Transparency and Negotiated Prices: The Value of Information in Hospital-Supplier Bargaining

Matthew Grennan, Ashley Swanson

Presented by: Linh Phan

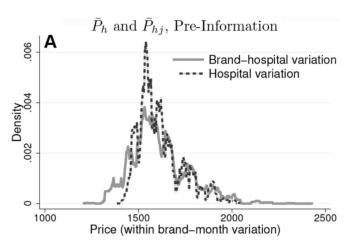


Outline

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- 2. Research Questions
- 3. Preview of findings
- 4. Data
- 5. Econometrics and Identification
- 6. Results
- 7. Threats
- 8. Contributions

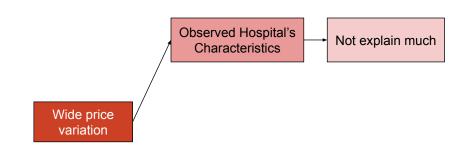


Motivations



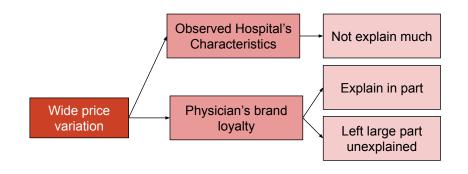
- Substantial variation in prices of hospital supplies
- ightharpoonup High prices on hospital supplies ightarrow High health care costtonoup NY

Motivations - What cause the variation?



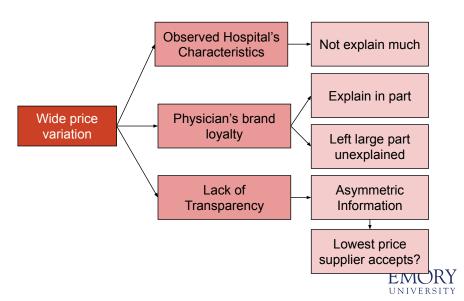


Motivations- What cause the variation?





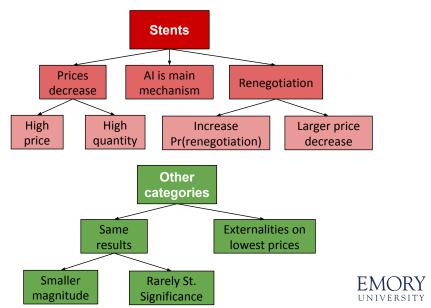
Motivations- What cause the variation?



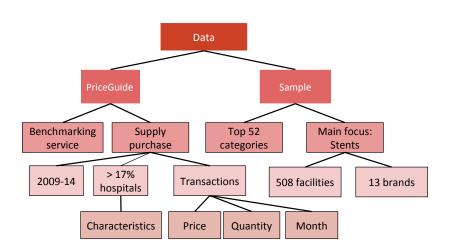
Research Questions

- 1. Does transparency in the form of benchmarking information on prices can affect prices of hospital supplies?
- 2. How this effect different between different hospitals?
- 3. How does transparency affect prices?

Preview of findings

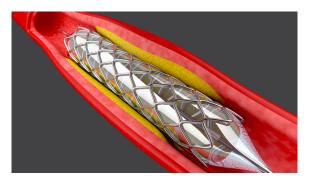


Data





Coronary Stent



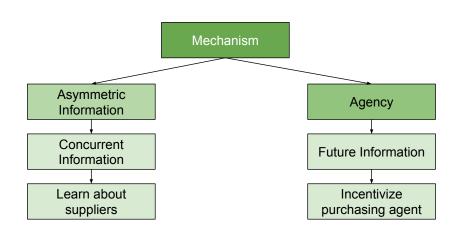
- ▶ a tube-shaped device placed in the coronary arteries that supply blood to the heart
- \blacktriangleright used in more than 90% of percutaneous coronary intervention procedures



PriceGuide

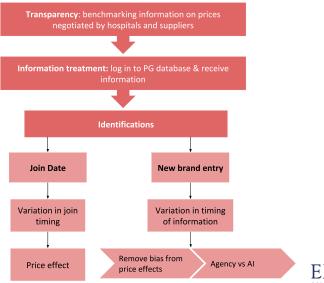
- Hospitals voluntarily joined this subscription service to benchmark their own prices and quantities against those of other hospitals
- New members submit retrospective data and continue to submit monthly data thereafter

Theoretical highlight



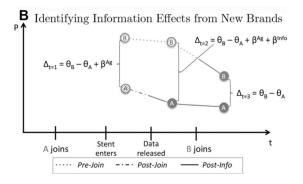


Identification of Information Treatment Effects



Identification of Information Treatment Effects

New brand entry to identify information effect

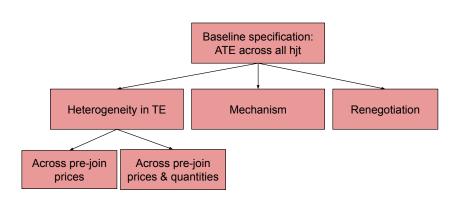


- ightharpoonup t=1: A is treated, B is untreated, no data on stent
- ightharpoonup t=2: A is treated, B is untreated with data on stent
- ightharpoonup t=3: A is treated, B is treated with data on stent





Econometrics





Econometrics

Baseline specification

$$P_{hjt} = \beta^{Info} \times \mathbf{1}_{\{post_{hjt}\}} + \theta_{hj} + \theta_t + \gamma_j \times (t - t_{min_j}) + \varepsilon_{hjt}$$
 (1)

 P_{hjt} : price observed for hospital h, brand j, and month t θ_{hj} : hospital-brand fixed effects θ_t :month fixed effects $\gamma_j \times \left(t-t_{min_j}\right)$:linear time trends t_{min_j} : first period data for brand j is observed

$$\mathbf{1}_{\{post_{hjt}\}} = \begin{cases} 1 & \text{after } h \text{ first accesses for brand } j \text{ in month } t \\ 0 & \text{before that} \end{cases}$$





- ▶ Effects of Information throughout the Price Distribution
 - Classify hospital-brand into quintile k of the prejoin price distribution
 - \blacktriangleright Estimate TE (β_k^{Info}) from the baseline specification for each quintile
 - Event studies for each quintile

- ▶ Effects of Information throughout the Price Distribution
 - Classify hospital-brand into quintile k of the prejoin price distribution
 - Estimate TE (β_k^{Info}) from the baseline specification for each quintile
 - Event studies for each quintile
- Treatment Effect and Quantity
 - Divide sample into hospital-brand with monthly volume below and above the 75th percentile (1 month before joining).
 - $\beta_{k,low^q}^{Info}(\beta_{k,high^q}^{Info})$: TE for quintile k for lower(higher)-volume brands.



Mechanism

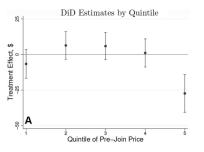
- $\begin{array}{l} \boldsymbol{\beta}_k^{Ag} \colon \text{interacting the price quintile k treatment effect with} \\ \boldsymbol{1}_{\{post_{ht}^{join}\}} \\ \text{where:} \ \boldsymbol{1}_{\{post_{ht}^{join}\}} = 1 \ \text{if} \ h \ \text{join the database in month} \ t. \end{array}$
- eta^{Info}_k : Further interaction with $\mathbf{1}_{\{(t-t_{min_j})>6\}}$ where $\mathbf{1}_{\{(t-t_{min_j})>6\}}=1$ if h first log-in more than 6 months after new brand entered.

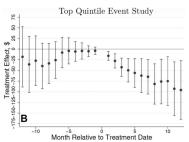
Mechanism

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- Renegotiation sample:
 - ▶ Dependent variables: $\mathbf{1}_{reneg_{hjt}}$: Effect of information on rate of renegotiation
 - ► Sample of renegotiation occurred: Effect of Information condition on Renegotiation



Results - Effect across price quintiles





- ▶ Price drops significantly for top pre-join price quantile
- ► Event studies confirm the DD estimation on top quintile and exogeneity of join timing w.r.t price trends



Across price quintiles: Quantities/Mechanisms/Renegotiation

Treatment	FEFFORE OF	INFORMATION:	MEGITANTENIC

		Treat	MENT EFF	ECTS OF IN	FORMATIO	ON: MECI	HANISMS	8	
$P_{ m quintile}$				$P_{ m quintile}$					
1	2	3	4	5	1	2	3	4	5
		A. Tre	atment-E	ffect Variati	on with	Quantity	Purcha	sed	
Low Quantity: $oldsymbol{eta}_{ ext{quintile,low}^f}^{ ext{Info}}$				High Quantity: $eta_{ ext{quintile,high}^f}^{ ext{Info}}$					
-4	9	9	5	-17**	-11	0	0	-9	-71***
(6)	(6)	(6)	(6)	(7)	(9)	(8)	(7)	(8)	(13)
			В. А	gency versu	s AI Med	hanisms			
	Future Information: $oldsymbol{eta}_{ ext{quintile}}^{ ext{Ag}}$				Concurrent Information: $eta_{ ext{quintile}}^{ ext{info}}$				
-17	-3	2	7	13	-1	7	5	-1	-30***
(11)	(12)	(10)	(12)	(18)	(6)	(5)	(5)	(5)	(7)
				C. Rene	gotiation	1			
Pr Renegotiation: $1(\{\text{reneg}_{hjt}\})$				Upon Renegotiation: $eta_{ ext{quintile},1_{(nenego,i)}}^{ ext{Info}}$					
.01	.013	.016*	.018	.023**	-14	4	1	-13	-76***
(.01)	(.01)	(.009)	(.011)	(.009)	(15)	(14)	(19)	(17)	(18)

Results - Other categories

Spending-Weighted Averages of Estimated Treatment Effects (TEs)

		TE BY PRICE QUINTILE (ALL QUANTITIES)		TE BY PRICE QUINTILE (LOW QUANTITY)		TE BY PRICE QUINTILE (HIGH QUANTITY)		EXPECTED SAVINGS	
	ATE	1	5	1	5	1	5	μ (\$/h-year)	σ (\$/h-year)
Commodities (1)	.002	.013*	013***	.021	012**	.005	016**	63	2,828
	(.004)	(.008)	(.005)	(.016)	(.006)	(.008)	(.008)	(306)	(1,028)
Other medical/surgical (2)	003	.003	017***	.004	021***	.002	006	-254	1,974
	(.002)	(.003)	(.004)	(.004)	(.005)	(.004)	(.005)	(428)	(279)
PPIs (3)	005***	.014***	033***	.014***	033***	.014***	039***	-1,869	5,492
	(.002)	(.003)	(.004)	(.003)	(.004)	(.005)	(.005)	(1,281)	(893)

Note.—Authors' calculations from PriceGuide data, 2009–14. $N_{bl}^{(i)} = 516,582$; $N_{bl}^{(i)} = 1,344,515$; $N_{bl}^{(i)} = 703,544$; $N_{b}^{(i)} = 748$; $N_{bl}^{(i)} = 701$; $N_{bl}^{(i)} = 601$; superscripts (1)—(3) refer to the three product classes in the first column. Reported specifications include hospital-brand and brand-year fixed effects; alternative fixed effects are shown in the appendix. Standard errors in the category-specific regressions, clustered at the hospital-brand level, are shown in parentheses.

- ▶ Top price quintile: Same prediction with stents but smaller magnitude.
- ► Bottom price quintile: Externalities of benchmarking information (prices increase)



Threats

- Representative of sample
- No explanation for the effect in different price quintiles
- Not fully capture the supply-side response
- Agents can learn over time so that the effect of benchmarking information will be bias toward zero

Contributions

First empirical study on the impact of transparency on price negotiation in B2B market:

- ► Contributing to existing literature on B2B bargaining by extending the understanding of transparency to B2B setting
- Lay the foundation future research