March 2010 health reforms include physician financial incentives to control costs in the Medicare and Medicaid programs
  - Accountable Care Organizations share cost savings
  - Physicians receive bundled payments for episodes including hospitalizations

Goal: cost control without compromising quality

Similar cost control incentives currently used by health maintenance organizations (HMOs) for private enrollees in California

Previous papers document lower costs in HMOs compared to other insurers but not the mechanisms used.

This paper: do patients whose physicians have a financial incentive to control costs receive care at lower-priced hospitals?
Motivation cntd.

- A substantial previous literature uses hospital discharge records to estimate models of hospital choice.
- Important for regulatory analysis (e.g., hospital mergers and investment):
  - How much do decision-makers value each hospital?
  - How much would the valuation change after merger/investment?
- But previous papers largely ignore impact of price paid by the insurer to the hospital.

We address this issue. Are hospital choices ever influenced by price paid by insurer to hospital?
Outline

- Overview of the Market and the Model
  - Why should choices respond to hospital prices?
  - How will we estimate price sensitivity?

- Previous Literature

- The Data

- The Model
  - Multinomial Logit Analysis
  - Inequalities Methodology

- Results and Conclusion
Focus on HMOs (53% of employed population)

7 largest HMOs had 87% of HMO market: we consider all but Kaiser

Physician contracts: California Delegated Model dominates
  - HMOs have non-exclusive contracts with large physician groups

Two payment mechanisms for physician groups

Capitation payments (fixed pmt per patient to cover services provided): physician groups have incentives to control hospital costs
  - Global capitation: payment covers both primary care and hospital stays
  - Non-global include "shared risk arrangements" (group shares in inpatient cost savings made relative to pre-agreed target)

These incentives are passed on to individual physicians

Alternative: fee-for-service contracts do not generate these incentives.
Implications for Analysis

- We utilize hospital discharge data for California in 2003, focus on women in labor
- Dataset does not identify patients’ physician groups or details of compensation schemes
- We observe each patient’s insurer and percent of each insurer’s payments for primary services that are capitated
- Considerable dispersion across insurers
  - Blue Cross: 38% capitated payments
  - Pacificare: 97% capitated payments

Questions: Are hospital choices influenced by price? Does price matter more when the patient is enrolled in a high-capitation insurer?

- If so, physicians likely to be responding to incentives generated by capitation contracts.
Possible Mechanisms for Causal Effect

- Obstetrician (OB) often affiliated with 1-3 hospitals
- Patient chooses OB based partly on hospital affiliation
- Interview evidence indicates physician group practice managers pass on price information to OBs.

Two possible mechanisms

- Within-physician differential treatment of patients
  - Consistent with previous literature
  - e.g. Melichar (2009), capitated patients have shorter visits than others within-physician
- Physicians with majority capitated patients use the cheaper hospital; others do not
  - More likely if some obstetricians affiliated with a single hospital.
Overview of the Model

Estimate utility of physician/patient agent making hospital choice:

\[ W_{i,\pi,h} = \theta_{p,\pi}(price_{i,\pi,h}) + g_{\pi}(q_h(s), s_i) + \theta_d d(l_i, l_h) + \varepsilon_{i,\pi,h} \]

- \( price_{i,\pi,h} \) = price paid by insurer to hospital for patient \( i \)'s services
- \( d(l_i, l_h) \) = distance between hospital and patient’s home
- \( s_i \) = measure of patient severity
- \( q_h(s) \) = vector of perceived qualities for different sickness levels
- \( g_{\pi}(.) \) = flexible function interacting \( q_h(s) \) and \( s_i \)
  - Permits hospitals to have higher quality for some sickness levels
  - And preferences for quality to differ across severities
  - Ideally would interact every severity group with hospital F.E.s.

Questions: Is the price coefficient negative? Is it more negative when insurer gives physicians incentive to control costs?
An Additional Issue: PPOs

- PPO as well as HMO enrollees sometimes included in the data
  - For BS and BC only (lowest-capitation insurers in data)
  - Cannot identify HMO enrollees separately from PPO

- Same mechanism for admission to hospital except that patient can go out-of-network if pays extra

- OOP prices may also be different:
  - HMOs: small copay (approx $200) for inpatient visit
  - PPOs: may have coinsurance rate (higher out-of-network)

- We drop hospitals to which very few patients admitted (likely out-of-network)

- Our inequalities method allows patients to have different preferences/discretion in different insurers

- Prices: KFF Survey 2003 suggests only 15% pay coinsurance rate, but still may affect interpretation of results.
Previous Literature

HMO cost controls: consider whether managed care plans (which have restricted networks & give physicians cost-control incentives) reduce costs

- Glied (2000) review: HMOs have lower admission rates and costs
- Cutler, McClellan, Newhouse (2000): HMOs have 30-40% lower expenditures, largely due to lower price per treatment
- Gaynor, Rebitzer and Taylor (2004): spending on utilization increases with the size of physician groups receiving group-based financial incentives in a single HMO

Hospital choice models: utility is a function of distance, hospital quality, hospital-patient interactions

- Often multinomial logit models; don’t include price paid by insurer
Preview of the Results

Multinomial logit analysis (follows previous literature):

- Limited controls for hospital quality (price endogeneity)
- $\theta_{p,\pi}$ positive when insurers and patients pooled
  - Negative coefficient for less-sick patients
  - More negative for high-capitation insurers

Inequalities analysis:

- Write down inequality constraints describing patient choices
- Sum over patients to difference out quality-severity terms $g_{\pi}(.)$
- Address price endogeneity issues
- $\theta_{p,\pi}$ negative for almost all insurers when patients pooled
  - More negative for high-capitation insurers
  - Larger magnitudes than for logits
  - No need to restrict to least-sick patients
The Dataset

- Hospital discharge data from California 2003 (OSHPD data)
- Census of hospital discharges, private HMO enrollees (and PPO for BS / BC): women in labor
- Patient characteristics: insurer name, hospital name, diagnoses, procedures, age, gender, zip code, list price
- Hospital characteristics: average discount, zip code, teaching status, number of beds, services, annual profits.
The Price Variable

- Price paid to hospital is unobserved
- Instead: list price (equivalent to hotel "rack rate") and average discount at hospital level
- Calculate expected list price = average list price for ex ante similar patients at the relevant hospital
- Define price = expected list price*(1-average discount)
- Likely to encounter issues with measurement error
- Potential specification error due to average discount variable will be addressed as a final step.
### Descriptive Statistics: Discharge Data

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Devn.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>88,157</td>
<td></td>
</tr>
<tr>
<td>Number of hospitals</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>Teaching hospital</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>List price ($)</td>
<td>$13,312</td>
<td>$13,213</td>
</tr>
<tr>
<td>List price*(1-discount)</td>
<td>$4,317</td>
<td>$4,596</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>2.54</td>
<td>2.39</td>
</tr>
<tr>
<td>Died</td>
<td>0.01%</td>
<td>0.004%</td>
</tr>
<tr>
<td>Acute Transfer</td>
<td>0.3%</td>
<td>0.02%</td>
</tr>
<tr>
<td>Special Nursing Transfer</td>
<td>1.5%</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
## Prices and Outcomes By Patient Type

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>Price* (1-disc)</th>
<th>Acute Transfer</th>
<th>Special Nursing</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>84130</td>
<td>4269 (4488)</td>
<td>0.3% (0.0%)</td>
<td>1.49% (0.0%)</td>
</tr>
<tr>
<td>&gt;40</td>
<td>4027</td>
<td>5310 (6373)</td>
<td>0.5% (0.1%)</td>
<td>1.54% (0.2%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Charlson</th>
<th>N</th>
<th>Price* (1-disc)</th>
<th>Acute Transfer</th>
<th>Special Nursing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>86326</td>
<td>4276 (4501)</td>
<td>0.3% (0.0%)</td>
<td>1.5% (0.0%)</td>
</tr>
<tr>
<td>1</td>
<td>1753</td>
<td>6079 (7060)</td>
<td>0.6% (0.2%)</td>
<td>2.3% (0.4%)</td>
</tr>
<tr>
<td>&gt;1</td>
<td>78</td>
<td>10022 (15186)</td>
<td>5.1% (2.5%)</td>
<td>12.8% (3.8%)</td>
</tr>
</tbody>
</table>

Notes: Labor diagnosis only. Charlson score (Charlson et al, 1986, *Journal of Chronic Diseases*): clinical index that assigns weights to comorbidities other than principal diagnosis where higher weight indicates higher severity. Values 0-6 observed in data.
Multinomial Logit Analysis

Equation to be estimated:

$$W_{i,π,h} = \theta_p,π(δ_h lp(c_i, h)) + g_{π}(z_h, x(s_i)) + \theta_d d(l_i, l_h) + ε_{i,π,h}$$

- $δ_h = 1$ - discount; $lp(c_i, h)$ = average list price of patient type $c_i$
- Assume $ε_{i,π,h}$ distributed i.i.d. Type 1 extreme value
- Define $g_{π}(z_h, x(s_i)) = q_h + βz_hx(s_i)$ where
  - $q_h$: hospital fixed effects, $z_h$: hospital characteristics
  - $x(s_i)$: $P$(adverse outcomes | age, principal diagnosis, Charlson score)

Caveat(s): No controls for measurement error. Price endogeneity problems if some unobservable not captured by $g_{π}(.)$ affects choices and is correlated with price.
## Results: Logit Analysis 1

<table>
<thead>
<tr>
<th></th>
<th>All labor</th>
<th>Least sick</th>
<th>Sickest patients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
<td>0.010** (0.002)</td>
<td>-0.017* (0.009)</td>
<td>0.012** (0.002)</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>-0.215** (0.001)</td>
<td>-0.215** (0.002)</td>
<td>-0.217** (0.002)</td>
</tr>
<tr>
<td><strong>Distance squared</strong></td>
<td>0.001** (0.000)</td>
<td>0.001** (0.000)</td>
<td>0.001** (0.000)</td>
</tr>
<tr>
<td>( z_h \times (s_i) ) interactions</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>(15 coeffs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hospital F.E.s</strong></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>(194 coeffs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>88,157</td>
<td>43,742</td>
<td>44,059</td>
</tr>
</tbody>
</table>

Notes: Least sick patients are aged 20-39 with zero Charlson scores and all diagnoses "routine"
## Results: Logit Analysis 2

<table>
<thead>
<tr>
<th></th>
<th>% capitated</th>
<th>Discharges</th>
<th>Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price x</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacificare</td>
<td>0.97</td>
<td>7,633</td>
<td>-0.077** (0.01)</td>
</tr>
<tr>
<td>Aetna</td>
<td>0.91</td>
<td>3,173</td>
<td>-0.011 (0.016)</td>
</tr>
<tr>
<td>Health Net</td>
<td>0.80</td>
<td>8,182</td>
<td>-0.038** (0.01)</td>
</tr>
<tr>
<td>Cigna</td>
<td>0.75</td>
<td>4,001</td>
<td>-0.021 (0.014)</td>
</tr>
<tr>
<td>Blue Shield</td>
<td>0.57</td>
<td>7,992</td>
<td>0.018 (0.011)</td>
</tr>
<tr>
<td>Blue Cross</td>
<td>0.38</td>
<td>12,761</td>
<td>0.008 (0.011)</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td></td>
<td></td>
<td>-0.215** (0.002)</td>
</tr>
<tr>
<td>Distance squared</td>
<td></td>
<td></td>
<td>0.001** (0.000)</td>
</tr>
<tr>
<td>(z_h \times (s_i)) controls</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Hospital F.E.s</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
<td>43,742</td>
</tr>
</tbody>
</table>

**Notes:** Least sick patients are aged 20-39 with zero Charlson scores and all diagnoses "routine"
Magnitude of Logit Results

Distance:
- Consider impact of a 1 mile increase in distance for hospital $h$, holding all else fixed, on probability $P_{ih}$ that patient $i$ attends hospital $h$
- Mean (std) distance for less-sick patients: 6.45 (10.11) miles
- Average effect: a 13.7% reduction in $P_{ih}$

Price:
- Similar exercise: a $1000 price increase for hospital $h$
- Mean (std) price for less sick patients: $3380 ($1870)
- Average effect for Pacificare enrollees: a 5.2% reduction in $P_{ih}$

Pacifcare price-distance trade-off:

$$\eta^{d,p} = \frac{1}{n} \sum_i \frac{\partial d_i}{\partial p_i} \cdot \frac{p_i}{d_i} = 0.33$$
Decision-maker utility from \((i, \pi, h)\) is

\[ W_{i,\pi,h} = \theta_{p,\pi}(\delta_h lp(c_i, h)) + g_{\pi}(q_h(s), s_i) + \theta_d d(l_i, l_h) \]

- Define \(c_i, s_i\) in much more detail than logit equivalents
- \(g_{\pi}(q_h(s), s_i)\) interacts severity dummies with hospital F.E.s
- Assumption: \(g_{\pi}(.)\) absorbs all unobserved quality variation known to decision-maker that affect hospital choice
- Remaining unobservable is measurement error s.t. \(E(\epsilon_{i,\pi,h} \mid l_{i,\pi}) = 0:\)

\[ W_{i,\pi,h} = \theta_{p,\pi}(\delta^o_h lp^o(c^o_i, h)) + g_{\pi}(q_h(s), s^o_i) - d(l_i, l_h) + \epsilon_{i,\pi,h} \]
Inequalities Analysis, Intuition

Identifying assumption: for every patient \(i_h\), utility from chosen hospital \(h\) \(\geq\) that from any alternative \(h'\)

\[
W_{i_h,\pi,h} \geq W_{i_h,\pi,h'}
\]

Notation:

\[
W(i_h, h, h') = W_{i_h,\pi,h} - W_{i_h,\pi,h'} \geq 0.
\]

Intuition: find all pairs of same-\(\pi\), same-\(s\), different-\(c\) patients \(i_h, i_{h'}\) s.t.:

- \(i_h\) visited \(h\) and had alternative \(h'\)
- \(i_{h'}\) visited \(h'\) and had alternative \(h\)

Sum their inequalities. Equal and opposite \(g_{\pi}(.)\) terms drop out. Take expectations on data-generating process to address \(\varepsilon_{i,\pi,h}\).
Patient $i_h$ and $i_{h'}$ utility differences (noting that $s_{i_h}^o = s_{i_{h'}}^o = s^o$):

\[ W(i_h, h, h') = \theta_{p,\pi} p^o(i_h, h, h') + g_{\pi}(q_h, s^o) - g_{\pi}(q_{h'}, s^o) - d(i_h, h, h') + \varepsilon(i_h, h, h') \geq 0 \]

\[ W(i_{h'}, h', h) = \theta_{p,\pi} p^o(i_{h'}, h', h) + g_{\pi}(q_{h'}, s^o) - g_{\pi}(q_h, s^o) - d(i_{h'}, h', h) + \varepsilon(i_{h'}, h', h) \geq 0 \]

Sum expressions; take expectations conditional on decision-maker’s information set:

\[ E(\theta_{p,\pi}(p^o(i_h, h, h') + p^o(i_{h'}, h', h)) - (d(i_h, h, h') + d(i_{h'}, h', h)) \mid l_{i,\pi}) \geq 0 \]

Sum over alternatives $h' > h$ and patients:

\[ \theta_{p,\pi} \sum_{h' > h} \sum_{i_h i_{h'}} (p^o(i_h, h, h') + p^o(i_{h'}, h', h)) \geq \sum_{h' > h} \sum_{i_h i_{h'}} (d(i_h, h, h') + d(i_{h'}, h', h)). \]
Add moments by interacting inequalities with instruments $z$:

- Assumption: $E(\varepsilon \mid z) = 0$
- Positive and negative parts of distance differences
- Perfectly observed by econometrician, known to physician/patient when choices made.

Conduct analysis for each insurer separately

- 73 - 283 moments per insurer
- Divide each moment by its estimated standard error
- Identify set of $\theta_p, \pi$ satisfying implied system of inequalities
  - If none: find $\theta_p, \pi$ to minimize amount by which inequalities violated.
Inequalities: Variable Definitions

Assumption: $g_\pi(q_h(s), s_i^o)$ absorbs all unobservables known to decision-maker that affect hospital choice

- interact narrow $s_i^o$ groups with hospital F.E.s
- obstetrical experts ranked diagnoses 1-3
- $s_i^o$: age x principal diagnosis x Charlson score x diagnosis input x rank of most serious comorbidity
- 106 populated groups x 157 hospitals.
Assumption: $c_i^o$ defined such that $c_i^o | s_i^o$ affects price but not choices directly

- must be more detailed than $s_i^o$, otherwise price terms drop out
- taking expectations addresses measurement error from small samples
- $c_i^o$: $s_i^o \times$ number of highest-ranked comorbidities (272 populated grps)
- obstetrical expert advice: number of diagnoses, conditional on their rank, affects price but not hospital referral.

Price variation: Moving from severity to price groupings explains an additional 12% of variance in price (from 50% to 62% of total variance).
Limitations of this methodology

- Assume unobservables causing endogeneity bias absorbed in $g_\pi(.)$

Benefits:

- Differencing out the $g_\pi(.)$ terms makes detailed hospital quality-patient severity controls possible
- Summing / averaging over patients addresses measurement error problems in price variable
- Requires no assumption on distribution of unobservables
- Allows for selection of patients into insurers based partly on hospital preferences ($g_\pi(.)$ terms differ across insurers)
  - Also accounts for different preferences of PPO enrollees.
Estimating Variation in Discounts Across Insurers

- Final step: address specification error in discount variable
- Observe $d_h$: average across insurers for each hospital
- Use data on percent of $h$’s revenues from each $\pi$ as input to estimation of $d_{\pi,h}$
- Specify logistic functional form so that $d_{\pi,h} \in [0, 1]$
- Estimate by NLLS. Explanatory variables include
  - hospital charas (e.g. teaching, FP, share of beds in market)
  - market fixed effects, insurer fixed effects.
- Results intuitive: discounts high when hospital "bargaining power" low
- Discount not significantly related to insurer percent capitation.
- Use estimates to generate prediction of $d_{\pi,h} \Rightarrow$ price measure.
## Results: Inequalities Analysis

Using observed discounts $d_h$:

<table>
<thead>
<tr>
<th></th>
<th>% capitated</th>
<th>$\hat{\theta}_{p,\pi}$</th>
<th>[CI$<em>{LB}$, CI$</em>{UB}$]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacificare</td>
<td>0.97</td>
<td>-1.34**</td>
<td>[-1.55, -1.09]</td>
</tr>
<tr>
<td>Aetna</td>
<td>0.91</td>
<td>-4.34**</td>
<td>[-5.84, -4.20]</td>
</tr>
<tr>
<td>Health Net</td>
<td>0.80</td>
<td>-0.37**</td>
<td>[-0.67, -0.23]</td>
</tr>
<tr>
<td>Cigna</td>
<td>0.75</td>
<td>-0.80**</td>
<td>[-0.92, -0.77]</td>
</tr>
<tr>
<td>Blue Shield</td>
<td>0.57</td>
<td>0.04</td>
<td>[-0.36, 0.47]</td>
</tr>
<tr>
<td>Blue Cross</td>
<td>0.38</td>
<td>-0.47**</td>
<td>[-0.48, -0.09]</td>
</tr>
</tbody>
</table>
Results: Estimated Confidence Intervals

Ho and Pakes ()
Hospital Choice

[Graph showing confidence intervals for different health insurance providers: Blue Cross, Blue Shield, Cigna, Health Net, Pacificare. Each provider has a diamond-shaped marker with error bars indicating the confidence interval.]
## Results: Inequalities Analysis

<table>
<thead>
<tr>
<th>Capitated Provider</th>
<th>% Capitated</th>
<th>Observed Discount $d_h$</th>
<th>Predicted Discount $\hat{d}_{\pi, h}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PacifiCare</td>
<td>0.97</td>
<td>-1.34** [-1.55, -1.09]</td>
<td>-0.98** [-1.48, -0.76]</td>
</tr>
<tr>
<td>Aetna</td>
<td>0.91</td>
<td>-4.34** [-5.84, -4.20]</td>
<td>-2.38** [-2.72, -2.01]</td>
</tr>
<tr>
<td>Health Net</td>
<td>0.80</td>
<td>-0.37** [-0.67, -0.23]</td>
<td>-0.27** [-0.64, -0.12]</td>
</tr>
<tr>
<td>Cigna</td>
<td>0.75</td>
<td>-0.80** [-0.92, -0.77]</td>
<td>-0.56** [-0.62, -0.53]</td>
</tr>
<tr>
<td>Blue Shield</td>
<td>0.57</td>
<td>0.04 [-0.36, 0.47]</td>
<td>0.28 [-0.71, 0.94]</td>
</tr>
<tr>
<td>Blue Cross</td>
<td>0.38</td>
<td>-0.47** [-0.48, -0.09]</td>
<td>-0.31** [-0.36, -0.23]</td>
</tr>
</tbody>
</table>
Results: t-statistics for Inequalities Analysis

- We calculate t-statistic for each moment = value of moment at estimated $\theta_{p,\pi}$ (inequality divided by estimated standard error)
- Model implies all t-statistics $\geq 0$
- Estimates quite close to this:

<table>
<thead>
<tr>
<th></th>
<th>Pacificare</th>
<th>Aetna</th>
<th>Health Net</th>
<th>Cigna</th>
<th>Blue Shield</th>
<th>Blue Cross</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># positive</td>
<td>152</td>
<td>71</td>
<td>166</td>
<td>88</td>
<td>162</td>
<td>247</td>
</tr>
<tr>
<td># negative</td>
<td>9</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>7</td>
<td>36</td>
</tr>
<tr>
<td>Ave positive</td>
<td>11.1</td>
<td>19.4</td>
<td>14.5</td>
<td>17.0</td>
<td>17.0</td>
<td>20.1</td>
</tr>
<tr>
<td># t &lt; -2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

- We exclude moments with $t < -2$ for Health Net and Blue Shield.
Magnitude of Results

- \( \eta^{d,p} \) = percent distance reduction needed to compensate for a 1% price increase:

<table>
<thead>
<tr>
<th>Insurer</th>
<th>% cap</th>
<th>Logits (less-sick patients)</th>
<th>Inequalities (all patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacificare</td>
<td>0.97</td>
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- Ineqs: results implied by specification using \( \delta_h \) as discount measure.
Alternative Explanations

- Blue Cross and Blue Shield data includes PPO enrollees
  - We drop hospitals likely to be out-of-network
  - \( g_\pi(\cdot) \) terms control for different patient preferences across plans
  - Small difference in OOP pricing strategies: if patients more price-elastic than physicians this biases results against us

- Blue Cross and Blue Shield unobservably different in other ways
  - Historically different: tax-exempt as social welfare plans, focused on Medicare administration / government employee coverage
  - But no longer tax-exempt; not major Medicare providers; BC is FP
  - BS: NFP status may help explain wide confidence intervals.
Robustness Tests

- Referring physicians may respond to capitation payments by reducing quantity (rather than choosing cheaper hospitals)
  - Regressed "severity-adjusted" list price on insurer capitation and market F.E.s, then add hospital F.E.s
  - With market FEs: negative capitation coefficient
  - With hospital FEs: coefficient positive and insignificant.

- Discounts may differ across diagnoses within \((\pi, h)\).
  - Estimated discount regression allowing \(d_{\pi,h}^{birth} = \gamma d_{\pi,h}\). Estimated \(\gamma = 1.06\) (S.E. 0.23)
  - Little effect on inequality results.
Objectives:
- Estimate preferences of the agent that determines hospital choice
- Identify whether physician incentives affect price sensitivity

Inequalities method allows us to:
- address endogeneity and measurement error concerns
- remove assumptions on error term distribution
- allow for patient selection into insurers based on hospital prefs.

More work to do on inequalities analysis

Price matters more when insurer capitates more physicians

Results have potentially important implications
- for the impact of the U.S. health reforms on costs
- and for understanding hospital merger and investment incentives.
## Comparison of High- and Low-Capitation Insurers

<table>
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<tr>
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<th>Percent Capitn</th>
<th>2002 Enrollment (000’s)</th>
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<th>Prem pmpm</th>
<th>IP day /1000</th>
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