Insurer Competition in Health Care Markets
Kate Ho (Columbia & NBER)
Robin S. Lee (Harvard & NBER)

November 12, 2015
8th Annual FTC Microeconomics Conference
Motivation

- Recent changes in US health insurance markets:
  - State & federal exchanges [PPACA 2010]
  - Employer sponsored markets:
    1. Increasing variety of insurance products
    2. Alleged non-compete agreements (e.g., BlueShield-BlueCross)
    3. Proposed mergers (e.g., Aetna-Humana, Centene-Health Net)

- **Insurer Competition** can *increase the quality of care* and *reduce premiums & costs*…
  …but due to *imperfectly competitive* insurance and medical provider (hospital, physician) markets, other effects *may not be welfare improving*

- This paper studies how insurer competition affects: *welfare (consumer & firm), hospital prices* and *premiums*
Consumers enroll in an insurer (MCO) offered by their employer or exchange, and obtain access to its hospital network
- 61% of non-elderly people in U.S. (2014)

Hospital network and reimbursements (prices) are determined by bilateral negotiations

Increased insurer competition can:
1. Lead to premium competition (potentially depressing hospital prices)
2. Provides hospitals with greater leverage to “play insurers off” one another and negotiate higher prices (mitigating premium reductions)

Net price effect is ambiguous and likely heterogeneous across markets
Objectives and Approach

1. **Develop, specify, and estimate a (stylized) model of:**
   - (i) Hospital-insurer bargaining, (ii) insurer premium setting, (iii) household insurer demand, and (iv) individual hospital demand
   - Decompose how insurer competition affects negotiated hospital prices ($350 billion of annual U.S. health care expenditures)
   - *Provide a framework for examining related issues in health care markets*

2. **Simulate the removal of an insurer from choice set**
   - California Public Employees’ Retirement System (CalPERS)
   - 2004 CA admissions, claims & enrollment data for 1.2M individuals
   - *[Relevant for employer-sponsored markets & exchanges]*

3. **Preview of results from removing an insurer:**
   - Premiums rise by 4-10% (but depend on whether insurers are constrained)
   - Hospital prices can both rise *and* fall by as much as 15-25% across markets, leading to a redistribution of rents across hospitals
   - (“Countervailing Effect” is empirically plausible in some markets…)
Related Literature (Briefly)

1. **Market concentration on hospital prices:** [c.f. Gaynor Town 12]
   - Many rely on HHI-regression analyses (cross-section and panel)
     - Insurer Concentration: [Moriya et al 10, Melnick et al 10, Dafny et al 10, 12,…]
     - Hospital Concentration: [Burgess et al 05, Capps Dranove 04, Dafny 09,…]
   ➔ Use formal model to decompose mechanisms, capture *heterogeneous effects*, and conduct *out-of-sample* counterfactuals and welfare evaluation

2. **Structural Models of Hospital-Insurer Demand / Bargaining**
   - Many abstract away from insurer competition (focus on hospital mergers)
     [E.g., Town Vistnes 01, Capps Dranove Satterthwaite 03, Lewis Pflum 13, Gowrisankaran Nevo Town 14; exceptions: Ho 06/09, Lee Fong 13]
   ➔ Estimation & counterfactual simulation w/ multiple MCOs & hospitals; Control for selection of and demand by households for insurers

3. **Broader IO literature on Bargaining in Vertical Markets:**
   - **Methods:** [Crawford Yurukoglu 12, Crawford Lee Whinston Yurukoglu 15, …]
   - **Countervailing Power:** [Galbraith 52, Chipty Snyder 99, Ellison Snyder 10, …]
Roadmap

- Theoretical Model
- Empirical Analysis
- Counterfactual Simulations
- Conclusion
Model: (Simplified) Timing & Setup

1. (a) Hospitals and MCOs *bargain* over prices $p$
   (b) MCOs set *premiums* $\Phi$

2. Households *choose insurer*: $D_j$ (household) and $D^E_j$ (individual) demand for MCO $j$

3. Individuals become sick and *choose a hospital*: $D^H_{hj}$ is demand for hospital $h$ on MCO $j$’s network

**Profit Equations:**

**MCO $j$:**
\[
\pi^M_j = D_j \phi_j - D^E_j \eta_j - \sum_{h \in G_j} D^H_{hj} p^*_h
\]

**Hosp $i$:**
\[
\pi^H_i = \sum_{n \in G_i} D^H_{in} (p^*_n - c_i)
\]
Model: Hospital-Insurer Bargaining Equation

Each MCO $j$ and Hospital $i$ engage in simultaneous bilateral Nash bargaining over “gains-from-trade”. Implied F.O.C. yields:

$[\text{Horn Wolinsky 88, Crawford Yurukoglu 12; Collard-Wexler Gowrisankran Lee 14}]$

$[\text{Generalized to system bargaining in paper}]$

$$p_{ij}^* D_{ij}^H = (1 - \tau_j) \left[ (\Delta_{ij} D_j \phi_j - \Delta_{ij} D_j^E \eta_j) - \sum_{h \in G_{j \setminus i} } p_{hj}^* [\Delta_{ij} D_{hj}^H ] \right]$$

**Total Payments** from MCO $j$ to Hospital $i$

(i) **Premium & Enrollment Effect:**
Change in MCO $j$’s premium revenues (net of non-hospital costs) when losing hospital $i$

(ii) **Price Reinforcement Effect:**
Change in MCO $j$’s payments to other hospitals when losing hospital $i$

$+ \tau_j \left[ D_{ij}^H c_i \right] - \left[ \Delta_{ij} D_{i,j}^H \right] (p_{h,-j}^* - c_i)$

(iii) **Hospital Costs**

(iv) **Recapture Effect:**
Change in hospital $i$’s “profits” from other insurer $-j$ when dropping MCO $j$
Model: Hospital-Insurer Bargaining Equation

Hospital “Gains-From Trade” (<0)

(iii) Hospital Costs
(iv) Recapture Effect

MCO “Gains-From-Trade” (>0)

(i) Premium & Enrollment Effect
(ii) Price Reinforcement Effect
Model: Hospital-Insurer Bargaining Equation

Hospital “Gains-From Trade” (<0)

(iii) Hospital Costs
(iv) Recapture Effect

MCO “Gains-From-Trade” (>0)

(i) Premium & Enrollment Effect
(ii) Price Reinforcement Effect

Total Pmts if $\tau = 1$
Model: Hospital-Insurer Bargaining Equation

Hospital “Gains-From Trade” (<0)

(iii) Hospital Costs
(iv) Recapture Effect

MCO “Gains-From-Trade” (>0)

(i) Premium & Enrollment Effect
(ii) Price Reinforcement Effect

Total Pmts if $\tau = .5$
Model: Hospital-Insurer Bargaining Equation

Hospital “Gains-From Trade” (<0)

(iii) Hospital Costs
(iv) Recapture Effect

MCO “Gains-From-Trade” (>0)

(i) Premium & Enrollment Effect
(ii) Price Reinforcement Effect

Total Pmts if τ = 0
Roadmap

- Theoretical Model
- Empirical Analysis
  - Setting & Data
  - Model: Hospital and Insurer Demand, Premium-setting and Bargaining
- Counterfactual Simulations
- Conclusion
Empirical Analysis: Setting & Data

- **California (CalPERS 2004)**
  - Agency managing pension/health benefits for CA public employees (~1.2M covered lives, ~10% total CA commercial market)
  - Markets: 14 HSAs (health service areas) defined by CA OSHPD

- **Stable choice set of 3 insurers (2/3 of total CA commercial mkt):**
  - BlueShield of CA HMO (BS) – 45% of enrollees
  - Anthem Blue Cross PPO (BC) – 16% of enrollees
  - Kaiser Permanente HMO (K) – 39% of enrollees

- **Data: Admissions, Claims, Enrollment, Networks, Plans**
  - Admissions: 35.6K inpatient admissions
  - **Claims: Observed prices per-admission (w/ DRG weight)**
  - Enrollment: 163K HHs (426K indivs) w/ salary, fam. composition
  - Networks: 400 insurer-hospital pairs w/ > 10 admissions
  - Supplemental: AHA Hospital Data (Costs, Systems, Characteristics)
Households pay only 20% of annual premiums

CalPERS constrains premiums: vary only by household size; 2-party and family are fixed multiples of single party premium.
Empirical Analysis: Matching the Model to the Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Data &amp; Inputs</th>
<th>Outputs</th>
</tr>
</thead>
</table>

### Empirical Analysis: Matching the Model to the Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Data &amp; Inputs</th>
<th>Outputs</th>
</tr>
</thead>
</table>
| **III. Hospital Demand**<br>(Individual) | Admissions (age-sex-diag-zip)<br>Hospital Networks | 1. Patient flows for any network  
2. EU of hospital network |
Empirical Analysis: Matching the Model to the Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Data &amp; Inputs</th>
<th>Outputs</th>
</tr>
</thead>
</table>
| **III. Hospital Demand**  (Individual) | Admissions (age-sex-diag-zip) Hospital Networks | 1. Patient flows for any network  
2. EU of hospital network |
| **II. Insurer Demand**  (Household)     | Household Enrollment, Family Characteristics, Premiums, Networks, [Hospital Demand] | 1. Insurer premium & network “elasticities”  
2. Enrollment for any CF network |
## Empirical Analysis: Matching the Model to the Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Data &amp; Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>III. Hospital Demand</strong></td>
<td>Admissions (age-sex-diag-zip) Hospital Networks</td>
<td>1. Patient flows for any network&lt;br&gt;2. EU of hospital network</td>
</tr>
<tr>
<td>(Individual)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Hospital Networks</strong></td>
<td></td>
</tr>
<tr>
<td><strong>II. Insurer Demand</strong></td>
<td>Household Enrollment, Family Characteristics, Premiums, Networks, [Hospital Demand]</td>
<td>1. Insurer premium &amp; network “elasticities”&lt;br&gt;2. Enrollment for any CF network</td>
</tr>
<tr>
<td>(Household)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ib. Hospital-Insurer Bargaining</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Empirical Analysis: Matching the Model to the Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Data &amp; Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>III. Hospital Demand</strong></td>
<td>Admissions (age-sex-diag-zip) Hospital Networks</td>
<td>1. Patient flows for any network</td>
</tr>
<tr>
<td>(Individual)</td>
<td></td>
<td>2. EU of hospital network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>II. Insurer Demand</strong></td>
<td>Household Enrollment, Family Characteristics, Premiums, Networks, [Hospital Demand]</td>
<td>1. Insurer premium &amp; network “elasticities”</td>
</tr>
<tr>
<td>(Household)</td>
<td></td>
<td>2. Enrollment for any CF network</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ia. Premium Setting</strong></td>
<td>Premiums, Prices, Networks, [Hospital + Insurer Demand]</td>
<td>1. Estimates of MCO (non-hospital) MCs</td>
</tr>
<tr>
<td><strong>Ib. Hospital-Insurer</strong></td>
<td></td>
<td>2. “Bargaining Weights”</td>
</tr>
<tr>
<td>Bargaining</td>
<td></td>
<td>3. CF premiums and negotiated prices</td>
</tr>
</tbody>
</table>

- Detailed demand systems (I+II) restrict the sensitivity of results to particulars of bargaining specification
Stage III: Hospital Demand

- **Utility** of individual $k$ with diagnosis $l$ from hospital $i$:

$$\begin{align*}
    u_{k,i,l,m}^H &= \hat{\partial}_i + z_i \gamma_{k,l} \beta^z + d_{k,i} \beta^d_m + \epsilon_{k,i,d}^H \\
    \text{Hospital fixed effects} & \quad \text{hospital x ind. chars} & \quad \text{distance} & \quad \text{Type I EV (mkt specific)}
\end{align*}$$

- **Estimate**: MLE using 35,570 inpatient admissions for BS & BC  
    [Control for choice set (network of hospitals on each plan)]

- **Output**: patient flows for any potential hospital network

- **Identification**: unobservable preference shocks uncorrelated with observable hospital characteristics (including location) [c.f., Ho (2006)]

- **WTP** (in utils): Individual $k$ of age-sex type $\kappa(k)$ for MCO $j$’s network:

$$WTP_{k,m}(G_{j,m}) = \gamma_{\kappa(k)}^a \sum_l \gamma_{\kappa(k),l} E_{\epsilon} \left[ \max_{h \in G_{j,m}} u_{k,h,l,m}^H \right]$$

Prob that type $\kappa(k)$ is admitted and diagnosed with $l$
Stage II: Insurer Demand (1/2)

- **Utility** of family $f$ for insurer $j$:

\[
\begin{align*}
u_{f,j,m}^M &= \partial_{j,m} + \alpha_f \phi_{\lambda(f),j} + \sum_{\kappa} \alpha_{W_{k,m}} \sum_{k \in f, \kappa(k)=\kappa} WTP_{k,m}(G_{j,m}) + \varepsilon_{f,j,m}^M \\
\end{align*}
\]

- **Details**: $\lambda(f)$ \{single, 2-party, family\}; Kaiser is “outside option”
- **Estimate**: MLE on 163K households (426K indivs), 14 markets
- **Identification**:
  - WTP: within-plan, within-market variation across zip codes in distance to hospitals within networks
  - Premiums: within-plan variation across household types
    - (Premiums for 2-party and families are fixed multiple of single premium)
    - Cond’l on income, premium sensitivities do not vary across household types
Stage II: Insurer Demand (2/2)

- **Output**: WTP & premium elasticities, insurer market shares (for every family type, any hospital network, any level of premiums)

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>2-Party</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS</td>
<td>-1.25</td>
<td>-2.18</td>
<td>-2.56</td>
</tr>
<tr>
<td>BC</td>
<td>-1.62</td>
<td>-2.50</td>
<td>-2.94</td>
</tr>
<tr>
<td>Kaiser</td>
<td>-1.20</td>
<td>-2.04</td>
<td>-2.41</td>
</tr>
</tbody>
</table>

- Recovered premium elasticities in-line with previous estimates:

- **Selection** on [age-sex-zip, family type, income] across insurers; insurers internalize this and face "cream-skimming" incentives
Stage I: Premium Setting and Bargaining (1/2)

We jointly estimate insurer marginal costs \( \{\eta_{BS}, \eta_{BC}, \eta_K\} \) and Nash bargaining parameters \( \{\tau_{BS}, \tau_{BC}\} \) via GMM using 3 sets of moments:

(i) Premium Setting:
- Insurers compete via **Nash Bertrand** premium setting
- Variants (competition for inclusion on choice set):
  a) A “scaled” elasticity of demand wrt premiums
  b) Included by an employer with some prob. \( z(\cdot) \):
  \[
  \max_{\varphi} z(\varphi) \pi_j^M (\varphi, \cdot)
  \]
  c) Fixed markups (MLR regulations)

(ii) Insurer Margins: (for alternatives to Nash Bertrand)
- Match 2004 CA DMHC data on [total medical costs / total revenues]
- Lower margins than implied by premium elasticities → interpreted as constraints on premium setting behavior
Stage I: Premium Setting and Bargaining (2/2)

(iii) Hospital-Insurer Bargaining:

\[ p_{ij} D_{ij}^H = (1 - \tau_j) \left( \left[ \Delta_{ij} D_j \right] \phi_j - \sum_{h \in G_j \setminus i} p_{hj} \left[ \Delta_{ij} D_{hj}^H \right] \right) - (1 - \tau_j) \eta_j \left[ \Delta_{ij} D_j^E \right] \]

Total Payments (DRG adjusted)

(i) & (ii) Premium, Enrollment, Price Reinforcement Effects

+ \tau_j \left[ D_{ij}^H c_i - \left[ \Delta_{ij} D_{ij}^H \right] \left( p_{h,-j}^e - c_i \right) \right] + \omega_{ij}

(iii) Hospital Costs

(iv) Recapture Effect

(Paper adapts equation to account for hospital systems bargaining jointly)

- Moments: \( E[\omega_{ij} Z] = 0 \) where instruments are constructed from equation, replacing prices with costs and \( \Delta WTP_{h,j} \) of other hospitals.

- Identification: correlation of prices w/ costs, enrollment changes
### Estimates: Cost and Bargaining Parameters

<table>
<thead>
<tr>
<th></th>
<th>(iv)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insurer Marginal Costs</strong></td>
<td></td>
</tr>
<tr>
<td>$\eta_{BS}$</td>
<td>1,645.18</td>
</tr>
<tr>
<td>(94.13)</td>
<td></td>
</tr>
<tr>
<td>$\eta_{BC}$</td>
<td>2,113.84</td>
</tr>
<tr>
<td>(69.36)</td>
<td></td>
</tr>
<tr>
<td>$\eta_K$</td>
<td>2,507.22</td>
</tr>
<tr>
<td>(46.09)</td>
<td></td>
</tr>
</tbody>
</table>

*Kaiser includes hospital costs*

- **Non-Hosp Marginal Costs:**
  - KFF (CA ’14): $1,836 pp/py on physician & clinical services
  - MA APCD (’10-’12): $1,644 pp/py on prof services (3 largest commercial payers)

- **Bargaining Parameters:**
  - Hospitals are able to capture a significant share of insurers’ GFTs

- **Elasticity Scaling:**
  - Insurers perceive ~3x larger
  - Alternative Model: insurers perceive a $100 increase in premiums increases probability of being dropped by 9.5%

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nash Bargaining Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>$\tau_{BS}$</td>
<td>0.13 (0.03)</td>
</tr>
<tr>
<td>$\tau_{BC}$</td>
<td>0.17 (0.04)</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elasticity Scaling</strong></td>
<td>$\rho$ 2.85 (0.20)</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Bargaining Use Margin Moments</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td>266</td>
</tr>
</tbody>
</table>
Roadmap

- Theoretical Model
- Empirical Analysis
- Counterfactual Simulations
- Discussion & Conclusion
Removing an Insurer from the Choice Set

- **Recompute Equilibrium:** negotiated prices, premiums, enrollment, utilization (in all markets, for all households and individuals)
- **Hold Fixed:** Non-premium characteristics of remaining insurers (e.g., networks), characteristics of hospitals, entry/exit of providers
- **Presentation:** Focus only Counterfactual #1 (Remove BC)
Counterfactual #1: Remove BC

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>(i) Remove BC</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Amount</td>
<td></td>
</tr>
<tr>
<td><strong>Premiums</strong></td>
<td>BS</td>
<td>3.69</td>
<td>3.85</td>
</tr>
<tr>
<td>(Single, $000/yr)</td>
<td></td>
<td>[3.49, 4.02]</td>
<td>[3.62, 4.27]</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>3.99</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Kaiser</td>
<td>3.90</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[3.74, 4.15]</td>
<td>[3.95, 4.04]</td>
</tr>
<tr>
<td><strong>Avg Hosp Prices</strong></td>
<td>BS</td>
<td>6.87</td>
<td>6.78</td>
</tr>
<tr>
<td>($000 / Admission)</td>
<td></td>
<td>[5.76, 8.80]</td>
<td>[5.58, 8.92]</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>5.39</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[4.86, 6.69]</td>
<td>-</td>
</tr>
<tr>
<td><strong>Surplus</strong></td>
<td>Insurer</td>
<td>0.48</td>
<td>0.59</td>
</tr>
<tr>
<td>($000 / Capita)</td>
<td></td>
<td>[.42, .54]</td>
<td>[.54, .66]</td>
</tr>
<tr>
<td></td>
<td>Hospitals</td>
<td>0.21</td>
<td>0.23</td>
</tr>
<tr>
<td>(Non-K)</td>
<td></td>
<td>[.18, .23]</td>
<td>[.18, .29]</td>
</tr>
<tr>
<td>Δ Cons.</td>
<td>-</td>
<td>-</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

- Premiums increase by ~4% for BS (11% if unconstrained)
- *Average hospital prices and payments relatively unchanged for BS*
- Surplus higher for insurers, lower for consumers ($50/capita)
- **Premiums fixed:** hospital prices fall (enrollment effect dominates)
- **Premiums adjust:** heterogeneous effect. Hospital prices rise in most markets when BC exits, but fall in some areas. Zero effect on avg.
Discussion: Removing an Insurer

- Higher premiums overall, higher hospital prices in many markets
  - Premiums rise by 4-10% depending on insurer that is removed (and 10-20% w/o constraints); consumer welfare harmed
  - Can be mitigated if significant constraints on premium setting behavior

- However, removal of BC allows BS to negotiate lower prices in some markets (particularly where BC was a stronger competitor)
  - Hospital prices fall by ~15% in certain markets (but rise in most others)
  - Redistribution of rents across hospitals and potential long-term implications (can identify markets that are most likely to be affected)

- Key Caveat: holds fixed (non-premium) provider characteristics

- Suggests that countervailing power effects are empirically relevant and can constrain spending in certain markets
Concluding Remarks

1. Establish the empirical plausibility of insurer concentration leading to a countervailing effect on hospital prices
   a) Plausible mechanism by which insurance mergers can lead to “cost savings”
   b) Though premiums are likely to increase, we also provide conditions under which both premiums + hospital prices can fall
   c) **Highlights important details to consider in policy evaluation**

2. Quantify the heterogeneity of price impacts across hospitals
   a) Decompose hospital prices into estimable components
   b) Longer-term hospital incentives [investment, entry, exit, merger]

3. Provide a framework to analyze equilibrium changes in markets with competing insurers and non-overlapping networks
   a) Implications for employer-sponsored markets, insurance exchanges
   b) **Costs and benefits more nuanced than simple models might predict**
Empirical Analysis: Setting & Data (2/2) - Prices

- We observe the payment for every hospital-MCO-admission:

- We assume each hospital $i$ and MCO $j$ bargain over a "DRG-adjusted" price $p^*_{ij}$ per admission $a$, approximated by:

  $$p^e_{ij} = \frac{1}{\# A_{ij}} \sum_{a \in A_{ij}} \frac{p^o_a}{DRG_a} = p^*_{ij} + \varepsilon^A_{ij}$$

  [DRG weights control for resource utilization / severity per admission]

- $\varepsilon^A_{ij}$: average of unanticipated admission-specific payment shocks (mean 0, independent of insurer and hospital observed characteristics) Source of “unobservable” in bargaining and premium-setting equations
Estimates: Hospital Price Decomposition

Table 6: Estimates: Negotiated Hospital Price Decomposition

<table>
<thead>
<tr>
<th></th>
<th>(i) Premium &amp; Enrollment</th>
<th>(ii) Price Reinforcement</th>
<th>(iii) Hospital Costs</th>
<th>(iv) Recapture Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS</td>
<td>31.9%</td>
<td>50.3%</td>
<td>17.3%</td>
<td>0.5%</td>
</tr>
<tr>
<td></td>
<td>[28.2%, 32.7%]</td>
<td>[45.0%, 51.3%]</td>
<td>[14.4%, 18.3%]</td>
<td>[0.4%, 0.5%]</td>
</tr>
<tr>
<td>BC</td>
<td>34.4%</td>
<td>38.2%</td>
<td>24.6%</td>
<td>2.7%</td>
</tr>
<tr>
<td></td>
<td>[30.9%, 35.8%]</td>
<td>[34.5%, 39.5%]</td>
<td>[22.3%, 26.5%]</td>
<td>[2.4%, 3.0%]</td>
</tr>
</tbody>
</table>

Total Pmts @τ = .13, .17
### Table 3: Admission Probabilities and DRG Weights

<table>
<thead>
<tr>
<th>Age-Sex Category</th>
<th>Admission Probabilities</th>
<th>DRG Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OSHPD</td>
<td>CalPERS</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>BS</td>
</tr>
<tr>
<td>0-19 Male</td>
<td>2.05%</td>
<td>1.78%</td>
</tr>
<tr>
<td>20-34 Male</td>
<td>2.07%</td>
<td>1.66%</td>
</tr>
<tr>
<td>35-44 Male</td>
<td>3.11%</td>
<td>2.79%</td>
</tr>
<tr>
<td>45-54 Male</td>
<td>5.58%</td>
<td>5.29%</td>
</tr>
<tr>
<td>55-64 Male</td>
<td>10.49%</td>
<td>10.13%</td>
</tr>
<tr>
<td>0-19 Female</td>
<td>2.28%</td>
<td>1.95%</td>
</tr>
<tr>
<td>20-34 Female</td>
<td>11.19%</td>
<td>11.75%</td>
</tr>
<tr>
<td>35-44 Female</td>
<td>7.91%</td>
<td>7.31%</td>
</tr>
<tr>
<td>45-54 Female</td>
<td>6.87%</td>
<td>6.16%</td>
</tr>
<tr>
<td>55-64 Female</td>
<td>9.74%</td>
<td>9.01%</td>
</tr>
</tbody>
</table>
Recall Predictions of Theory

- The effect of removing an insurer on negotiated prices $p_{ij}$:

  - *la. Premium effect:* softer premium competition, higher $p_{ij}$
  
  - *lb. Enrollment effect:* dropping a hospital causes smaller loss in insurer j’s enrollment, improves j’s outside option, lower $p_{ij}$
  
  - *IV. Recapture effect:* when hospital i dropped, fewer consumers may switch plans to keep access to hospital i; i’s outside option worsens, lower $p_{ij}$

  - *II. Price reinforcement effect:* changes in both enrollment and other hospital prices; *ambiguous* effect on $p_{ij}$

- We predict the net effects across markets and hospitals
Recap: Estimation & Identification of Model

- Premiums, hospital prices and costs, consumer and household choices of hospital and insurance plan are all observed in the data.

- Hospital and insurer demand identified from individual-level data on observed choices over observed product choice sets (MLE):
  - Exogenous variation in premiums by construction
  - Assume exogenous variation in consumer location

- Insurer premium-setting & margin moments identify non-hosp costs:
  - We assume premiums set to maximize insurer profits given costs
  - Demand estimates provide premium elasticities – a crucial input
  - Also utilize observed insurer markups – important tie to reality
  - We perform multiple robustness tests re: assumptions here

- Remaining piece is bargaining equation:
  - To estimate bargaining weights
  - And provide structure to predict price effects of removing an insurer