is what I describe as "Marcus Welby medicine"

- There were several defining features of "Marcus Welby Medicine"

- . The doctor diagnosed problems and offered treatments

- . The PCP directed the health care system, or referred patients to specialists who took over as "captain of the ship"

- . Physicians received fee-for-service (FFS) payments from providers

- . Hospitals were either paid their charges, or reimbursed for their costs (based on accepted principles for allocating hospital costs)

To better understand the role of uncertainty in shaping health care markets, and the reason for the dominance of Marcus Welby medicine, it is useful to refer to another seminal concept in economics – the concept of *experience goods*

Experience goods are those for which quality matters and consumers may be uncertain about quality at the time of purchase

- Examples include cars, lawyers, and business education
- With experience goods, buyers value information and actively seek it out

Q: What are the various ways that consumers learn about quality and other attributes of experience goods?

- They rely on personal experiences and those of friends and family, such as when they select a PCP
- They rely on brand, such as when they select a HDTV
- They rely on independent reviews, such as when they select an automobile
- They rely on recommendations of experts, such as when they select an expensive stereo component

Markets evolve to help consumers solve their shopping problem. The history of appliance retailing provides a good example

Health care is an experience good. Try to think back to what it must have been like for patients back in the 1970s.

Q: Which of these mechanisms would be available to help solve the shopping problem?

We know that *insurance* mitigates income risk. But it might also exacerbate the shopping problem

- Mutes incentives to shop on the basis of price
- Little reason to question the need for costly services

We can now complete Arrow's argument:

- Health care is an experience good
- The shopping problem is difficult due to uncertainty
- The institutions that emerged – those associated with Marcus Welby Medicine (MWM) – did so because they helped consumers solve the shopping problem

(Extending the logic: Managed care grew because it offered advantages relative to MWM)

MWM certainly has some attractive features: A well-informed individual makes medical decisions in the patient's behalf, often selling additional services (e.g., hospital care) as a result

So what distinguishes doctors from, say, plumbers or auto mechanics?

What separates Dr. Welby from other “sales” people is *trust*

- His patients *trusted* him to act as a *perfect agent*
- There was no expectation of self-aggrandizement

Arrow argues persuasively that trust is inherent to the MD/Patient relationship

- "The social obligation for best practice is part of the commodity the physician sells"

- . Key word is *social*.

- . Patients cannot directly measure whether the MD is trustworthy, but believes that the socialization within the medical community fosters appropriate MD motivations

- Q: What are the mechanisms that might lead to such socialization?

In the past decade, sociologist David Mechanic has added immensely to our understanding of the concept of trust in medicine

- He describes several forms of trust, including:
  - Trust in compassion, trust in control, trust in competence
  - Let's explore these in more depth

Trust in compassion

- Can we accept that trust in compassion is well placed?
  - During the quarter, we will see read and discuss many attempts by policy makers to disparage the motives of MDs
  - Some, but not all, of these efforts hold water

## Trust in control

- Historically, MDs were autonomous from insurers and hospital administrators
- MDs had unfettered decision making authority – to this day they control as much as 80 percent of all health care expenditures, including virtually all expenses incurred inside hospitals

## Trust in competence

- We will return to this later in the course For now, take note of Robert Brook's quote from *JAMA* (1998):

*"Thousands of studies ... have shown that the level of quality care provided to the average person leaves a great deal to be desired and, perhaps more importantly, the variation in quality of care by physician or by hospital is immense."*

The central role of Marcus Welby was just one key institutional feature of the health economy. Another key feature helped to reaffirm our trust.

In most communities, the health care delivery system revolved around the nonprofit *community hospital*

- These provide a range of services for patients with virtually any medical problem, and accept nearly all patients regardless of ability to pay
- Physicians who were shut out of the local hospital had no viable practice
- Prohibited by law from distributing profits to investors or managers
- Controlled either by a local board (for secular nonprofits) or a religious organization (for nonseculars)
- The largest beneficiary of local fund-raising activities; local business leaders boosted their status by attaining membership on the hospital board

For-profits thrived only in pockets in the south, and were mainly owned by MDs

- Today, nearly 90 percent of beds are still controlled by nonprofits
  - Nonprofits are important in nursing home market and dominate home health and hospice.

Nowadays, many nonprofits have complex organizational structures

- Some NFPs have for-profit subsidiaries
- Some offer hefty compensation for executives that is tied to performance in the for-profit subsidiaries

There are several legal and regulatory distinctions between nonprofits and for-profits

- First, nonprofits receive various tax breaks, such as exemption from property taxation and payment of sales taxes for supplies.
- In exchange, nonprofits are expected to provide a community benefit, generally in the form of uncompensated care but also in the form of unprofitable care.
- There is also a ban on inurement -- compensation must be divorced from financial performance

This raises a time-honored question: Why are there nonprofits?

One branch of theories about nonprofits is *normative* -- why we ought to have nonprofits

- This literature emphasizes the services provided by nonprofits
- Also stresses that there is value in having non-governmental organizations delivering these services
- Such arguments are used to justify nonprofit tax breaks

Nonprofit hospitals receive millions of dollars in tax breaks; in exchange they are supposed to provide commensurate levels of community benefits

- Community benefits include charity care, bad debt, research, education, and community outreach
- Many question whether some of these are truly charitable acts
- E.g., for-profits do many of the same things

There is a vigorous ongoing debate about whether to tighten the definition of community benefits

- E.g., impose minimum standards for charity care
- E.g., disallow research and teaching

Discussion question: Read the Dafny/Dranove proposal for increasing pay for charity care in Illinois. (See the link at the web page.) Put yourself in the shoes of the Illinois Hospital Association. Prepare a statement giving your position on this proposal. Make a counter proposal. (Note that this proposal is currently under consideration in the state legislature and was endorsed by Crain's Chicago Business.)

Another branch of theories is *positive* -- what is it about the real world that enables nonprofits to compete so effectively?

- Tax breaks certainly help
- But nonprofits have disadvantages as well; it is more difficult to use financial incentives to reward effective management

The “consumerism” theories of Hansman and Weisbrod

- In some industries, the key attributes of the products or services are hard for consumers to measure – the traditional shopping solutions break down
- In these industries, consumers gravitate towards nonprofits because they perceive that they will have higher levels of hard to measure attributes
- Examples of hard to measure attributes of hospitals and doctors
  - . Use of disease guideline procedures
  - . Time spent by staff reviewing an MRI before rendering a diagnosis

Link ownership status and *hard to measure attributes*

- Consumers fear that providers will skimp on these attributes
- Hansman/Weisbrod argue that incentives to skimp are muted in nonprofits because of the legal prohibition on “inurement”
  - . To be eligible for preferential tax treatment, nonprofits must agree not to compensate officers on the basis of profits and losses
- Consumers understand and gravitate towards NFPs in *selected* markets
  - . Nonprofits thrive in health care, where quality is easy to measure
  - . For-profits thrive in pharma, because quality is easier to measure

Raises obvious question: Do nonprofits really behave like nonprofits?

- Theorists have had their doubts.

. There are several skeptical theoretical perspectives on NFP's, suggesting that NFPs maximize size or "prestige"

. Others believe that competitive pressures force NFPs to maximize profits

- Empirical question: Are there any measurable differences between nonprofits and for-profits?

. Evidence is mixed on issues such as quality and service offerings

. Nonprofits do more "charitable" things, but this may reflect location decisions, rather than unwillingness to meet community needs (note semantics here)

## Demand and Insurance

As Arrow noted, insurance is a dominant feature of healthcare markets

- ~85 percent of Americans have it
- Essentially all Europeans, Canadians, and Japanese have insurance

We have already discussed the value we get in terms of risk avoidance

- It is worth mentioning another reason why we have insurance: to facilitate access to providers who are unwilling to take on uninsured patients

Unfortunately, health insurance create problems in health services markets

- It insulates providers from price competition (later lecture)
- It distorts purchase decisions; the resulting inefficiencies are said to be due to *moral hazard*
- A key question, therefore, is how to strike the right balance between risk avoidance and moral hazard
- To answer this, we need to learn more about moral hazard

There are two kinds of moral hazard, “economic” and “insurance”

### *Economic moral hazard*

Definition: Economic moral hazard occurs when individuals who are insured against losses from an adverse event engage in behaviors that increase the likelihood that the adverse event occurs

Economic moral hazard requires three things to be true:

(1) Our behavior affects the probability of an adverse event; this is self-evident

(2) We do not always act to minimize the likelihood of adverse events

. This seems reasonable: When driving, we do not always slow down for yellow lights; many of us smoke or have poor diets, etc.

. We often take risks because we enjoy the benefits

(3) We use some kind of implicit benefit/cost framework when engaging in risky behaviors.

. Assumes some degree of rationality underlying risk behavior

. Evidence is rather strong; consider reduced demand for smoking in response to published health information and taxes

Implication of these assumptions: As the cost of a bad outcome decreases, we take more risks (the marginal benefit of added risk taking exceeds the marginal cost)

Empirical studies document the presence of economic moral hazard in expected and unexpected places

- Cameras at dangerous intersections in Chicago have reduced the accident rate

- After Tylenol scare of 1980s, legislation required "tamper proof" bottles. A study showed that parents were more likely to leave medication bottles on countertops, often without properly closing them.

- Doctors claim to engage in "defensive medicine" when malpractice risks increase

Q: Does health insurance promote poor health behaviors? Should we use financial incentives to discourage risky behaviors?

- For example, employers and insurers could limit coverage for smokers who get lung disease so as to discourage them from smoking.

- . There is no systematic research to indicate if this would be successful

- . However, some companies have introduced such policies and are claiming that self-reported smoking is down

- If it was your firm, what would you do? What happens to the smokers?

### *Insurance Moral Hazard*

Definition: Once an adverse event occurs, insurance lowers the effective price of any remedy, causing consumers to increase the quantity purchased.

- This increases total spending (though out of pocket spending may be less than it was without insurance)
- The value of the marginal purchases may be much less than the cost

Insurance moral hazard creates a *deadweight loss*

- DWT loss is a concept associated with economic efficiency
- Assumes demand reflects WTP (Value), and supply reflects costs
- The “total surplus” created for society by a transaction equals the difference between the value and the cost

- . This is analogous to the societal view of benefit/cost analysis

- . When Arrow talked about market efficiency, he was talking about maximizing total surplus

- . Total surplus can be divided into consumer surplus and profits (B-P and P-C, to borrow terminology from strategy)

- Maximum total surplus occurs at the point where Supply=Demand

- If some factor causes the actual quantity to differ from this point, then there is a loss of surplus. This is known as the deadweight loss.

Handout "Moral Hazard and Efficiency" illustrates the DWT loss when there is simple insurance

- Consider demand for a hypothetical medical service

- Suppose that  $P = C = \$50$  (I.e., there are no profits; this focuses our attention on *efficiency* rather than *wealth transfers*)

- Let the demand curve be  $P = \$(100 - Q)$ . Assume this reflects the true WTP for medical services. (E.g., there are 30 consumers willing to pay at least \$70 for the service.)

We will measure efficiency with and without insurance

- “Total surplus” is a useful measure of efficiency. This is total benefits minus total costs. Graphically, this is the area under the demand curve minus the area under the cost curve.
- If consumers lacked insurance, they would pay \$50, so they would purchase 50 units. In this case, total surplus is  $3750 - 2500 = \$1250$
- Suppose insurance pays for 80%. The “out-of-pocket” price (OOPP) is \$10. Consumers increase purchases from 50 to 90 units. Total surplus is  $4950 - 4500 = \$400$ 
  - Surplus has fallen by \$800
  - This \$800 is dwt loss
  - The \$800 represents the difference between the cost of the additional 40 units (\$2000) and the value of those units (\$1200)

You should check the second example on handout in your own time

- Key difference is that the demand curve is flatter, so that insured individuals now purchase 130 units
- Main result: dwt loss is larger when demand is more elastic
- Remember, we are equating WTP to social value when making these calculations

Insurers use three techniques to expose consumers to market prices

- Coinsurance - a fixed % of the bill
- Copayment – a flat fee per service (e.g., \$20 per prescription)
- Deductible - an up-front payment made before insurance kicks in at all

- . If the demand for low price services is more elastic than the demand for high price services, then it is desirable to include a deductible
- . This is because the deductible eliminates substantial moral hazard
- . Also, the deductible does not eliminate the major risk spreading benefit of insurance

Q: How would the graphical analysis change if consumers had to pay a deductible as well as pay coinsurance?

Q: Does the effect of a deductible depend on when during the year the purchase is made?

All consumers bear the cost of DWT loss

- Moral hazard consumption is a kind of prisoner's dilemma – each enrollee wants to exploit the insurer but does not want other enrollees to do so
- Most of us would prefer to purchase insurance that alleviates the moral hazard problem
  - We would receive greater expected benefits (our share of the surplus) because the surplus is larger

Balancing DWT and risk protection

- Optimal insurance should have nontrivial deductibles, which completely eliminate moral hazard for low price (and often high elasticity) services
- Optimal insurance should also have “last dollar coverage” that limits risk for high price (and often low elasticity) services
- Forecasting exactly how much can be saved through cost sharing (and how much risk will be borne by patients) is an empirical matter
  - . We need to know the elasticity of demand for medical care

Estimating elasticities is not as easy as it might seem

Q: How do consumer goods companies estimate demand elasticities?

Traditional methods are not practical for healthcare. Consider an alternative:

- Compare out of pocket (OOP) prices and utilization across a sample of patients enrolled in different health plans with different copayment levels
- Q: The results would be biased. Why?

An early study that was immune from such criticisms was conducted by Stanford's Anne Scitovsky and Nelda McCall in the 1960s

- At time of study, all Stanford employees received primary care from the Palo Alto Medical Clinic (PAMC)
- Stanford imposed a 25 percent copayment for use of the PAMC
- S/M observed a 25 percent drop in utilization in the year after the copayment was imposed.
- S/M assumed that the health status of the Stanford community had not changed appreciably over one year's time, and attributed any utilization changes to changes in price. (They supported this assumption with various arguments, such as the presence of a stable population and stable economy.)

Here is how to compute an elasticity of demand for such a "natural experiment".

- The usual formula for an elasticity of demand is  $\eta = (\Delta q / \Delta p) \cdot (p / q)$ 
  - . This works if the percentage change in price is small
  - . If so, you can use the initial values of p and q
  - . In the PAMC example, the percentage change in price is large (effectively infinite!), so this formula is no longer valid
- For large changes in p, we must compute the *arc elasticity of demand*

$$\eta = (\Delta q / \Delta p) \cdot (\bar{p} / \bar{q})$$

We can simplify the calculation by working with "standardized" p's and q's

- We can suppose that the average price increased from 0 to .25.
- We can also suppose that the quantity of medical services purchased decreased from 1 to .75.
- The actual values are proportional to these standardized values and the proportions drop out of the formula

- Using these values, we obtain

$$\eta = (-.25/.25) \cdot (.125/.875) = -.14$$

Studies of this sort consistently find small elasticities of demand for health care services

- E.g., there are many studies of what happens to drug purchases after copayments are imposed
- These findings imply that small copayments can have considerable bang

- . Q: Do they tell us anything about larger copayments?

- . If the elasticity was constant, we could predict what would happen as copays increased further:

- . E.g., If the copay increases to 30% and  $\eta$  remains constant at  $-.14$ , then quantity will fall from  $.75$  to  $.725$  (Can you derive this yourself?)

Such natural experiments have been few and far between, so easy estimates of the price elasticity of demand for medical care have been hard to come by

The National Health Insurance debates of early 1970s focused attention on whether patient cost sharing could drive down costs, leading Congress to authorize one of the most expensive research projects of all time

- The \$80 million RAND National Health Insurance Experiment was designed to learn as much as possible about demand elasticities, as well as the impact of cost sharing on patient outcomes
- The results remain the most credible evidence on how cost sharing will affect costs

## The RAND methodology

- RAND randomly assigned 5800 study participants to one of five RAND-operated indemnity insurance plans for 3-5 years.
  - . Random assignment eliminated concerns about selection (and the regression methodology used to examine the data had further controls for enrollee characteristics)
  - . Participants were paid substantial sums to participate, further assuring random assignment (they wanted to be sure that patients would participate regardless of which plan they were assigned to)
  - . Demand estimation methods adjusted for any resulting income effect on utilization
  
- There was a sixth plan that was not part of the major study, but used in an important secondary study
  - . The Group Health Cooperative of Puget Sound.
  - . GHC was an old and respected HMO
  - . The RAND GHC patients were randomly assigned, avoiding statistical questions of self-selection bias
  
- Indemnity plans were similar on all dimensions except for cost sharing
  - . One plan covered everything (“free care”)
  - . Three plans required a fixed percentage copayment (25%, 50%, 95%) up to an annual OOP ceiling of ~\$1000 per person (“cost sharing plans”)
  - . One plan required a \$200 annual deductible for OPT care, but IPT was free (“individual deductible” plan)

The handout provides valuable summary data

- All forms of utilization fall as cost sharing increases
- Total expenses are 40% higher under free care than under 95% copayment (effectively a large deductible plan)
- OPT utilization was more responsive to cost sharing than was IPT

A more subtle but very interesting result emerges from a comparison of the free care and individual deductible plans

- Compared with free care, the indiv. ded. plan had higher cost sharing for outpatient, and the same full coverage for inpatient
- Two competing theories:
  - . If you charge for OPT care (through the deductible) more people will use IPT care (i.e., IPT and OPT are substitutes)
  - . If you charge for OPT care, fewer people seek care at all, driving down IPT use (i.e., IPT and OPT are complements)
- Results show less use of IPT care in the individual deductible plan, supporting view that the two are complements

To estimate elasticities, the RAND team takes a more sophisticated approach than merely computing arc elasticities

- They estimate four related regression equations that break down the demand process into specific components
  - 1) Does the person receive any medical care?
  - 2) Do they receive hospital care?
  - 3) If they receive OPT care only, how much do they spend in total?
  - 4) If they receive some IPT care, how much do they spend in total?

- With this structure, they can determine which aspects of demand are most affected by cost sharing

- . Is it the decision to initiate care or the amount one spends conditional on initiating care?
- . Does cost sharing affect spending for patients who are hospitalized?

The key findings of this more systematic analysis are as follows

- Predicted spending in free care (where the predictions are based on the regression results) is 46 percent higher than in the 95 percent deductible plan

- . This is similar to the difference in the raw data, but estimated with a higher degree of statistical significance
- . Most of the effect occurs between free care and 25 percent coinsurance

- Inpatient and outpatient use appear to be complements, but the effect is not statistically significant. One cannot reject the null hypothesis that changing the price of one has no effect on the use of the other

- Cost sharing affects both the probability of any use and the probability of having a hospital admission.

- . 60 percent of the difference in expenses is based on whether the individual has any use whatsoever
- . In other words, the savings from cost sharing come mainly by deterring some individuals from seeking any care
- . In other RAND publications, they report that conditional on entering a hospital, inpatient expense is unaffected by cost sharing

## Other results

- Important findings re: GHC
  - . Utilization of RAND enrollees at the GHC of Puget Sound is similar to utilization of regular GHC enrollees
  - . Perhaps there is no favorable self-selection into GHC?
  - . Savings from GHC are genuine
- Initial health status did not predict responses to cost sharing
- Health outcomes results are important
  - . Overall, free care did not seem to lead to better outcomes
  - . However, poor individuals with bad initial health status fared worse under copayments than under free care

## The RAND study has some weaknesses

- Regression analysis generated *imprecise* estimates of price effects
  - . There was high variation in utilization in each group, making the “noise term” in the regression rather large
  - . Barely able to rule out possibility that differences in utilization are due to random chance
- Imprecision was inevitable, given that 10 percent of individuals account for 80 percent of costs. A few dozen individuals drove much of the results
- Study not large enough to generate market level responses such as possible provider price changes in response to changes in demand
- Perhaps providers would lower prices if all consumers in the market had to pay 25% of the price