Pricing and Incentives in Publicly Subsidized Health Care Markets: the Case of Medicare D

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Designing a Publicly Subsidized Health Care Market

- Redesigning health care markets using competition between private plans to deliver efficiency and cost savings
- Medicare Part D: relevant and rather successful case...
- ... but potential distortions due to interplay of subsidies and competition:
  1. An "endogenous" rule to determine the subsidy amount
  2. A random assignment of part of the enrollees to plans

- This study aims to:
  1. Show that plans respond to the distorted incentives
  2. Quantify the effects of this distortion on the cost of the program and on the welfare of enrollees
  3. Propose an alternative design

Outline

A Publicly Subsidized Health Care Market

Medicare Part D (or Medicare Rx)

- Main features:
  1. Started in 2006 (Medicare Modernization Act of 2003)
  2. Large program costing Medicare about 50 billion in 2010
  3. Private plans providing insurance for prescription drugs
  4. Voluntary enrollment (with disincentives not to enroll)
  5. Two main types of plans: PDP and MA-PD
  6. Most of the premium subsidized by Medicare (about 75%)
  7. Extra help for people with low incomes and modest assets
     1. Below 150% poverty ($16,245/single, $21,855/couple)
     2. Assets less than $12,510/individual, $25,010/couple

Demand: Basic data

Enrollment of LIS and non-LIS elderly:

- Total enrollment in 2010 is 27.2 million
- Enrollees in regular PDP and MA-PD are 24.7 million
- Remaining 2.5 million are in employer-only or special MA
- More than one-third (9.8 million, or 40 percent) receive the Low Income Subsidy (LIS). Key LIS facts:
  1. 81 percent are enrolled in PDPs and the rest in MA
  2. average total dollar subsidy amount is $4,000
  3. Medicare defaults elderly into plans but they can opt out
  4. About 7 million enrollees did not opt out

Demand: Payment Scheme for Non-LIS Enrollees

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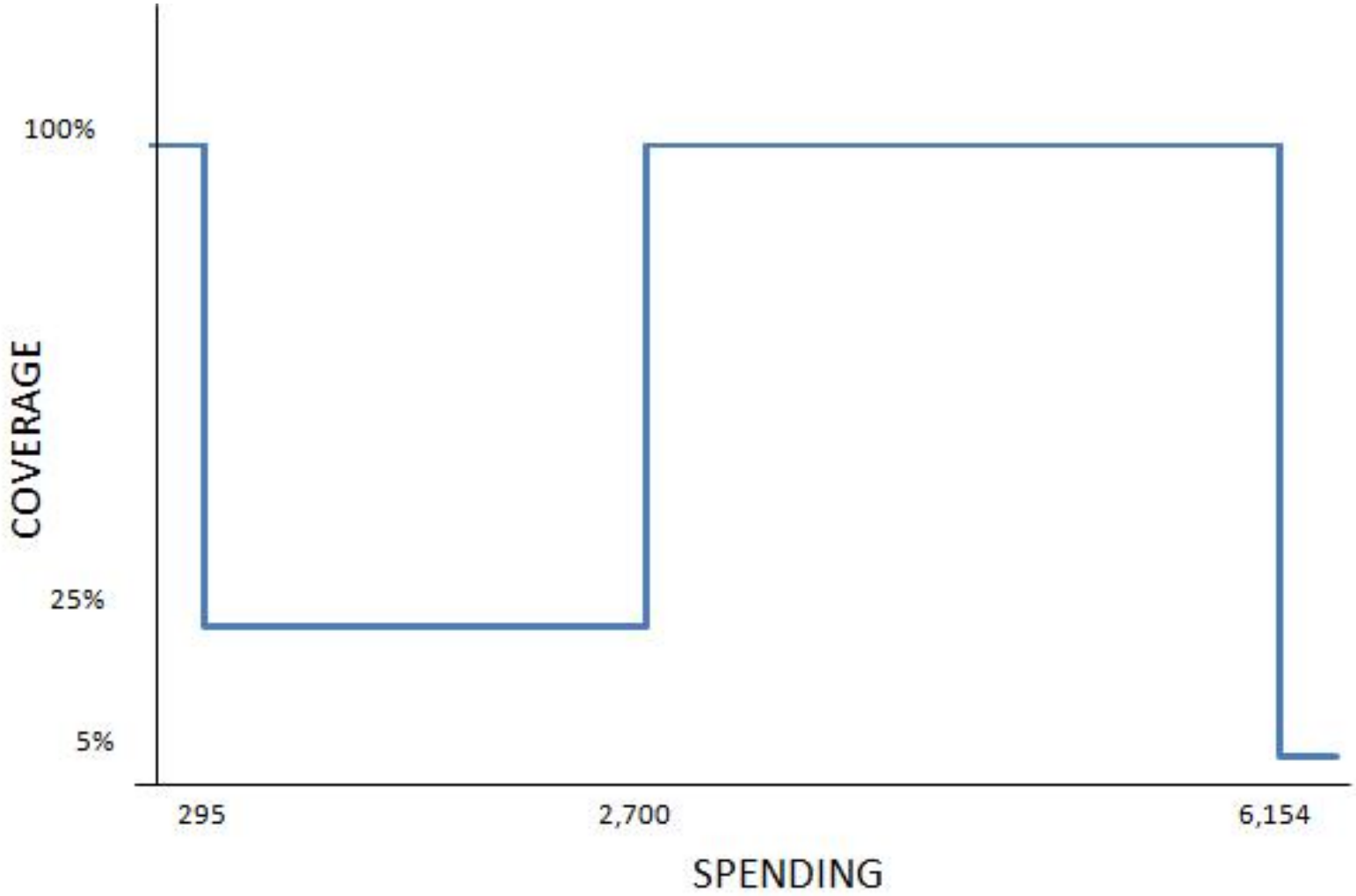


Payment Scheme for LIS Enrollees

Medicare Prescription Drug Benefit Subsidies for Low-Income Beneficiaries, 2010

Low-Income Subsidy Level	Monthly Premium	Annual Deductible	Copayments
Individuals with Medicare and Medicaid	$0	$0	$1.10-$2.50/generic $3.30-$6.30/brand-name; no copays after total drug spending reaches $6,440
Individuals with Medicare and Medicaid in nursing homes	$0	$0	No copays
Individuals with income <135% of poverty and resources <$8,100/individual; $12,910/couple	$0	$0	$2.50/generic $6.30/brand-name; no copays after total drug spending reaches $6,440
Individuals with income 135%-150% of poverty and resources <$12,510/individual; $25,010/couple	sliding scale up to $31.94*	$63	15% of total costs up to $6,440; $2.50/generic $6.30/brand-name thereafter

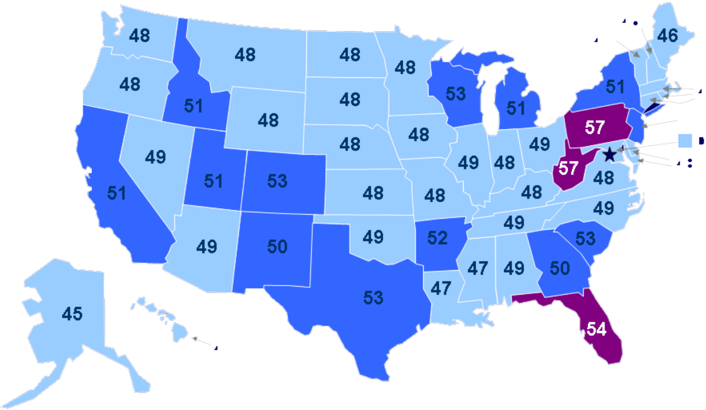
SOURCE: Kaiser Family Foundation summary of Medicare drug benefit low-income subsidies in 2010.
NOTE: 2010 poverty level is $10,830/individual and $14,570/couple. Resources include funeral or burial expenses of $1,500/individual and $3,000/couple. *$31.94 is the 2010 national average monthly Part D beneficiary premium.

Demand: Random Reassignment of LIS Enrollees

Random reassignment of LIS receivers

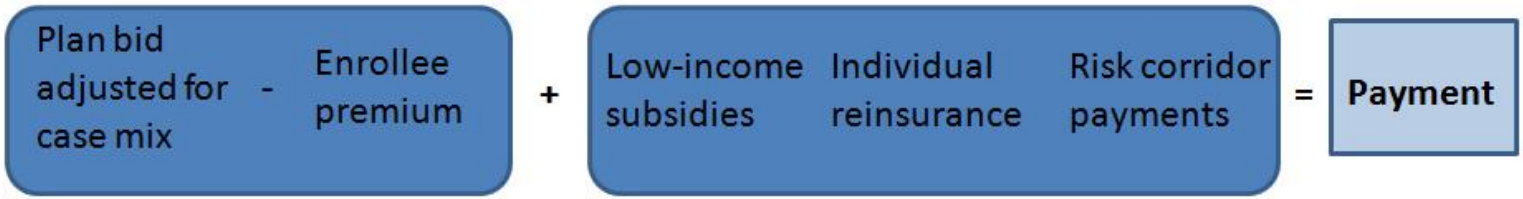
- In the first year of the program (2006)
  1. All LIS randomly assigned in equal shares to each of the plans having a premium below a certain threshold (LIS-benchmark)
  2. These plans are called "eligible"
- In each of the following years t (2007 -)
  1. Plans that in t-1 were eligible but are no more so in t lose all their LIS enrollees
  2. Plans that in t are eligible keep all their LIS (if they have)
  3. Plans that in t are eligible receive an equal share of the LIS enrollees that are randomly reassigned in t (and of new LIS enrollees entering Part D)

Supply: Number of PDP Available in 2009 by State



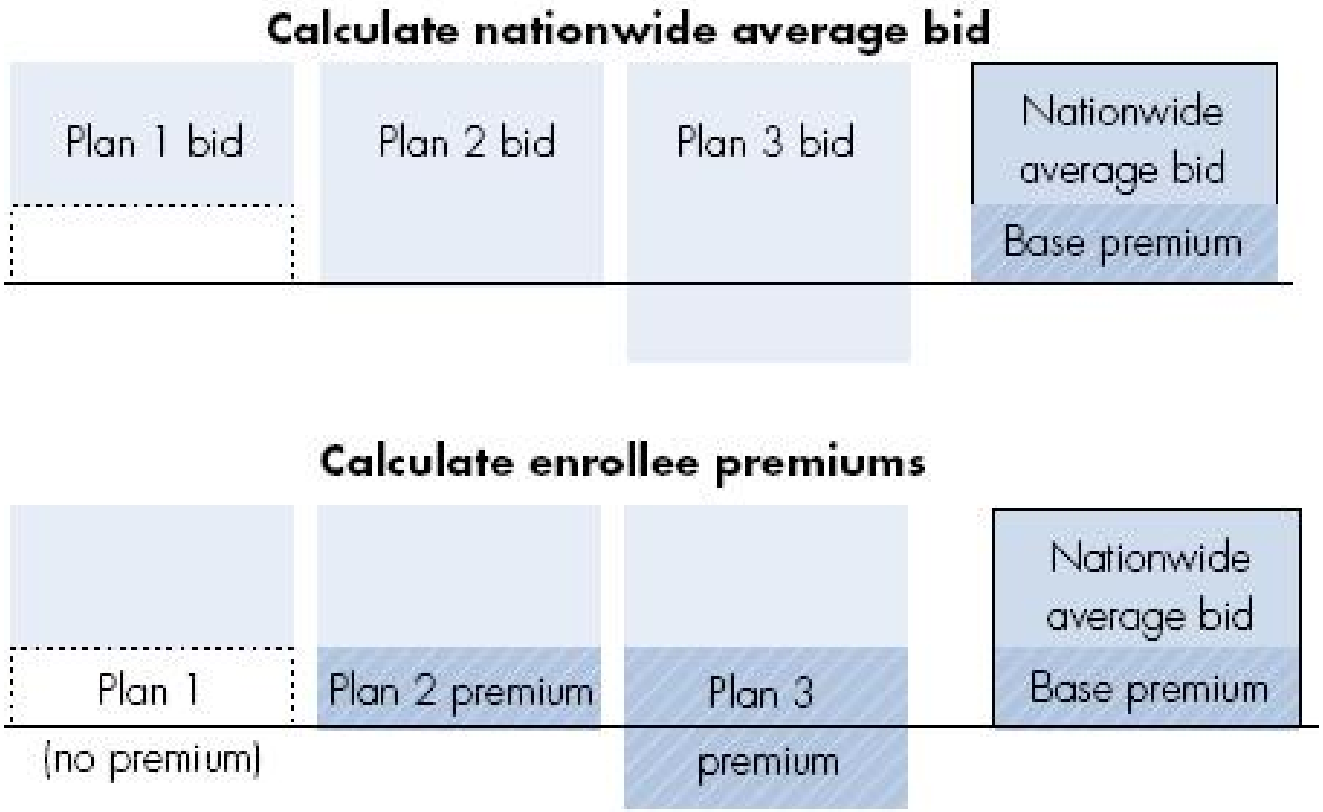
Supply: Payments to Plans

Annual bids (simultaneously submitted first Monday of June)



- Exogenous components
  1. Adjustment for case mix (higher payments for more sick)
  2. Reinsurance (80% of spending above catastrophic level)
  3. ▸ Risk corridors for sharing excessively high/low profits
- Endogenous components
  1. The bid
  2. The premium (based on the "national average")
  3. The low income subsidy

Supply: The Premium and the National Average



An example with 3 plans in the country. The basic premium equals the national average times a factor with numerator 25.5% and denominator 100% minus CMS's estimate of the aggregate revenues that plans obtain through the reinsurance.

Supply: The LIS-benchmark

Calculation of the LIS-benchmark (region specific)

- In 2006:
  - Simple average of all the basic premiums in the region
- In 2007 and 2008:
  - Weighted average of basic premiums in the region with weights proportional to total enrollment in the previous year
- From 2009:
  - Weighted average of basic premiums in the region with weights proportional to LIS enrollment in the previous year

If the average obtained is less than the lowest PDP premium for basic coverage, then the premium of this PDP becomes the regional benchmark

Outline

Part D from a Market Design Perspective

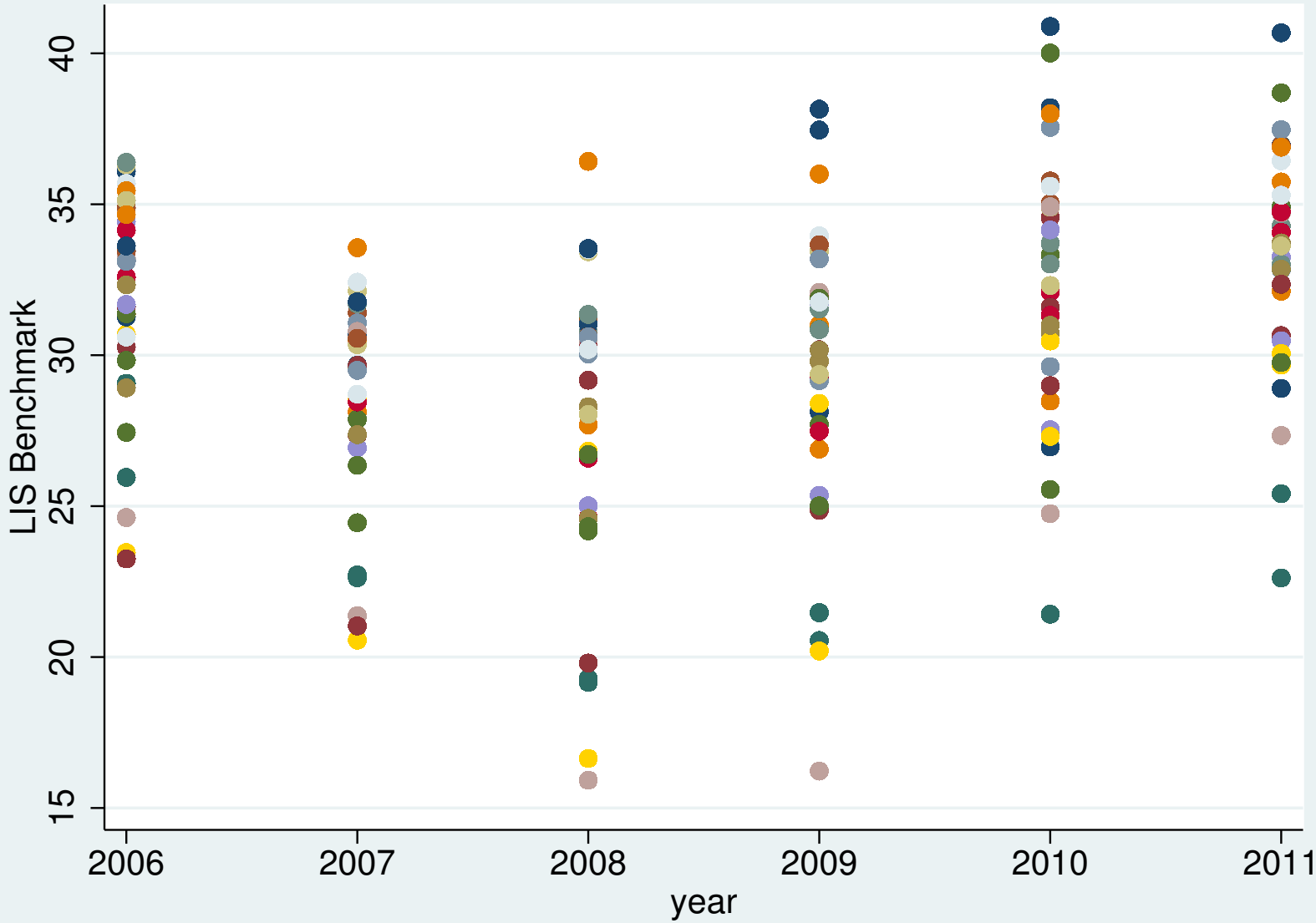
Interaction of LIS and RR creates perverse incentives:

- Few general conjectures about manipulation of bids and entry
  - If no response to the incentive: the LIS-benchmark declines and in a finite number of periods all LIS are in the lowest cost plans(s)
  - Bids distortion: higher average bids and support bids
  - Entry distortion: higher entry below the LIS-benchmark

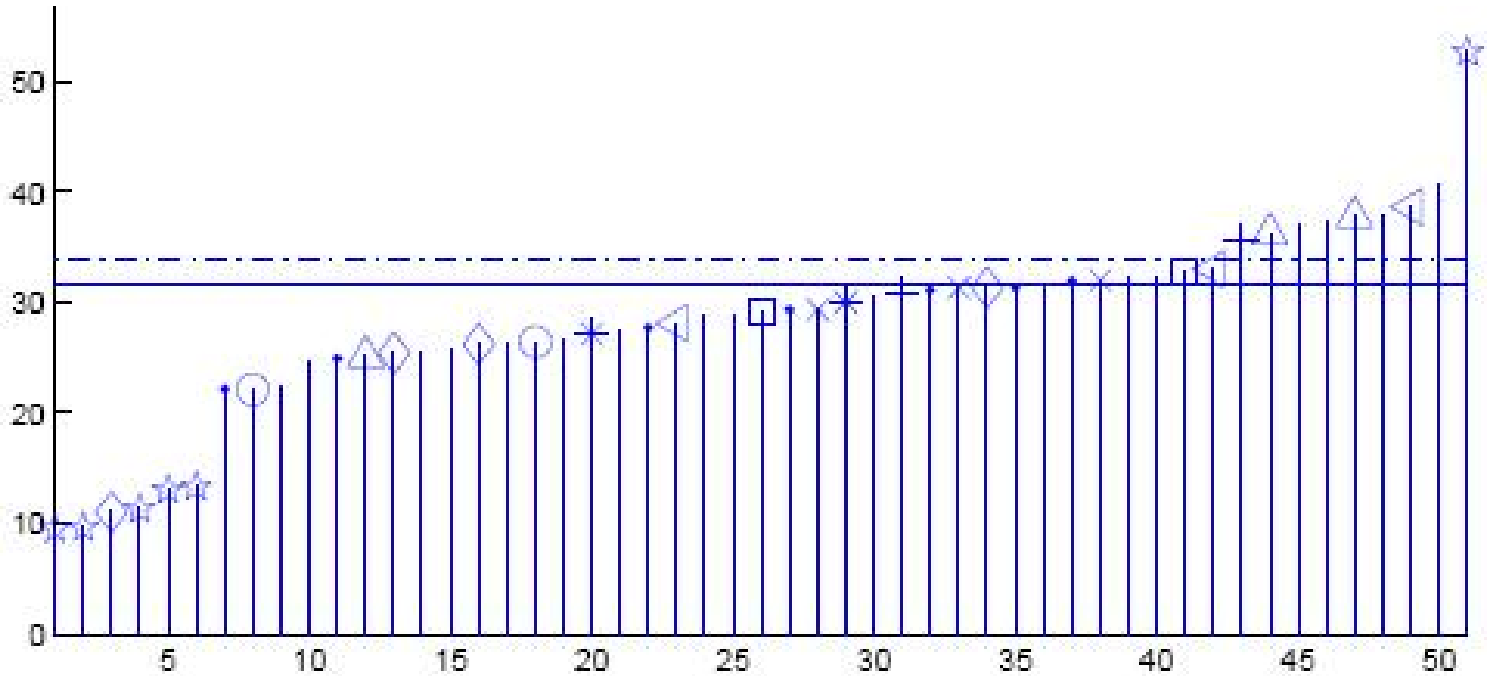
All these conjectures can be proved in toy models but which are the right assumption?

For instance, without a thigh risk corridor there is no equilibrium...

LIS Benchmark in the 34 Regions

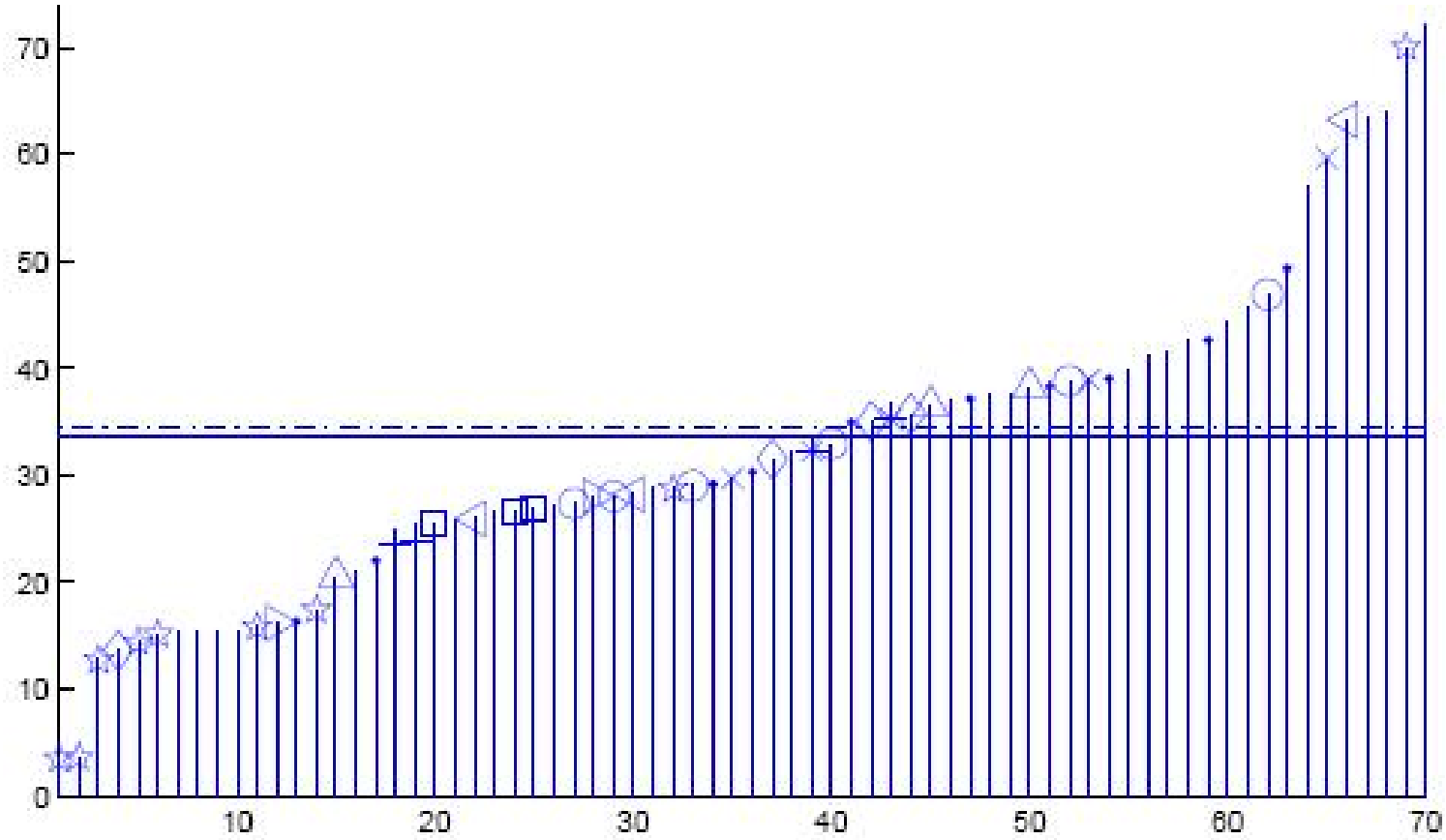


Bids in region 31 (Idaho-Utah) for year 2007



All bids of PDP with a positive LIS weight.

Bids in region 31 (Idaho-Utah) for year 2007



All bids of PDP with a positive LIS weight.
Another case of "support bids"?

LIS Benchmark in the 34 Regions

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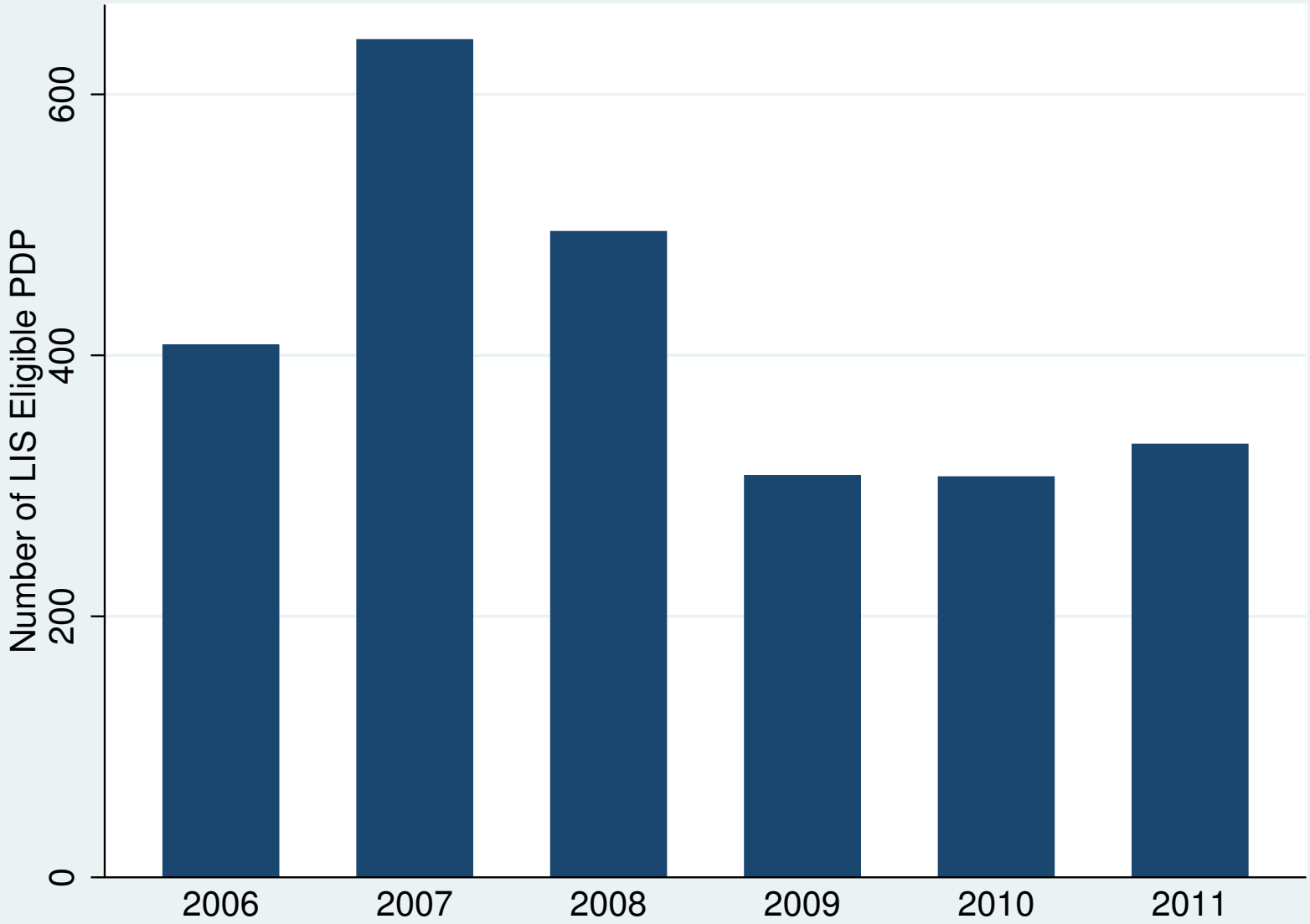


Formal Bid Test

Adaptation of the previous bid test:

- The statistic is no more A1 but the LIS-Benchmark
- The "suspect group" is made of all plans of the same company with $W > 0$
- The control groups plan with $W > 0$ and cumulative W equal to that of suspects
- Drawing of control groups is conditional on costs drivers

Result:

- Very strong rejection that Humana and Aetna plans are influencing the LIS-benchmark like any random set of plans

Outline

Demand and Supply Estimation

- Use ▸ BLP demand estimation framework (i.e. distribution of consumers' tastes for the various characteristics of the plans)
- Estimate the marginal cost in the ▸ supply equation imposing Nash-Bertrand and using only enhanced plans
- Project estimates to basic PDP and simulate pricing under Nash-Bertand
- Quantify the departure between the observed and simulated prices

Outline

Demand and Supply Estimation

Provided with estimates of both supply and demand we can construct counterfactual policies to:

1. Minimize the cost of the program
2. Maximize the welfare of non-LIS enrollees
3. Minimize the welfare loss of LIS enrollees due to RR

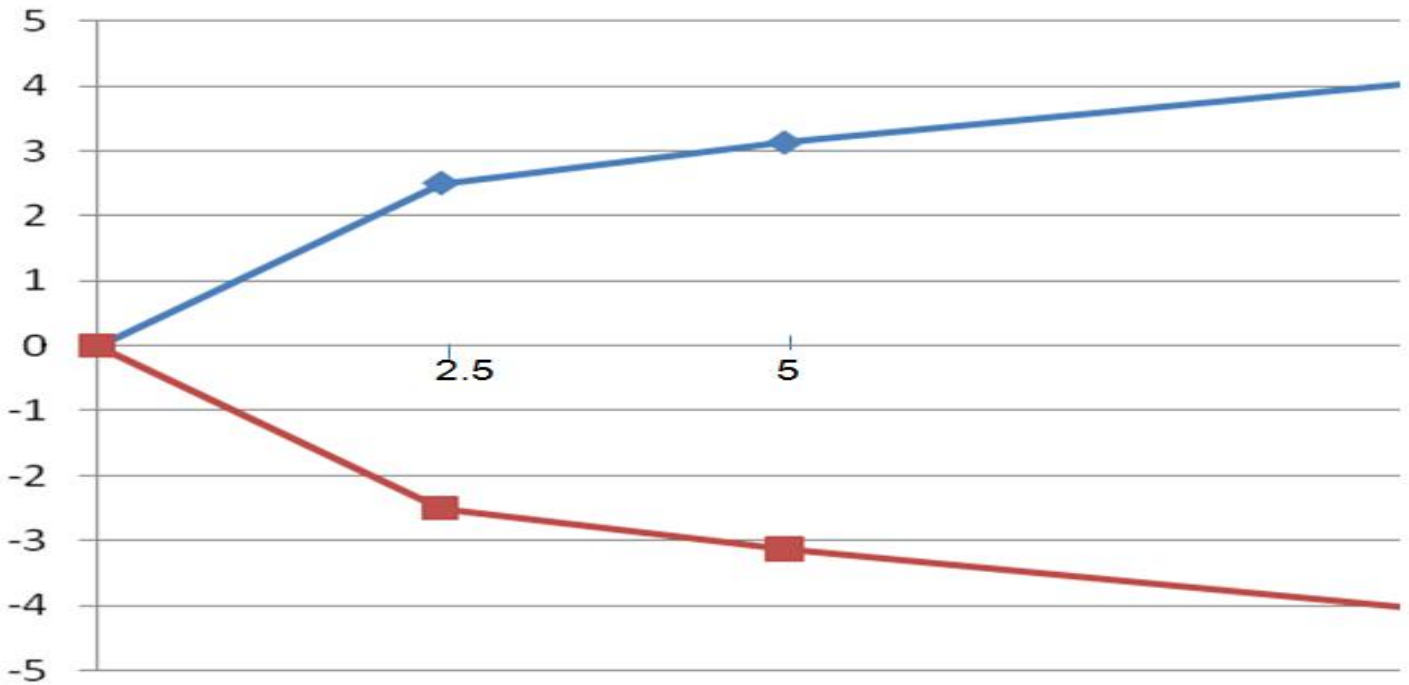
Outline

Conclusions

- Theory can guide the analysis of incentives
- Empirical analysis can quantify the response
- Together they can allow for an effective design of markets

Thank you!

Risk Corrdiors



Profits after the application of the corridors (2006-2007 values) as a function of profits before the application of the corridors.

Back

THE BLP DEMAND MODEL: Quick Review

Setup:

- Market t $= 1, \ldots, T$
- Product j $= 1, \ldots, J$ in each market
- Consumer i $= 1, \ldots, NS$ in each market
- Utility of consumer i for product j in market t

$$u_{ijt} = \alpha_i(y_i - p_{jt}) + x_{jt}\beta_i + \omega_{jt} + \epsilon_{ijt}$$

- y_i: income of consumer i
- p_{jt}: price of product j in market t
- x_{jt}: a vector of observable characteristics of product j
- ω_{jt}: unobserved (by the econometrician) product charact.
- ϵ_{ijt}: mean-zero stochastic term
- α_i, β_i: individual-specific taste coefficients to be estimated

Random-Coefficients Logit Models of Demand: Quick Review

- The random coefficients:

$$\begin{pmatrix} \alpha_i \\ \beta_i \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \end{pmatrix} + \Pi\, D_i + \Sigma\, v_i \qquad v_i \tilde{} P_v^*(v), \quad D_i \tilde{} P_D^{**}(D)$$

- D_i: unobserved demographic variables for consumer i
- v_i: additional unobserved individual variables
- α, β : mean of taste coefficients
- Π,Σ : measure of how taste characteristics vary with D_i and v_i
- Structural parameters to be estimated $\theta = (\theta_1, \theta_2)$:

$\theta_1 = (\alpha, \beta)$ [linear]
$\theta_2 = (\Pi, \Sigma)$ [non linear]

Random-Coefficients Logit Models of Demand: Quick Review

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$\delta_{jt} = x_{jt}\beta$ - $\alpha p_{jt} + \omega_{jt}$

- δ_{jt}: mean utility for all consumers for product j in market i

μ

$_{ijt} = [-p_{jt}, x_{jt}](\Pi D_i + \Sigma v_i)$

-

μ

$_{ijt} + \epsilon_{ijt}$: deviation from the mean utility δ_{jt}

- $s_{jt}(\delta, \theta_2)$: estimated market share through simulation:

$$s_{jt}(\delta, \theta_2) = \frac{1}{ns} \sum_{i=1}^{ns} \frac{\exp(\delta_{jt} + \mu_{ijt})}{1 + \sum_{k=1}^{J} \exp(\delta_{kt} + \mu_{ikt})}$$

- S_{jt}: observed market share of product j in market t
- Market shares equations: $s_{jt}(\delta, \theta_2) = S_{jt}, \forall j, t$

Supply in the BLP model: the pricing problem of the multiproduct firm

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Profits of firm f:

$$\text{Profit}_f = \sum_{j \in F_f} (p_j - c_j) M s_j(\delta, \theta_2)$$

Assume Nash-Bertrand eq., then first order conditions:

$$\begin{aligned} s_j(\delta, \theta_2) + \sum_{r \in F_f} (p_r - c_r) \frac{\partial s_r(\delta, \theta_2)}{\partial p_j} &= 0 \\ & \textit{or} \\ s(\delta, \theta_2) + \Delta(\theta)(p - c) &= 0 \end{aligned}$$

where M is the size of the market and Δ is

$$\Delta(\theta) = \{ . \frac{-\partial s_r}{\partial p_j} \textit{ if } r \textit{ and } j \textit{ are produced by the same firm} 0$$

Supply Estimation

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In each market a multiplan firm i chooses premia to maximize:

$$\sum_{b \in B} [p_b - mc_b](S_b^{NL} T_B^{NL} + S_b^L T^L) + \sum_{e \in E} [p_e - mc_e](S_e^{NL} T_E)$$

Typically, FOC are taken and Nash-Bertrand $(\partial p_{-i} / \partial p_i = 0)$ is assumed, but here $S_b^L(p_b, p_{-ib})$ is not differentiable.

Instead, S_b^{NL} and S_e^{NL} are smooth functions of $p_b, p_e, p_{-ib}, p_{-ie}$

Supply Estimation

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So, assuming Nash-Bertrand only for E plans $(\partial p_{-i}/\partial p_e = 0)$, the p_e that solve the original problem are those that solve:

$$\bar{\pi} = \sum_{b \in B} [p_b - mc_b](S_b^{NL} T_B^{NL}) + \sum_{e \in E} [p_e - mc_e](S_e^{NL} T_E)$$

Which has FOC with respect to $p_e \in E$:

$$S_e^{NL} + (T_B^{NL}/T_E) \sum_{z \in B} [p_z - mc_z](\partial S_z^{NL}/\partial p_e) + \sum_{z \in E} [p_z - mc_z](\partial S_z^{NL}/\partial p_e) = 0$$