

# The Economic Aspects of Health Care Administration

## Lecture Notes

### Introduction

What is Health Economics?

Economics looks at the world from a perspective of choices we make given our limited resources.

*Scarcity*-- Limited nature of society's resources

*Opportunity Cost* - the highest valued alternative to choosing an action

*Economics* - the study of how society manages its scarce resources

So in health economics we apply these concepts to the health care industry. This allows us to address such questions as Who gets a heart Transplant? Why does surgery cost so much? Will insurance pay for AIDS treatment? How many children get immunized? Are for-profit hospitals good for health? Is marijuana a gateway drug? Does competition improve the quality of health care? Etc.

Other than the fact that you guys work or will work in the industry, the study of health economics is interesting for a number of reasons.

1. The size of the industry to the overall economy – nearly one of every seven dollars spent on final goods and services in the us economy goes to the health sector – in 1960 this was one in twenty, in 1980 one in eleven. We have been spending a larger and larger share of our income on health care. In 2004 we spend 16% of our GDP on health care.

Spending as a share of GDP rose steadily up to the early 1990s then leveled off.

But in the last few years spending as a share of GDP has again increased.

Between 1994 and 1998 health care spending increased at about the same rate or lower than GDP. Beginning in 1991 spending increased rapidly:

6.2 in 1999

7.2 in 2000

8.9 in 2001

9.3 in 2002

7.7 in 2003

7.9 in 2004

6.9 in 2005

6.7 in 2006

6.1 in 2007 accounting for 16.2% of GDP or more than \$7,026 per capita

GDP increased around 3-6% over this period.

Why? Expenditures = Price\*Quantity or maybe Price\*Quantity\*Quality

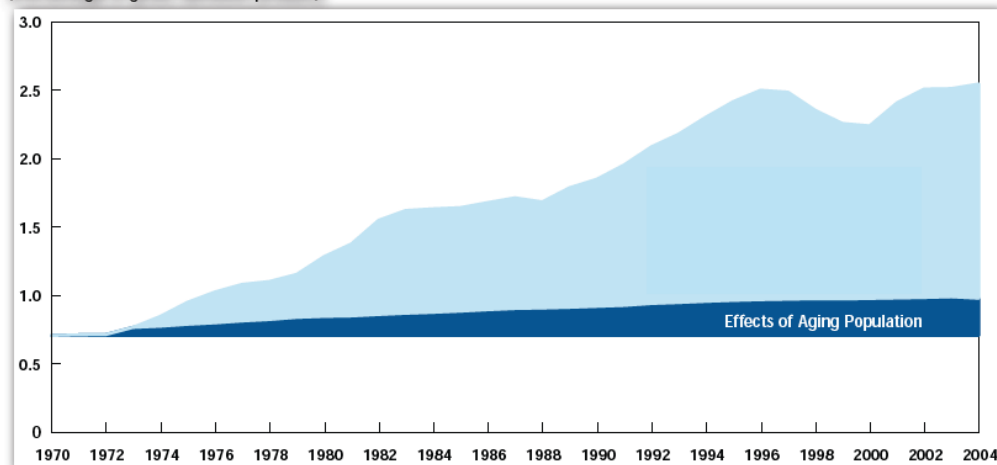
- a. People may be buying more health services. Aging population increased income, etc
  - b. People may be buying higher quality health services. New procedures and services that were previously not available.
  - c. Health care inflation may be higher than the general rate of inflation. Higher incomes and the increased prevalence of insurance, including larger government programs may have led to increased health care prices over time.
2. At the same time there is a growing group of individuals without adequate access to health care. About 15% of the population has no insurance (25% in Texas). In addition among those with employment, the uninsured rate is growing most rapidly. Note that problems 1 and 2 are in conflict with each other. We are spending more and more on health care and fewer and fewer have access to it. It will be hard to fix one problem without making the other worse.

Given the demographics in the country (the baby-boomers headed towards retirement), the rise of consumer-driven care which may push the healthiest individuals out of traditional insurance pools. This problem is likely to get much worse in the near future.

Politically no one wants to touch this. Yet it is probably the most important domestic policy issue facing our nation.

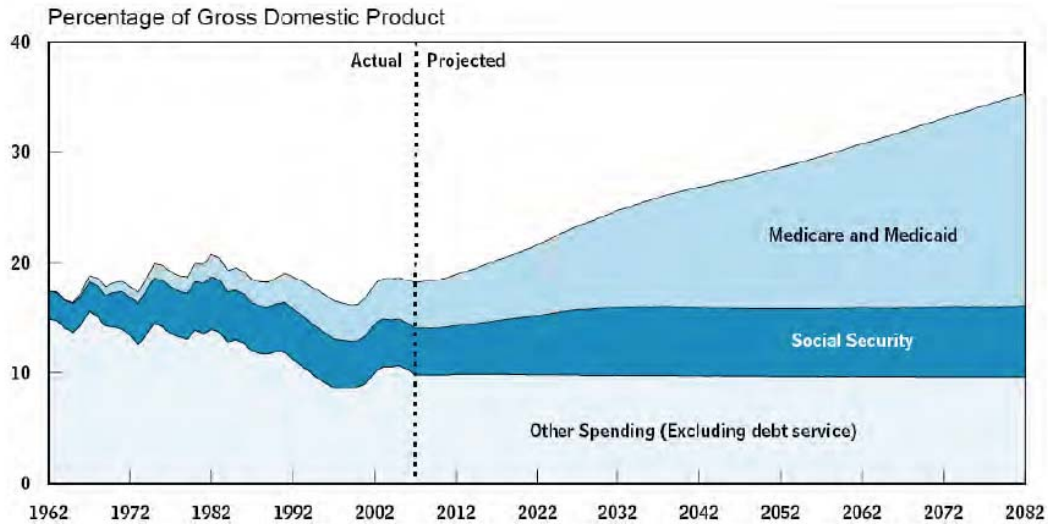
### Sources of Medicare Cost Growth Since 1970

(Percentage of gross domestic product)



Source: Congressional Budget Office.

Note: In 1970 (the base year for this figure), Medicare spending was 0.7 percent of GDP.



**Health care cannot continually absorb more and more, unless it dramatically increases value.**

3. Great example of the conflict between free markets vs. government regulation.

What is the best way to allocate our scarce resources? Generally it is the free market – assuming profit maximization, lots of buyers and sellers of the same good, no one has a “large” share of the market, everyone good symmetric information, there is no uncertainty, it is easy to enter or exit the industry.

In the health care industry all of these assumptions are violated. So the question is what is the best way to proceed?

Uncertainty

Probably the most prominent of the above violation is the idea of uncertainty. Ken Arrow established health economics as a field with his work in this area. Unlike other goods consumers do not know their health status and their need for health care in the current or future periods. Thus the demand for health care is irregular in nature from the individual’s perspective. Thus the demand facing a firm is also irregular.

There is also uncertainty on the supply side. We usually assume that the products and their effects are well understood by consumers (oranges, steel, baseball games, etc). In contrast, there is often product uncertainty in health care. Consumers often do not know the expected outcomes of various treatments without their physician’s advice, and in many cases physicians themselves cannot predict the outcome of the treatments with certainty.

As a result of this uncertainty, there arise markets for insurance, but insurance may not arise for certain risks (the elderly). Therefore, there may be a role for the government in the industry.

#### Prominence of insurance

Consumers purchase insurance to guard against risk. Because of this, the consumers do not pay directly for the full costs of their health care. Rather, third-party payers pay a majority of the direct costs. This insurance changes the incentives of consumers. A problem referred to as *Moral Hazard*.

#### Problems of Information

Uncertainty is one example of an informational problem. Asymmetric information is another --one side of the market has better information than the other. Health care. Physician-induced-demand. *Adverse Selection*

#### Role of Non-Profit Firms

We typically assume in economics that firms maximize profits. Most economic analysis relies on this assumption. Yet, most hospitals and many other health care providers are not-for-profit. Now what?

#### Government Involvement

The government is a huge player in the game: both directly as a purchaser through Medicare and Medicaid, but also as a regulator. Certificate of Need, licensure requirements, restrictions on advertising, standards of ethics, etc. All of these factors, while potentially being “good things” also have the effect of restricting competition, which tends to have negative effects.

Given all of these problems some have argued that the market cannot possibly provide the “right” level and quality of health care. Thus, we should have more or even complete government involvement. While others look at the same set of problems and come to the opposite conclusion: given all these problems it is remarkable that the market does as well as it does and *less* government involvement is needed.

Thus, the health care industry is a literal playground for economist.

Our goal this semester will be to understand some of these issues in a little more detail and to appreciate what an economic perspective can bring to the table.

## Microeconomic Tools for Health Economics

### **I. Principles of Econ**

Let's start with a few basic principles of economics.

4 principles of *individual* decision making

1. People face tradeoffs
2. The cost of something is what you give up  
Ex. Going to college [go through example here]

Opportunity Cost - the highest valued alternative to choosing an action

3. Rational people think at the margin – or sunk costs are irrelevant.  
Marginal changes are small incremental changes  
Ex. 1) Airline example: it costs \$100,000 to fly a 200-seat plane, thus the average cost is \$500 per seat. One might surmise that the airline should never sell a ticket for less than \$500. Does this make sense? Use marginal thinking to refute.  
2) Pharmaceutical Industry?

4. People respond to incentives  
Since people make decisions by comparing costs and benefits, then behavior changes when these change.
  - seat belt laws, motor cycle helmets
  - income taxes
  - mandatory employer provided benefits
  - minimum wages

The next 3 principles deal with how people interact with each other.

5. Trade can make everyone better off  
Popular notion is that trade between US and China is a contest-- there will be winner and a loser. In fact the opposite is true -- both sides are winners from trade.  
To see this consider things at the family level:
  - looking for a job,
  - shoppingAll involve competing against other families since each family wants to buy the best goods at the lowest price and get the highest paying job, etc. But you would not want to isolate yourself from other families -- clearly this competition makes us better off. Same is true for countries, states, etc.

6. Markets are usually a good Way to Organize Economic Activity

Market Economy -- an economy that allocates resources through the decentralized decisions of many firms and households as they interact in markets for goods and services.

It is hard to imagine that decentralized decision making by millions of self-interested households and firms would not result in chaos. Adam Smith first talked about the Invisible Hand -- the idea that markets act as if they were guided by an invisible hand that led them to desirable outcomes.

Prices are the key to this working. Microeconomics is often called Price Theory. We will find that prices generally reflect both the value of a good to society and the cost to society of making the good. Markets in equilibrium set these two equal to each other, so that the only goods are made that have a higher value than the cost to society of making them. This is a HUGE deal.

7. Governments can sometimes improve market outcomes.

Market Failure - a situation in which a market left on its own fails to allocate resources efficiently

Externality - the impact of one person's actions on the well-being of a bystander

Public Good – A good that is both non-excludable and non-rival, eg. Police protection, care for the poor.

Market Power -- the ability of a single economic actor (or small group of actors) to have a substantial influence on market prices.

## II. Supply and Demand

### Demand

#### **The Law of Demand**

There is an inverse relationship between the price of a good and the amount of it consumers choose to buy

Two effects of a price change:

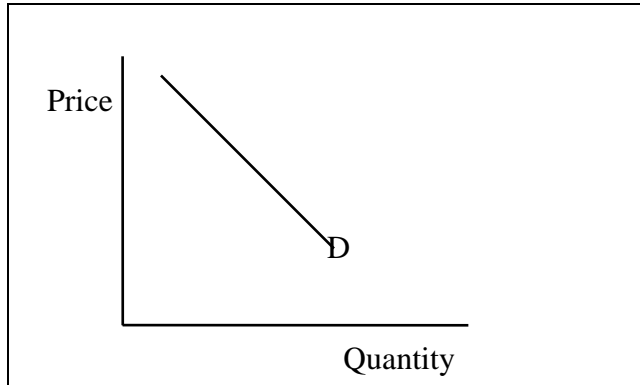
*Income effect* – lower price means that a consumer's real purchasing power increases, which increases the consumption of the good and likewise for a price reduction.

*Substitution effect* – when the price of one good falls, the consumer has an incentive to increase consumption of that good at the expense of the other, now relatively more expensive goods.

#### **Determinants of individual Demand**

1. Income
2. Prices of related goods
3. Tastes
5. Expectations

#### **Demand Schedule and Demand Curve**



### Market Demand vs. Individual Demand

-- market demand is horizontal summation of individual demand curves

### Shifts in the Demand Curve

- Change in prices of related goods
- Change in income (normal and inferior goods)
- Change in tastes
- Change in Expectations

### Price elasticity of demand and its determinants

Defn:

*Price elasticity of demand* -- a measure of how much the quantity demanded of a good responds to a change in the price of that good.

Determinants:

- Necessities vs. luxuries
- Availability of close substitutes
- Definition of the market
- Time horizon

Variety of Demand Curves

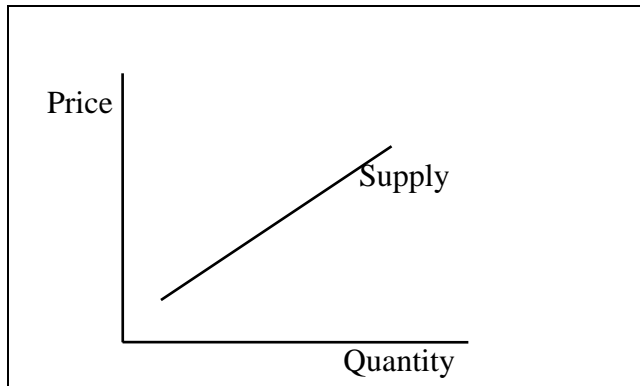
### Supply

There is a direct relationship between the price of a good and the quantity supplied

### Determinants of individual Supply

1. input prices
2. technology
3. expectation

### The Supply Schedule and the Supply Curve



### Market Supply vs. individual Supply

#### Shifts in the Supply Curve

- Change in the price of inputs
- Change in technology
- Change in the number of suppliers

#### Price Elasticity of Supply

### Supply and Demand Together

#### Equilibrium

#### Changes in Equilibrium

- The market for pizza when the price of tomatoes increases
- The market for pizza when the price of beer increases

1. National health insurance proposal is passed that provides comprehensive health insurance to everyone. How would this affect the markets for health care in the short run?

Demand increases. (Independent of any cost control measures)

2. Hospitals can hire only baccalaureate RNs. How would this affect the market for hospital care?

3. Government lowers reimbursement rates paid to physicians for Medicare patients. How would this affect the market for non-Medicare patients?

In a competitive market, to the extent that physicians can move between Medicare and non-Medicare markets freely, physicians would shift more time and other inputs to non-

Medicare patient production. Shifting the supply to the right – resulting in *lower* prices for non-Medicare patients.

What about when Medicare lowers DRG rate to hospitals? How does this impact prices to non Medicare patients?

### III. Supply in More Detail: Production and Cost

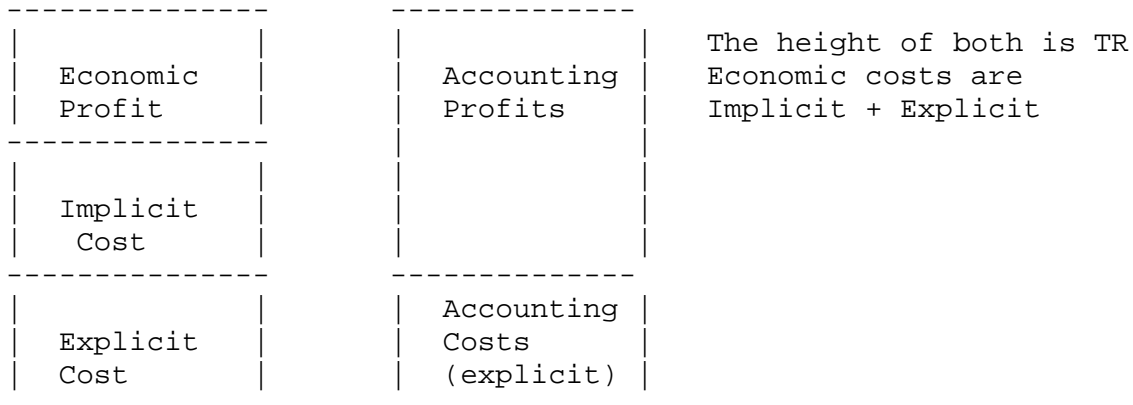
#### Economic Costs

- Economic Costs of a resource is its value or worth in its best alternative use
- Include Explicit (cash expenditures to outsiders)  
Implicit (cost of self-owned resources)

#### Economic Profit vs. Accounting Profit

Profit - TR-TC

Economic profit Subtracts out economic costs (which include opp cost)  
Accounting profit subtracts out only direct costs



#### Short-Run vs. Long Run

- Short-Run -- Time period in which some factors of production are fixed (plant capacity)
- Long-Run -- Time period required for all factors to be variable

Since can be big difference - firms typically make 2 sets of decisions, SR and LR

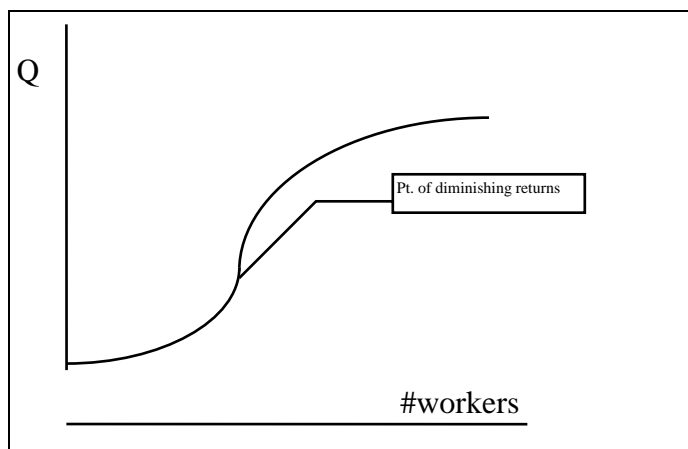
#### Costs in the Short-Run

**Law of Diminishing Marginal Returns** - as successive units of a variable resource are added to a fixed resource, eventually, the extra (marginal) output attributable to each additional unit of the variable resource will decline.

Pin Factory -- 1. Cut the wire; 2. Sharpen, 3. Put on head

# of workers	total product	marginal product	average product
0	0	--	--
1	50	50	50
2	125	75	62.5
3	225	100	75
4	290	65	72.5
5	325	35	65
6	330	5	55
7	320	-10	45.7

Diminishing returns set in after the 3rd worker



Now want to convert idea of diminishing returns into costs

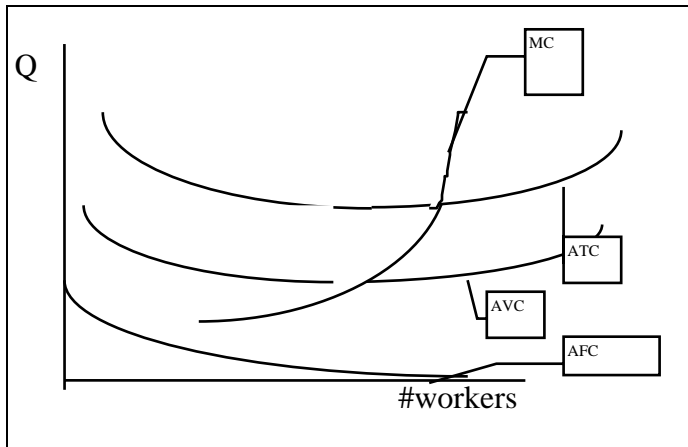
Draw Total Cost Curve

Define

Fixed Costs  
Variable Costs  
Total Costs

Define

Average Fixed cost  
Average Variable Cost  
Average Total Cost  
Marginal Cost



### Costs in the Long-Run

Derive LRATC curve as a function of all the minima on the SRC curves Envelope

### Economies of Scale

- specialization of labor
- specialization of managerial skill
- efficient use of capital

### Diseconomies of Scale

## IV. Firms Under Competition

### What is a Competitive Market

#### Characteristics

1. Many buyers and sellers in the market
2. Goods offered by the sellers are largely the same (homogeneous)
3. Firms can freely enter or exit the market

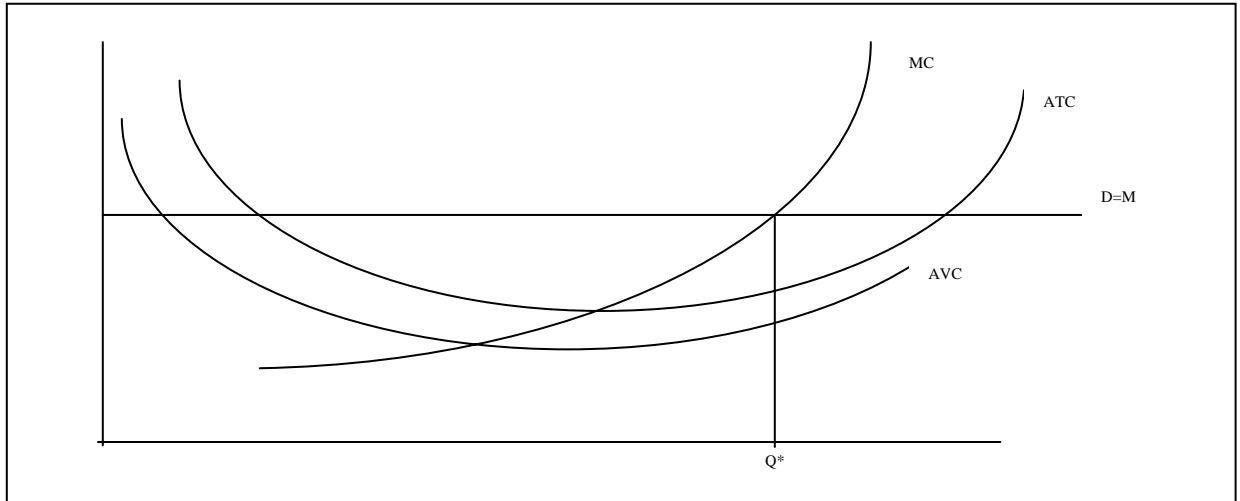
#### Revenue of a firm

Suppose we are selling tomatoes – note that since we are small, that all we can do is take the market price as given

Quantity (bushels)	Price	Total Revenue	Average Revenue	Marginal Revenue
1	10	10	10	10
2	10	20	10	10
3	10	30	10	10
4	10	40	10	10
5	10	50	10	10

Note that this implies that  $P=MR$ , or what this implies is that the competitive firm faces a perfectly elastic demand curve.

Profit Maximization and the Competitive Firm's Supply Curve



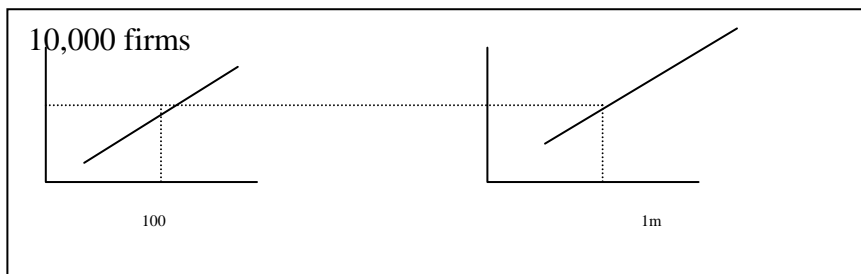
MR=MC MAXIMIZES PROFIT!!

**Shut down point**

*MC above AVC = Supply for the competitive firm*

**Profit and Long-Run Adjustments**

Do short-run market supply curve as the sum of all firms' supply curves.



*Now show how things adjust in the long run so that profits are zero.*

*Long-run supply curve is vertical (assumes a constant cost industry)*

The Supply curve in a Competitive Market

Put a demand curve in there -- this is where price is determined

Now do a demand shift

## V. Monopoly

### Assumptions

1. Single Seller - firm and industry are the same
2. No close substitutes - Coke and cola, DeBeers
3. Blocked Entry - High barriers to entry

### Examples of Barriers to Entry

1. Economies of scale - natural monopoly
2. Legal barriers - patents, licenses
3. Ownership of resources - DeBeers, Alcoa

### Marginal Revenue and Demand

Firm faces a downward sloping demand curve (the market demand) in order to sell more it must lower its price

<u>Q</u>	<u>P</u>	<u>TR</u>	<u>MR</u>
0	11	0	--
1	10	10	10
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	4	30	0
7	4	28	-2

### Profit Maximization: MR=MC

Note that Monopolist cannot charge as much as it wants - it is constrained by demand

### Efficiency

Deadweight Loss due to monopoly

$$P > MC$$

$$P < \text{Min (ATC)}$$

### Price Discrimination

Movie theaters

Lunch vs. Dinner prices

coupons in paper

Blue light specials

Hardback vs. Soft cover books

Prescription Drugs?

three conditions needed

1. Market power
2. Market segmentation
3. No resale

Movie theaters. What price to charge Senior citizens vs. adults

If had to charge one single price

## VI Monopolistic Competition

One of the models of industry behavior between monopoly and perfect competition is something called monopolistic competition. This is a lot like perfect competition except that firms are able to differentiate their product from each other.

Assumptions:

1. many firms
2. differentiated product
3. some control over price
4. relatively easy entry and exit

There are lots of examples here, gas stations, for example. Most gas stations sell basically the same thing but are able to differentiate themselves somewhat based on convenience (location), amenities offered (pay at the pump, convenience store, coffee, etc.) and maybe brand name recognition (Exxon, Shell, BP, etc). All things equal, you will go to the place that is easiest for you, but if it is cheaper, you'll go around the corner, etc. So there is price competition.

Short run—something a lot like a monopoly.  $MR=MC$  maximizes profits. Firms face a downward sloping demand curve to the extent they are able to differentiate themselves. But any economic profits will be eroded over time, due to entry and emulation. So in longrun profits are zero.

The long-run equilibrium is something close to the perfectly competitive one, but efficiency is lower.

## VI Oligopoly

### I. Assumptions

1. Few very large firms  
could be homogeneous or differentiated product
2. High barriers to entry
3. Large economies of scale
4. Mutual interdependence

Examples - steel, autos, breakfast cereal, cigarettes

### II. Game Theory

Behavior is strategic like in a game of chess or between pitcher and hitter in baseball. The success of my strategy depends on what my opponent's strategy is.

#### Prisoners' Dilemma

Moe and Larry have been caught red-handed in a crime and face 2 years in prison. During his interview the DA suspects they are also responsible for a more serious crime, but has no evidence. The DA makes them play a game with the following rules

each player is placed in a separate room, with no communication between them. Each is told of their suspicion in the major crime and are told that:

- if both he and his accomplice confess to the larger crime, each will receive a sentence of 5 years
- if he alone confesses he will receive an even shorter sentence of 1 year while his accomplice will receive 10 years.

- If both do not confess, both get 2 years

Each player has 2 strategies Confess, do not confess  
yielding four possible outcomes

neither confesses

both confess

Moe confesses but Larry does not

Larry confesses but Moe does not

Payoff Matrix

		Moe's Strategy	
		Confess	Do Not Confess
Larry's Strategy	Confess	5 years / 5 years	10 years / 1 year
	Do Not Confess	1 year / 10 years	2 years / 2 years

Must consider the actions of rival when choosing strategies

Nash Equilibrium: player A takes the best possible action given the action of player B and player B takes the best possible action given the action of player A.

In this case the NE is to confess. In this case the NE is a dominant strategy equilibrium confess is always the best no matter what the other guy does. This is not always true

Note the dilemma of the game - both would be made better off if they kept their mouths shut, but the fear of being the only one not to confess causes problems.

How does this apply to Oligopoly?

Assume Duopoly in the cola industry between Pepsi and Coke.

Suppose they have entered into a collusive agreement (note this is illegal) or have formed a CARTEL. The strategy for each firm

- Comply stick to the agreement
- Cheat break the agreement in a way to benefit the firm (cut price)

four possible outcomes

- both firms comply
- both firms cheat
- Pepsi complies coke cheats
- coke complies Pepsi cheats

Must consider the actions of rival when choosing strategies

		Coke Cheat	Comply
Pepsi Cheat		\$0	\$-100
Comply		\$-100	\$200

Note the only Nash Equilibrium is for both firms to cheat.

This implies collusive agreements will be tough to enforce and that Cartels will not last very long

One limitation of the above game is that it was only played once. In reality this is played over and over again. If this is the case then one firm has the chance to punish cheating behavior

#### Obstacles to Collusion

- demand and cost differences
- large number of firms in the cartel
- lags in detection
- low barriers to entry

## **VII. More on cost shifting:**

Let's come back to the idea of cost shifting

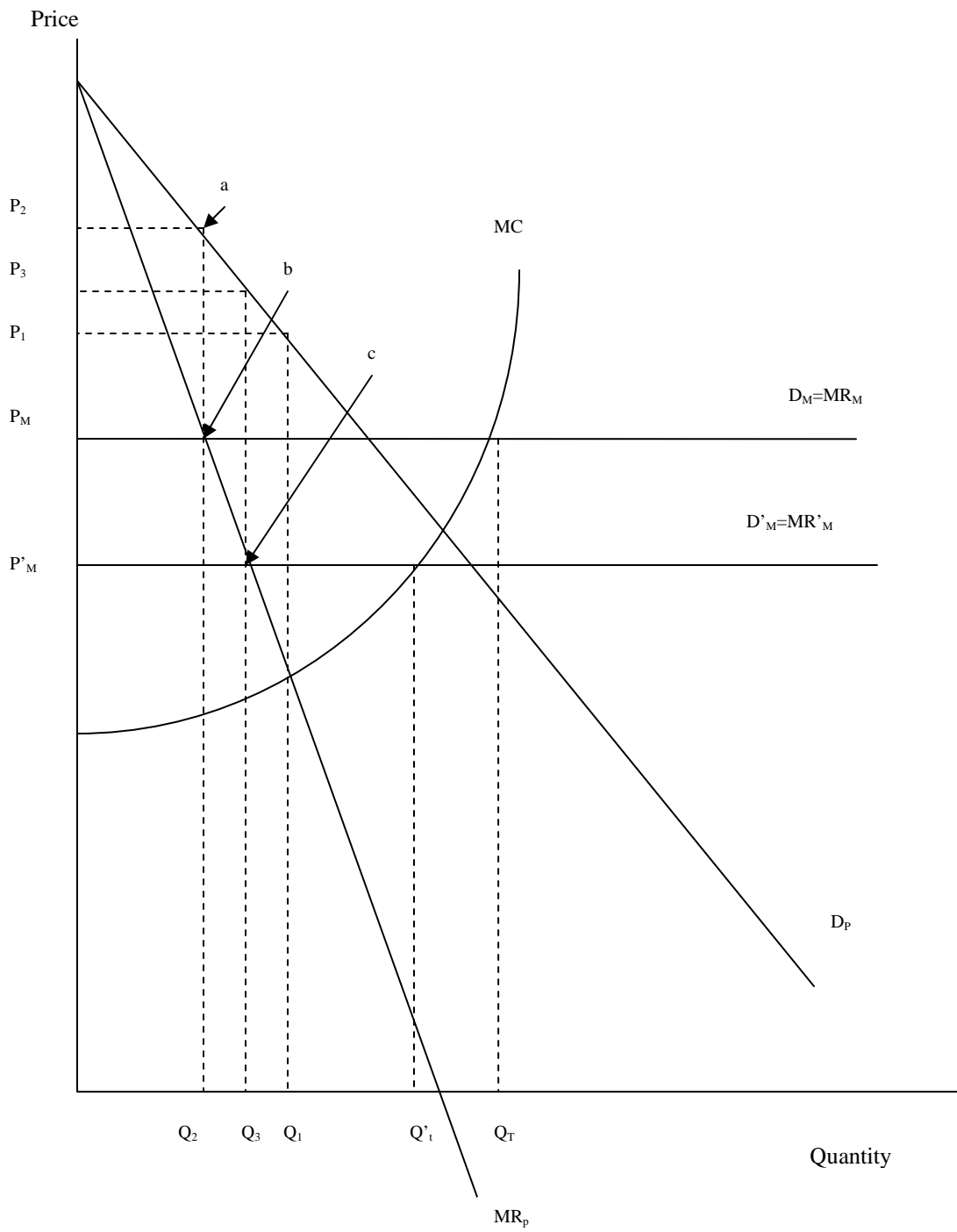
How do hospitals afford to provide free care to the uninsured, or care for Medicare/Medicaid patients at substantial discounts?

Consider the relationship between Medicare and private payers. Do Medicare patients simply receive a discount, or are private patients paying higher prices to subsidize care for the elderly?

In the diagram below consider the following demand and cost schedule facing a hospital with some degree of market power. If the hospital only served private patients, it would have a demand curve of  $D_P$  and marginal revenue curve  $MR_P$ .

Assuming profit maximization the firm would set  $MR=MC$  and provide  $Q_1$  services at a price of  $P_1$ .

Now if the hospital decided to see Medicare patients, it is obliged to accept the approved DRG rate for the service (prospective payment). Typically, this is a price lower than the private price, say  $P_m$ , which represents demand curve  $D_M$  – it is horizontal since it get constant revenue for each patient.



Now the hospital's new total demand curve equal to  $D_p$  down to point a, dropping down to  $D_M$  thereafter. Also the new marginal revenue curve is  $MR_p$  to point b then becoming  $MR_M$ . So profit is maximized where  $MR=MC$  providing  $Q_T$  services. The hospital sees  $Q_2$  private patients and charges them a higher price ( $P_2 > P_1$ ). The  $(Q_T - Q_2)$  Medicare patients will be provided medical care at a price equal to  $P_M$ . Note that at point b the hospital stops seeing private patients since the marginal revenue of private patients is less than that for public patients.

Now suppose Medicare lowers its payment rates to hospitals. In the diagram above the Medicare price falls to  $P'_M$  and the Medicare demand and marginal revenue curves fall as well. The hospital's new marginal revenue curve is now  $MR_p$  down to point c and  $MR_M$  thereafter. Now more private patients are seen ( $Q_3$ ) and the price they pay is lower ( $P_3$ ) (but still greater than  $P_1$ ). Likewise fewer Medicare patients are served.

Thus this analysis suggests that the government payment mechanism has a big impact on the amount private patients pay for hospital services. In general private sector prices are higher due to Medicare. However, when Medicare lowers the rates paid to hospitals for treating the elderly, there is a downward pressure on prices paid by everyone else.

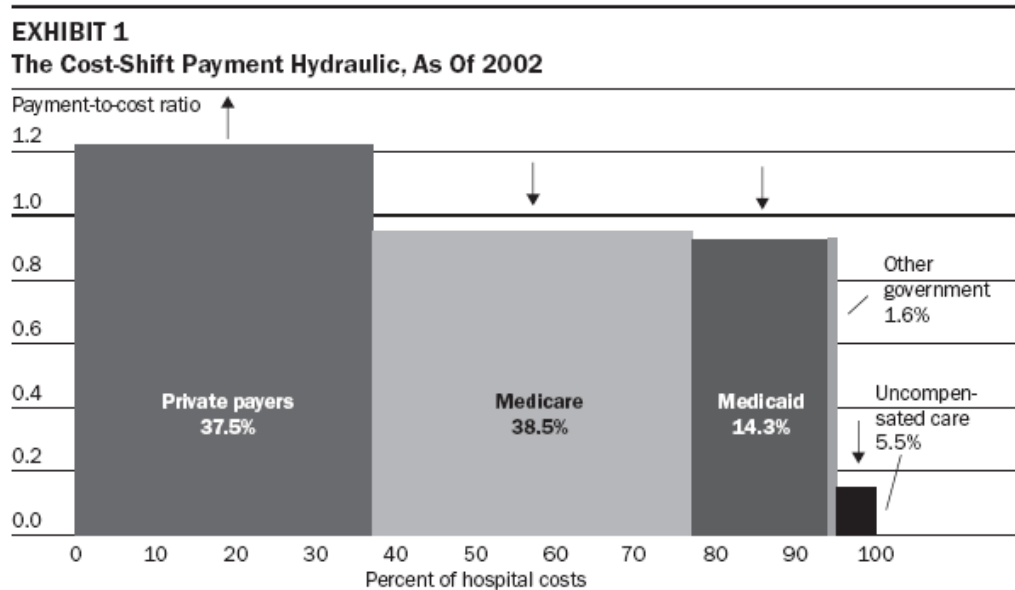
- if significant excess capacity and constant marginal costs then the hospital will treat each as a separate market and the two would not affect each other.
- Note too that when Medicare lowers its reimbursement hospital profits are decreased. There is incentive for them to increase bargaining

power against private insurers. So one thing that could happen is that lower Medicare reimbursement could result in hospital mergers or consolidations. This would shift out the demand curve facing the new hospital and allow higher prices. This is what you might expect if hospitals are already operating at or near zero profits.

- Also this assumes that hospitals are acting as profit maximizers.

### Evidence of cost shifting

The following graphs are taken from a study in the January/February 2007 edition of Health Affairs by Allen Dobson, Joan DaVanzo, and Namrata Sen of the Lewin Group.



**SOURCE:** Lewin Group analysis of data presented in Lewin Group, *Trendwatch Chartbook 2005: Trends Affecting Hospitals and Health Systems* (Washington: American Hospital Association, May 2005).  
**NOTE:** The bold ruling line at 1.0 represents costs and payments in balance.

This first graph shows the payment to cost ratio by payor for hospitals in 2002.

Note that one of the tough things to measure here is the appropriate cost. These costs are taken from what hospitals' definitions of Medicare, Medicaid and Private payers' costs as reported through the American Hospital Association Annual Survey. So do they really represent the "true cost" of treatment? That is tough to measure.

But assuming costs are measured accurately, then this is evidence of cost shifting. So Medicare made up 38.5% of costs in 2002, but hospitals were reimbursed at about 95% of costs. Thus Medicare reduced total hospital margins by 1.93 percentage points ( $.385 * [(1 - .95) * 100] = 1.93$ ).

Medicaid leaves about 8 percent of costs uncovered (even after accounting for DSH).

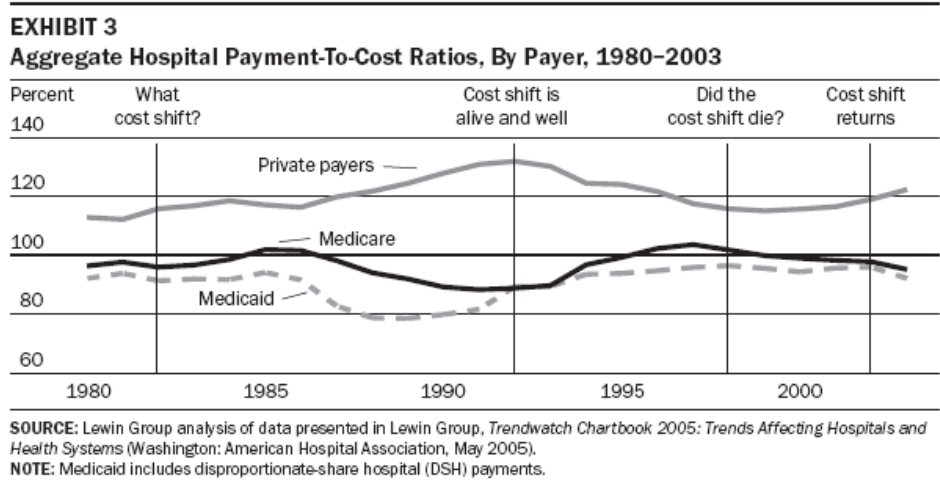
On the other hand, private payers pay about 1.22 more than costs. Thus, this suggests a pretty strong cost-shift "hydraulic".

Note that to the extent that this is really costs shifting (and not just accounting differences in measuring costs), then this suggests that hospitals have enough market power over private insurers to be able to do this. That or private insurers and consumers are willing to pay above normal prices so the hospital can cover its costs.

These are aggregate numbers and so they probably mask individual trends within DRGs.

The next figure shows the payment to cost ratio over the 1980 to 2003 period. Note that prior to 1985 or so (pre PPS) private payments were about 1.10 times costs and

Medicare was close to 1.00. There was not much need for shifting. Once the PPS became binding though, note the Medicare ratio (and Medicaid) decreased, while the private ratio increased. This suggests hospitals were able to deal with losses in the public market through increased leverage in the private market. But note once we get past the mid 1990s the private ratio falls. Managed care came on strong and pushed against hospitals. Medicare payments, however were increasing. But note that most recent years, the cost shift appears to be becoming more important.



In the end, then the aggregate total margin for hospitals over the 1980 to 2003 period ranged between 4 and 6 percent for the most part.