Vertical Integration between Hospitals and Insurers

José Ignacio Cuesta
SIEPR

Carlos Noton
U. de Chile

Benjamín Vatter
Northwestern U.

NBER, July 2019

Motivation

- Increasing role of **insurer-provider** vertical integration in health care
  - e.g., Kaiser, Aetna-CVS
- Longstanding concern about concentration in healthcare markets
  - Most of the work on horizontal mergers
- Ambiguous theoretical effect of vertical integration
  - Solves double marginalization
  - Aligns incentives to reduce cost within the vertical chain
  - Market power, foreclosure and exclusion
- Limited empirical evidence due to lack of data/settings

This Paper

1. Develop a model to study competition and vertical incentives
   - Bargaining between insurers and hospitals, some of which are VI
   - Consumers demand both insurance and health care
   - VI creates patient- and enrollee-steering incentives

2. Estimate the model using data from Chile
   - Market structure combines VI and non-VI firms
   - Administrative data for private insurance: plans, claims

3. Counterfactual analysis to study welfare effects of banning VI
   - Role of cost efficiencies and consumer preferences

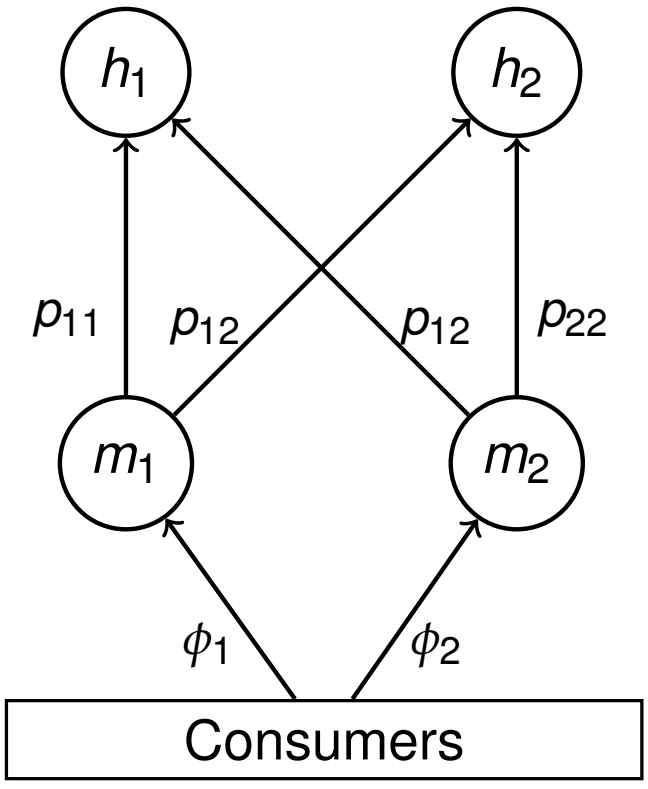
▸ Related literature

Main Findings

1. VI firms use prices to steer consumers towards affiliated partners:
   - 20% lower OOP costs in VI hospitals for patients from the related insurer
2. Banning VI increases consumer surplus and total welfare
   - VI hospitals would decrease prices to rival insurers by 19.8%
   - VI insurers would increase premiums by 4.7%
   - VI cost efficiencies do not change the results qualitatively
3. VI can increase CS if consumers more sensitive to premiums than prices
   - Elastic to prices, less elastic to premiums $\longrightarrow$ VI decreases CS
   - Less elastic to prices, elastic to premiums $\longrightarrow$ VI increases CS

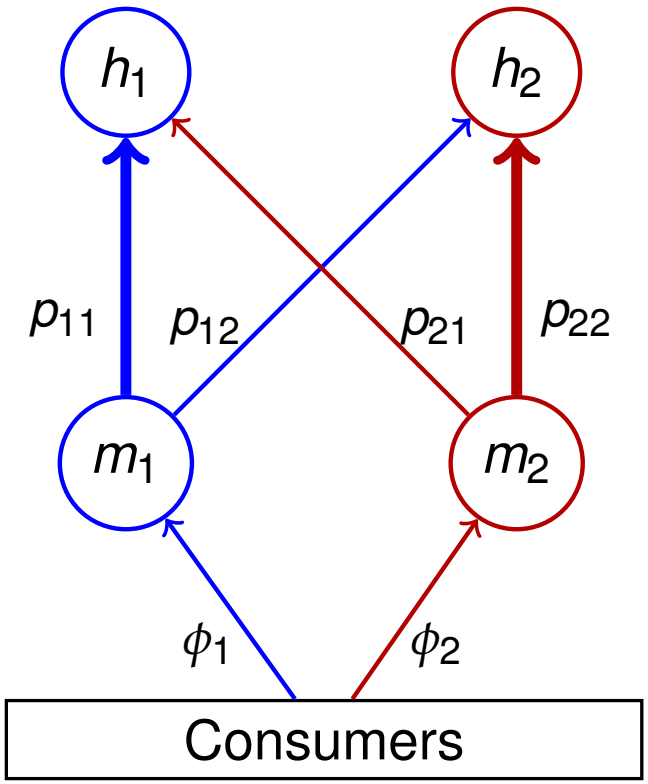
Outline

A Simple 2×2 Example



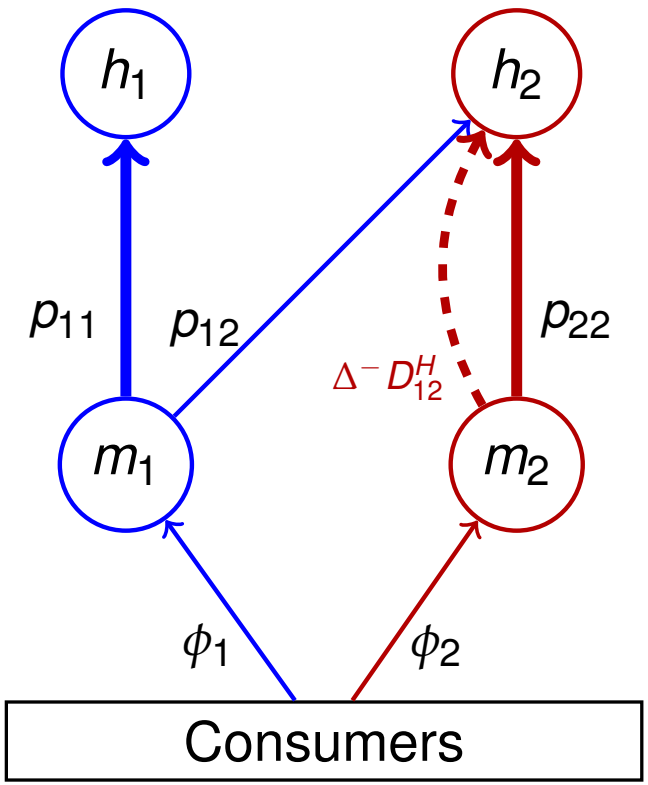
- Hospitals: h_1, h_2, Insurers: m_1, m_2
  - Hospital prices $p_m = (p_{m,h_1}, p_{m,h_2})$
- Insurance
  - Premium ϕ_m
  - Coinsurance rate $0 < c_m < 1$
- Consumers
  1. Demand for insurance
  2. Demand for healthcare
- Non-standard vertical structure
  - Consumers buy upstream and downstream

Price Setting under VI



- VI: $Firm_1 = (h_1, m_1)$ and $Firm_2 = (h_2, m_2)$
- p_{11}, p_{22} are set optimally within VI firms:
  - Joint profit maximization
  - **No double marginalization**
- p_{12}, p_{21} are bargained over:
  - Simultaneous Nash bargaining
  - **Disagreement implies disconnection**
  - VI affects disagreement payoffs and all equilibrium prices

Standard Bargaining Effects

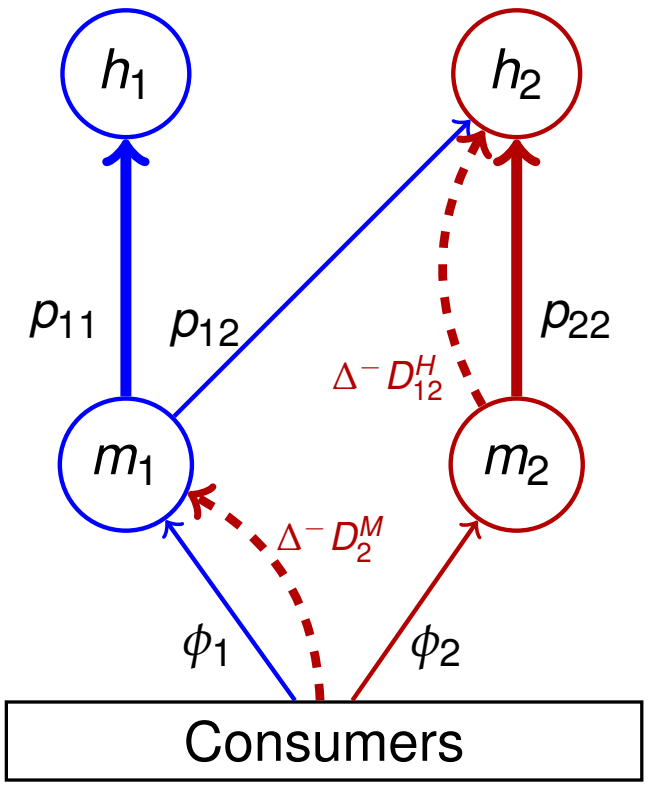


Suppose disagreement between h_1 and m_2:

- All other prices and premiums fixed

1. Hospital bargaining effect:
   - h_1 no longer available for m_2 plans
     $\longrightarrow$ h_1 demand falls
     $\longrightarrow$ Profit of *Firm*$_1$ falls

Standard Bargaining Effects

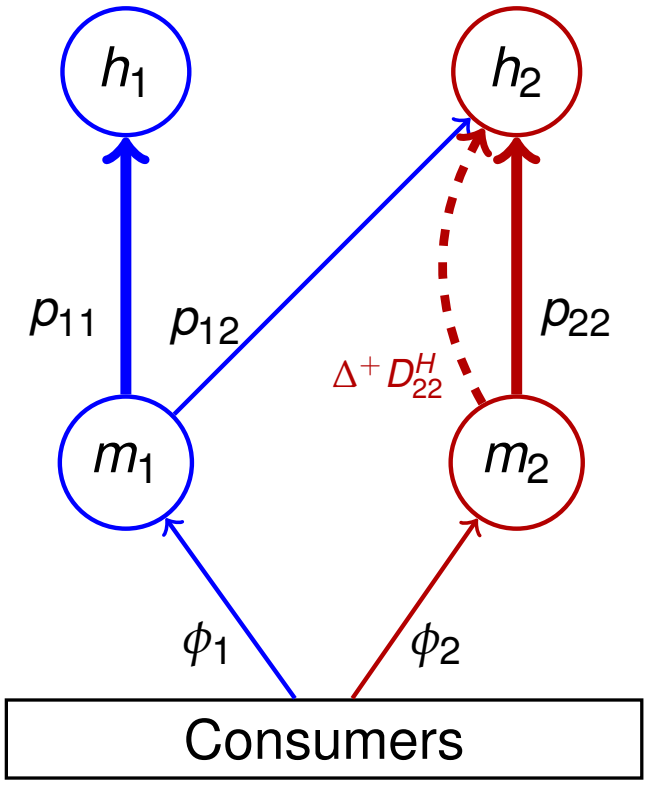


Suppose disagreement between h_1 and m_2:

- All other prices and premiums fixed

1. Hospital bargaining effect:
   - h_1 no longer available for m_2 plans
     $\longrightarrow$ h_1 demand falls
     $\longrightarrow$ Profit of *Firm*$_1$ falls
2. Insurer bargaining effect:
   - Value of network of m_2 decreases
     $\longrightarrow$ m_2 demand falls
     $\longrightarrow$ Profit of *Firm*$_2$ falls

Additional Bargaining Effects under VI

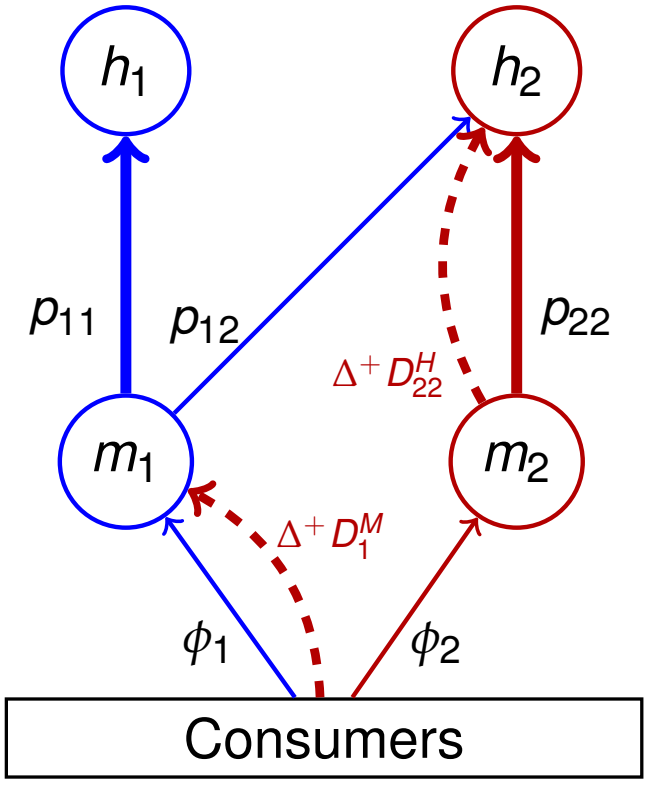


Suppose disagreement between h_1 and m_2:

- All other prices and premiums fixed

3. ***Patient-steering*** effect:
   - Enrollees of m_2 must go to h_2
     $\longrightarrow$ h_2 demand increases
     $\longrightarrow$ Profit of *Firm*$_2$ increases

Additional Bargaining Effects under VI



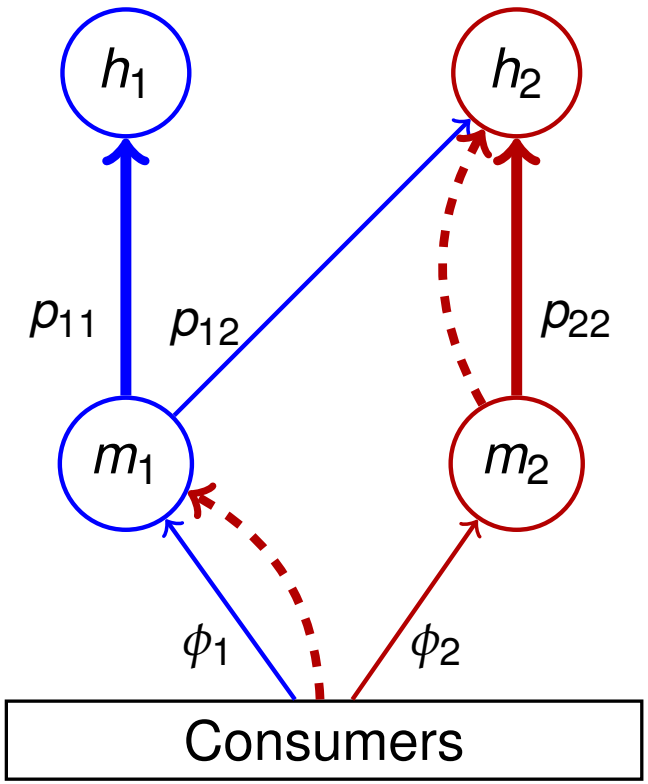
Suppose disagreement between h_1 and m_2:

- All other prices and premiums fixed

3. ***Patient-steering*** effect:
   - Enrollees of m_2 must go to h_2
     $\longrightarrow$ h_2 demand increases
     $\longrightarrow$ Profit of *Firm*$_2$ increases

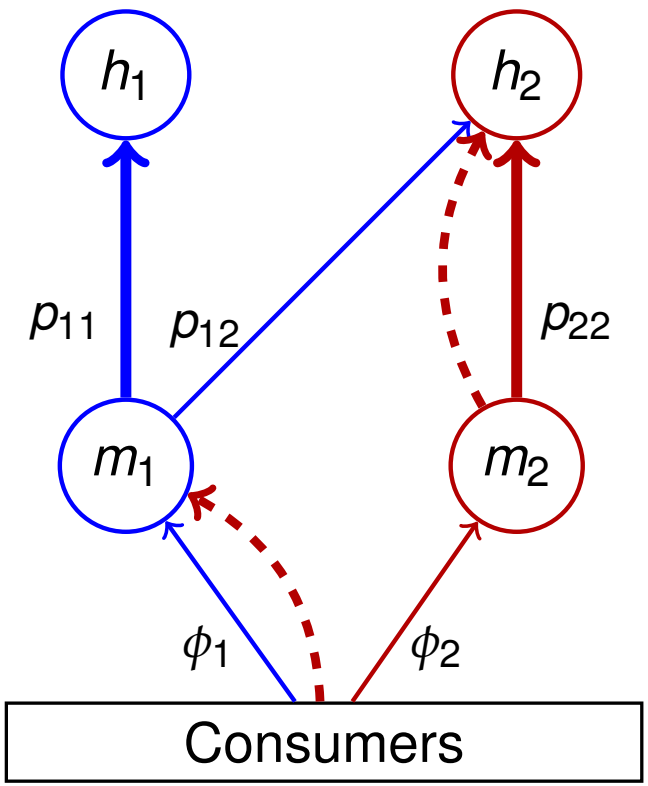
4. ***Enrollee-steering*** effect:
   - Network of m_1 improves relative to m_2
     $\longrightarrow$ m_1 demand increases
     $\longrightarrow$ Profit of *Firm*$_1$ increases

Effect of Vertical Incentives



- VI reduces loss from disagreement
- *Patient-steering* + *Enrollee-steering*:
  $\Rightarrow \uparrow$ pressure on negotiated vs own prices

Effect of Vertical Incentives



- VI reduces loss from disagreement
- *Patient-steering* + *Enrollee-steering*:
  $\Rightarrow \uparrow$ pressure on negotiated vs own prices
- What is the net effect on prices?
  - Depends on demand elasticity to p and ϕ
  - Depends on costs and product differentiation

  $\longrightarrow$ Overall effect an empirical question

Outline

The Chilean Health Market

- Public-Private provision: focus on private sector (low interaction)
- Insurers:
  - 6 insurers offer multiple plans, discriminatory pricing
  - 2 insurers are VI
- Hospitals:
  - 12 main private hospitals in Santiago
  - 6 hospitals are VI
- Interaction between insurers and hospitals:
  - VI insurers offer complete networks (unlike e.g. Kaiser)
  - *All* insurers interact with *all* hospitals
  - 59% of VI hospital admissions come from integrated insurer

▸ Distribution of admissions

Administrative Data for 2013–2016

1. Plans and membership:
   - For each plan: policyholder ID, plan ID, coverage rates, premium
   - For each policyholder: household size, dependents, income
2. Claims/admissions:
   - Prices, copayment and coverage (i.e. observable insurer cost)
   - Basic consumer demographics: age, gender, location
3. Admission prices in public hospitals
4. Hospital and insurer attributes:
   - Ownership structure
   - Financial statements

▸ Sample restrictions

Model-free Evidence

1. VI, prices and coverage:
   - Total admission prices 8% lower for patients from VI
   - Patient OOP payment 20% lower for patients from VI
2. VI and hospital choice:
   - After joining a VI insurer, patients more likely to choose VI hospitals
3. VI and hospital cost-control:
   - No evidence VI hospitals provide different medical treatments to VI patients

- Evidence is consistent with two very different scenarios
  - VI firms have lower costs vs VI firms distort prices to steer demand

$\longrightarrow$ Use model to disentangle effects of VI

▸ Prices and costs ▸ Choices

Outline

Model Structure and Timing

1. **Hospital prices**: hospital h and insurers m determine p_{mh}
   - Joint profit maximization: If m and h are VI
   - Nash bargaining: If m and h are not VI
2. **Insurance premiums**: insurer m sets vector ϕ_m
   - VI insurers internalize effect on integrated hospitals
   - Premiums set after observing prices

     $\longrightarrow$ respond to off-path disagreements between hospitals and insurers
3. **Insurance demand**:
   - Depends on premiums, WTP for hospital network and health risk
4. **Hospital demand**:
   - Depends on hospital prices given insurance plan, distance

▸ Profit equations ▸ Price and premium determination

Equilibrium Hospital Prices

- Optimal prices of hospital system s to all insurers (including VI):

$$P_s = \underbrace{C_s^H}_{\substack{\text{Hospital} \\ \text{marginal} \\ \text{costs}}} - \underbrace{(\Omega_s + \Lambda_s)}_{\substack{\text{Effective} \\ \text{price} \\ \text{sensitivity}}}^{-1} \underbrace{(D_s^H + \Gamma_s)}_{\substack{\text{Effective} \\ \text{hospital} \\ \text{demand}}}$$

where:

- C_s^H: hospital marginal cost
- Ω_s: hospital price sensitivity
- Λ_s: bargaining effect
- D_s^H: hospital demand
- Γ_s: vertical incentives

- Our model nests other models:

$$\underbrace{\text{Nash-Bertrand}}_{\Omega} + \underbrace{\text{Bargaining}}_{\Lambda} + \underbrace{\text{Vertical incentives}}_{\Gamma}$$

Identification and Estimation

- **Demand side**: Estimate consumer preferences using Logit demands
  - Identified from individual-level variation over time
  - Allow for rich set of fixed effects across heterogeneous demographic groups
    - Average price elasticity: -2.4, Average premiums elasticity: -1.3

▸ Demands ▸ Supply preliminaries ▸ Supply identification ▸ First stage ▸ Supply results

Identification and Estimation

- **Demand side**: Estimate consumer preferences using Logit demands
  - Identified from individual-level variation over time
  - Allow for rich set of fixed effects across heterogeneous demographic groups
    - Average price elasticity: -2.4, Average premiums elasticity: -1.3

- **Supply side**: Estimate hospital costs and bargaining weights using GMM
  1. Hospital mark-up moments

     $\longrightarrow$ Identify average hospital marginal costs

  2. Orthogonality conditions based on WTP using public system prices
     - Endogeneity: prices capture across-insurer within-hospital cost variation
     - Instrument: public system prices paid to public hospitals, by medical procedure
     - Exclusion: set for different hospitals and population of consumers
     - Relevance: public and private sectors subject to common cost shifters

     $\longrightarrow$ Given hospital cost, bargaining weights identified by hospital prices FOC

▸ Demands ▸ Supply preliminaries ▸ Supply identification ▸ First stage ▸ Supply results

Estimated Vertical Incentives

- Enrollee-steering: VI insurer gain if related hospital forecloses rival insurer
- Patient-steering: VI hospital gain if related insurer excludes rival hospital

	Steering effects on bargaining surplus	
VI Firm	Enrollee-steering	Patient-steering
Firm 1	-29.8%	-22.2%
Firm 2	-1.7%	-15.9%

$\Rightarrow$ Banning VI should have significant effects on negotiated prices

Outline

Equilibrium Effects of Vertical Integration

- What are the effects of banning vertical integration?
  - Simulate equilibrium outcomes under alternative market structure

- Counterfactual exercise on observed plans, policyholders and admissions:
  1. Break up vertical ownership linkages
  2. Hospitals renegotiate hospital prices
  3. Insurers reoptimize premiums
  4. Consumers choose plans and hospitals

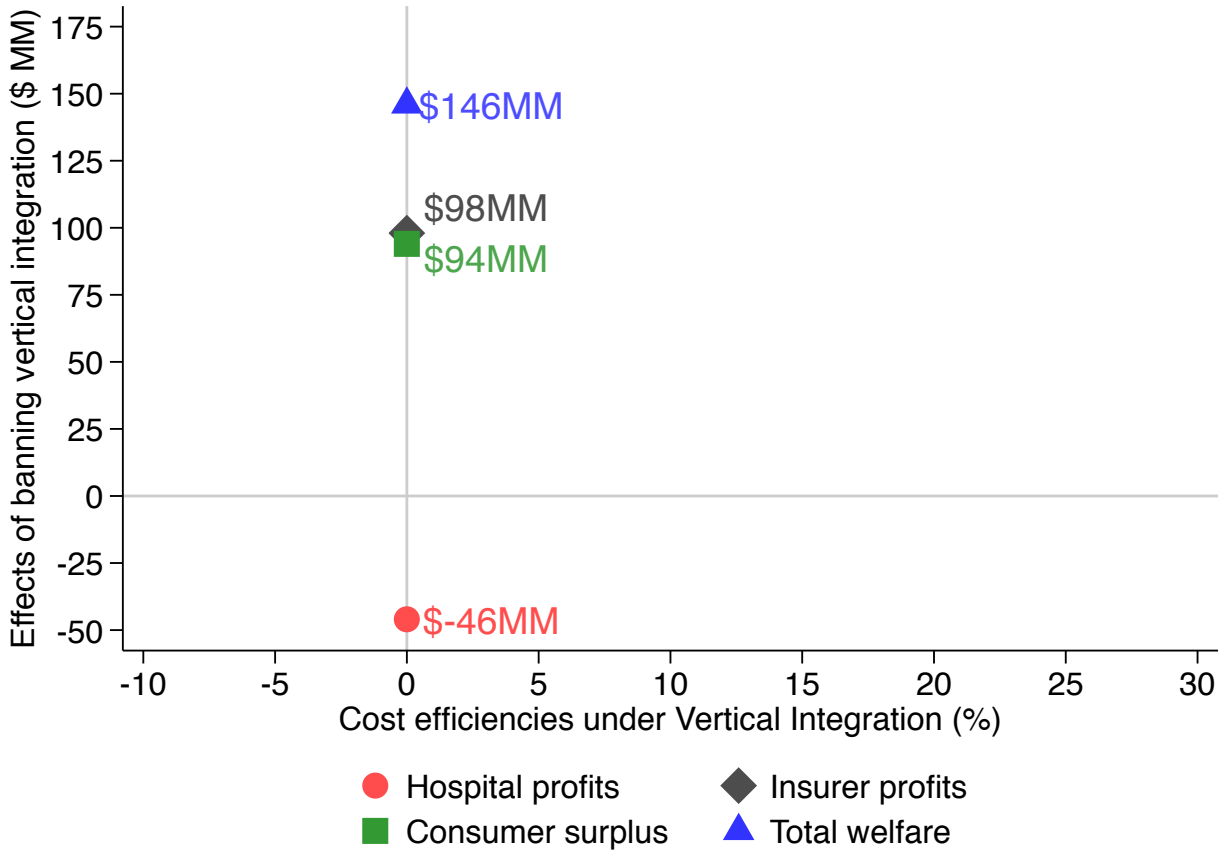
Banning VI: Price Effects

Panel A: Insurers	Δ% Premium	Δ% Share
VI at baseline	**4.72%**	**-1.67%**
Non-VI at baseline	-0.32%	**3.87%**

Panel B: Hospitals	Δ% Price	Δ% Share
VI to own-VI	-2.44%	**-18.53%**
VI to non-VI	**-19.84%**	**16.68%**
Non-VI to VI	**-0.41%**	-1.85%
Non-VI to non-VI	0.63%	-5.50%
Non-VI to all	0.35%	-4.47%

- VI insurers increase premiums when VI is banned
  - VI insurers used to charge lower premiums to attract enrollees
  - VI insurers used to negotiate higher prices with rival hospitals to steer patients
- VI hospitals decrease prices to non-VI insurers when VI is banned
  - VI hospitals used to charge higher prices to rival insurers to steer enrollees

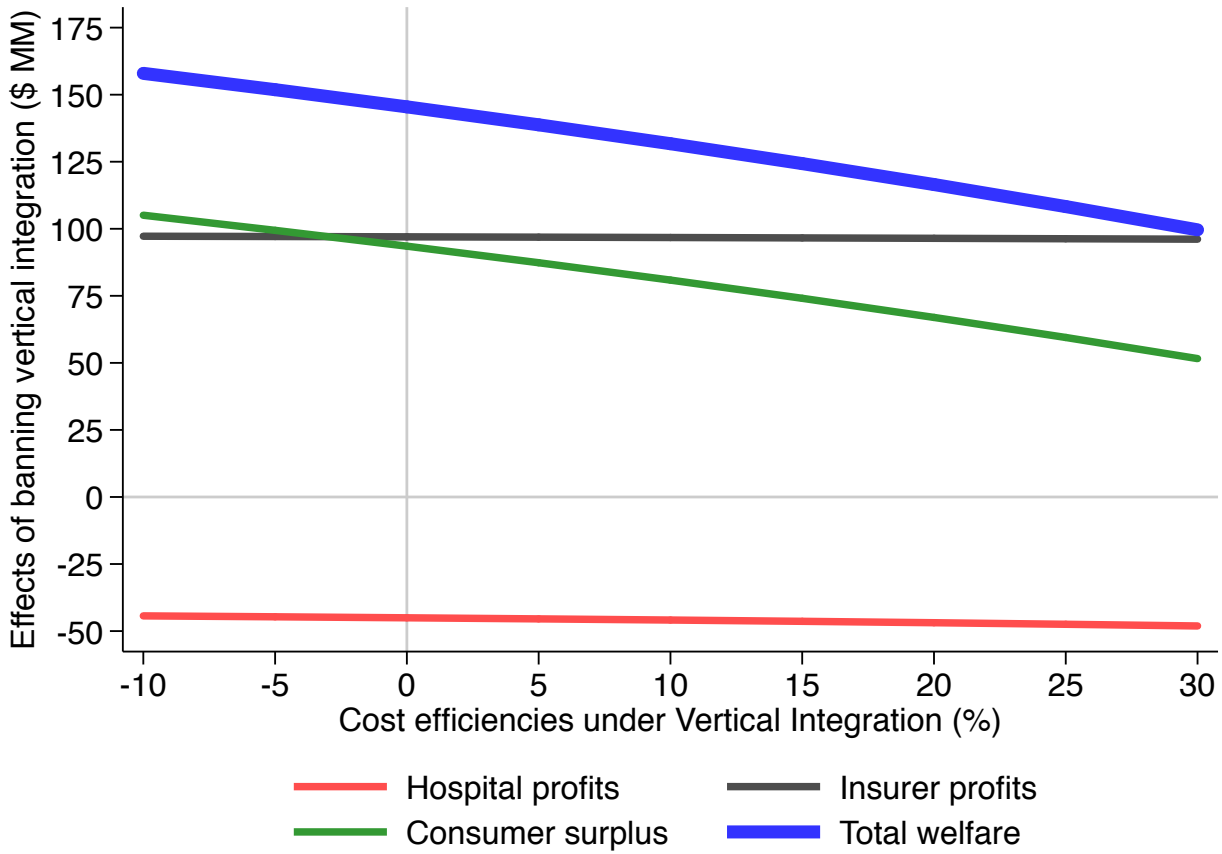
Banning VI: Welfare Effects



- Banning VI increases overall welfare by $146 MM
- Consumers are willing to pay $55/year to ban VI, or 4% higher premiums

▸ ΔCS by group

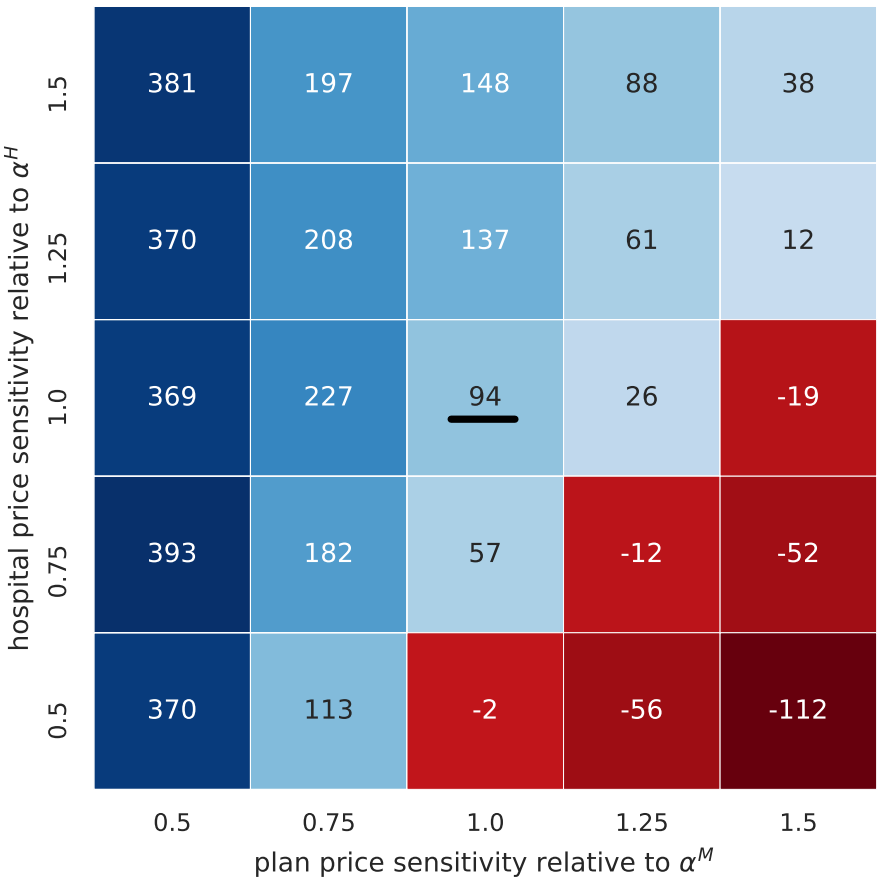
Banning VI: Welfare Effects and Cost Efficiencies



- Cost efficiencies reduce but do not overturn results
- Hospital-insurer specific cost efficiencies $\longrightarrow$ limited effect on total profits

▸ Table ▸ Hospitals by VI ▸ Insurers by VI

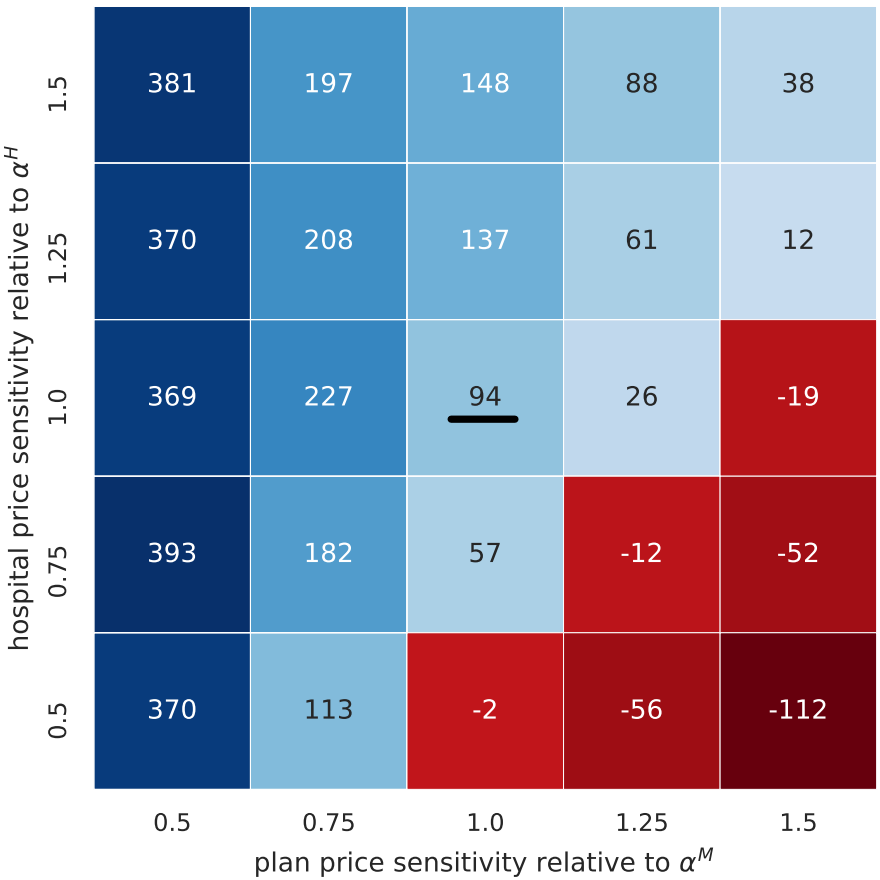
Banning VI: CS and Demand Elasticity



ΔCS from banning VI (USD millions)

- Effective enrollee-steering (↖)
  - ↑ prices to rivals profitable
  - ↑ premium profitable
- Ineffective enrollee-steering (↘)
  - Non-sensitive to hospital prices
  - ↓ premiums to attract enrollees

Banning VI: CS and Demand Elasticity



ΔCS from banning VI (USD millions)

- Effective enrollee-steering (↖)
  - ↑ prices to rivals profitable
  - ↑ premium profitable
- Ineffective enrollee-steering (↘)
  - Non-sensitive to hospital prices
  - ↓ premiums to attract enrollees
- Differences between Chile and U.S.
  - Hospital price sensitivity lower in U.S.
  - Chile: -2.40; U.S.: -0.12 (Prager, 2018)

Outline

Conclusion

- Develop a model for healthcare markets
  - Highlights steering incentives under VI
- Estimate the model using data from Chile
  - Patient and enrollee steering effects substantially distort market outcomes
  - Banning VI is welfare enhancing even under cost-efficiencies
- Antitrust implications
  - VI incentives to steer demand can substantially increase prices
  - If VI efficiency is shared across insurers it can offset adverse VI effects

Additional Slides

Related Literature

1. **Competition in healthcare market**:
   - General: Gaynor and Town (2011); Gaynor et al (2015)
   - Insurer mergers: Chorniy et al (2016), Ho and Lee (2017)
   - Hospital mergers: Dafny (2009), Dafny et al (2012), Gowrisankaran et al (2015), Lewis and Pflum (2015, 2017), Craig et al (2018), Dafny et al. (2018)

   $\longrightarrow$ Study competition against VI systems

2. **Competition and bargaining in vertical markets**:
   - Theory: Horn and Wolinsky (1988), Collard-Wexler et al. (2017)
   - Empirics: Crawford and Yurukoglu, (2012), Prager (2016), Gowrisankaran et al (2015), Ghili (2017), Ho and Lee (2017, 2018), Crawford et al (2018), Diebel (2018), Liebman (2018)

   $\longrightarrow$ Extend toolkit to allow for VI as well as horizontal mergers

3. **Vertical integration**:
   - Hastings (2004), Hortaçsu and Syverson (2007), Crawford et al (2018)

   $\longrightarrow$ Improve downstream flexibility and study of distortions on bargaining

Back

Admission Distribution for Private Hospitals

Hospital / Insurer	Banmédica	Colmena	Consalud	Cruz Blanca	Masvida	Vida Tres	VI share
Alemana	15.24	37.53	5.56	24.34	7.57	9.77	0.00
Avansalud	10.05	10.34	52.62	22.26	3.12	1.61	52.62
Bicentenario	6.30	6.55	63.17	21.80	1.89	0.29	63.17
Dávila	67.89	5.21	12.24	9.43	1.86	3.38	71.27
Indisa	11.57	25.46	8.46	24.28	27.61	2.62	0.00
Las Condes	17.98	37.42	5.33	21.12	9.06	9.09	0.00
Santa María	44.73	17.88	4.59	17.45	6.14	9.21	53.94
Tabancura	12.14	17.25	43.38	18.71	4.57	3.95	43.38
UC	0.43	11.13	22.36	65.14	0.78	0.15	0.00
UC San Carlos	7.84	64.03	3.20	15.49	5.90	3.54	0.0
Vespucio	63.30	6.30	16.64	9.63	2.51	1.62	64.92
U. de Chile	21.60	9.34	46.20	19.78	1.81	1.26	0.00

Back

Sample Restrictions for Estimation

- Geography: metropolitan region of Santiago
  - Over 2 million covered lives per year
- Service type: Inpatient care only
  - About half of the market in dollar value
  - Outpatient market is very dispersed and providers are hard to track
- Hospitals: focus on the 12 largest providers
  - 80% of value of claims and 69% of number of claims
- Insurers: open insurers, and plan-groups with enough claims information
  - 7 closed insurers that serve specific industries or firms

Back

VI, Prices, Coverage and Organization

Back

- Exploit within-hospital variation in outcomes from VI and non-VI insurers:

$$\log(y_{idjh}) = \beta VI_{m(j)h} + X'_{ij}\gamma + \tau_d + \eta_{m(j)} + \zeta_h + \varepsilon_{idjh}$$

where $VI_{m(j)h}$ indicates that admission i comes from a VI insurer

VI, Prices, Coverage and Organization

Back

- Exploit within-hospital variation in outcomes from VI and non-VI insurers:

$$\log(y_{idjh}) = \beta VI_{m(j)h} + X'_{ij}\gamma + \tau_d + \eta_{m(j)} + \zeta_h + \varepsilon_{idjh}$$

where $VI_{m(j)h}$ indicates that admission i comes from a VI insurer

	log(Charge)	log(Payment)	log(OOP)
VI	-0.079***	0.039*	-0.230***
	(0.017)	(0.022)	(0.031)
N	545,716	545,716	545,716
R^2	0.45	0.42	0.38

- Relationship between VI, prices and coverage:
  - Prices 8% lower, patient OOP 20% lower for patients from VI

VI, Prices, Coverage and Organization

Back

- Exploit within-hospital variation in outcomes from VI and non-VI insurers:

$$\log(y_{idjh}) = \beta VI_{m(j)h} + X'_{ij}\gamma + \tau_d + \eta_{m(j)} + \zeta_h + \varepsilon_{idjh}$$

where $VI_{m(j)h}$ indicates that admission i comes from a VI insurer

	log(Charge)	log(Payment)	log(OOP)	1(Hemogram)	1(C-section)
VI	-0.079***	0.039*	-0.230***	0.064***	-0.049**
	(0.017)	(0.022)	(0.031)	(0.021)	(0.019)
N	545,716	545,716	545,716	62,662	77,019
R^2	0.45	0.42	0.38	-	-

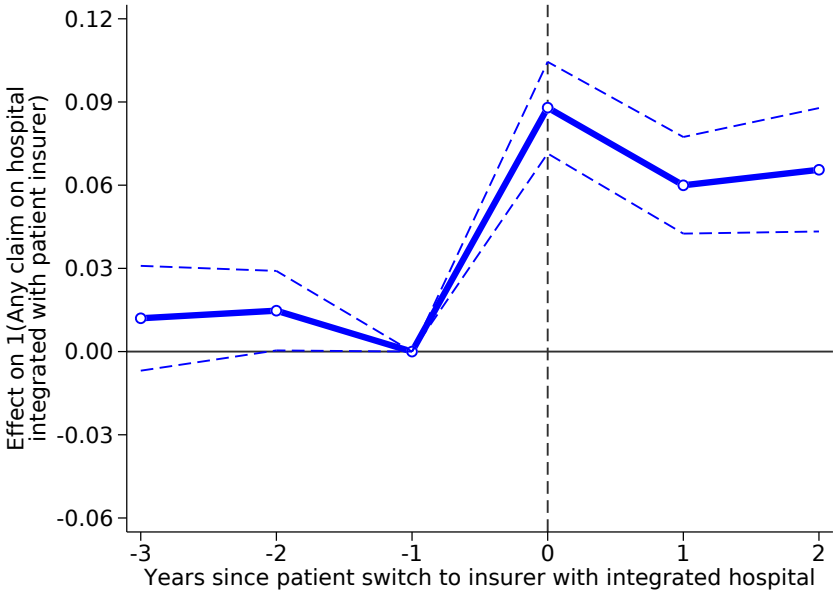
- Relationship between VI and hospital cost-control behavior:
  - Mixed evidence that physicians in VI firms reduce costs
  - No evidence that patients in VI firms receive fewer services

VI, Hospital Choice and Expenditure

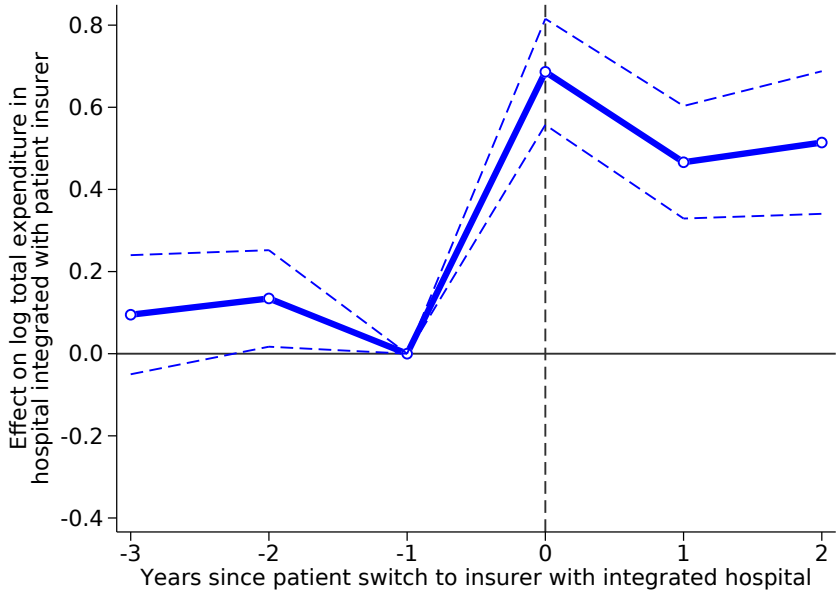
Back

- Exploit insurance switchers to study whether VI affects choice

$$y_{iht} = \sum_{\tau} \beta_{\tau} \underbrace{D_{ih\tau}}_{\substack{=1 \text{ if } h \text{ is VI with} \\ \text{new insurer}}} + \alpha_i + \delta_{ht} + \varepsilon_{iht}$$



(a) Effect on choice



(b) Effect on expenditure

Hospital and Insurer Profits

- **Hospital system s profits**:

$$\pi_s^H(\boldsymbol{\phi}, \boldsymbol{p}) = \sum_{h \in \mathcal{H}_s} \sum_{m \in \mathcal{M}} \sum_{j \in \mathcal{J}_m} \underbrace{D_{hj}^H(\boldsymbol{\phi}, \boldsymbol{p})}_{\text{Hospital demand}} (p_{mh} - \underbrace{c_{mh}^H}_{\text{Hospital cost}})$$

- **Insurer m profits**:

$$\pi_m^M(\boldsymbol{\phi}, \boldsymbol{p}) = \sum_{j \in \mathcal{J}_m} \underbrace{D_j^M(\boldsymbol{\phi}, \boldsymbol{p})}_{\text{Plan demand}} (\phi_j - \underbrace{c_j^M}_{\text{Plan cost}})$$

- **Integrated system (m, s) profits**:

$$\pi_{ms}^{VI}(\boldsymbol{\phi}, \boldsymbol{p}) = \theta_{ms} \pi_m^M(\boldsymbol{\phi}, \boldsymbol{p}) + \pi_{s(m)}^H(\boldsymbol{\phi}, \boldsymbol{p})$$

Back

Price and Premium Determination

- Insurers offer differentiated plans and compete on premiums:

$$\boldsymbol{\phi}_m^* \in \arg\max_{\boldsymbol{\phi}_j} \begin{cases} \pi_m^M(\boldsymbol{\phi}_j, \boldsymbol{\phi}_{-j}^*, \boldsymbol{p}) & \text{if m not VI} \\ \pi_{ms(m)}^{VI}(\boldsymbol{\phi}_j, \boldsymbol{\phi}_{-j}^*, \boldsymbol{p}) & \text{if m VI} \end{cases}$$

- Hospital prices determined by Nash-in-Nash bargaining or optimally by VI:

$$\boldsymbol{p}_{mh}^* \in \arg\max_{p_{mh}} \begin{cases} \pi_{ms(h)}^{VI} & \text{if m,h VI} \\ \left(\pi_{s(h)}^H - \pi_{s(h)\setminus m}^H\right)^{(1-\lambda_{mh})} \left(\pi_m^M - \pi_{m\setminus s(h)}^M\right)^{\lambda_{mh}} & \text{otherwise} \end{cases}$$

  - Timing assumption implies: $\boldsymbol{\phi}^*(p)$
  - Disagreements affect all off-path premiums, but not prices
  - Disagreeing hospital systems remove all hospitals

Back

Demand for Hospitals and Insurance Plans

- **Hospital demand**: Indirect utility from hospital h, diagnosis d and plan j:

$$u^H_{ijhd} = \underbrace{\alpha^H_i c_{jh} p_{jhd}}_{\text{Copayment}} + \underbrace{\beta_v v_{ih}}_{\text{Distance}} + \underbrace{\delta^H_{h\kappa(i)d}}_{\text{FE}} + \underbrace{\varepsilon^H_{ijhd}}_{\sim T1EV}$$

$\longrightarrow$ Average hospital price elasticity: -2.40

- **Plan demand**: Indirect utility from plan j for household f:

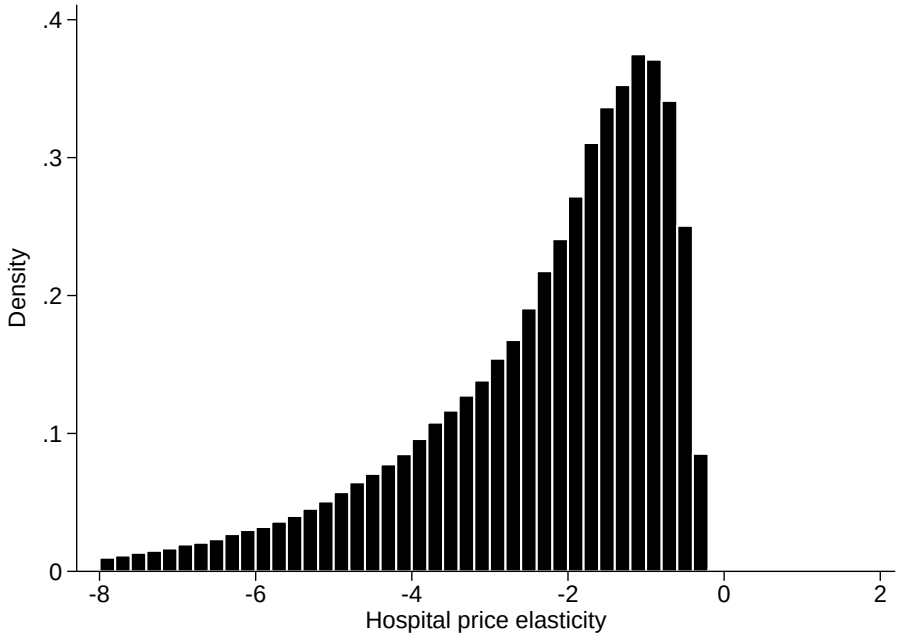
$$u^M_{fj} = \underbrace{\alpha^M_f \phi_{fj}}_{\text{Premium}} + \underbrace{\beta_f \sum_{i \in f} E_{d,\varepsilon}[\max_h u^H_{ijhd}]}_{\text{WTP}} + \underbrace{\delta^M_{m(j)\kappa(f)}}_{\text{FE}} + \underbrace{\varepsilon^M_{fj}}_{\sim T1EV}$$

where WTP is expected utility from plan j in terms of health care

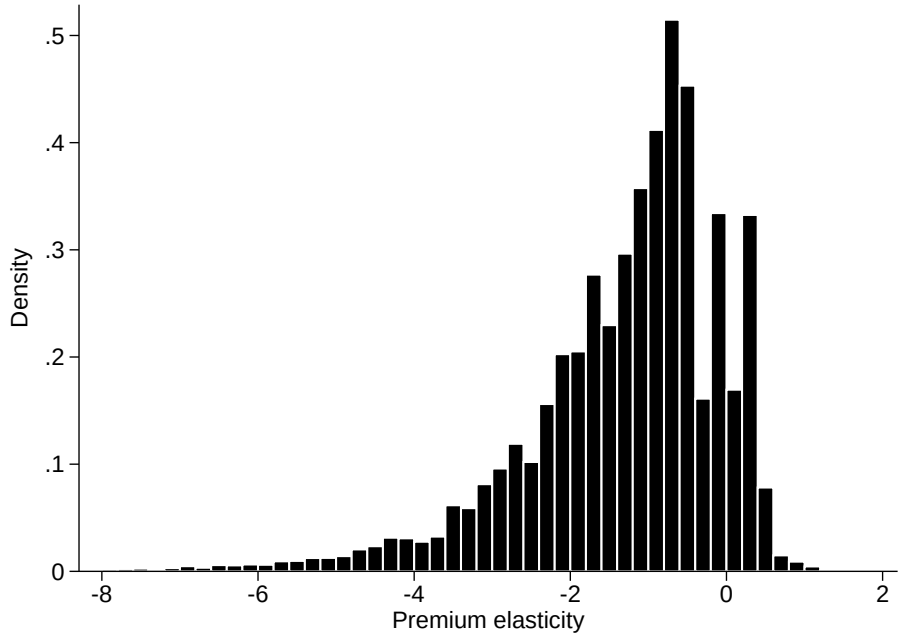
$\longrightarrow$ Average plan premium elasticity: -1.32

▸ Hospital sample ▸ Plan sample ▸ Results ▸ Back to estimation

Hospital and Insurer Demand Elasticities



Hospital price elasticity



Plan premium elasticity

- Average hospital price elasticity: -2.40
- Average plan premium elasticity: -1.32

▸ Hospital demand estimates ▸ Unobservables and quality ▸ Plan demand estimates ▸ Back to Demand

Hospital Demand Estimation Sample

	N	Mean	Std	Min	25%	50%	75%	Max
Copayment	8,290,164	1.078	0.768	0.049	0.514	0.859	1.438	7.418
Public price	690,847	0.086	0.066	0.003	0.040	0.067	0.113	0.596
# Dependents	8,981,011	1.455	1.386	0.000	0.000	1.000	2.000	14.000
Female	8,981,011	0.555	0.497	0.000	0.000	1.000	1.000	1.000
Distance	8,290,164	9.090	6.479	0.000	4.948	7.747	11.855	65.144
Age	8,981,011	27.895	20.260	0.000	0.000	25.000	45.000	60.000
Preferential provider	8,981,011	0.123	0.328	0.000	0.000	0.000	0.000	1.000
Observations	8,981,011							
Choices	690,847							
Consumers	409,512							

Back

Plan Demand Estimation Sample

	N	Mean	Std	Min	25%	50%	75%	Max
Premium	41,496,906	0.164	0.074	0.025	0.118	0.149	0.192	1.634
Female	41,496,906	0.409	0.492	0.000	0.000	0.000	1.000	1.000
# Dependents	41,496,906	0.012	0.181	0.000	0.000	0.000	0.000	10.000
WTP	41,496,906	0.156	0.152	-0.536	0.050	0.124	0.220	2.827
Income	41,496,906	1.518	1.079	0.000	0.700	1.444	2.441	31.852
Observations	41,496,906							
Choices	1,420,518							
Consumers	599,926							

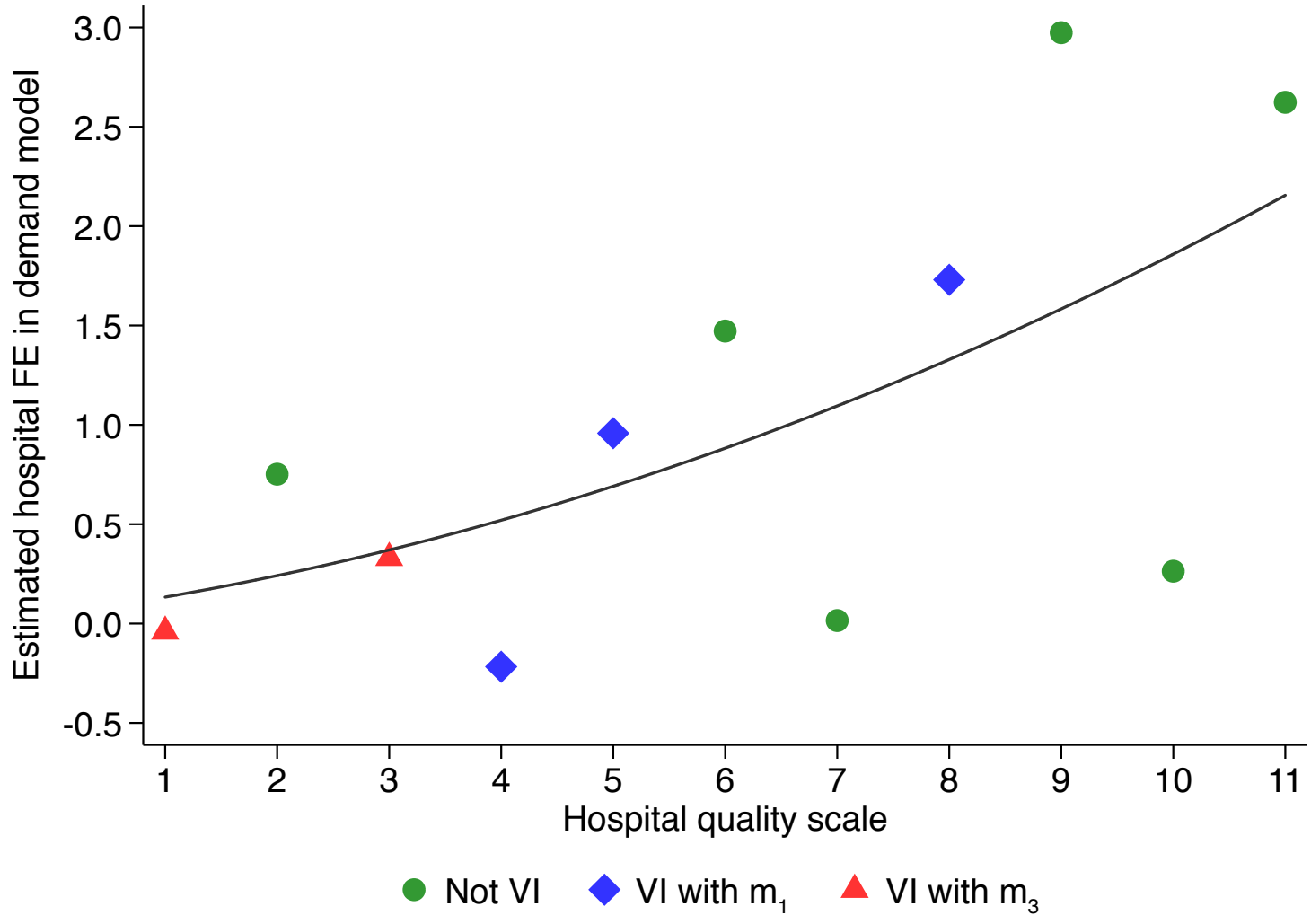
Back

Hospital Demand Estimates

	All	Age $\leq$ 45	Age $>$ 45
Panel A - Preferences estimates	(1)	(2)	(3)
α^H - Hospital price			
Age $\leq$ 25	-2.133***	-2.639***	
	(0.011)	(0.017)	
Age $\in (25, 45]$	-2.168***	-2.644***	
	(0.010)	(0.015)	
Age $\in (45, 60]$	-2.078***		-1.558***
	(0.011)		(0.013)
Age $>$ 60	-1.970***		-1.489***
	(0.011)		(0.013)
Single female	0.441***	0.796***	0.165***
	(0.010)	(0.015)	(0.012)
Dependents	0.375***	0.682***	0.169***
	(0.009)	(0.014)	(0.011)
Income 2nd quartile	-0.294***	-0.285***	-0.288***
	(0.007)	(0.010)	(0.010)
Income 3rd quartile	0.083***	0.167***	-0.040***
	(0.007)	(0.009)	(0.010)
Income 4th quartile	0.495***	0.631***	0.295***
	(0.007)	(0.009)	(0.010)
β_v - Distance to hospital	-0.094***	-0.101***	-0.083***
	(0.000)	(0.001)	(0.001)
Observations	7,899,554	5,098,860	2,800,694

Back

Hospital Unobservables and Hospital Quality



Back

Insurance Demand Estimates

	All	Age ≤ 45	Age > 45	All	Age ≤ 45	Age > 45
	(1)	(2)	(3)	(1)	(2)	(3)
Panel A - Preferences estimates	α^M - Plan premium			β - Network expected utility		
Age ≤ 25	-15.839***	-19.889***		5.871***	11.027***	
	(0.223)	(0.321)		(0.071)	(0.106)	
Age $\in (25, 45]$	-6.486***	-14.385***		5.492***	10.347***	
	(0.097)	(0.253)		(0.034)	(0.083)	
Age $\in (45, 60]$	-8.552***		-3.945***	4.910***		5.246***
	(0.092)		(0.133)	(0.036)		(0.048)
Age > 60	-4.805***		0.375***	2.283***		2.416***
	(0.082)		(0.108)	(0.030)		(0.038)
Single female	-0.409***	0.606**	0.724***	-0.116***	-5.464***	0.781***
	(0.087)	(0.257)	(0.113)	(0.029)	(0.076)	(0.037)
Dependents	-2.747***	-2.484***	-1.609***	-2.630***	-8.175***	-2.076***
	(0.068)	(0.244)	(0.082)	(0.028)	(0.077)	(0.032)
Income 2nd quartile	-9.407***	-7.743***	-8.128***	-0.059***	0.309***	-0.192***
	(0.070)	(0.103)	(0.095)	(0.017)	(0.022)	(0.025)
Income 3rd quartile	1.268***	8.157***	-3.287***	0.748***	1.269***	0.492***
	(0.058)	(0.088)	(0.077)	(0.016)	(0.022)	(0.023)
Income 4th quartile	9.101***	19.940***	2.569***	0.674***	1.199***	0.714***
	(0.053)	(0.086)	(0.058)	(0.017)	(0.024)	(0.024)
Observations	44,276,610	30,234,540	14,042,070	44,276,610	30,234,540	14,042,070

Back

Identification of the Supply Side

- If $\mathbf{c}$ and θ are identified then $\boldsymbol{\lambda}$ is identified
- Financial moments identify hospital average marginal cost $\bar{c}_{ht}$
- Conditional on $\mathbf{c}$, premium and insurer financial moments (mainly) identify $\boldsymbol{\theta}$
- Orthogonality conditions identify within-insurer marginal cost variation:
  - Decompose $c_{hmt} = \bar{c}_{ht} + \zeta_{hmt}$ such that:

$$P_s - \bar{C}_s^H = F(P, \bar{C}, \zeta | \boldsymbol{\lambda}, \boldsymbol{\theta})$$

    for $F(\cdot)$ known function of rival system prices and preferences
  - Non-linear IV logic, need Z orthogonal to ζ and predictor of P

$$\mathbb{E}[\zeta | P] \neq 0$$

    where for Z we use:
    - WTP for the hospital given public prices
    - Mean WTP for other hospitals in the system given public prices
    - Mean over competing hospital WTP using public system prices
    - Mean over rival systems WTP using public system prices

Back

GMM Instrument First Stage

- The first stage regression is:

$$p_{hmt} = z'_{hmt}\beta + \varepsilon_{hmt}$$

	$\hat{\beta}$	S.E.	z	$P > \|z\|$	[0.025	0.975]
WTP hospital	-0.0596	0.051	-1.164	0.244	-0.160	0.041
WTP system	0.0631	0.052	1.207	0.227	-0.039	0.166
WTP rivals	-0.2873	0.058	-4.922	0.000	-0.402	-0.173
WTP system rivals	0.3046	0.060	5.110	0.000	0.188	0.421
Observations	288					
R-squared	0.854					
F-statistic	437.0					

Back

Preliminaries: Risk and Prices

1. **Diagnosis risk**: mean diagnosis frequency over the sample by gender-age
2. **Negotiated prices**:
   - Model assumes a single price is negotiated p_{hmt}, but observe $\tilde{p}_{ihm\tilde{d}t}$.
   - Assumption: **common condition-weight**

$$\ln(\tilde{p}_{ihm\tilde{d}t}) = \ln(p_{mht}) + \ln(\omega_{i\tilde{d}t}) + \epsilon_{ihm\tilde{d}t}, \quad \mathbb{E}[\epsilon|p,\omega] = 0$$

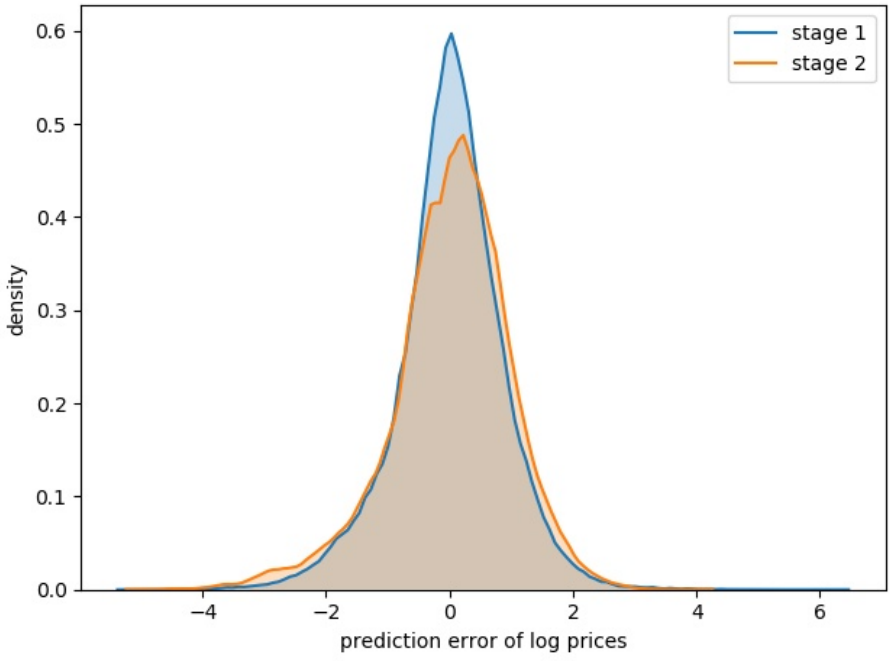
   - Problem: $\omega_{i\tilde{d}t}$ unobserved and $i\tilde{d}$ is too rich, want lower dimension $\kappa(i)d$.
   - Solution: use public system prices and average:

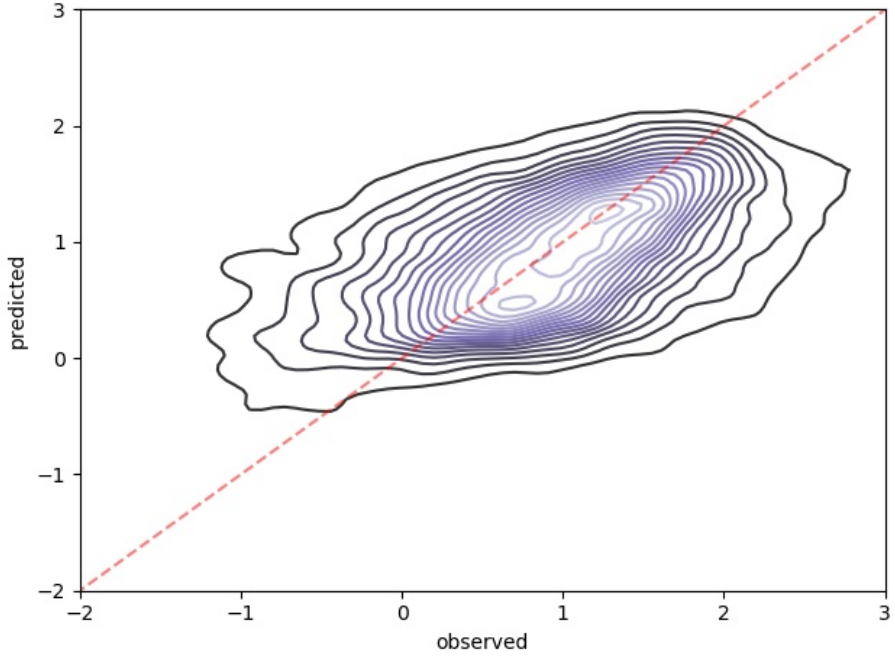
$$\ln(\tilde{p}_{ihm\tilde{d}t}) = \underbrace{FE_{mht}}_{p_{mht}} + \alpha \ln(p^{pub}_{i\tilde{d}t}) + \epsilon_{ihm\tilde{d}t}$$

$$\hat{\alpha} \ln(p^{pub}_{i\tilde{d}t}) = \underbrace{FE_{\kappa(i)dt}}_{\omega_{dt}} + \varepsilon_{\tilde{d}t}$$

▸ Fit assessment ▸ Back

Negotiated Price Fit





Back

Supply Side Estimates

Hospitals	Marginal Cost	Negotiated Price	Mark-up
All Hospitals	3.02	4.50	0.386
VI Hospitals	2.09	3.40	0.406
Non-VI Hospitals	3.94	5.60	0.366
VI Hospitals to VI-own insurer	2.29	3.33	0.341
VI Hospitals to non VI-own insurer	2.04	3.42	0.422

- Marginal cost of VI slightly higher for own-VI
- Average price for non-VI distorted upward by two premium hospitals
- No double-marginalization does not imply no mark-up

▸ Bargaining weights ▸ Back

Bargaining Weight Estimates

- Bargaining weights are estimated as:

$$\lambda_{hm} = \bar{\lambda}_h \alpha_{VI(h,m)} + (1 - \alpha_{VI(h,m)})\bar{\lambda}_m$$

where underlined number are VI weights on insurer profits

Hospital / Insurer	Banmedica	Colmena	Consalud	Cruzblanca	Masvida
UC	1	0.892	1	0.765	0.655
UC San Carlos	0.942	0.475	0.942	0.347	0.238
U. de Chile	1	0.891	1	0.763	0.653
Alemana	0.909	0.237	0.909	0.109	1e-08
Avansalud	0.695	1.69e-08	0.466	1.32e-08	1e-08
Bicentenario	0.695	1.69e-08	0.466	1.32e-08	1e-08
Davila	0.204	0.178	0.749	0.178	0.178
Indisa	0.948	0.519	0.948	0.392	0.282
Las Condes	0.913	0.267	0.913	0.14	0.0303
Santa Maria	0.204	0.178	0.749	0.178	0.178
Tabancura	0.695	1.69e-08	0.466	1.32e-08	1e-08
Vespucio	0.204	0.178	0.749	0.178	0.178

Back

Banning VI: Consumer Surplus

Consumers	Market share	Premium sensitivity (α)	Δ Consumer surplus
Female 0-24	1.482%	-21.480	-0.002
Female 25-44	22.747%	-11.332	0.025
Female 45-60	9.510%	-7.954	0.075
Female 60+	4.204%	-4.151	0.200
Male 0-24	4.633%	-24.093	-0.007
Male 25-44	36.839%	-9.879	0.043
Male 45-60	14.562%	-7.069	0.070
Male 60+	6.022%	-3.758	0.132
Weighted average		-9.838	0.055

- Consumers willing to pay $55/year to ban VI, or $\sim$4% higher premiums
- Heterogeneity driven by premium-sensitivity and preferences over hospitals

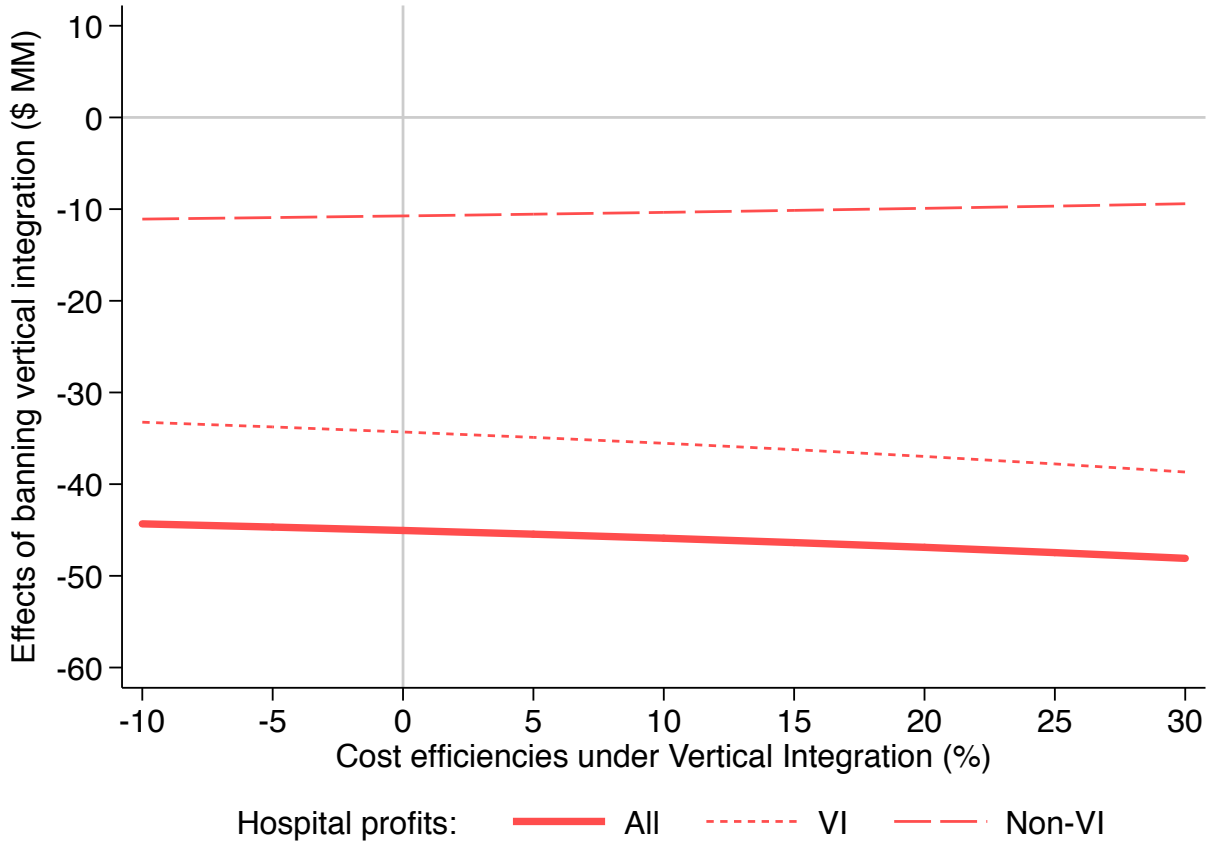
Back

Banning VI: Welfare Effects and Cost Efficiencies

Cost Efficiency	Consumers	Hospitals	Insurers	Total
-10%	101.342	-44.090	100.915	158.167
-5%	95.850	-44.433	100.827	152.244
0%	90.104	-44.803	100.732	146.032
5%	84.088	-45.204	100.629	139.514
10%	77.787	-45.638	100.517	132.666
15%	71.180	-46.111	100.397	125.466
20%	64.248	-46.627	100.268	117.888
25%	56.971	-47.194	100.130	109.907
30%	49.327	-47.817	99.983	101.493

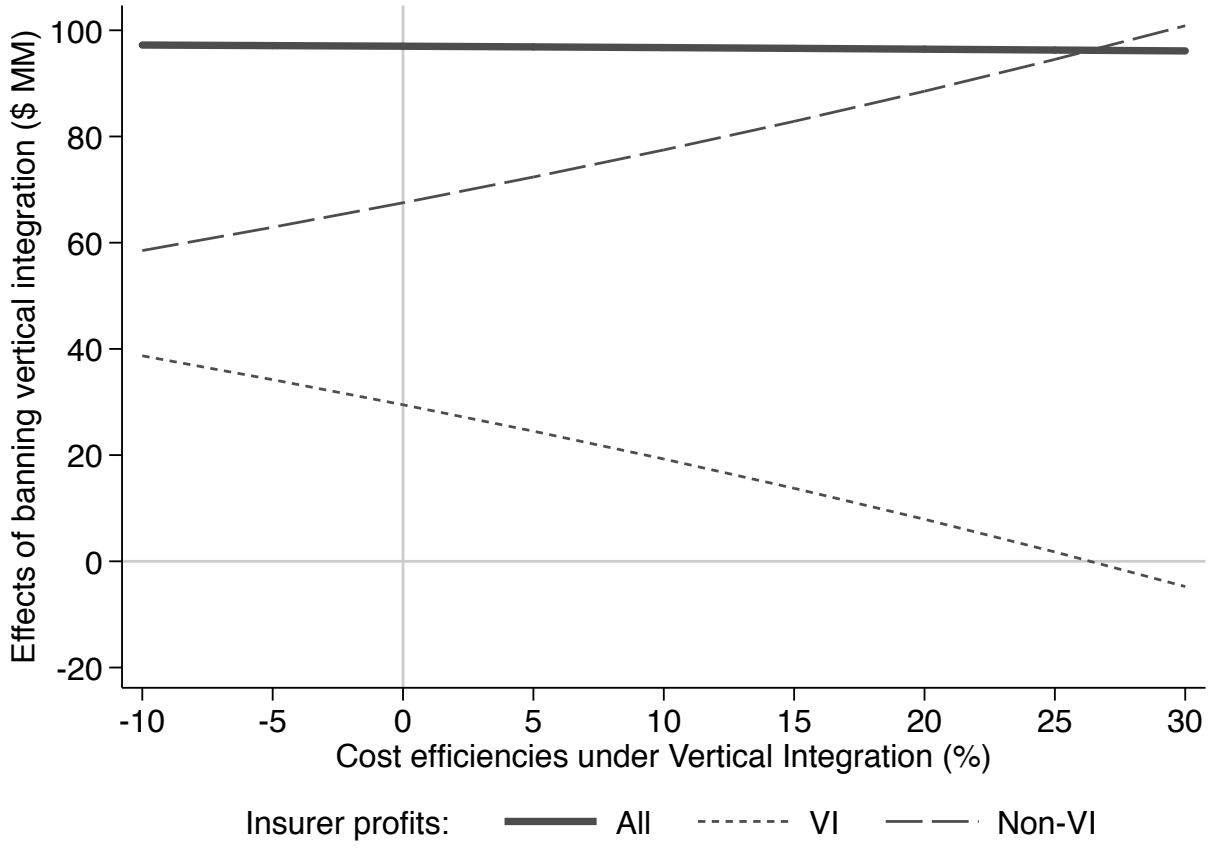
Back

Banning VI: Hospital Profits



Back

Banning VI: Insurer Profits



Back