Public Procurement vs. Regulated Competition in Selection Markets

José Ignacio Cuesta
Stanford University, NBER

Pietro Tebaldi
Columbia University, NBER

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How to organize selection markets?

- Adverse selection threatens market efficiency (Akerlof, 1970; Rothschild and Stiglitz, 1976)
  - Regulatory responses: risk adjustment, reinsurance, quality standards, mandates, subsidies
  - In practice: regulated competition, with multiple firms competing under a regulator's oversight
  - Preserving choice is valuable for consumers, yet it keeps cream-skimming incentives in place

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- Why not consider competition *for the market* (Demsetz, 1968; Diamond, 1992)?
  - Public procurement approach: competitive bidding to award contract to winning firm
  - Limited attention for selection markets, despite natural monopoly structure (Kong et al., 2024)
  - Used in practice: Medicaid, Chilean pensions, employer-sponsored insurance, 401k

This paper

1. Framework:
   - Regulated competition: Differentiated firms competing in prices and quality
   - Public procurement: Regulator sets scoring rule, firms bid, choice set is restricted to winning firm

   $\longrightarrow$ Procurement lowers variety, impacts price and quality competition, limits cream skimming

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2. Application to government-sponsored health insurance:
   - Open issue since at least Diamond–Enthoven in the early 1990s, implemented for Medicaid MCOs
   - Managed competition: California ACA marketplace, rich micro data on choices and plan networks
   - Public procurement: Counterfactual second-score scoring auctions (Asker and Cantillon, 2010)

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- Main findings:
  - Procurement rewarding quality outperforms regulated competition (in our setting)
  - Larger gains in markets with fewer insurers, higher HHI, more severe adverse selection

Outline

1. Stylized framework
2. Setting and data
3. Demand and cost model
4. Public procurement vs. Regulated competition
5. Discussion

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Stylized framework

- Environment:
  - Individuals i, and J contracts
  - Each firm j offers a contract with quality δ_j and price p_j
  - Indirect utility and cost under contract j are:

$$
\begin{aligned}
U_{ij} &= -\alpha_i p_j + \beta_i \delta_j + \epsilon_{ij} \\
C_{ij} &= \kappa_j(\delta_j)(1 + \rho\beta_i)
\end{aligned}
$$

where (i) quality is costly to provide if $\kappa_j' > 0$, and (ii) there is adverse selection if $\rho > 0$

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    where (i) quality is costly to provide if $\kappa_j' > 0$, and (ii) there is adverse selection if $\rho > 0$

- Under regulated competition, plans simultaneously set prices and quality to maximize profits:

$$\max_{p_j, \delta_j} \Pi_j^o(\delta_j, p_j; \boldsymbol{\delta}_{-j}, \boldsymbol{p}_{-j}) = \int \sigma_j(\delta_j, p_j; \boldsymbol{\delta}_{-j}, \boldsymbol{p}_{-j}, \beta_i)(p_j - C_j(\beta_i))dF(\beta_i)$$

  where selection leads to inefficiently low quantity, calls for regulation (e.g., risk adj, subsidies)

Stylized framework: Procurement using second-score scoring auctions

- Regulator sets a quasi-linear scoring rule in an SSSA (Asker and Cantillon, 2008)

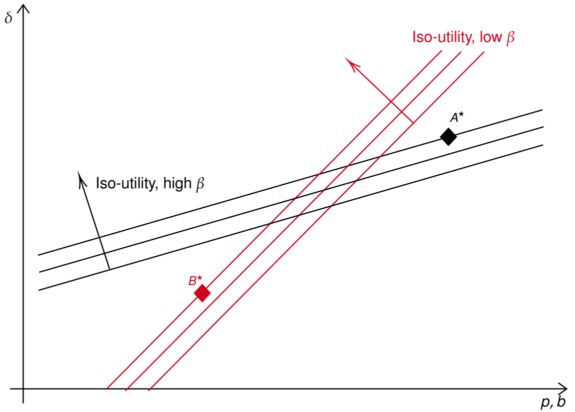
$$\Psi(\delta, b) = \psi(\delta) - b, \quad \psi' > 0$$

- Each firm j submits quality-rate pair (δ_j, b_j), highest score wins right to supply the market, j^w
- Winner offers (δ^a, p^a) such that it delivers at least the second-highest score, solves:

$$\max_{\delta,p} \Pi^a_{j^w}(\delta, p) \quad \text{s.t.} \quad \psi(\delta) - p \geq \max_{k \neq j^w} \psi(\delta_k) - b_k$$

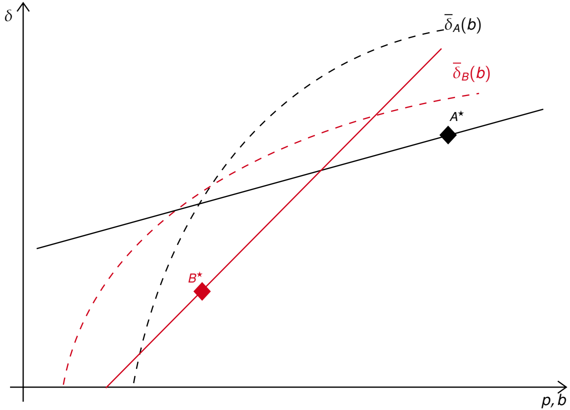
- Why SSSAs? Strategically simple in terms of bidding and analysis
  - Weakly dominant to submit a bid (δ_j, b_j) that maximizes the score subject to breaking even

Stylized framework: Preferences and oligopoly equilibrium



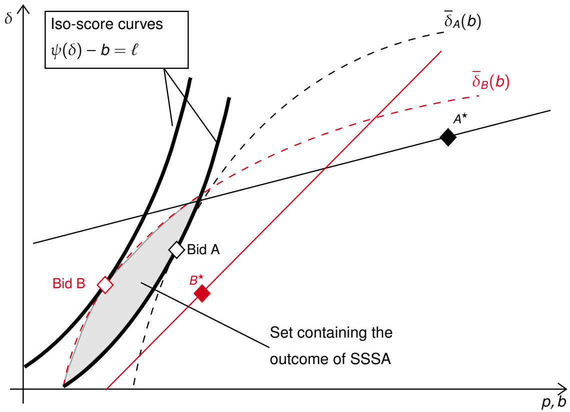
- Two consumer types $\{\beta^{\text{low}}, \beta^{\text{high}}\}$, two firms $j \in \{A, B\}$
- Oligopoly equilibrium (A^{*}, B^{*}) is such that β^{low}'s choose B, β^{high}'s choose A

Stylized framework: Break-even combinations $\Pi_j^a(b, \overline{\delta}_j(b)) = 0$



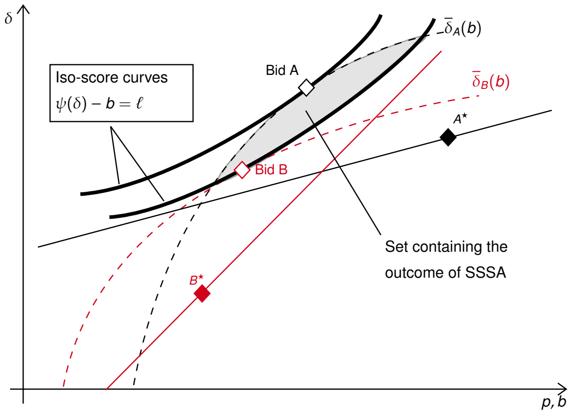
- Break-even combinations $\bar{\delta}_j(b)$ reflect A's comparative advantage at providing quality
- In a procurement auction, bids will be on these curves

Stylized framework: Procurement with low emphasis on quality



- Steep iso-score curves reflect low weight on quality
- *B* wins this auction, chooses a contract to sell from the gray area, some consumers worse off

Stylized framework: Procurement with high emphasis on quality



- Flatter iso-score curves reflect high weight on quality
- *A* wins this auction, chooses a contract to sell from the gray area, all consumers better off

Implications for consumer welfare

- Four forces at play:
  1. **Variety effect**: Choice is valuable and procurement limits it
  2. **Quality effect**: The design of the auction may lead to higher or lower quality by the winner
  3. **Cost effect**: Cost changes via consumer responses (selection) and the cost of quality
  4. **Markup effect**: The auction changes competition and may lead to lower markups

  $\longrightarrow$ Variety effect is most likely negative, but the others are ambiguous

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- How to quantify these effects?
  - Regulated competition outcomes often observed in the data
  - Need to estimate the distribution of preferences and the cost function

  $\longrightarrow$ Can compute outcomes under public procurement for a range of scoring rules

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Empirical context

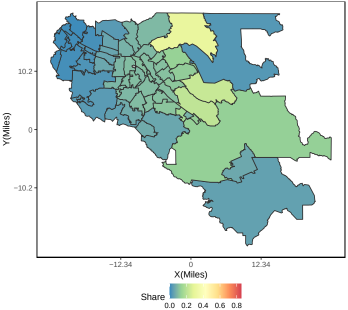
- California ACA marketplace in 2014-2017
  - Standardized plans organized in tiers of financially homogeneous plans
  - Tiers are Bronze, Silver, Gold, Platinum, covering 60, 70, 80, and 90 percent of expenses
  - Data on individual choices and location data, plan attributes
  - Focus on individual choices by subsidized potential buyers of ages 26-64 (78% of total)

- Provider network data is main empirical novelty
  - Key for capturing plan horizontal differentiation
  - Administrative data on provider networks for almost every quarter-plan
  - Data at the back end of provider search engine offered by the marketplace

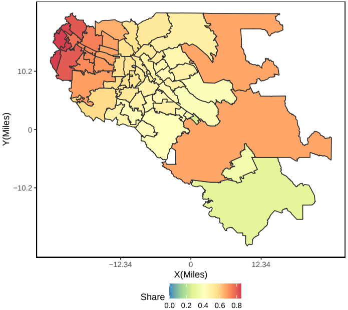
    $\longrightarrow$ Compute share of providers covered by j within a radius from i's zipcode

Summary stats Search Potential buyers

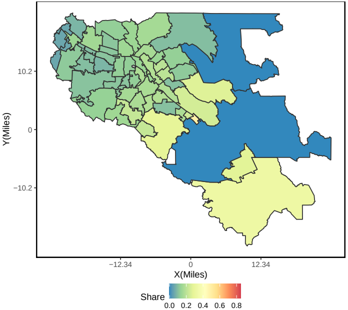
Provider networks data



(a) Anthem-HMO



(b) BlueShield-PPO



(c) Kaiser-HMO

- Average plan covers 25% of PCPs within 0–10 miles, 27% within 10–20 miles
- Closest in-network hospital is at 9 miles from the zip code centroid

Summary stats Map

Enrollment responses to variation in plan characteristics: Premiums

- Exploit pricing restrictions:
  - Age-rating + subsidies induce variation
  - Plan otherwise identical within zip-income
- Estimate:

$$y_{ijrt} = \gamma \text{premium}_{ijrt} + \eta_{jrtzd} + \varepsilon_{ijrt}$$

  where comparison within η_{jrtzd} is:
  - within plan-region-year-zip
  - within 4-yrs age × 10-pp FPL bins
- Interpreting magnitude:
  - +\$10 premium/month → -1.7% $\Pr[y_{ijrt=1}]$

	Dep. var.: 1(Chosen plan)×100		
Plan premium	-0.195***		
Actuarial value			
Distance to closest hospital			
Share PCPs in 0-10 miles			
Share PCPs in 10-20 miles			
Mean dep. var.	1.412	3.325	1.412
N	214 MM	56 MM	214 MM
R^2	0.143	0.155	0.098
N per FE	12.313	52.420	80.169
Sample	All plans	Silver	All plans

Figures

Enrollment responses to variation in plan characteristics: Actuarial value

- Exploit cost-sharing reductions:
  - Induce variation across FPL
  - Plan otherwise identical within zip-age
- Estimate at cost-sharing discontinuities:

$$y_{ijrt} = \gamma \mathrm{AV}_{ijrt} + \eta_{jrtza} + \varepsilon_{ijrt}$$

  where comparison within η_{jrtza} is:
  - within plan-region-year-zip-age
  - around income-based CSR thresholds
- Interpreting magnitude:
  - +5 p.p. AV → +19% $\Pr[y_{ijrt=1}]$

	Dep. var.: 1(Chosen plan)×100		
Plan premium	-0.195***		
Actuarial value		0.129***	
Distance to closest hospital			
Share PCPs in 0-10 miles			
Share PCPs in 10-20 miles			
Mean dep. var.	1.412	3.325	1.412
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Enrollment responses to variation in plan characteristics: Networks

- Exploit spatial variation:
  - Networks vary across consumer zips
  - Plan otherwise identical within income-age
- Estimate across zipcodes:

$$y_{ijrt} = \gamma \mathcal{N}_{ijrt} + \eta_{jrtaf} + \varepsilon_{ijrt}$$

  where comparison within η_{jrtaf} is:
  - within plan-region-year-age-FPL
  - assume preferences *iid* within η_{jrtaf}
- Results:
  - -5 miles closest hospital → +4.9% $\Pr[y_{ijrt=1}]$
  - +10% PCP share in 0-10 → +13%$\Pr[y_{ijrt=1}]$

	Dep. var.: 1(Chosen plan)×100		
Plan premium	-0.195***		
Actuarial value		0.129***	
Distance to closest hospital			-0.014***
Share PCPs in 0-10 miles			1.859***
Share PCPs in 10-20 miles			0.108
Mean dep. var.	1.412	3.325	1.412
N	214 MM	56 MM	214 MM
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Model overview

- An individual i is summarized by its type $\theta_i = (w_i, z_i, \alpha_i, \beta_i, \mu_i, \xi_i)$, where:
  - w_i: collects age and income; z_i: indicates zipcode of residence within region r
  - α_i, β_i, μ_i, ξ_i: preference over premium, (un)observable plan attributes, and insurance vs. not

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  - α_i, β_i, μ_i, ξ_i: preference over premium, (un)observable plan attributes, and insurance vs. not
- Demand: Individuals pick one plan j from the set $\mathcal{J}_{rt}$ or remain uninsured, with indirect utility:

$$u_{jrt}(\theta_i) = -\alpha_i p_{jrt}^{w_i} + \beta_i^{av} AV_{jrt}^{w_i} + \beta_i^n \mathcal{N}_{jrt}^{z_i} + \mu_i + \xi_{if_{jrt}}$$

where:

Details

  - Pure characteristics random coefficients model with micro data (Berry and Pakes, 2007),
  - Conservative for value of variety, by removing preference shocks that depend on $|\mathcal{J}_{rt}|$
  - Identification exploits granular variation in attributes via simulated MLE

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- Costs: When individual of type θ_i enrolls in plan j in region-year rt the insurer expects costs:

$$c_{jrt}(\theta_i, \underbrace{\mathcal{N}_{jrt}, \xi_{f_{jrt}}}_{\text{Network and quality}}) = \underbrace{\kappa_{jrt}(\mathcal{N}_{jrt}, \xi_{f_{jrt}})}_{jrt\text{-specific, common across } \theta_i\text{'s}} \cdot \underbrace{AV_j}_{\text{Actuarial value}} \cdot \underbrace{\exp[\rho^{\text{age}}\text{age}_i + \rho^{AV} WTP^{AV}(\theta_i) + \rho^{\text{net}} WTP^{\text{net}}(\theta_i)]}_{\text{Expected medical spending, varying across individuals with age and WTP for actuarial value and network}}$$

where identification relies on pricing FOCs and external data on average costs

Details

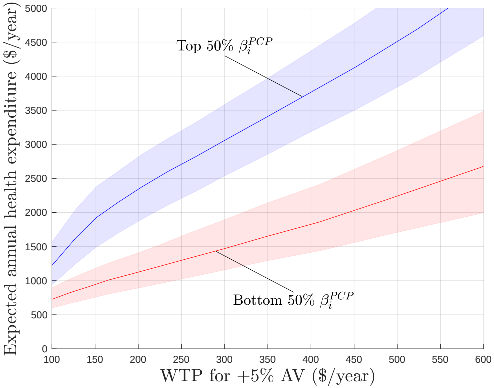
Demand estimates: Semi-elasticities to premium

		Diversion of plan enrollment upon change in a plan's attributes (%)											
		Anthem			Blue Shield			Kaiser			Other		
Insurer	Tier	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.
		A. Δ^+ \$10/month in premium											
Anthem	Bronze	-16.28	3.98	0.96	1.55	0.76	0.10	1.37	0.02	0.12	1.82	0.64	0.36
	Silver	7.41	-21.66	2.22	0.15	3.45	0.07	0.24	1.14	0.13	0.42	4.05	0.48
Blue Shield	Bronze	2.29	0.14	0.00	-33.02	21.02	0.18	1.55	0.04	0.00	1.46	0.73	0.10
	Silver	0.61	2.43	0.04	12.84	-25.98	3.76	0.32	1.09	0.26	0.15	2.22	0.63
Kaiser	Bronze	1.63	0.20	0.00	1.25	0.41	0.02	-15.77	3.26	2.15	1.12	0.78	0.27
	Silver	0.16	2.66	0.00	0.10	2.73	0.00	8.38	-19.36	0.97	0.05	2.89	0.00

- Flexible substitution patterns for prices and network attributes Networks
- Strong substitution among close tiers and within insurer, less so among differentiated plans
- Extensive margin responses in line with literature, vastly heterogeneous Details

Expected cost and willingness to pay

- Expected cost correlates with WTP:
  - Selection on plan generosity
  - Einav et al. (2010), others
- Expected cost higher for individuals with stronger network preferences:
  - Selection on network structure
  - Shepard (2022); Serna (2023)



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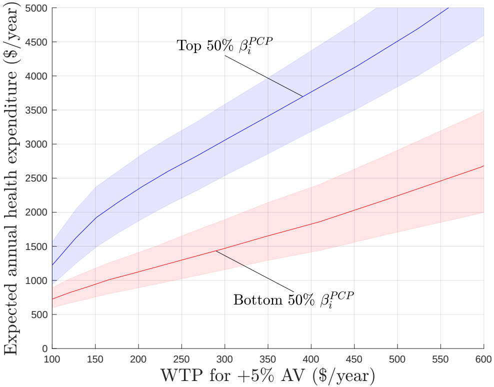
  - Shepard (2022); Serna (2023)
- Adjustment costs also from FOCs:
  - 10 p.p. in PCP share → ↑3% cost
  - -5 miles to closest hospital → ↑3.3% cost



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Regulated competition vs. Public procurement

- Setting held fixed:
  - Four metal tiers, marketplace insurers in each region-year are bidders
  - To focus comparison: hold fixed age-rating, rating regions, subsidies

Regulated competition vs. Public procurement

1. Regulated competition:
   - Static Nash oligopoly pricing equilibrium status quo (observed/inverted)

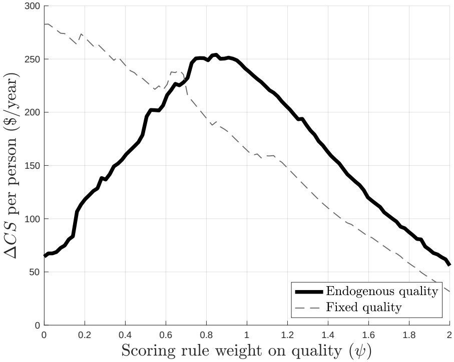
2. Public procurement based on SSSAs with scoring rule:

$$\Psi(b, \mathcal{N}, \overline{\xi}) = \psi \cdot \underbrace{CS^a(0, \mathcal{N}, \overline{\xi})}_{\substack{\text{CS when only the winner} \\ \text{is available, for free}}} - b, \quad \psi \in [0, 2]$$

   and where:
   - Insurer bids by submitting attributes $(\mathcal{N}, \overline{\xi})$ and rate b
   - Winner: j^w achieving highest score
   - Winner can adjust quality $(\mathcal{N}, \overline{\xi})$ and rate as long as the score remains above the second highest
   - Consumers choose whether or not to enroll in the winner's plans

SF example

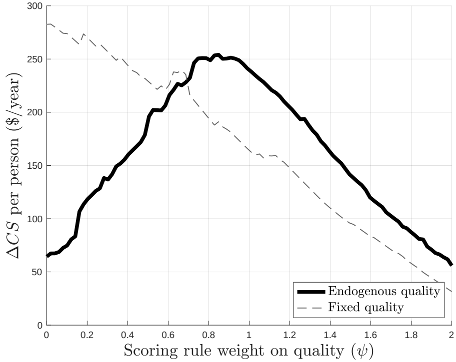
Impacts across all markets: Impacts on average CS



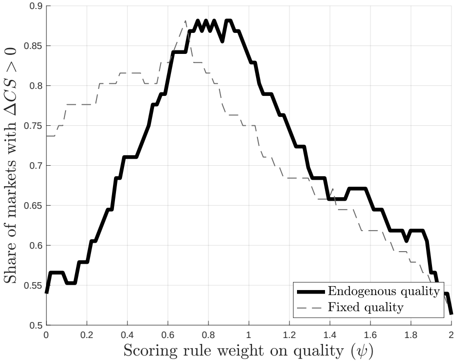
(a) ΔCS relative to ACA

- Procurement performs well: meaningful increase in CS (average ACA enrollee pays ≈$2,000)

Impacts across all markets: Share of markets with gains in average CS



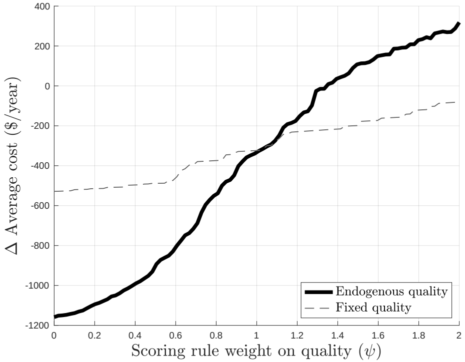
(a) ΔCS relative to ACA



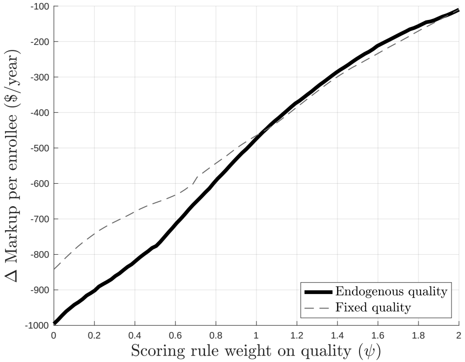
(b) Share of markets with ΔCS>0

- Procurement performs well: meaningful increase in CS (average ACA enrollee pays ≈\$2,000)
- Scoring rule matters: optimal rule is $\psi \approx 0.95$, at which 87% of markets are better-off

Impacts across all markets: Impacts on AC and markups



(a) Δ *AC* relative to ACA

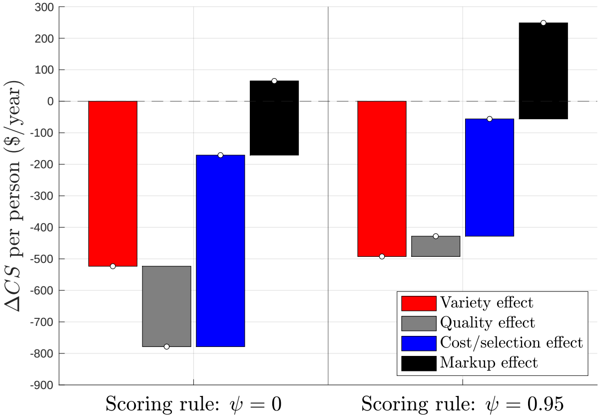


(b) Δ Markup relative to ACA

- Procurement lowers average cost via selection and quality changes, except for high-ψ auctions
- Markups decrease throughout, more so for low-ψ auctions

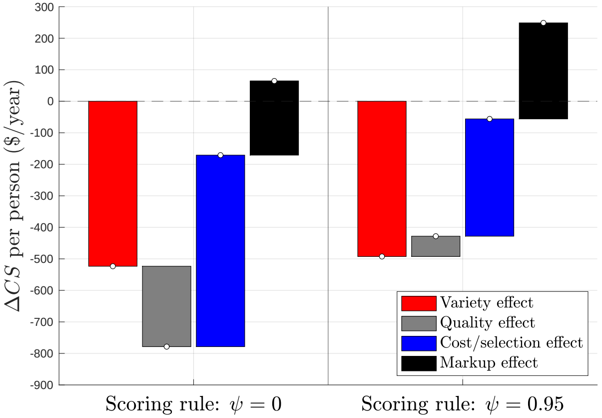
Competitiveness

Mechanisms: Variety, quality, cost, and markup effects



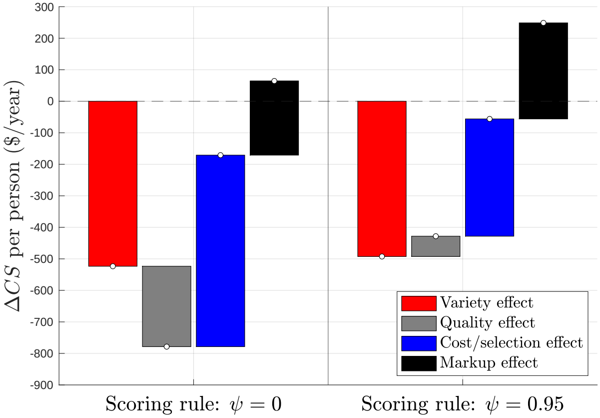
- *Variety effect* from moving from full choice set to winner plan
- It is negative, since the available choice set mechanically shrinks

Mechanisms: Variety, quality, cost, and markup effects



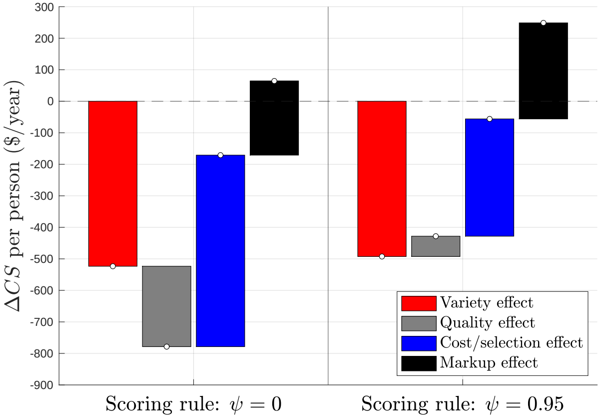
- *Quality effect* from changes in quality of winner plan
- Flips signs depending on the scoring rule

Mechanisms: Variety, quality, cost, and markup effects



- *Cost effect* from changes in the average cost of winner plan
- It is positive and pivotal, suggesting that enrollee selection improves

Mechanisms: Variety, quality, cost, and markup effects



- *Markup effect* from changes in the markup of winner plan
- It is positive, consistent with strong competition for the market

Additional results

- Procurement tends to perform better when:
  - Small number of insurers under regulated competition Details
  - More concentrated market Details
  - More severe adverse selection Details

- Caveats and robustness: Discussion
  - Re-bargaining of costs (Ho and Lee, 2017, 2019)

    Change in market design affects leverage, ambiguous direction
  - Post-auction enforcement (Bajari et al., 2014; Decarolis, 2014)

    Monitoring concerns regarding quality provision
  - Both limit gains from procurement, but results are qualitatively robust for a range of scenarios
  - Recall: goal is not specific design, but exploring trade-offs around competition vs. procurement

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Conclusion

- Procurement mechanisms as an alternative to regulated competition:
  - Incentive-compatible scoring mechanism weighting premium and plan quality
  - Auctions that reward non-premium attributes may do better than regulated competition
- Practical considerations:
  - Implementable, but need to consider several design details
  - More suitable for fringe market as a tool for marginal coverage expansion
  - Alternative geographic and demographic market definition
- Comments welcome!

Thanks!

Descriptive statistics

Back

Variable	N	Mean	SD	p10	p50	p90
A - Enrollment data						
Age	3,094,738	46.97	11.36	30.00	49.00	61.00
Income as percentage of FPL	3,094,738	229.11	62.74	160.00	215.00	325.00
Annual premium	3,094,738	1920.56	1357.56	485.03	1596.90	3779.97
Enrolled in silver plan	3,094,738	0.64	0.48	0.00	1.00	1.00
B - Plan data						
Plan market share	1,429	0.05	0.09	0.00	0.01	0.18
Average revenue per enrollee	1,429	5,355.75	1,257.70	3,935.05	5,134.53	7,159.26
Average cost per enrollee	1,094	3,835.13	1,988.96	1,896.21	3,602.54	6,018.96
C - Potential buyers						
Enrolled in ACA plan	9,657,042	0.32	0.47	0.00	0.00	1.00

Measuring market size

Back

- Two data sources:
  - Use ACS 2009-2013 files for insurance and demographics
  - Data on population by zip code from Greatdata.com (commercial database built from public sources)
- Potential buyer ≡ individual who is individually insured or uninsured

1. Flexible regression on age and income bins, regions, sex, year:

$$\text{Potential buyer}_i = \tau(X_i) + \varepsilon_i$$

2. Compute number of potential buyers of type d and region-year rt using ACS weights:

$$NPB_{drt} = \sum_{i:d(i)=d} \hat{\tau}_i \cdot w_i$$

3 Allocate potential buyers to zip codes using population weights w_z:

$$NPB_{dzt} = NPB_{drt} \cdot w_z$$

Descriptive statistics for provider networks data

Back

Variable	N	Mean	SD	p10	p50	p90
HMO plan	33,416	0.53	0.50	0.00	1.00	1.00
Share of PCPs in 0-10 miles	33,416	0.25	0.22	0.00	0.20	0.56
Share of PCPs in 10-20 miles	33,416	0.27	0.21	0.03	0.22	0.55
Share of PCPs in 20-30 miles	33,416	0.27	0.20	0.04	0.23	0.55
Distance to closest hospital	33,416	8.97	11.95	0.00	5.02	21.10

Heterogeneity in plan networks

Back

- For each zip code, compute:

$$\text{Diff}_{zt} = p_{90}(\mathcal{N}_{jzt}) - p_{10}(\mathcal{N}_{jzt})$$

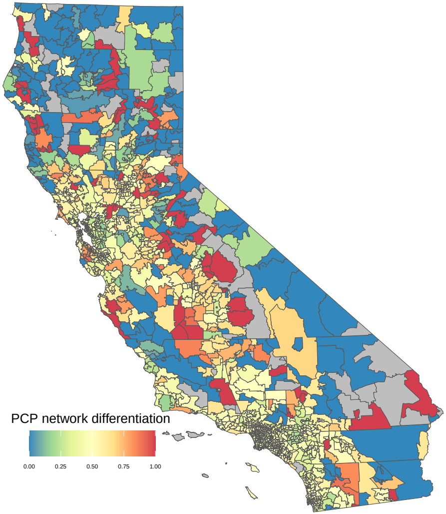
$$\text{CV}_{zt} = \text{SD}(\mathcal{N}_{jzt})/\text{Mean}(\mathcal{N}_{jzt})$$

where $\mathcal{N}_{jzt}$ captures network offerings in zt

	Diff_{zt}	CV_{zt}
Mean	0.43	0.62
SD	0.25	0.18

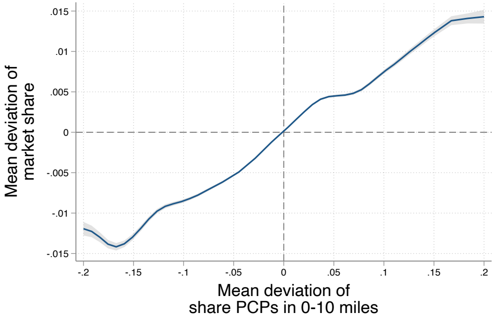
- Horizontal differentiation within region
  - Impacts appeal of procurement approach

    e.g., impact on variety, markups

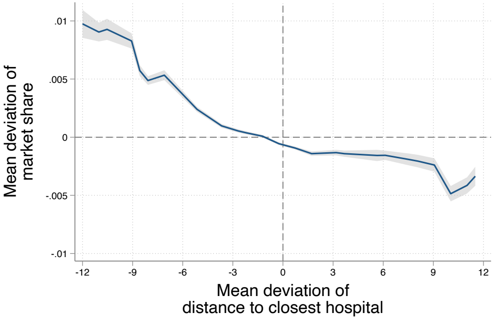


Enrollment responses to network characteristics

Back



(a) Plan shares and PCP share



(b) Plan shares and distance to hospitals

Notes: Local polynomial smoothing across zip codes and granular demographics conditional on region, year, plan and coarse demographics (8 age bins, 26 income bins, sex).

How to interpret preferences for PCPs?

Back

- Our model mute about the reason for value large % of PCPs in network:

  A. Buyer already has PCP (from previous job, Medicaid, spousal coverage) higher % of PCP covered $\approx$ higher prob own PCP is in network

  B. Buyer does not have a PCP but looks for PCPs nearby

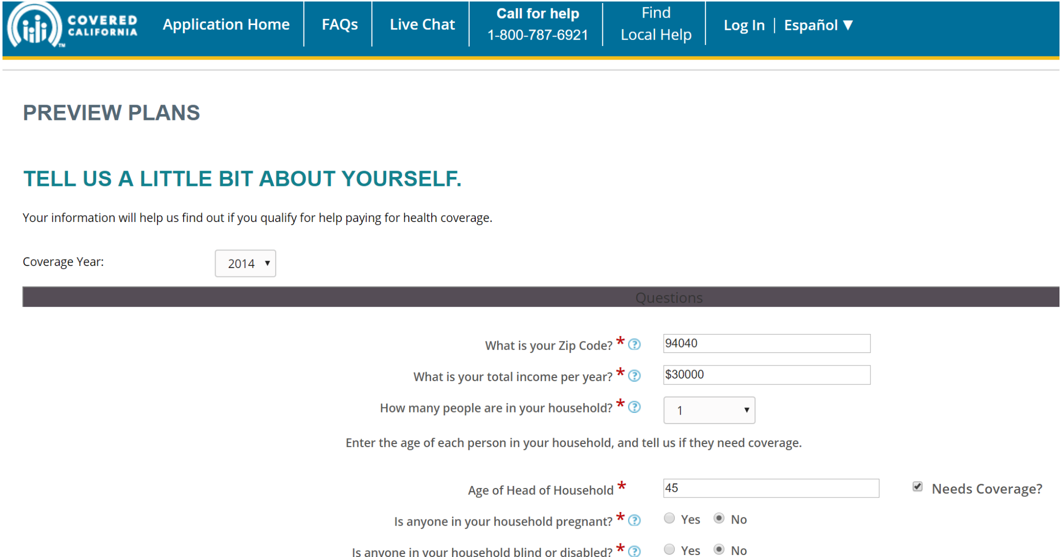
- Under A, after paying switching cost, loss from lack of choices would be lower / foregone;

$\rightarrow$ value of choice could be over-estimated relative

- Under B, loss from lack of choices persistent to longer horizon

Choice environment: Demographics

Back


Application Home | FAQs | Live Chat | Call for help 1-800-787-6921 | Find Local Help | Log In | Español ▼

PREVIEW PLANS

TELL US A LITTLE BIT ABOUT YOURSELF.

Your information will help us find out if you qualify for help paying for health coverage.

Coverage Year: 2014

Questions

What is your Zip Code? * 94040

What is your total income per year? * $30000

How many people are in your household? * 1

Enter the age of each person in your household, and tell us if they need coverage.

Age of Head of Household * 45 Needs Coverage?

Is anyone in your household pregnant? * Yes No

Is anyone in your household blind or disabled? * Yes No

Choice environment: Plans

Back

22 plans for 1 adult in ZIP code 94040.

Coverage could start as early as 01/01/2014.

Monthly premiums displayed have been reduced by your estimated monthly tax credit of $179.00 .

Filter By

Plan Type

- PPO
- HMO

Plan Features

- HSA Compatible Can be used with a Health Savings Account

Metal Tier

- Platinum: highest premiums, lowest out-of-pocket costs
- Gold: higher premiums, lower out-of-pocket costs
- Silver: lower premiums,

Sort By Total Expense Estimate

1 2 ›

	ADD TO CART	ADD TO CART	ADD TO CART
	Anthem BlueCross Anthem - Bronze 60 PPO	Anthem BlueCross Anthem - Bronze 60 HSA P...	VHP Valley Health Plan Valley Health - Bronze 6...
	BRONZE PPO	BRONZE HSA PPO	BRONZE HMO
Monthly Premium	$108.10 after $179.00 tax credit	$110.05 after $179.00 tax credit	$121.76 after $179.00 tax credit
Primary Care Visits			
Generic Drugs			
Yearly Deductible	$5000 (May Not Apply)	$4500 (May Not Apply)	$5000 (May Not Apply)
Total Expense Estimate	Lower	Lower	Lower
Quality Rating	Quality Rating in future	Quality Rating in future	Quality Rating in future
	COMPARE VIEW DETAIL	COMPARE VIEW DETAIL	COMPARE VIEW DETAIL

Choice environment: Plan attributes

Back

View Health Plan Details

ADD TO CART

Anthem BlueCross

Anthem - Bronze 60 PPO

BRONZE	PPO
Monthly Premium	$108.10
	after $179.00 tax credit
Primary Care Visits	
Generic Drugs	
Yearly Deductible	$5000 (May Not Apply)
Total Expense Estimate	Lower

Summary of Benefits and Coverage

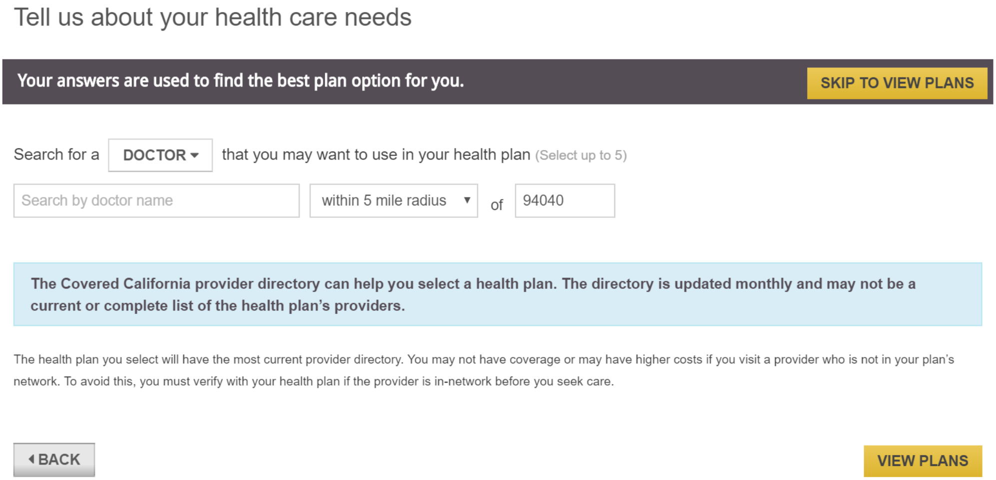
Plan Brochure

Summary	
Total Expense Estimate	$2421.75
Plan Type	PPO
Cost Sharing Reductions	Not Available
HSA Compatible	No
Quality Rating	Quality Rating in future

Doctors and Facilities

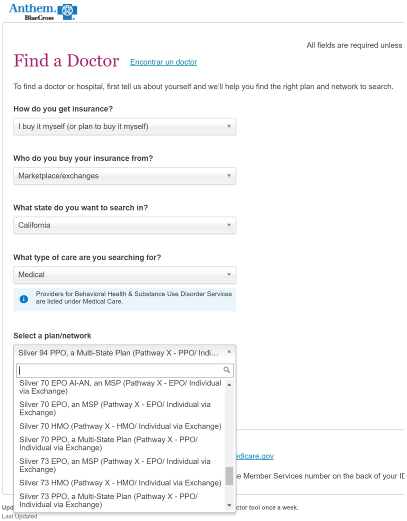
Choice environment: Provider search

Back



Choice environment: Provider search

Back



Anthem. BlueCross

All fields are required unless

Find a Doctor [Encontrar un doctor]

To find a doctor or hospital, first tell us about yourself and we'll help you find the right plan and network to search.

How do you get insurance?

I buy it myself (or plan to buy it myself)

Who do you buy your insurance from?

Marketplace/exchanges

What state do you want to search in?

California

What type of care are you searching for?

Medical

Providers for Behavioral Health & Substance Use Disorder Services are listed under Medical Care.

Select a plan/network

Silver 94 PPO, a Multi-State Plan (Pathway X - PPO/ Indi…

- Silver 70 EPO AI-AN, an MSP (Pathway X - EPO/ Individual via Exchange)
- Silver 70 EPO, an MSP (Pathway X - EPO/ Individual via Exchange)
- Silver 70 HMO (Pathway X - HMO/ Individual via Exchange)
- Silver 70 PPO, a Multi-State Plan (Pathway X - PPO/ Individual via Exchange)
- Silver 73 EPO, an MSP (Pathway X - EPO/ Individual via Exchange)
- Silver 73 HMO (Pathway X - HMO/ Individual via Exchange)
- Silver 73 PPO, a Multi-State Plan (Pathway X - PPO/ Individual via Exchange)

edicare.gov

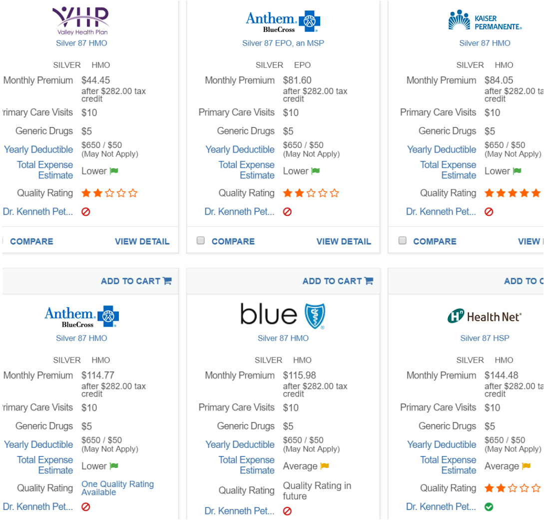
e Member Services number on the back of your ID

Upd ctor tool once a week.

Last Updated

Choice environment: Provider coverage by plan

Back



Plan demand: Pure characteristics

Back

- Our exercise removes a large number of plans from choice sets
  - Common random utility models: space of idiosyncratic errors grows with the number of products
  - Likely over-estimate value of variety, no clear solution (Ackerberg and Rysman, 2005; Dafny et al., 2013)

Plan demand: Pure characteristics

Back

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  - Common random utility models: space of idiosyncratic errors grows with the number of products
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- Pure characteristics demand model (Berry and Pakes, 2007)
  - More natural, internally consistent solution: rich heterogeneity, no idiosyncratic errors
  - We adapt this to our context with micro data, relying on panel structure (Berry and Haile, 2024)
  - MLE with flexible ξ varying at *(insurer-network-region-year)*$\times$*(age group)*

Plan demand: Pure characteristics

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  - We adapt this to our context with micro data, relying on panel structure (Berry and Haile, 2024)
  - MLE with flexible ξ varying at *(insurer-network-region-year)*$\times$*(age group)*
- Alternatively, one could assume ε's are welfare-irrelevant (e.g. Abaluck and Gruber, 2023)
  - This would favor procurement $\rightarrow$ we prefer more conservative approach

Plan demand: Model

Back

- An individual i is summarized by its type $\theta_i = (w_i, z_i, \alpha_i, \beta_i, \mu_i, \xi_i)$, where:
  - w_i: collects age and income; affects premium and actuarial value
  - z_i: indicates zipcode of residence within region r; affects networks
  - α_i, β_i, μ_i, ξ_i: preference over premium, (un)observable plan attributes, and insurance vs. not

- Individuals pick one plan j from the set $\mathcal{J}_{rt}$ or remain uninsured, with indirect utility:

$$u_{jrt}(\theta_i) = -\alpha_i p_{jrt}^{w_i} + \beta_i^{av} AV_{jrt}^{w_i} + \beta_i^{n} \mathcal{N}_{jrt}^{z_i} + \mu_i + \xi_{if_{jrt}}$$

where:

$$\alpha_i \sim \text{LogNormal}(\overline{\alpha}^{w_i}, \sigma^{\alpha, w_i}) \qquad \beta_i^{av} \sim \text{LogNormal}(\overline{\beta}^{av, w_i}, \sigma^{av, w_i})$$

$$\beta_i^{n} \sim \text{LogNormal}(\overline{\beta}^{n, w_i}, \Sigma^{n, w_i}) \qquad (\mu_i, \xi_{if_{jrt}}) \sim \text{Normal}([\overline{\mu}^{w_i}, \overline{\xi}_{f_{jrt}}^{w_i}], [\sigma^{\mu, w_i}, \sigma^{\xi, w_i}])$$

- Estimation leverages micro data and granular variation in attributes + simulated MLE

Details

Demand estimates: Extensive margin responses and WTP for attributes

Back

		Age below 45		Age above 45	
	All	Low income	High income	Low income	High income
A. Δ% in market enrollment					
Δ^{+}\$10/month in premium	-2.23	-2.57	-2.67	-1.77	-2.30
Δ^{+}0.05 in PCP share in 0-10 miles	1.29	1.11	1.33	1.18	1.64
Δ^{+}0.05 in PCP share in 10-20 miles	0.70	0.81	0.94	0.54	0.66
Δ^{-}2 miles in distance	0.79	0.99	1.15	0.56	0.69
B. Willingness-to-pay (\$/year)					
Δ^{+}5 p.p in actuarial value	287.7	193.89	218.46	380.88	386.85
Δ^{+}0.05 in PCP share in 0-10 miles	69.85	53.08	59.92	85.21	86.22
Δ^{+}0.05 in PCP share in 10-20 miles	38.42	38.08	42.57	36.57	36.26
Δ^{-}2 miles in distance	45.43	48.20	54.23	38.98	39.00

- In range of the estimates in the literature, non-trivial WTP for network attributes
- Heterogeneity: older have higher WTP for PCP networks, small differences by income

Plan demand: Estimation details

Back

- Exploit revealed preference to construct likelihood function
- If type θ_i chooses j, then $u_{jrt}(\theta_i) > u_{krt}(\theta_i)$ for all $k \neq j$, and with $\Delta_{jk} A_i \equiv A_{ij} - A_{ik}$ for any A_i

$$\alpha_i \Delta_{jk} p_i + \beta_i \Delta_{jk} X_i + \Delta_{jk} \xi_{frt} > 0,$$

- Rearrange the inequalities as:

$$\begin{aligned}
\alpha_i &> \overline{\Delta}_i^j(\beta_i, \boldsymbol{\xi}) \equiv \max_{k:\Delta_{jk} p_i > 0} -\frac{\beta_i \Delta_{jk} X_i + \Delta_{jk} \xi_{frt}}{\Delta_{jk} p_i} \\
\alpha_i &< \underline{\Delta}_i^j(\beta_i, \boldsymbol{\xi}) \equiv \min_{k:\Delta_{jk} \alpha_i < 0} -\frac{\beta_i \Delta_{jk} X_i + \Delta_{jk} \xi_{frt}}{\Delta_{jk} p_i}
\end{aligned}$$

- And for any value of $\boldsymbol{\xi}$ the likelihood of observing i choosing j is

$$\sigma_j(w_i, z_i) = \int \left(\int_{\overline{\Delta}_i^j(\beta_i, \boldsymbol{\xi})}^{\underline{\Delta}_i^j(\beta_i, \boldsymbol{\xi})} dF(\alpha_i) \right) dG(\beta_i).$$

Demand estimates: Semi-elasticities to PCP networks

Back

		Diversion of plan enrollment upon change in a plan's attributes (%)											
		Anthem			Blue Shield			Kaiser			Other		
Insurer	Tier	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.	Br.	Sil.	G./Pl.
		B. Δ^+ 0.05 in PCP share in 0-10 miles											
Anthem	Bronze	8.31	-2.35	-0.47	-0.91	-0.43	-0.05	-0.60	-0.03	-0.05	-0.60	-0.34	-0.19
	Silver	-4.04	9.43	-1.05	-0.09	-1.41	-0.05	-0.10	-0.39	-0.07	-0.24	-0.91	-0.24
Blue Shield	Bronze	-1.40	-0.09	-0.00	14.53	-7.76	-0.60	-0.74	-0.03	-0.01	-0.58	-0.40	-0.10
	Silver	-0.43	-0.89	-0.03	-7.89	13.96	-1.86	-0.20	-0.36	-0.12	-0.10	-0.87	-0.33
Kaiser	Bronze	-0.72	-0.10	-0.00	-0.60	-0.20	-0.02	6.32	-1.23	-0.91	-0.38	-0.29	-0.11
	Silver	-0.09	-0.95	-0.00	-0.05	-1.09	-0.00	-4.33	9.49	-1.45	-0.04	-0.93	-0.02

- Disciplines competition in networks, extra revenue when increasing network breadth
- Similar patterns for other network attributes

Insurer costs: Model

Back

- When individual of type θ_i enrolls in plan j in region-year rt the insurer expects costs:

$$c_{jrt}(\theta_i, \underbrace{\mathcal{N}_{jrt}, \overline{\xi}_{f_{jrt}}}_{\text{Networks and quality}}) = \underbrace{AV_j}_{\text{Actuarial value}} \cdot \underbrace{\kappa_{jrt}(\mathcal{N}_{jrt}, \overline{\xi}_{f_{jrt}})}_{\text{Plan-specific, common across } \theta_i\text{'s}} \cdot \underbrace{\exp[\rho^{\text{age}}\text{age}_i + \rho^{AV} WTP^{AV}(\theta_i) + \rho^{\text{net}} WTP^{\text{net}}(\theta_i)]}_{\text{Expected medical spending, varies across individuals with with age, WTP for AV, and WTP for networks}}$$

Insurer costs: Model

Back

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- Costs vary with network breadth and quality:

$$\kappa_{jrt}(\mathcal{N}_{jrt}, \overline{\xi}_{f_{jrt}}) = \overline{\kappa}_{jrt} \exp[(\boldsymbol{\eta}^n + \lambda^n_{jrt})\mathcal{N}_{jrt} + (\boldsymbol{\eta}^\xi + \lambda^\xi_{jrt})\xi_{f_{jrt}}]$$

where $\boldsymbol{\eta} = (\boldsymbol{\eta}^n, \boldsymbol{\eta}^\xi)$ capture the costs of adjusting networks or brand value, and $\boldsymbol{\lambda}$ are shocks

- Need to estimate $\bar{\boldsymbol{\kappa}}$, $\boldsymbol{\rho}$, and $\boldsymbol{\eta}$

Insurer costs: Identification and estimation

Back

- Intuition with single-plan insurer, generalized and formalized in the paper
- Profits as a function of cost heterogeneity $\overline{\boldsymbol{\kappa}}$ and selection $\boldsymbol{\rho}$:

$$\Pi_j = R_j - Q_j \cdot AC_j(\overline{\boldsymbol{\kappa}}, \boldsymbol{\rho})$$

1. Optimal pricing implies marginal revenue equals marginal cost:

$$MR_j = Q_j' \cdot AC_j(\overline{\boldsymbol{\kappa}}, \boldsymbol{\rho}) + Q_j \cdot AC_j'(\overline{\boldsymbol{\kappa}}, \boldsymbol{\rho}) = MC_j$$

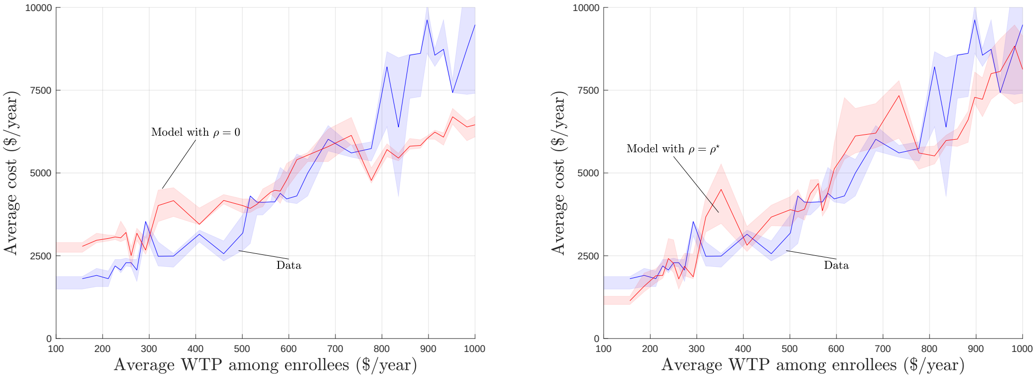
   $\longrightarrow$ FOC inversion gives $\overline{\boldsymbol{\kappa}}(\boldsymbol{\rho})$ for any selection parameter $\boldsymbol{\rho}$

2. To identify selection, recall its implication that $MC_j \neq AC_j$

   $\longrightarrow$ Using observed AC_j^{obs} from claims, find $\boldsymbol{\rho}$ such that $AC_j(\overline{\boldsymbol{\kappa}}(\boldsymbol{\rho}), \boldsymbol{\rho})) \approx AC_j^{\text{obs}}$

Identification of selection parameters ρ

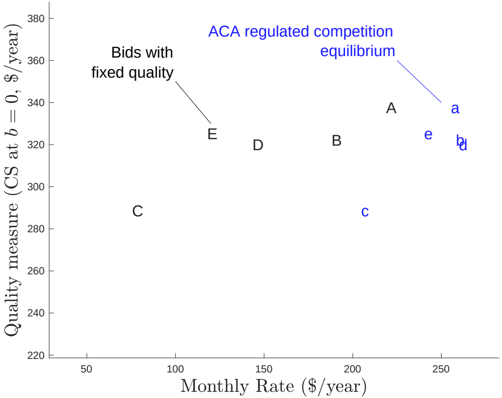
Back



- $\rho^\star$ captures the gradient between composition of enrollees and observed cost

San Francisco 2016 as an example: Baseline

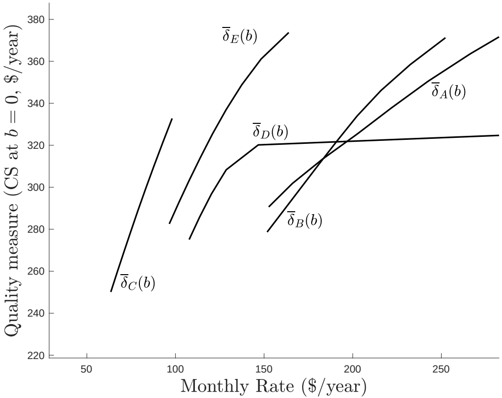
Back



- Bids in SSSA under fixed quality are have much lower rates
- Difference captures profits under oligopoly

San Francisco 2016 as an example: Break-even price-quality curves

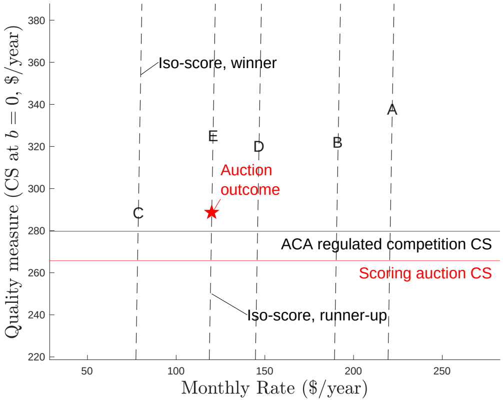
Back



- Using our estimates, we can compute break-even price-quality pairs
- For any scoring rule, an insurer's bid is the price-quality pair on $\overline{\delta}_f(b)$ yielding the highest score

San Francisco 2016 as an example: Low-ψ auction, fixed quality

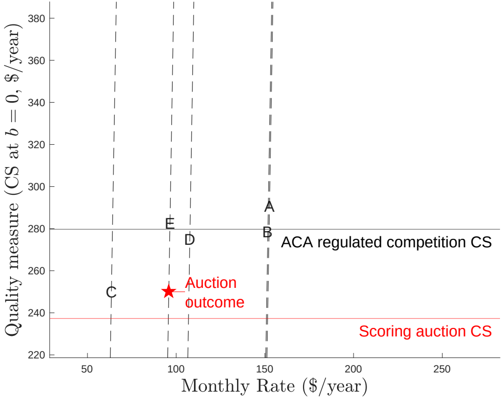
Back



- A low-ψ auction picks a low-cost low-quality firm C
- C then offers a plan with a price close to E's
- Regulated competition dominates procurement

San Francisco 2016 as an example: Low-ψ auction, endogenous quality

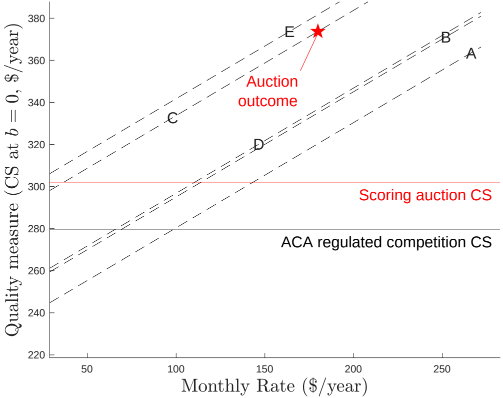
Back



- The winner and runner-up firms are the same under endogenous quality
- But the scoring rule incentivizes lowering quality
- The outcome is lower price and lower quality, regulated competition further dominates

San Francisco 2016 as an example: High-ψ auction, endogenous quality

Back

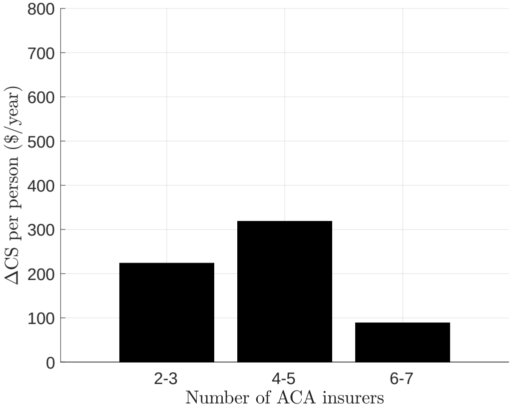


- A high-ψ auction picks a higher quality firm, *E*
- The scoring rule places incentives for firms to invest in quality
- Procurement dominates regulated competition

Heterogeneity across markets: Number of insurers

Back

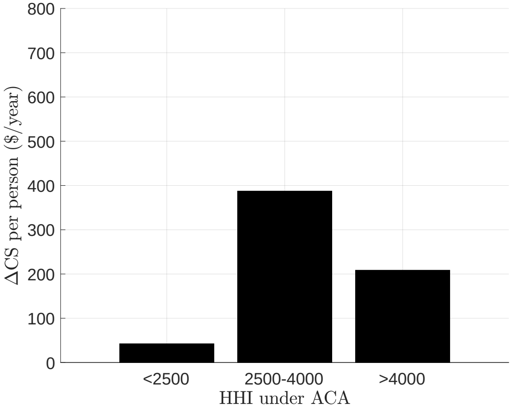
- Procurement tends to perform poorly in markets with many firms
- Modal US market has few firms
- Auctions might be a viable solution



Heterogeneity across markets: Market concentration

Back

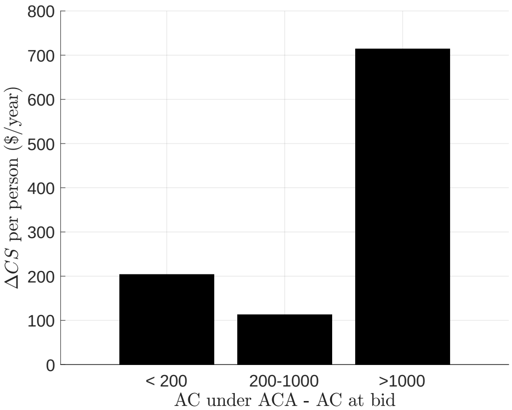
- More concentrated markets likely less efficient under oligopoly
- Procurement performs better in concentrated markets



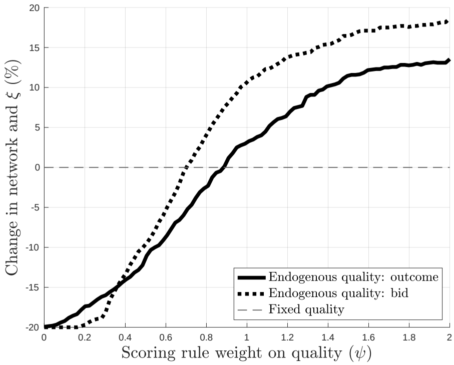
Heterogeneity across markets: Severity of adverse selection

Back

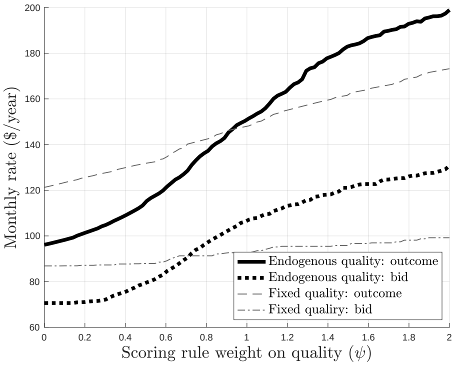
- By comparing *AC* under regulated competition and procurement, can proxy severity of selection
- Procurement does better when selection is more severe



Impacts across all markets: Quality provision and competitiveness Back



(a) Δ Quality: bid and SSSA outcome



(b) Monthly rate: bid and SSSA outcome

- At low ψ: Insurers lower quality beyond what a monopolist would offer, strong price competition
- At higher ψ: Insurers increase quality and price competition weakens

Some caveats for implementation

Back

- Re-barganing of costs (Ho and Lee, 2017, 2019)
  - Firms need hospitals to win auction
  - Firms can promise higher volumes upon winning auction
  - Direction is ambiguous
  - Less of an issue if segment is fringe relative to ESHI and MA
- Post-auction enforcement (Bajari et al., 2014; Decarolis, 2014)
  - Imperfect monitoring concerns
  - Winner could degrade quality
- Recall: goal is not specific design, but exploring trade-offs around competition vs. procurement

Sensitivity

Sensitivity to changes in cost and weak enforcement

Back

	Baseline	A. Change in input prices						B. Weak enforcement		
		−20%	−10%	−5%	+5%	+10%	+20%	−10%	−20%	−50%
ΔCS per person ($/year)	+249	+573	+416	+330	+160	+81	−84	+182	+115	−86
Share of markets with ΔCS>0	0.87	1.00	0.97	0.92	0.72	0.62	0.30	0.78	0.75	0.39

- Procurement dominates as long as unmodeled costs do not increase too much
  - An increase of 15% makes average ΔCS negative
- Procurement dominates as long as enforcement is not too weak
  - A 37% relaxation of the constraint by which winner must deliver ≥ second-highest score makes average ΔCS negative