Module 3: Hospital Pricing and Competition

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Econ 372

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Institutional Background

History of hospitals

- Before 1900: Just don't go to the hospital! (at least in the U.S.)
  - mainly charity care
  - hospitals were a learning experience for physicians
- Early 1900s: big safety and technological improvements
- Mid 1900s: huge growth, especially in wealthy and urban areas
  - Medicare and Medicaid in 1965 (Social Security Act)

Now

As we know, we now spend **a lot** on health care in the U.S., and a big part of that is very high health care prices (and a big part of that is hospital prices)

Ownership types

1. Private not-for-profit: About 60%

2. For-profit: About 20%

3. State and local gov't: About 20%

Source: AHA Fast Facts

Non-profit hospitals

What does it mean to be a not-for-profit hospital?

From an economics perspective:

- Hospital assumed to maximize some objective function, $u(q, z)$, subject to a production constraint
- q denotes quantity of care and z denotes quality of care
- Production is constrained by the break-even condition

Non-profit hospitals

What does it mean to be a not-for-profit hospital?

From a practical perspective:

- Profits must be re-invested into the hospital
- Must show "community benefit" (no consensus definition...includes uncompensated care, services to Medicaid, and certain specialized services that are generally unprofitable)
- No taxes! and tax-free bonds

Non-profit hospitals and tax benefits

- $24.6 billion in tax exemptions in 2011
- $62.4 billion in "community benefits"
- Washington Post Article

What do you think? Are these community benefits measured appropriately?

What is a non-profit hospital?

The real question is...what is the hospital's objective function?

- For-profit in disguise
- Output maximizers
- Tax-benefit maximizers
- Social welfare maximizers

Most empirical evidence doesn't find much of a difference between FP and NFP hospitals, except FPs have higher prices. Why is that?

For-profit hospitals

These are easier to study theoretically...just a standard profit maximizing firm.

- $\pi = P(q)q - C(q)$, where q denotes quantity of care
- Firm has some market power and so faces a downward sloping demand curve

Unilateral Pricing (depends on the objective)

Pricing for NFP hospitals

Objective is to maximize some function of profits and quantity of care provided, denoted by

$$U\left(\pi_j = \pi_{i,j} + \pi_{g,j}, D_{i,j}, D_{g,j}\right)$$

where π_j denotes total profits for hospital j and $D_{i,j}$ denotes hospital demand from insurer i. We assume that p_j is exogenous and determined by a public payer, so the hospital need only set its price for private insurance customers, p_i.

Solution for NFP hospital

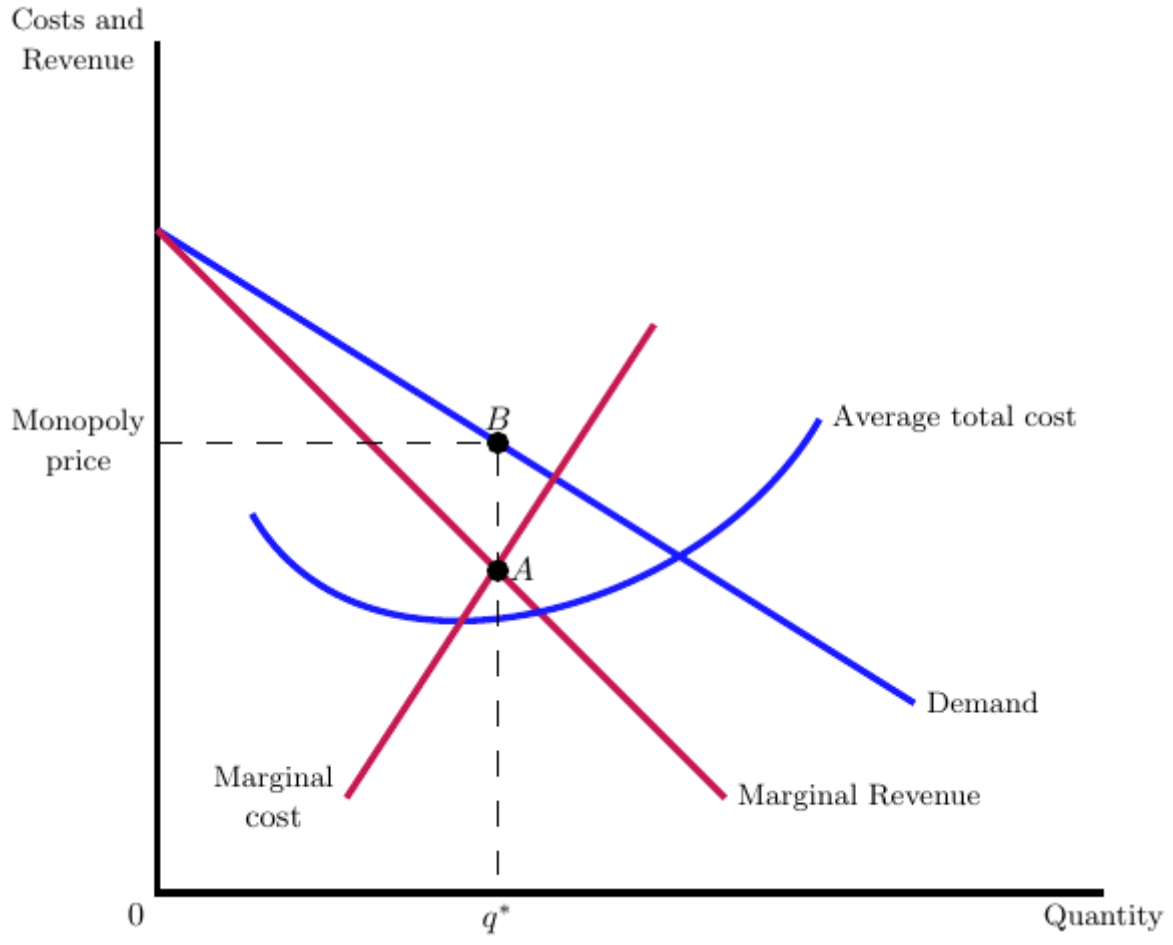
The hospital chooses p_i such that

$$\frac{\mathrm{d}U}{\mathrm{d}p_i} = U_1 \pi_1^i + U_2 \frac{\mathrm{d}D_i}{\mathrm{d}p_i} = 0,$$

where U_1 denotes the derivative of $U(\cdot)$ with respect to its first argument and similarly for U_2.

In general, we can't solve this directly without knowing the hospital's utility function.

Assuming pure profit maximization



Example

Consider the firm's demand curve, $d = 16 - q$, and cost curve, $c(q) = 5 + q^2$. Where will the firm produce and at what price? What is the firm's markup over marginal cost? The profit function is, $\pi = (16 - q)q - 5 - q^2$. Differentiating with respect to quantity yields $-q + 16 - q - 2q = 16 - 4q = 0$, or $q = 4$. At this quantity, the price is $p = 12$, which is a markup of 4 over the marginal cost (or 50% markup).

In-class problem (unilateral pricing)

Consider the firm's demand curve, $d = 40 - 2q$, and cost curve, $c(q) = 5q + \frac{1}{2}q^2$.

1. What is the firm's profit maximizing choice of quantity and price?
2. What is the markup over marginal cost?

Two-price Market

Relationship between prices

In health care, providers usually face two prices:

1. A price fixed by Medicare and Medicaid, p_m.
2. A price that is negotiated with insurers, p_n.

How does p_m affect p_n?

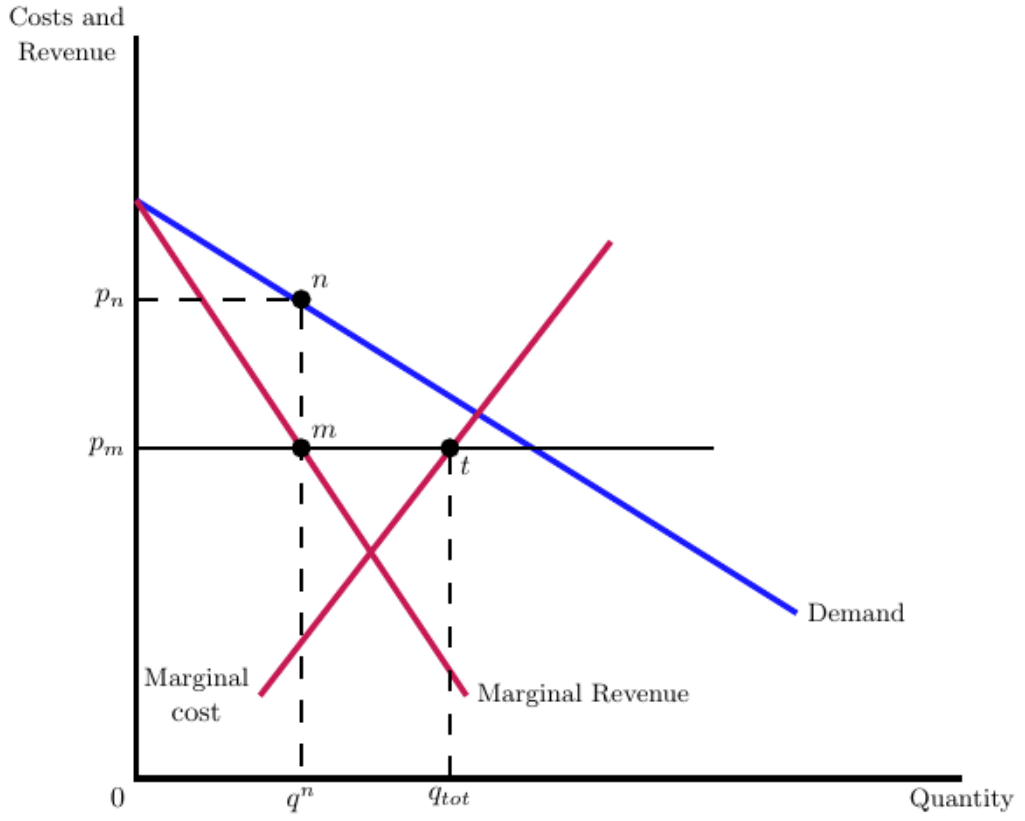
Two price market and NFP

Although we don't know the general solution for the private price, we can find how it varies with the public price...

$$\frac{\mathrm{d}p_i}{\mathrm{d}p_j} = -\frac{U_{11}\pi_1^i\pi_1^j + \frac{\mathrm{d}D_i}{\mathrm{d}p_i}U_{12}\pi_1^j}{\frac{\mathrm{d}^2U}{\mathrm{d}p_i^2}}$$

Two price market and FP

- Sell to "private" market as long as marginal revenue exceeds the public price
- Switch to "public"" market otherwise, and sell to the point where price equals marginal cost



In-class problem (two-price market)

Consider the firm's demand curve in the private insurance market, $d = 16 - q$, and costs, $c(q) = 5 + q^2$. Assume that there exists a public insurer that pays a fixed price of $\bar{p} = 10$.

1. How many private patients will the provider serve?
2. How many public patients?
3. What if $\bar{p}$ drops to \$9.

Cost-shifting

- Relationship between public and private price is important
- Speaks to anticipated effects of a change in Medicaid or Medicare rates
- Do hospitals "make up" the difference?

The idea that hospitals will increase private prices following a decrease in the public price is called **cost shifting**.

Cost-shifting

But how could it happen?

Assumes that hospitals could have increased private prices earlier but chose not too. This is technically possible if, for example:

- Hospital has very low margins (maybe negative with a lower public price)
- Insurer wants to prop up the hospital for competitive reasons
- Hospital has diminishing returns to profits

but economists usually see this as a smaller effect than most policy makers.

What is a hospital's *price*?

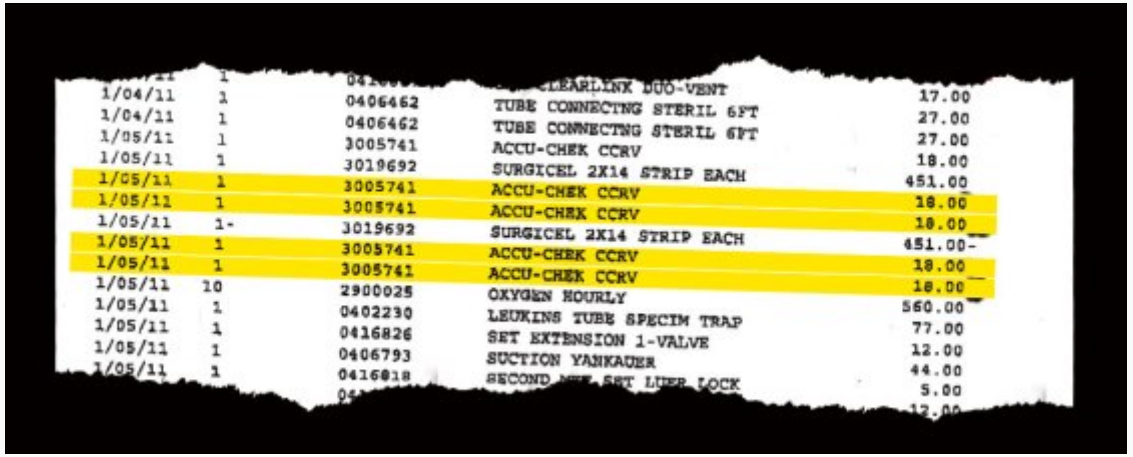
What is a hospital price?

In practice, it's a negotiation with insurers

- Hospitals can't set price on their own
- Negotiation with insurers
- Bargaining problem where insurer and hospital split some total amount
- Agent/entity with higher bargaining position will get larger share

What is a hospital price?

Defining characteristic of hospital prices and services: *it's complicated!*



1/04/11	1	0406462	TUBE CONNECTNG STERIL 6FT	17.00
1/04/11	1	0406462	TUBE CONNECTNG STERIL 6FT	27.00
1/05/11	1	3005741	ACCU-CHEK CCRV	27.00
1/05/11	1	3019692	SURGICEL 2X14 STRIP EACH	18.00
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1/05/11	10	2900025	OXYGEN HOURLY	18.00
1/05/11	1	0402230	LEUKINS TUBE SPECIM TRAP	560.00
1/05/11	1	0416826	SET EXTENSION 1-VALVE	77.00
1/05/11	1	0406793	SUCTION YANKAUER	12.00
1/05/11	1	0416018	SECOND [illegible] SET LUER LOCK	44.00
				5.00
				12.00

Brill, Steven. 2013. "Bitter Pill: Why Medical Bills are Killing Us." *Time Magazine*.

What is a hospital price?

Lots of different payers paying lots of different prices:

- Medicare fee-for-service prices
- Medicaid payments
- Private insurance negotiations (including Medicare Advantage)
- But what about the price to patients?

$$\text{Price} \neq \text{charge} \neq \text{cost} \neq \text{patient out-of-pocket spending}$$

What is a hospital price?

What is a hospital price?

Not clear what exactly is negotiated...

Fee-for-service

- price per procedure
- percentage of charges
- markup over Medicare rates

Capitation

- payment per patient
- pay-for-performance
- shared savings

Hospital prices in real life

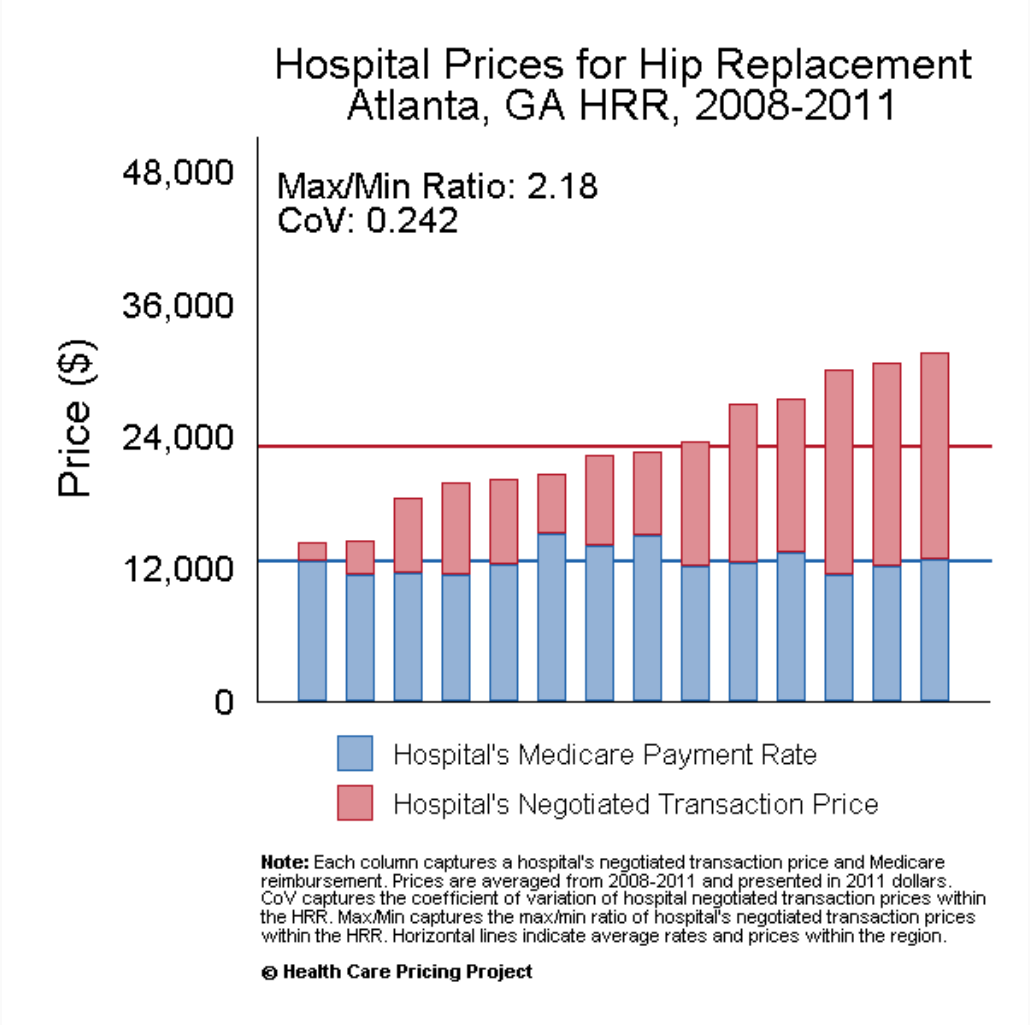
We'll get into the real data in a bit, but for now...a few facts:

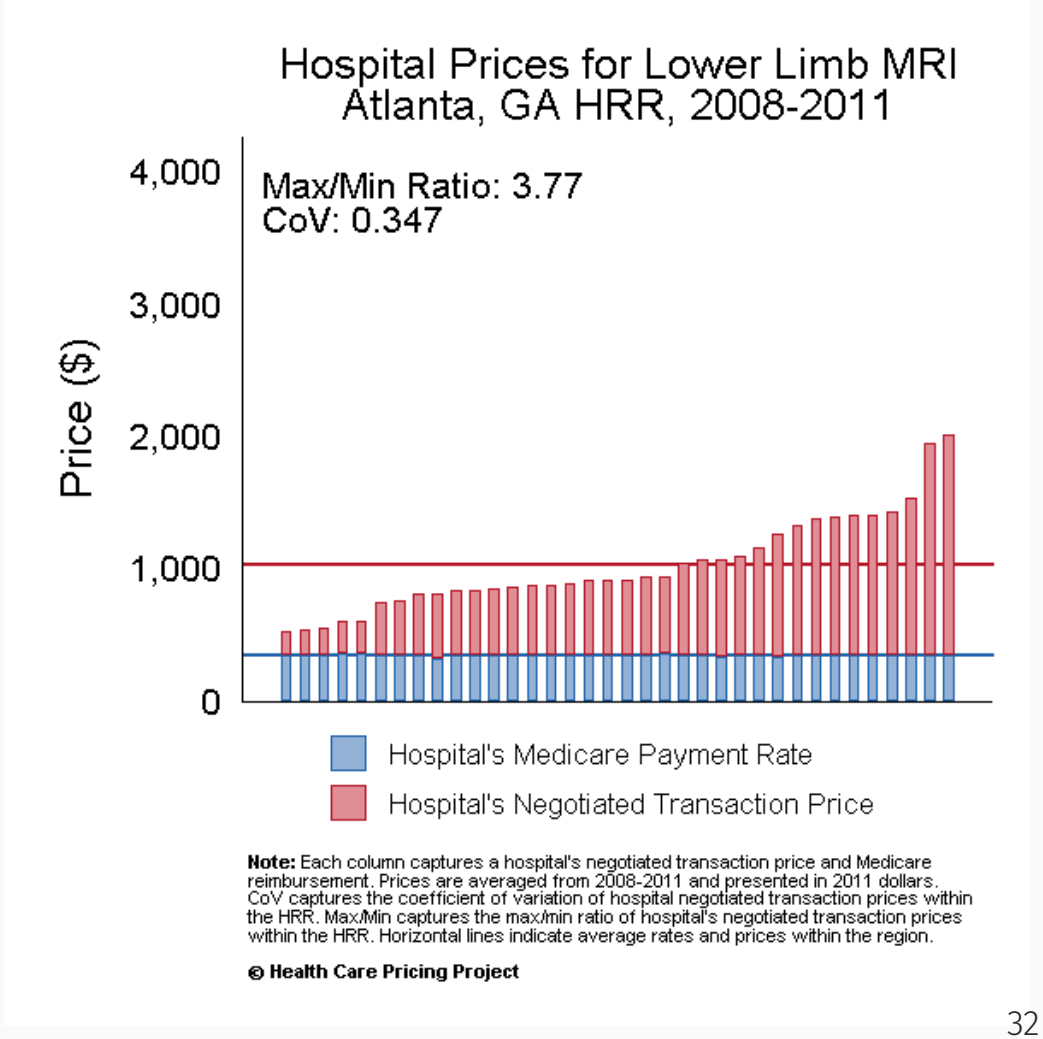
1. Hospital services are expensive

2. Prices vary dramatically across different areas

3. Lack of competition is a major reason for high prices

Hospital prices in real life





Pricing and Negotiations

Nash Bargaining problem

We model this bargaining problem as a "Nash bargaining" problem.

- Two people are faced with a negotiation
- If they agree, each gets payoffs u_1 u_2, respectively
- If they disagree, each gets some other payoff, t_1 and t_2, with $u_1 > t_1$ and $u_2 > t_2$
- Nash showed that the solution is $\mathbf{max}(u_1 - t_1)(u_2 - t_2)$

Understanding the outside option

Key part of understanding effect on price is to understand the "outside option". What does this mean?

Outside option in this case is the profit to the hospital or insurer if a negotiation "breaks down". What is the outside option to an insurer if they are in a monopoly hospital market?

In-class problem (Nash bargaining)

Assume that two agents are negotiating over how best to divide their quantity of good x, which is normalized to 1. If the players reach an agreement, player 1 receives utility $u_1 = x$, and player 2 receives utility $u_2 = (1 - x)$. If the players do not reach an agreement, player 1 receives a payoff of $t1 = 0$, and player 2 receives payoff $t_2 = a > 0$.

1. Find the Nash bargaining solution to this game.
2. Explain how this solution varies with a.

Central Empirical Issues

At least 2 related issues in studying hospital competitiveness:

1. How do we measure "competitiveness"?
2. What is the effect of competition?

Measuring competitiveness

- Common measure is Herfindahl-Hirschman Index (HHI), $\sum_{i=1}^{N} \boldsymbol{s}_i^2$.
  - 2,500 is considered **highly concentrated**
  - 1,800 is considered **unconcentrated**
- "Willingness to pay" is more recent measure (theoretically supported)
- Both require a measure of the geographic market

Defining the market

Lots of subjectivity...

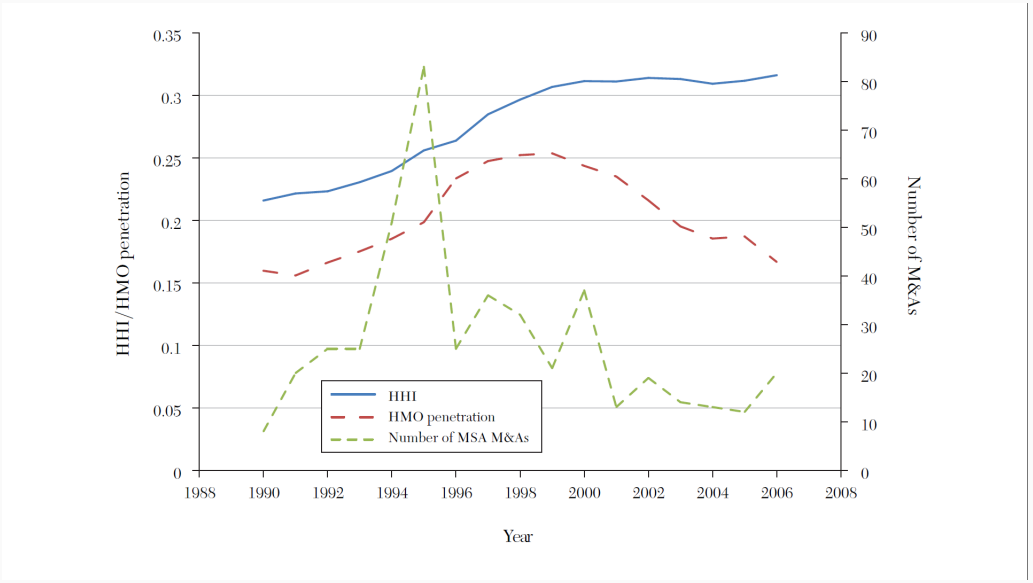
- Radius around a hospital?
- Concentric circles to define "catchment" areas?
- Patient/physician referrals?
- At what product-level do hospitals compete?

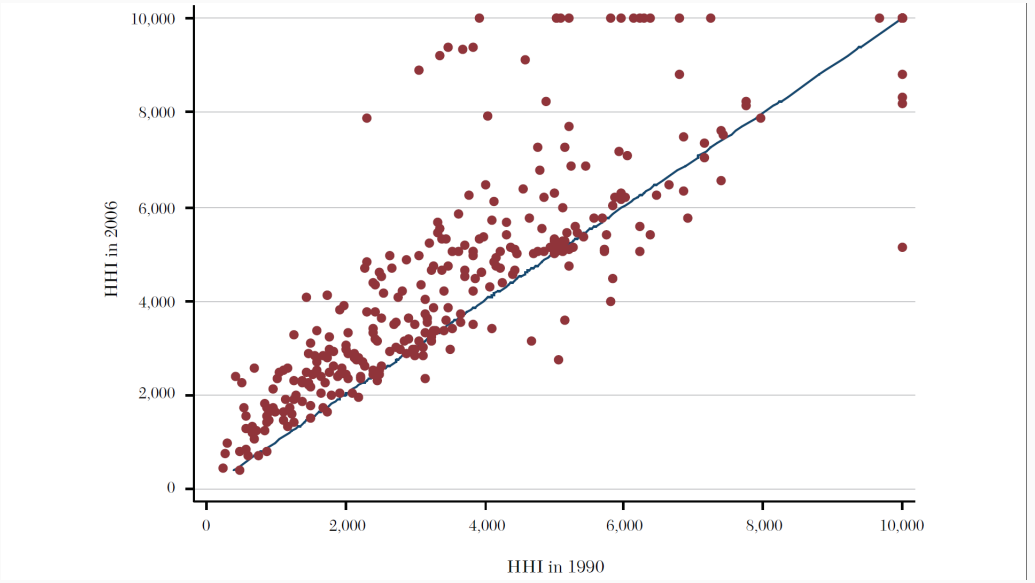
Trends in competitiveness

Almost any way you define it, hospital markets are more and more concentrated (less competitive) in recent decades.

- 1990: 65% of MSAs highlgy concentrated, 23% unconcentrated
- 2006: 77% highly concentrated, 11% unconcentrated

Hospital concentration over time





Source: Gaynor, Ho, and Town (2015). The Industrial Organization of Health Care Markets. Journal of Economic Literature.

Hospital concentration over time

- More data and interactive report from the Health Care Cost Institute.
- Presentation from the National Institute for Health Care Management

Why?

Historical perception of hospital competition as "wasteful" and assumption that more capacity means more (unnecessary) care:

- Limit public spending by limiting competition
- Prevalence of certificate of need (CON) laws

Effects of reduced competition

1. Higher prices
2. Lower quality, 2020 NEJM Paper
3. Maybe lower costs (but not passed on to lower prices)

Effects for both "in-market" and "out-of-market" mergers

Types of hospitals involved in mergers

- Ascension-Presence: Largest non-profit system in US adds 10 hospitals to existing 9 hospitals in Chicago
- Fairview-HealthEast: 11 hospital system becomes largest in Twin Cities area
- Hospital corporation of america (HCA) adds 4 hospitals to the 10 existing HCA hospitals in Houston
- Northwestern-Centegra: Forms 10 hospital system in Chicago
- Emory-DeKalb: Forms 10 hospital system in Atlanta
- Jefferson-Einstein: Forms 18 hospital system in Philadelphia area

Source: NIHCM Hospital Consolidation Trends

Different merger types

Essentially two types of mergers:

1. "Within-market"
2. "Out-of-market"

Why do you think these matter?

Within-market mergers

- Listed previously (Emory-DeKalb, etc.)
- **Big** price effects
  - 20 to 40% in many studies
  - Up to 60% in some studies
  - Bigger increases the closer are the hospitals
  - Price increases spillover to other hospitals too
- Account for about 50% of all mergers since 2000

Out-of-market mergers

- Involve larger systems spanning different isolated markets
  - Advocate-Aurora: 27 hospital system in IL and WI
  - Baptist Memorial-Mississippi Baptist: 22 hospitals in TN, AR, and MS
  - UPMC-Pinnacle: 24 hospital system recently added 8 in central PA
  - Catholic Health Initiatives-Dignity Health: 142 hospitals in 21 states
  - HCA: 177 hospitals in 21 states
  - RCCH HealthCare Partners: 89 hospitals in 30 states, focusing on non-urban areas
- About 35% of all mergers are out-of-market but in same state, 15% out-of-state
- Smaller but meaningful price increases, 5 to 10%

How do they increase prices?

Two ways this can happen theoretically:

1. Common customers (hospital markets are local, but insurance markets are more broad)
2. Multi-market contact (particularly relevant for understanding out-of-state mergers)

1. Common customers

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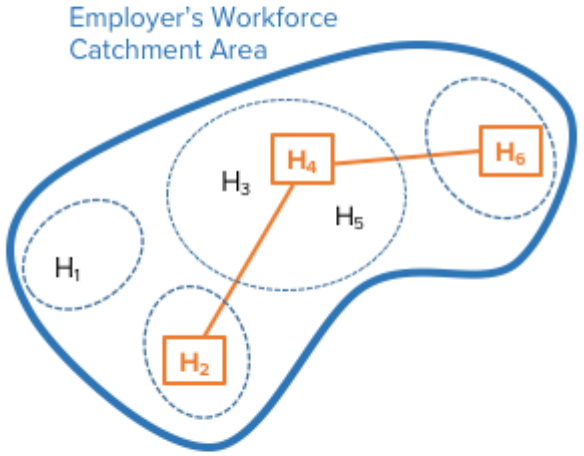
Broader Merger Geographies Require New Approaches by the FTC

These emerging conceptual frameworks have not yet been used in a federal merger challenge, despite the rapid pace of cross-market and multimarket hospital mergers.

Cross-Market Regional Mergers[a]

- Employers often draw workers from numerous distinct markets within a broader geographic region.
- To sell insurance to these employers, insurers must build a hospital network covering all markets where their employees live.
- A merger that gives a hospital system a presence in several of these distinct markets also gives that system more market power – **even if it does not increase hospital concentration within any of the smaller markets.**
- By negotiating on an "all or nothing" basis, the system can force insurers to include all system members in the network and to pay them higher prices.



For full slide deck and all references see https://www.nihcm.org/categories/hospital-consolidation-trends-impacts-outlook.

2. Multimarket contact

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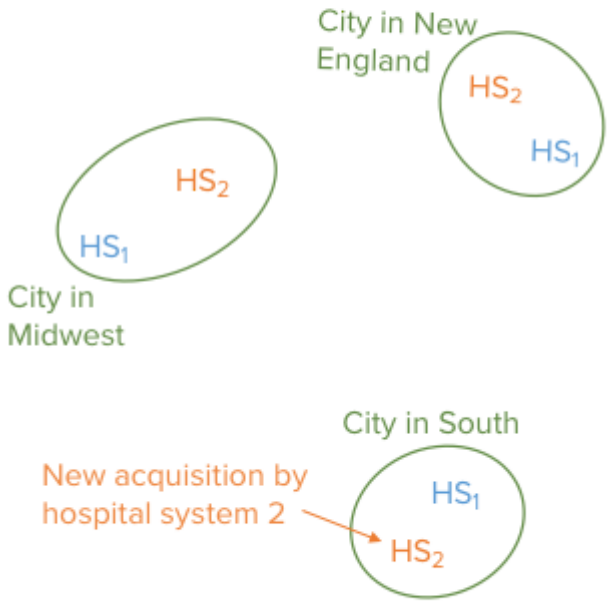

Mergers Across Distant Markets[a]

- As large hospital systems (HSs) expand their geographic reach nationally, they are increasingly competing against one another in multiple far-flung markets.
- The mutual forbearance hypothesis posits that such systems may avoid competing strenuously in any given common market so as to not set off vigorous competition with rival system members in other common markets.
- Consolidations that increase the extent of multimarket contact can lead to higher hospital prices – **even when the markets of the merging entities do not overlap at all and there is no increase in market power locally.**

For full slide deck and all references see https://www.nihcm.org/categories/hospital-consolidation-trends-impacts-outlook.

Where do we go frome here?

1. Adopt sensible policies
2. Antitrust enforcement

Finishing the class

For the next two classes:

- Please read the Cooper et al. paper, "The Price Ain't Right", available on **Canvas**
- Please review the Brookings Report, Making health care markets work