Painful bargaining: Evidence from anesthesia rollups

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Motivation

- "Traditional" treatment of mergers:
  - One-off transactions
  - Devised/backed by operating companies
- Markets increasingly shaped by "rollups":
  - Series of related transactions
  - Formulated/financed by investment funds
  - Exempt from premerger notification $\rightarrow$ avoid scrutiny
  - Exceed \$1T in US annual transaction volume

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Research Question: How do rollups affect market structure, price, and consumer welfare?

Summary

- Study markets for US anesthesia services
  - Site of the first rollup case in US history
- Complaint informs our research design and model
- Case addresses only one firm-state; court docs redact price information
  - This paper assembles comprehensive ownership/claims data
- Exercises:
  - Identify and document rollups
  - Measure (large) price effects
  - Estimate a structural bargaining model
  - Simulate counterfactual equilibria given remedies

Institutional Details

The Rollup

- Criteria:
  - Financial sponsor (e.g., PE firm) funds and directs investments
  - Makes an initial platform acquisition
  - Makes subsequent add-on acquisitions
- Importance:
  - Formulated as niche strategy in 1984 by Golder Thoma & Cressey
  - Has grown rapidly to ∼40% all US M&A (by count)

Practitioner's Perspective

From Mergers & Acquisitions from A to Z (Sherman 2018):

> *Under a [rollup] strategy, the buyer is a holding company.*
>
> *It typically involves aggressive acquisition of competitors in a given market.*
>
> *Obviously, antitrust laws are an issue.*

The US Anesthesia Industry

- Specialized clinicians anesthetize patients during surgeries
- Most are FTEs of single-specialty groups that we call practices
- Multiple practices may be owned by a single entity:
  - Practices retain identity and clinical autonomy
  - Business decisions are made by parent co's that we call firms
- Markets correspond to MSAs
  - "Industry participants...recognize metropolitan areas...as markets for anesthesia" (Complaint, page 67)

Three "Textbook" Rollups

- Early 2012: JR, a healthcare executive, pitches WCAS, a large financial sponsor

  "Goal [is] to build a platform...by consolidating practices with high share in a few key markets [to get] negotiating leverage with commercial payors."
  — *Internal WCAS communications*

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  - Acquires its first practice, *Greater Houston Anesthesiology*
  - Over 7 years, adds *North Houston, MetroWest, Guardian*
- 2013-2018: rollups of Dallas and Austin markets (9 deals in total)
- BR, a WCAS partner, summarizes one such transaction:

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Novel Litigation

- On September 21, 2023, FTC charges USAP and WCAS
- Allegations in complaint:
  - Consolidated and monopolized markets; then raised price
  - Violated Section 7, Section 2, and other statutes
- First case challenging a series of completed transactions under US merger law
  - Bears resemblance to *U.S. v. Grinnell*
- Chair Khan calls the sequences of mergers a "stealth consolidation scheme"

Data

Sources and Structure

- Sources:
  - HCCI Commercial Claims Dataset
    (covers 1/3 of employer-sponsored US population)
  - CMS Doctors & Clinicians Dataset
  - Transaction records from e.g., *Pitchbook*

- Observe procedure-level *price, clinician, practice, firm, date, hospital; market*

- Unit of observation: practice-quarter, practice-year, or hospital-year

- Sample period: 2012–2021

- Restrict attention to rolled up markets
  (where financial sponsor acquires ≥ 2 firms)

Brief Summary

Number of markets	18
Acquisitions	
Distinct rollups/market	1.11
Unique sponsors	9
Add-on acquisitions	50
(Platforms average 2.34× larger)	
Average in-network price	
Per 15 minutes	\$108
Per procedure	\$616
Size/relevance of sample	
Number of clinicians	>3,000
Number of procedures	>800,000

We Identify Rollups in 18 Markets

	No sponsor	Sponsor but no add-ons	Sponsor and add-ons
N	254	67	18
Population (10,000s)	42.06	145.61	328.65
GDP per capita	42,249	43,633	56,787
HHI average, 2012-2021	6,050	4,322	3,075
HHI change, 2012-2021	633	410	1,501
Share privately insured	0.54	0.55	0.53

Rollups occur in larger markets with significant concentration increases

Targets Differ Systematically Over Time

	Platform acquisitions		**Add-on acquisitions**	
	Mean	Std Dev	Mean	Std Dev
Number of clinicians	61.45	81.32	26.24	29.80
Market share	23%	18%	9%	11%
Transaction year	2015.10	1.80	2016.76	2.25

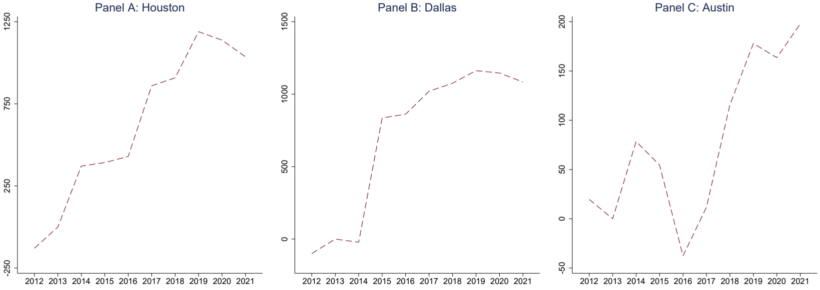
Platform acquisitions are larger and occur earlier

Market Structure Effects

Method: Measuring Market Structure Effects

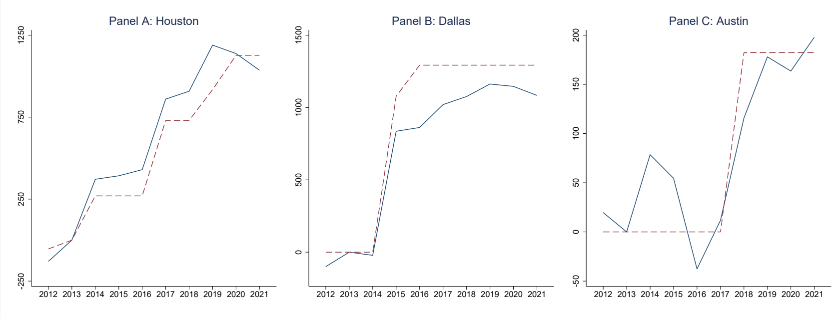
- Compare <u>actual</u> and <u>predicted</u> HHI changes within each market
- Actual HHI:
  - Index firms by f and years by t
  - Denote market share by s
  - Calculate $\overline{HHI}_t = \sum_f s_{ft}^2$
  - Plot relative to start: $\overline{HHI}_t - \overline{HHI}_{2012}$
- Predicted HHI:
  - Index acquisitions by i and transaction years by t_i
  - Compute $\widehat{\Delta\text{HHI}}_i = 2 \times s_{\text{target}_i, t_i - 1} \times s_{\text{acq.}_i, t_i - 1}$
  - Plot: $\sum_{\tau=2012}^{t} \sum_{i:t_i=\tau} \widehat{\Delta\text{HHI}}_i$

HHI Increases in Litigated Markets

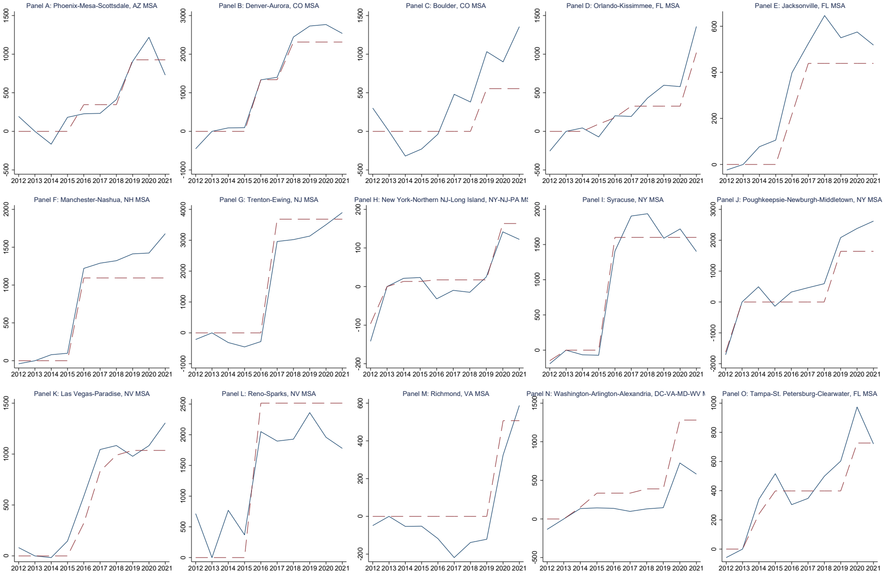


Significant concentration increases in markets targeted by USAP

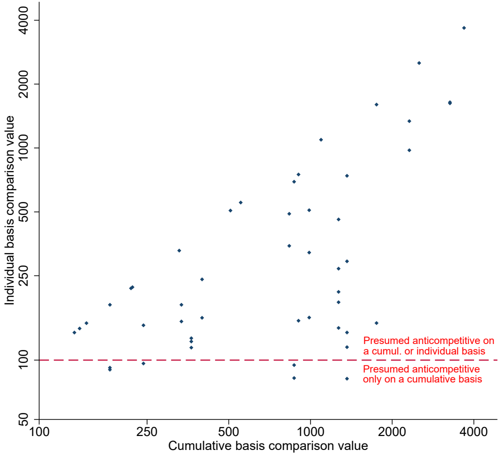
Concentration Increases Because of Rollups



Actual HHI changes track the predicted impact of acquisitions


Panel A: Phoenix-Mesa-Scottsdale, AZ MSA
Panel B: Denver-Aurora, CO MSA
Panel C: Boulder, CO MSA
Panel D: Orlando-Kissimmee, FL MSA
Panel E: Jacksonville, FL MSA
Panel F: Manchester-Nashua, NH MSA
Panel G: Trenton-Ewing, NJ MSA
Panel H: New York-Northern NJ-Long Island, NY-NJ-PA MS
Panel I: Syracuse, NY MSA
Panel J: Poughkeepsie-Newburgh-Middletown, NY MSA
Panel K: Las Vegas-Paradise, NV MSA
Panel L: Reno-Sparks, NV MSA
Panel M: Richmond, VA MSA
Panel N: Washington-Arlington-Alexandria, DC-VA-MD-WV M
Panel O: Tampa-St. Petersburg-Clearwater, FL MSA

Add-Ons Create an Enforcement Challenge

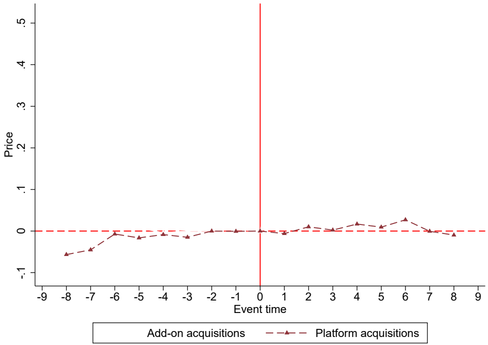


Individual add-on transactions often fall below regulatory scrutiny thresholds

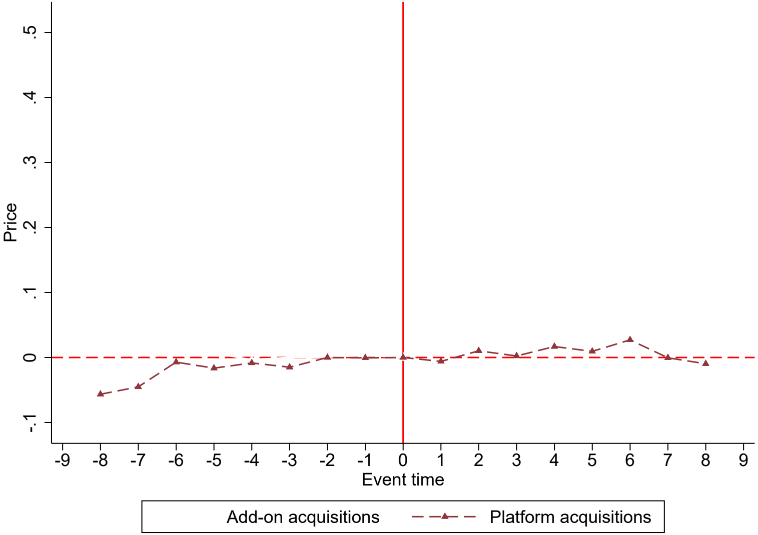
Price Effects

Method and Results: Price Effects of Platform Acquisitions

- Each acquisition is treated as an event
- Event time indexed by τ, target firms by r
- $y_{r\tau}$ represents log price charged by r at τ
- Analysis uses 19 quarter window
- Average over targets r
- Compute and plot: $y_\tau = \overline{y_\tau} - \overline{y_0}$



Prices Do Not Change After Platform Acquisitions



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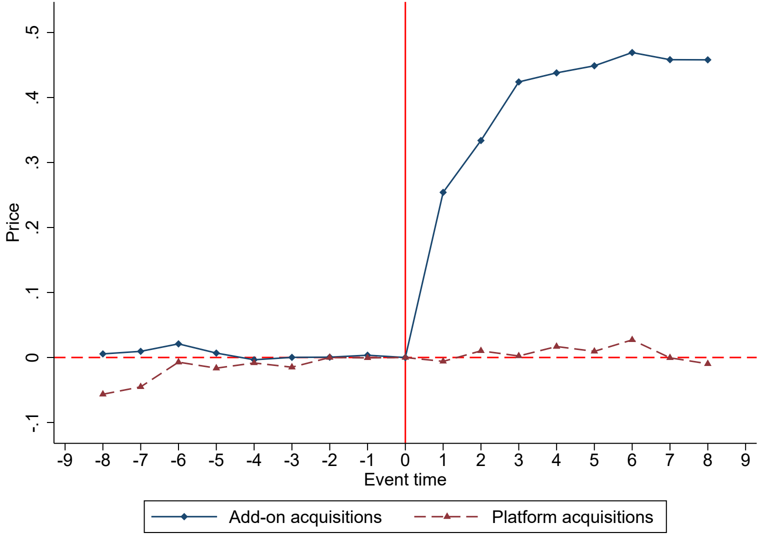
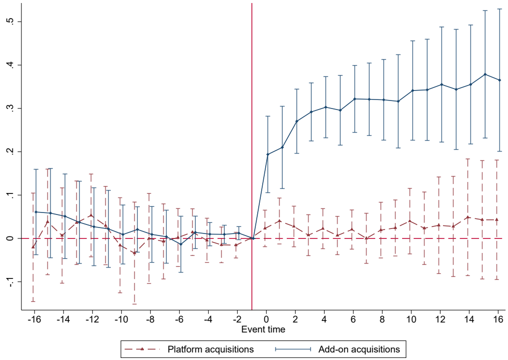


Robustness Checks

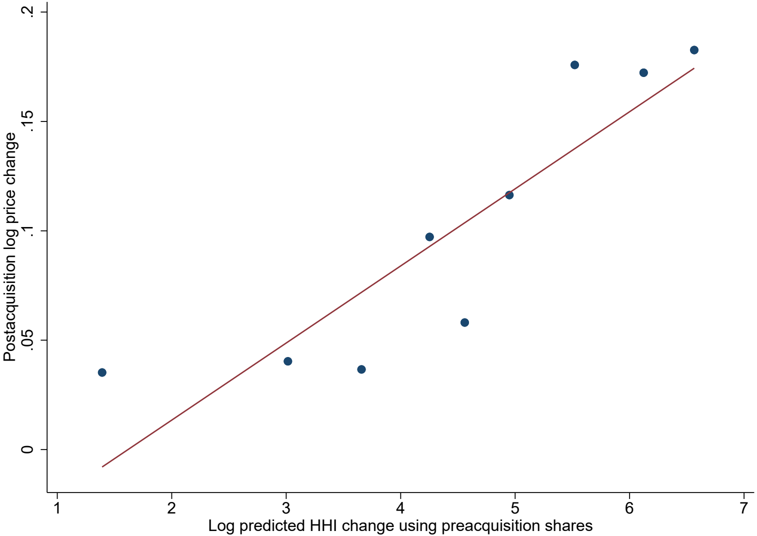


- Event study with firm and calendar quarter FE → similar results
- Robust to using obstetrics-only sample Details
- Non-anesthesia prices for anesthetized procedures unaffected Details

Addressing Alternative Explanations

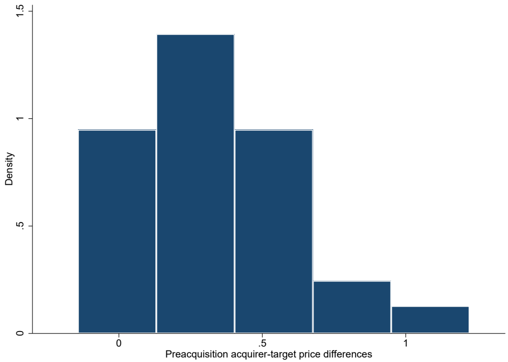
- ~~Financial sponsor effect ruled out: Platform acquisitions show no price changes~~
- Quality improvement not driving price increases: No changes in quality measures Details
- Bargaining ability differences unlikely to explain results: Evidence from industry practices and data Details

Price Increases Correlate with Market Structure Changes



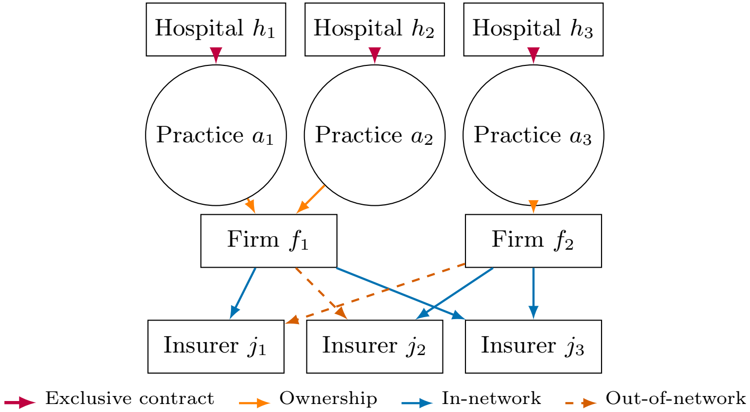
Price Increases Implemented Quickly

- Immediate price jumps post-acquisition due to billing code changes
- Clinicians are "on paper" transferred to higher-priced acquirers
- Pre-acquisition price differences explain timing and magnitude



Model

Anesthesia Market Structure



Model Overview

- **Players**:
  - Surgeries performed at set $\mathcal{H}$ of hospitals
  - Anesthesia provided by set $\mathcal{A}$ of practices or *locum tenens*
  - Practices owned by set $\mathcal{F}$ of firms
  - Reimbursements paid by set $\mathcal{J}$ of insurers
- **Timing**:
  - $f \in \mathcal{F}$ and $j \in \mathcal{J}$ simultaneously Nash bargain
    - Agreement $\Rightarrow$ in-network price p_{fj}
    - No agreement $\Rightarrow$ out-of-network price $\bar{p}$
    - Define $N_{fj} = 1$ if in-network and $N_{fj} = 0$ otherwise
  - $h \in \mathcal{H}$ observes network and chooses $a \in \mathcal{A}$ or *locum tenens*

DEMAND

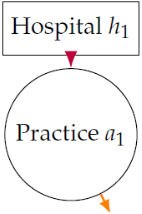
Hospital issues "request for proposals," or "RFP," to exclusively staff facility.

- Need to ensure coverage over time and for all services
- All publicly accessible RFPs that we have obtained emphasize payor relationships

If a practice is in-network, the insurer pays the entire in-network price

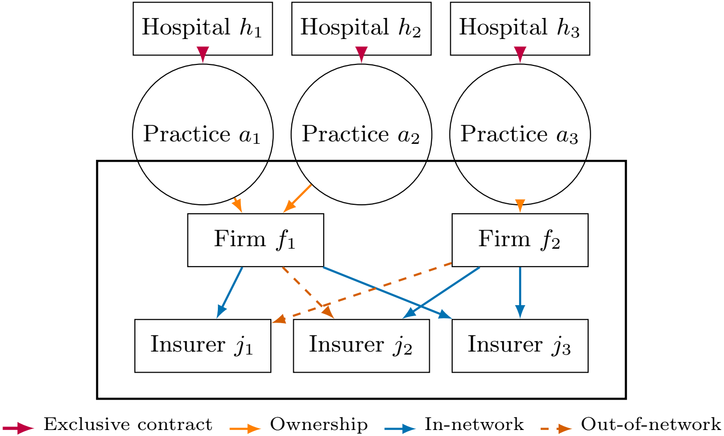
Else, then insurer pays a fraction of the (exogenous) out-of-network price

- Balance is billed to patient, who is typically surprised
- Hospital suffers loss in utility measured by θ
  (reputational damage, contractual penalty, or via other means)



Formal Utility Model

Anesthesia Market Structure



Price and network formation

Ignore *locum tenens* for simplicity.

Each insurer seeks to maximize profit (here, equivalent to minimizing cost).

Firms also seek to maximize their profits.

Price and network formation

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Each insurer seeks to maximize profit (here, equivalent to minimizing cost).

Firms also seek to maximize their profits. Firms and insurers simultaneously Nash bargain.

For each bargaining pair, equilibrium prices satisfy

$$p_{fj} = \arg\max_{p} \left[\pi_f(N_{fj}, p) - \pi_f(1 - N_{fj}, \bar{p})\right]^b \times \left[\pi_j(N_{fj}, p) - \pi_j(1 - N_{fj}, \bar{p})\right]^{1-b},$$

given positive gains from trade.

For simplicity, we impose equal bargaining weights.

Results

Estimation Approach

- **Demand-side moments:**

$$\widehat{\frac{\partial \ell(\cdot)}{\partial \theta}} \propto \sum_{m,t} \sum_{h \in \mathcal{H}_{mt}} \sum_{a \in \mathcal{A}_{mt}} \overline{N}_{aht} \left[Y_{aht} - \frac{e^{X_{at}\beta + \overline{N}_{aht}\theta}}{1 + \sum_{a'} e^{X_{a't}\beta + \overline{N}_{a'ht}\theta}} \right]$$

- **Supply-side moments:**

$$\hat{\zeta} \propto \sum_{m,t} \sum_{j \in \mathcal{J}_{mt}} \sum_{a \in \mathcal{A}_{mt}} \left(\underbrace{p_{mtf(a)j}(\beta, \theta, \mathbf{mc})}_{\text{predicted prices}} - \underbrace{p^{o}_{mtf(a)j}}_{\text{observed prices}} \right)$$

Results: Hospitals Prefer In-Network Providers

	(1)	(2)	(3)	(4)
In-network ($\hat{\theta}$)	1.50	1.50	1.59	1.59
	(0.11)	(0.11)	(0.14)	(0.14)
Size of practice ($\hat{\beta}_1$)	0.013	0.013	0.014	0.014
	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Constant ($\hat{\beta}_0$)	-3.42	-3.42	-1.93	-1.93
	(0.12)	(0.12)	(0.20)	(0.20)

Significant preference for in-network providers

Results: Implied Margins ~40%

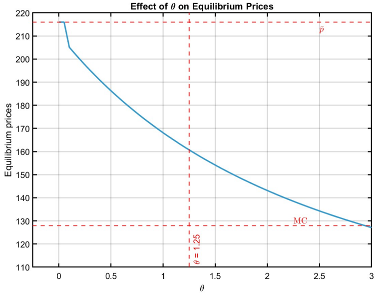
	(1)	(2)	(3)	(4)
Marginal cost ($\hat{\lambda}_0$)	55.34	30.60	52.60	44.39
	(0.88)	(1.62)	(1.07)	(1.87)
Time trend ($\hat{\lambda}_1$)		4.96		3.36
		(0.28)		(0.63)

Average price per 15 minutes = $108, implying ~40% margin

Comparative Statics and Policy Impact

Equilibrium price p_{fj} is:

- $\uparrow$ in $\overline{p}$ (out-of-network maximum price)
- $\uparrow$ in γ (ability to collect)
- $\uparrow$ in mc (marginal cost)
- $\uparrow$ in b (bargaining parameter)
- $\downarrow$ in θ (disutility from out-of-network billing)



Policy Connections: These parameters map to key health policy proposals (e.g., the No Surprises Act).

Important: Equilibrium price p_{fj} is highly sensitive to these parameters.

Counterfactuals

Simulated Effects of Antitrust Interventions

- **Unwinding Completed Transactions**:
  - Reduces annual expenditures by \$327,000 to \$25M per market
  - Total savings to payors: over \$96 million annually
  - NPV (7.1-year duration, 10% discount rate): over \$472 million
- **Deterring Incipient Transactions**:
  - Reduces annual expenditures by \$528,000 to \$6 million per market
  - Total savings to payors: around \$40 million annually
- Entry is not a panacea!

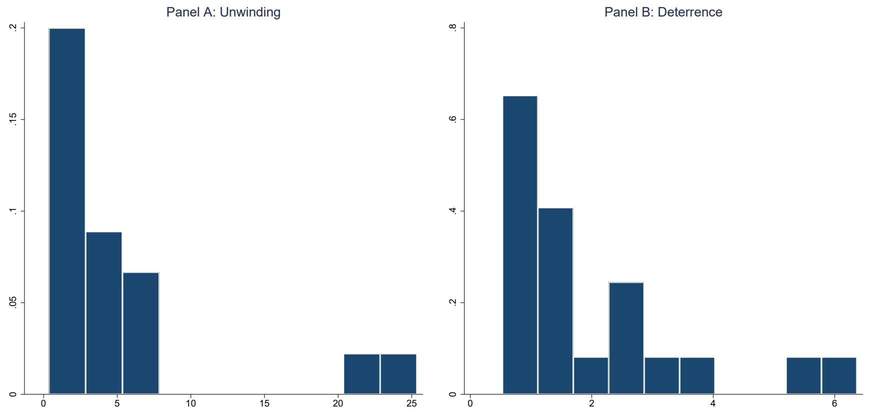
Enforcement [1/2]

- Court orders divestiture of completed add-on acquisitions
- Infeasible in other industries:
  - Parties commonly share information and commingle assets
  - "Unscrambling eggs"
- Comparatively easy in anesthesia:
  - No long-term projects to restart
  - No long-lived brands to reestablish
  - Main effect was to business activities (e.g., pricing)
- Example: USAP divests NH, MetroWest, and/or Guardian

Enforcement [2/2]

- Novel court case $\rightarrow$ agents' beliefs may depend on judgment
- HSR reform may accomplish the same (see, e.g., 6/2023 NPRM)
- FTC consent order requires WCAS "obtain prior approval for any future investments in anesthesia nationwide"
- Sponsor acquired a platform but no add-on in 67 markets
- Exercise:
  - In each of the 67 markets, assign the platform an add-on
  - Choose the target to most closely resemble observed add-ons
  - Assume add-ons will be completed *but for some* policy change

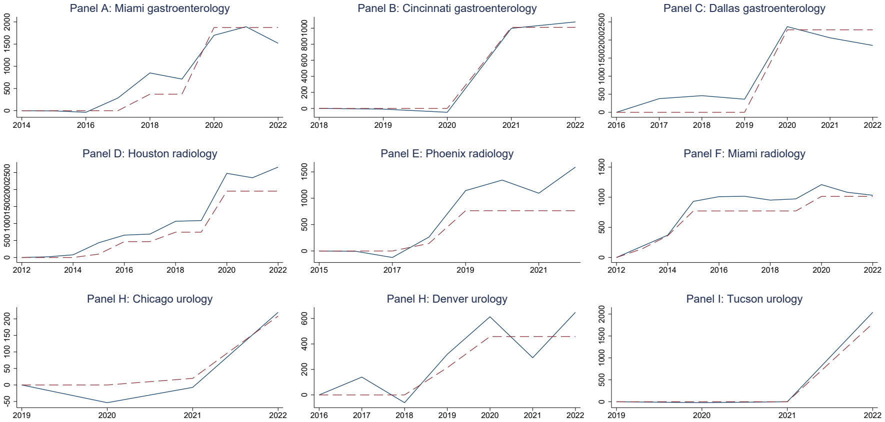
Prices Are Lower Absent Rollups



Bigger damages per market in a smaller number of markets

Larger number of small markets with similar price changes

FROM "ARE PE FUNDS LIABLE FOR ANTICOMP. ACQ'NS?" [2025]



Potential Entry? (1/2)

- High profits often attract rivals that undercut existing prices
- Entry into anesthesia markets is hard:
  - Clinicians are scarce and find it costly to move
- Were it to occur, it would likely arise from adjacent markets:
  - Platforms may have pay-to-stay-away incentives
- Complaint reports that this occurred:
  - In 2014, USAP allegedly paid EmCare $9MM/year not to enter
  - According to one WCAS employee, *"What USAP and Welsh Carson really wanted was 'an agreement [for EmCare] not to compete with us in the DFW market'."*

Potential Entry? (2/2)

	Entrant size (clinicians)				
	8	9	22	35	59
Expenditure changes (in millions):					
Rollup markets	-5.86	-6.57	-15.60	-24.20	-39.98
Donor markets	2.44	2.72	6.20	9.99	17.36
All markets (net effect)	-3.43	-3.85	-9.40	-14.21	-22.62
% reduction by donor markets	41.6%	41.4%	39.7%	41.3%	43.4%

- Simulated entry reduces expenditures in markets with rollups
- But gains are partially offset by increased costs in "donor" markets
- Net effect is smaller than other remedies (40% of savings lost)

Conclusions

- Rollups increasingly shape market structures
- Academics and agency staff should understand their motivations/mechanics
- We find add-ons have economically important consequences
- We do not find any independent effect of sponsors: price changes following platform acquisitions are trivial
- We argue that remedies may affect other markets and *subsequent behavior through deterrence*

Thank You!

Appendix Slides

Backup: Quality Measures

- Two main measures:
  - Unintentional dural puncture (UDP) rates
  - 30-day readmission rates
- Clinicians claim ownership doesn't influence medical decisions

> *"In other domains a loss of control is unlikely—day to day clinical care of individual patients remains the responsibility of the clinicians involved, and a PE investor will not dictate the choice of one medication over another in the operating room."*

- Quantity (of minutes and admissions) also unaffected Details

Return to Main Presentation

Backup: Bargaining Ability

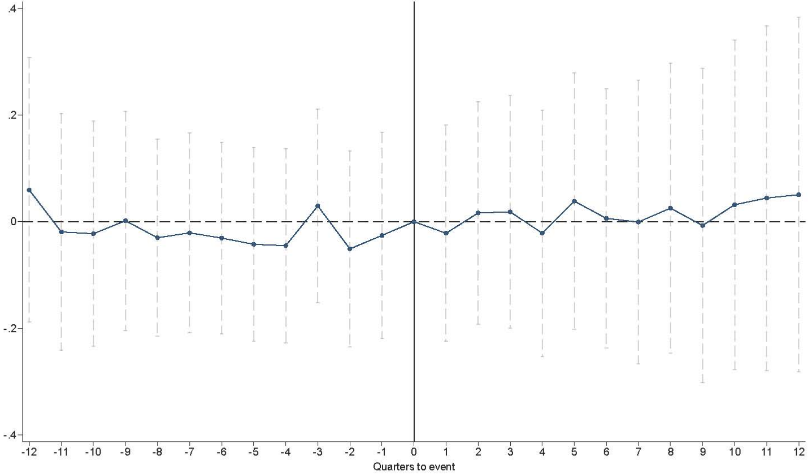
- Court documents distinguish "leverage" (market structure) from "power" (ability)

  > *Practitioners that engage in, influence, or are affected by payor-provider bargaining carefully distinguish "leverage" from "power" (see the District Court's decision in FTC v. ProMedica Health Sys.).*

- Many providers outsource bargaining to specialized services

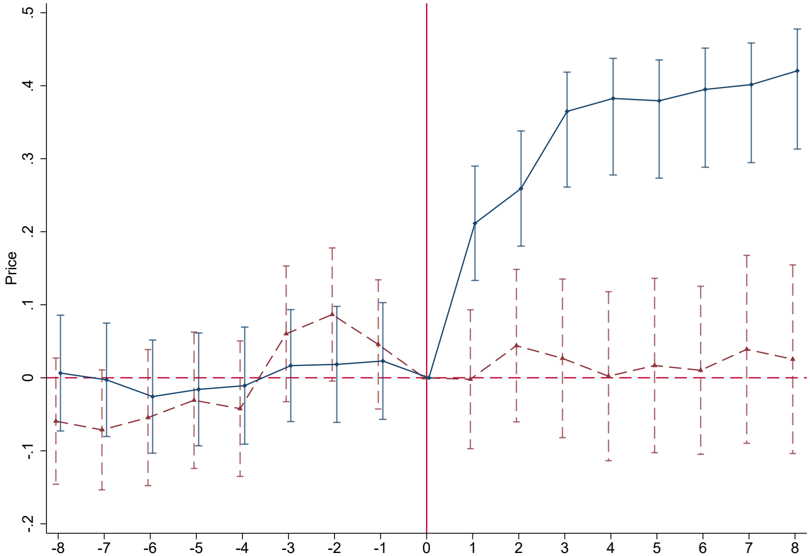
Return to Main Presentation

Backup: Hospital Prices

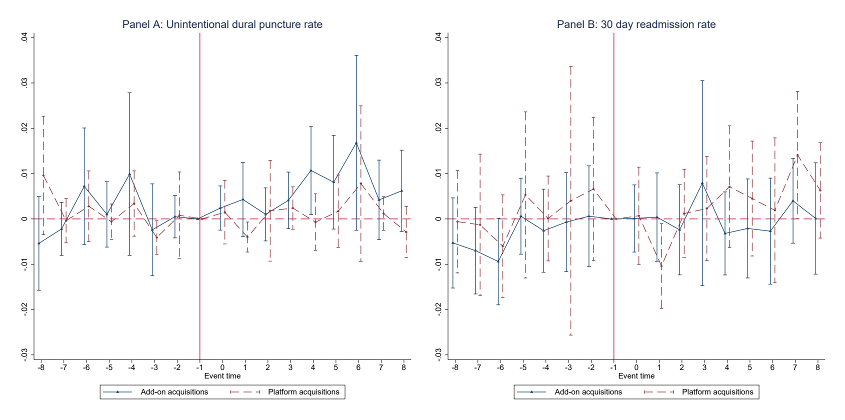


Return to Main Presentation

Backup: Obstetrics Sample

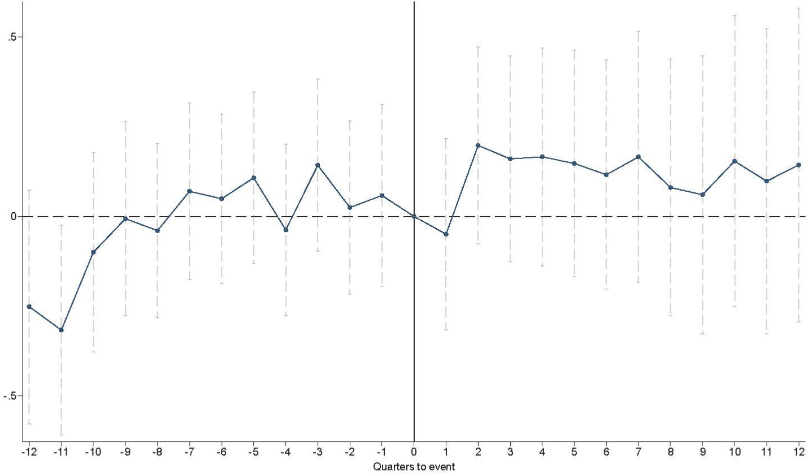


Quality is Unchanged



No significant changes in quality measures following acquisitions

The Quantity of Admissions is Unchanged



No significant changes in admission volume following acquisitions

Implementation Details

Consider a hedonic model of prices:

$$p_{aft} = \alpha_a + \phi_f + \tau_t + \epsilon_{aft}$$

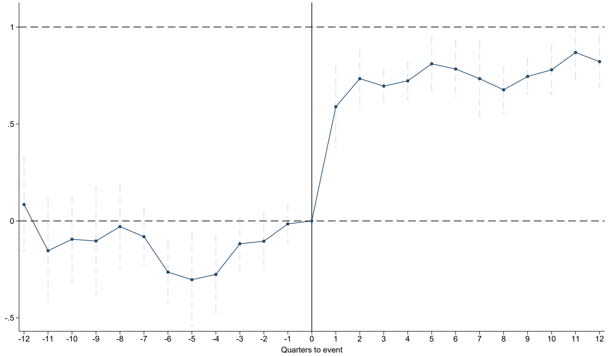
Define the difference in prices as the owner of the clinician's firm changes:

$$\delta_\alpha = \overline{p_{d(a)}} - \overline{p_{o(a)}}$$

Then estimate the following equation:

$$p_{it} = \tilde{\alpha_a} + \mu_{r(i,t)} \hat{\delta_a} + \tau_t + \epsilon_{it}$$

Prices are "Spread Like Peanut Butter"



- We don't observe harmonization (across markets) after platform acquisitions except in a small subset of cases
- This is despite targets adopting the platform's (in-)network status

Back to Implementation

Backup: Formal Utility Model

If h chooses a, it earns:

$$\tilde{U}_{ha} = \sum_{j \in \mathcal{J}} Q_{hj} \left[X_a \beta - \theta (1 - N_{f(a)j}) + \epsilon_{ha} \right]$$

If h selects outside option: $\tilde{U}_{h0} = [\sum_{j \in \mathcal{J}} Q_{hj}] \epsilon_{h0}$

Where:

- Parameters: θ measures disutility from balance billing; β reflects preferences for attributes
- Data: Q_{hj} denotes patient flows; X_a are observable attributes; $1 - N_{f(a)j}$ indicates out-of-network status
- ϵ captures unobservable factors (distributed T1EV)

Return to Demand Overview

Technical Details: Demand-side Moments

Let $\mathbf{Y}_h$ denote $(Y_{1h}, Y_{2h}, ..., Y_{A_{mt}h})$ and obtain:

$$\ell(\beta, \theta; \mathbf{Y}_1, \mathbf{Y}_2, ..., \mathbf{Y}_{H_{mt}}) = \sum_m \sum_t \sum_{h \in \mathcal{H}_{mt}} \sum_{a \in \mathcal{A}_{mt}} \Big[Y_{aht} \left(X_{at}\beta + \overline{N}_{aht}\theta \right) - \log \left(1 + \sum_{a' \in \mathcal{A}_{mt}} e^{X_{a't}\beta + \bar{N}_{a'ht}\theta} \right) \Big]$$

True parameters satisfy $\mathbb{E}[\partial \ell / \partial \beta_k] = 0$ for $k = 0, 1, ..., K$ and $\mathbb{E}[\partial \ell / \partial \theta] = 0$.
To illustrate with β_k, set the following as close as possible to zero:

$$\frac{\widehat{\partial \ell(\cdot)}}{\partial \beta_k} = \frac{1}{MT} \sum_{m,t} \frac{1}{\# \mathcal{H}_{mt}} \sum_{h \in \mathcal{H}_{mt}} \frac{1}{\# \mathcal{A}_{mt}} \sum_{a \in \mathcal{A}_{mt}} x_{kat} \left[Y_{aht} - \frac{e^{X_{at}\beta + \overline{N}_{aht}\theta}}{1 + \sum_{a'} e^{X_{a't}\beta + \overline{N}_{a'ht}\theta}} \right]$$

Technical Details: Supply-side Moments

$$\begin{aligned} p_{mtfj}(\beta, \theta, \mathbf{mc}) &:= \text{model-predicted price} \\ p^o_{mtfj} &:= \text{observed prices} \\ \zeta_{mtaj} &:= \text{measurement error in price} \\ W &:= \text{matrix of market- and time-specific indicator variables} \\ Z &:= \text{matrix of instruments} \end{aligned}$$

Assume $\mathbb{E}[\zeta | W, z] = 0$.

To illustrate with $z \in Z$, set the following as close as possible to zero:

$$z\zeta = \frac{1}{MT} \sum_{m,t} \sum_{j \in \mathcal{J}_{mt}} \sum_{a \in \mathcal{A}_{mt}} z_{mtaj} \left(p_{mtf(a)j}(\beta, \theta, \mathbf{mc}) - p^o_{mtf(a)j} \right)$$

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GMM Objective Function

Define:

$$\Psi = \left[\frac{\partial \ell(\cdot)}{\partial \beta_0}, \frac{\partial \ell(\cdot)}{\partial \beta_1}, ..., \frac{\partial \ell(\cdot)}{\partial \beta_K}, \frac{\partial \ell(\cdot)}{\partial \theta}, z\zeta \right]'$$

and define $\Omega = \Psi'\Psi$.

Choose:

$$\hat{\beta}, \hat{\theta}, \hat{\mu}_m, \hat{\mu}_t = \underset{\beta,\theta,\mu_m,\mu_t}{\operatorname{argmin}} \left\{ \Psi\left(\beta, \theta, \mu_m, \mu_t\right) \Omega^{-1} \Psi\left(\beta, \theta, \mu_m, \mu_t\right)' \right\}$$

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