Insurer Competition in Health Care Markets

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November 16, 2022

Motivation

Reduced insurer competition has unknown impacts on welfare, negotiated provider prices, and premiums.

- Strengthen insurers' bargaining power
- Increase premiums
- Increase payments to hospitals

Impact of changes in competition can vary across markets and across providers in the same market.

Research Question

How do market structure changes impact equilibrium outcomes in health care markets?

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How do market structure changes impact equilibrium outcomes in health care markets?

- Analyze four key components of the health care market in California
  - Insurer-hospital bargaining over negotiated provider prices
  - Insurer-employer bargaining over premiums
  - Household demand for insurers
  - Individual demand for hospitals
- Conduct simulations varying the set of insurers available

Contribution

- Identify and quantify how insurer competition affects negotiated prices
  - Increase in insurers' market power $\Rightarrow$ Upward pressure on negotiated prices
  - Increase in insurers' bargaining power may offset those effects
- Understand how market structure affects outcomes
  - Estimate model of insurer competition for households
  - Incorporate employer bargaining over premiums with insurers

Main Results Preview

Empirical Estimates

- Households prefer insurance plans with higher network expected utility.
- Insurers and employers have approximately equal bargaining weights during premium negotiations.
- The largest determinants of hospital price levels are the price reinforcement effect and the premium and enrollment effects.

Counterfactuals

- Removing an insurer does not necessarily increase health care costs.
- Consumers are harmed when an insurer is removed.

Literature Review

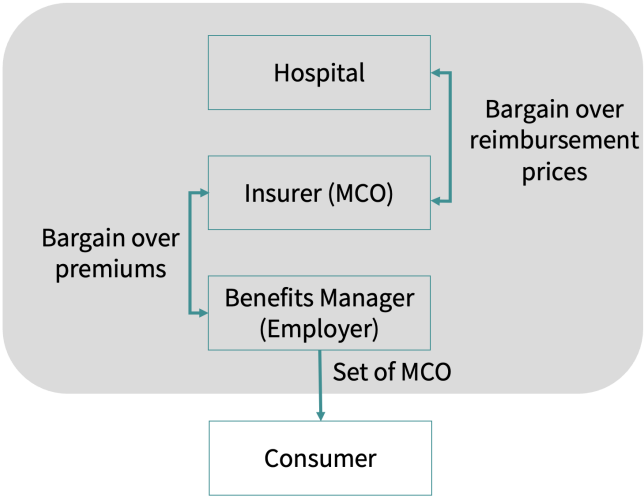
Using a regression framework, previous literature looked at the relationship between market concentration and medical provider prices.

Multiple papers find that increased competition leads to higher premiums when premium setting constraints are absent.

Only two previous papers estimate and computers counterfactual negotiated input prices in a bargaining model of bilateral oligopoly with competing upstream and downstream firms.

- Crawford and Yurukoglu (2012) and Crawford, Lee, Whinston, and Yurukoglu (2015)
- Papers focused on the cable television industry.

Health Care Market



Timing

1. The employer and the set of insurers bargain over premiums $\phi = \phi_j$ where ϕ_j represents the per-household premium charged by insurer j.

1. All insurers and hospitals in network G bargain to determine hospital prices $p = p_{ij}$ where p_{ij} is the price paid to hospital i by insurer j for treating one of j's patients.

2. Given hospital networks and premiums, employer offers a set of insurers for households to choose from. Households choose to enroll in an insurer, determining household demand for insurer j, denoted by $D_j(G, \phi)$.

3. After enrolling in a plan, each individual becomes sick with some probability and visit the hospital in their network, which determines $D_{ij}^H(G, \phi)$, the number of individuals who visit each hospital i through each insurer j.

Data

Enrollment, claims, and admissions information from California in 2004

- Benefit Manager: California Public Employees' Retirement System (CalPERS)
- Insurers: Blue Shield, Blue Cross, and Kaiser
- Consumer: California public and state employees, retirees, and their families

Additional data sets:

1. Hospital characteristics from AHA survey
2. Hospital costs from OSHPD Hospital Annual Financial Data
3. Demographic information from 2000 Census
4. Medical loss ratios from California Department of Managed Health Care

Subscripts

- j: insurer
  1. Blue Cross (BC)
  2. Blue Shield (BS)
  3. Kaiser (K)
- m: market
  - 14 HSAs in California
- f: family
  1. Single
  2. 2-Party
  3. Family
- i: hospital
- κ: "type" (age-sex category)
- k: individual
- l: diagnosis
  1. Cardiac
  2. Cancer
  3. Neurological
  4. Digestive
  5. Labor
  6. Other

Individual Demand for Hospitals

$$u^H_{k,i,l,m} = \delta_i + z_i v_{k,l} \beta^z + d_{i,k} \beta^d_m + \epsilon^H_{k,i,l,m}$$

- δ_i : hospital fixed effects
- z_i : observed hospital characteristics
- $v_{k,l}$: characteristics of the consumer
- $d_{i,k}$: distance between hospital i and individual k's zip code of residence
- $\epsilon^H_{k,i,l,m}$: idiosyncratic error term assumed to be iid Type 1 extreme value

Willingness to Pay

Consumer's Ex Ante Expected Utility for an Insurer's Hospital Network

$$WTP_{k,j,m}(G_{j,m}) = \gamma^{a}_{\kappa(k)} \sum_{l \in L} \gamma_{\kappa(k),l} EU_{k,j,l,m}(G_{j,m})$$

Weighted sum across diagnoses of expected utility of a hospital network conditional on a given diagnosis, scaled by the probability of admission to any hospital

Household Demand for Insurance Plans

$$u^{M}_{f,j,m} = \delta_{j,m} + \alpha^{\phi}_{f}\left(0.2\phi_{j}\Phi_{\lambda(f)}\right) + \sum_{\forall k} \alpha^{W}_{\kappa} \sum_{k \in f:\kappa(k)=\kappa} WTP_{k,j,m} + \epsilon^{H}_{f,j,m}$$

- $\delta_{j,m}$: insurer fixed effects
- ϕ_{j} : single household premium
- $\lambda(f)$: family type
- Φ : premium multipliers for family type
- α_{κ} : age-sex category specific coefficient
- $\epsilon^{H}_{f,j,m}$: idiosyncratic error term assumed to be iid Type 1 extreme value

Identification

Individual Preferences for Hospitals

- Variation in hospital choice sets across markets
- Differences in choice probabilities for hospitals with particular characteristics
  - Within diagnosis categories
  - Across diagnosis categories
- Assumption: unobservable hospital preference shocks are uncorrelated with observable hospital characteristics

Household Preferences for Insurance Plans

- Variation in households' WTP for an insurer's network
  - Geographic variation within-market across zip codes
  - Variation in probabilities of experiencing different diagnoses
- Assumption: premium sensitivity does not vary across family types, controlling for income

Own-Premium Elasticities

	Single	2-Party	Family
BS	-1.23	-2.15	-2.53
BC	-1.62	-2.50	-2.95
Kaiser	-1.23	-2.12	-2.53

Table 1: Insurance Plan Household Price Elasticities Estimates

The lower the absolute value of own-premium elasticity, the less likely they are switch plans with an increase in premiums.

Insurer Premiums Bargaining

$$\omega_j^1(\boldsymbol{\theta}) = \tau^{\phi} \times \frac{\partial \pi_j^M}{\partial \phi_j} - \left(1 - \tau^{\phi}\right) \times \left(\frac{\pi_j^M \times \left(\Phi' \hat{\boldsymbol{D}}_j(\cdot) + 0.8 \sum_{k \in \mathcal{M}} \phi_k \Phi' \frac{\partial \hat{\boldsymbol{D}}_k(\cdot)}{\partial \phi_j} \right)}{GFT_j^E(\cdot)} \right) \forall j$$

$$\frac{\partial \pi_j^M(\cdot)}{\partial \phi_j} = \Phi \times \hat{\boldsymbol{D}}_j(\cdot) + \phi_j \left(\Phi' \frac{\partial \hat{\boldsymbol{D}}_j(\cdot)}{\partial \phi_j} \right) - \frac{\partial \hat{D}_j^E(\cdot)}{\partial \phi_j} \eta_j - \sum_{h \in \mathcal{S}_j^H} \frac{\partial \hat{D}_{h,j}^H(\cdot)}{\partial \phi_j} \hat{p}_{h,j}$$

- Negotiates only a single household premium ϕ_j with the employer
- GFT, the employer's gains from trade with insurer j, is derived from household-insurer utility function
- ω_j^1 is mean zero by construction
- Engage in Nash-Bertrand premium competition when $\tau^{\phi} = 1$
- Use a constant and the number of hospital systems in the network of each insurer as instruments

Hospital-Insurer Bargaining

$$\omega^3_{S,j}(\boldsymbol{\theta}) = \sum_{i\in\mathcal{S}} \hat{p}_{ij}\hat{D}^H_{ij} - (1-\tau_j)\underbrace{\left[\phi_j \Phi'\left[\Delta_{S,j}\hat{\boldsymbol{D}}_j\right] - \sum_{h\in\mathcal{G}^M_j\setminus\mathcal{S}} \hat{p}_{h,j}\left[\Delta_{S,j}\hat{D}^H_{h,j}\right]\right]}_{\hat{z}^3_{1:S,j}}$$

$$+ (1-\tau_j)\,\eta_j \underbrace{\left[\Delta_{S,j}\hat{D}^E_j\right]}_{z^3_{2,S,j}}$$

$$- \tau_j\underbrace{\left[c_{i\in\mathcal{S}} c_i \hat{D}^H_{i,j} - \sum_{i\in\mathcal{S}}\sum_{n\in\mathcal{G}^H_S, n\neq j}\left[\Delta_{\mathcal{S},j}\hat{D}^H_{i,n}\right](\hat{p}_{i,n}-c_i)\right]}_{\hat{z}^3_{3,S,j}} \quad \forall \mathcal{S}\in\mathcal{S},$$

Bargaining Estimates

ESTIMATES: INSURER MARGINAL COSTS AND NASH BARGAINING PARAMETERS[a]

		(i)	(ii)
Insurer Non-Inpatient	η_{BS}	925.78	1691.50
Marginal Costs		11.12	10.41
(per individual)	η_{BC}	1417.73	1948.61
		6.93	8.14
	η_K	1496.44	2535.14
		–	0.62
Nash Bargaining	τ_{BS}	0.33	0.31
Parameters		0.01	0.05
	τ_{BC}	0.40	0.38
		0.02	0.03
	τ^{ϕ}	1.00	0.47
		–	0.00
Use Margin Moments		N	Y
Number of Bilateral Pairs		268	268

[a]2-step GMM estimates of marginal costs for each insurer (which do not include hospital payments for BS and BC), Nash bargaining parameters, and elasticity scaling parameter. When "margin moments" are not used, we set $\tau^{\phi} = 1.00$, and Kaiser marginal costs are directly obtained from (12) by setting $\omega^{\perp}_{\text{Kaiser}} = 0$. Standard errors are computed using 80 bootstrap samples of admissions within each hospital-insurer pair to re-estimate hospital-insurer DRG weighted admission prices and re-estimating these parameters.

Price Decomposition

	Price	Premium and Enrollment	Price Reinforcement	Hospital Costs	Recapture Effect
BS	7191.11	24.2% [23.6%, 25.5%]	66.3% [64.9%, 69.3%]	8.9% [5.1%, 10.6%]	0.6% [0.4%, 0.5%]
BC	6023.86	32.3% [31.8%, 33.7%]	52.6% [51.8%, 55.1%]	12.1% [9.2%, 13.1%]	3.0% [2.3%, 3.3%]

Table 2: Negotiated Hospital Price Decomposition Estimates

The largest determinants of hospital price levels are the price reinforcement effect and the premium and enrollment effects.

Counterfactuals

REMOVING AN INSURER: SUMMARY RESULTS[a]

		Baseline	(i) Remove Kaiser		(ii) Remove BC	
		Amount	Amount	% Change	Amount	% Change
Premiums (per year)	BS	3.78 [3.76, 3.79]	4.41 [4.36, 4.43]	16.6% [15.8%, 16.8%]	3.65 [3.62, 3.66]	−3.4% [− 4.0%, −3.3%]
	BC	4.19 [4.18, 4.20]	4.80 [4.75, 4.81]	14.4% [13.7%, 14.6%]	–	–
	Kaiser	3.67 [3.66, 3.67]	–	–	3.62 [3.60, 3.62]	−1.4% [− 1.6%, −1.3%]
Household Enrollment	BS	73.91 [73.65, 74.34]	124.16 [124.13, 124.25]	68.0% [67.1%, 68.6%]	87.73 [87.44, 88.51]	18.7% [18.4%, 19.3%]
	BC	27.49 [27.49, 27.50]	38.56 [38.47, 38.59]	40.2% [39.9%, 40.4%]	–	–
	Kaiser	61.31 [60.88, 61.58]	–	–	64.99 [64.21, 65.27]	6.0% [5.2%, 6.3%]
Hospital Payments (per individual)	BS	0.66 [0.65, 0.68]	0.66 [0.64, 0.68]	0.5% [− 3.1%, 1.7%]	0.60 [0.57, 0.62]	−8.5% [− 12.7%, −7.5%]
	BC	0.56 [0.55, 0.58]	0.68 [0.67, 0.72]	21.2% [20.0%, 24.8%]	–	–
Hospital Prices (per admission)	BS	7.19 [7.06, 7.35]	7.23 [6.92, 7.43]	0.6% [− 3.1%, 1.8%]	6.55 [6.19, 6.74]	−8.9% [− 13.3%, −7.7%]
	BC	6.02 [6.04, 6.40]	7.29 [7.14, 7.64]	21.0% [19.8%, 24.6%]	–	–
Surplus (per individual)	Insurer	0.44 [0.44, 0.44]	0.99 [0.99, 0.99]	125.9% [124.6%, 126.6%]	0.38 [0.38, 0.39]	−13.3% [− 13.8%, −11.7%]
	Hospitals (Non-K)	0.30 [0.29, 0.31]	0.51 [0.49, 0.52]	69.7% [63.0%, 72.3%]	0.27 [0.26, 0.28]	−9.0% [− 13.8%, −7.6%]
	Δ Cons.	–	−0.19 [− 0.19, −0.18]	–	−0.01 [− 0.01, −0.01]	–

[a]Results from simulating removal of Blue Cross or Kaiser from all markets using estimates from specification (iv) in Table V. All figures are in thousands. Baseline numbers (including premiums, hospital prices, and enrollment) are recomputed from model estimates. Average insurer payments to hospitals and average DRG-adjusted hospital prices are weighted by the number of admissions each hospital receives from each insurer under each scenario. Surplus figures represent total insurer, hospital, and changes to consumer surplus per insured individual. 95% confidence intervals, reported below estimates, are constructed by using 80 bootstrap samples of admissions within each hospital-insurer pair to re-estimate hospital-insurer DRG weighted admission prices, re-estimate insurer marginal costs and Nash bargaining parameters, and re-compute counterfactual simulations.

Counterfactuals

REMOVING AN INSURER: COUNTERFACTUAL BLUE SHIELD AND BLUE CROSS HOSPITAL PRICE CHANGES ACROSS MARKETS[a]

	Avg. Hospital Price ($/Admission)					Decomposition of Change ($/Admission)				
		Fix Premiums		Adjust Premiums		(ia) Prem Effect	(ib) Enroll Effect	(ii) Price Reinforce	(iii) Cost Effect	(iv) Re-Capture
	Baseline	CF	% Change	CF	% Change					
(ia) REMOVE KAISER: BS PRICES										
All Mkts	7191.13	6451.01	−10.29%	7175.65	−0.22%	624.97	−1149.39	473.70	0.65	34.59
2. Sacramento	8204.98	7318.75	−10.80%	7751.96	−5.52%	605.39	−1572.02	491.33	1.83	20.45
4. SF Bay W.	8825.62	7994.95	−9.41%	8589.65	−2.67%	616.37	−1439.98	533.81	−0.86	54.69
5. E. Bay	7368.50	5967.77	−19.01%	6537.55	−11.28%	717.37	−1820.40	229.04	0.15	42.89
9. C. Valley	6591.73	6369.72	−3.37%	7329.03	11.19%	556.42	−550.32	681.83	0.00	49.36
10. S. Barbara	7934.89	7779.92	−1.95%	8709.83	9.77%	402.15	−187.53	533.88	2.55	23.90
11. LA	5878.37	4829.25	−17.85%	5661.03	−3.70%	662.05	−1163.77	258.83	0.43	25.12
14. SD	6673.04	6038.49	−9.51%	6634.70	−0.57%	472.14	−908.62	380.01	−0.04	18.16
(ib) REMOVE KAISER: BC PRICES										
All Mkts	6023.83	5988.53	−0.59%	7219.85	19.85%	671.85	−130.41	580.01	0.24	74.33
2. Sacramento	6651.31	6703.09	0.78%	8186.10	23.08%	839.58	−137.89	728.48	2.05	102.58
4. SF Bay W.	7602.06	7734.73	1.75%	9189.30	20.88%	836.40	−157.26	747.50	−0.70	161.29
5. E. Bay	7158.45	7150.76	−0.11%	8570.60	19.73%	835.46	−220.00	684.32	0.18	112.19
9. C. Valley	5210.75	5215.51	0.09%	6763.68	29.80%	875.55	−134.94	700.05	0.00	112.27
10. S. Barbara	5130.74	5094.60	−0.70%	6395.60	24.65%	699.55	−84.34	599.56	2.52	47.55
11. LA	6084.19	5803.18	−4.62%	6960.25	14.40%	687.32	−386.22	540.62	0.21	34.12
14. SD	5381.70	5482.36	1.87%	6841.04	27.12%	807.95	−143.63	719.75	−0.02	75.29
(ii) REMOVE BLUE CROSS: BS PRICES										
All Mkts	7191.13	6898.64	−4.07%	6620.28	−7.94%	−129.81	−247.77	−167.38	0.01	−25.89
2. Sacramento	8204.98	8098.96	−1.29%	7799.41	−4.94%	−125.74	−131.81	−134.28	−0.02	−13.72
4. SF Bay W.	8825.62	8643.19	−2.07%	8370.57	−5.16%	−128.03	−195.86	−95.34	0.10	−36.12
5. E. Bay	7368.50	7252.44	−1.58%	6913.99	−6.17%	−149.00	−113.83	−170.56	0.00	−21.11
9. C. Valley	6591.73	5945.62	−9.80%	5781.16	−12.30%	−115.57	−485.97	−152.72	−0.02	−56.29
10. S. Barbara	7934.89	7248.92	−8.65%	7170.32	−9.64%	−83.53	−610.90	−17.78	−0.28	−52.08
11. LA	5878.37	5623.27	−4.34%	5304.90	−9.76%	−137.51	−216.72	−200.27	−0.02	−18.94
14. SD	6673.04	6373.32	−4.49%	6161.37	−7.67%	−98.07	−239.34	−160.35	0.00	−13.91

[a]Average (DRG-adjusted) hospital prices for Blue Shield from simulating the removal of Blue Cross or Kaiser across all HSAs, or within a selected sample of HSAs, using estimates from specification (iv) in Table V. Baseline numbers are recomputed from model estimates. Average hospital prices are weighted by the number of admissions each hospital receives from each insurer under each scenario. Decomposition effects correspond to terms in equation (A.4), and are weighted by the number of admissions under the baseline scenario; their sum equals the predicted overall change in hospital prices.

Counterfactuals

REMOVING AN INSURER: SUMMARY RESULTS (NASH–BERTRAND PREMIUM SETTING)[a]

		Baseline	(iii) Remove BC (Nash-Bertrand)	
		Amount	Amount	% Change
Premiums (per year)	BS	3.78 [3.76, 3.79]	4.20 [4.17, 4.22]	11.0% [10.8%, 11.3%]
	BC	4.19 [4.18, 4.21]	–	–
	Kaiser	3.67 [3.66, 3.67]	3.98 [3.97, 4.00]	8.7% [8.4%, 8.9%]
Household Enrollment	BS	73.91 [73.53, 74.56]	82.99 [82.71, 83.39]	12.3% [11.8%, 12.5%]
	BC	27.49 [27.06, 27.77]	–	–
	Kaiser	61.31 [61.10, 61.44]	71.13 [70.78, 71.38]	16.0% [15.8%, 16.2%]
Hospital Payments (per individual)	BS	0.66 [0.65, 0.68]	0.66 [0.65, 0.67]	−0.4% [− 0.7%, −0.1%]
	BC	0.56 [0.55, 0.58]	–	–
Hospital Prices (per admission)	BS	7.19 [7.06, 7.36]	7.11 [6.96, 7.29]	−1.1% [− 1.5%, −0.8%]
	BC	6.02 [6.03, 6.40]	–	–
Surplus (per individual)	Insurer	1.27 [1.27, 1.27]	1.57 [1.57, 1.58]	24.1% [23.4%, 24.7%]
	Hospitals (Non-K)	0.30 [0.29, 0.31]	0.29 [0.28, 0.30]	−2.8% [− 3.9%, −1.9%]
	Δ Cons.	–	−0.09 [− 0.09, −0.08]	–

[a]Results from simulating removal of Blue Cross or Kaiser, using estimates from specification (i) in Table V (without insurer margin moments) and assuming Nash–Bertrand premium setting. All figures are in thousands. Baseline numbers are recomputed from model estimates. Average insurer payments to hospitals and average (DRG-adjusted) hospital prices are weighted by the number of admissions each hospital receives from each insurer under each scenario. Surplus figures represent total insurer, hospital, and changes to consumer surplus per insured individual. 95% confidence intervals, reported below estimates, are constructed by using 80 bootstrap samples of admissions within each hospital-insurer pair to re-estimate hospital-insurer DRG weighted admission prices, re-estimate insurer marginal costs and Nash bargaining parameters, and re-compute counterfactual simulations.

Conclusion

Empirical Estimates

- Households prefer insurance plans with higher network expected utility.
- Insurers and employers have approximately equal bargaining weights during premium negotiations.
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