# Vertical Integration and Plan Design in Healthcare Markets

Jose Ignacio Cuesta
Stanford

Carlos Noton
PUC Chile

Benjamin Vatter
MIT Sloan

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Discussant: Shosh Vasserman
Stanford GSB

**Figure 1:** Market structure
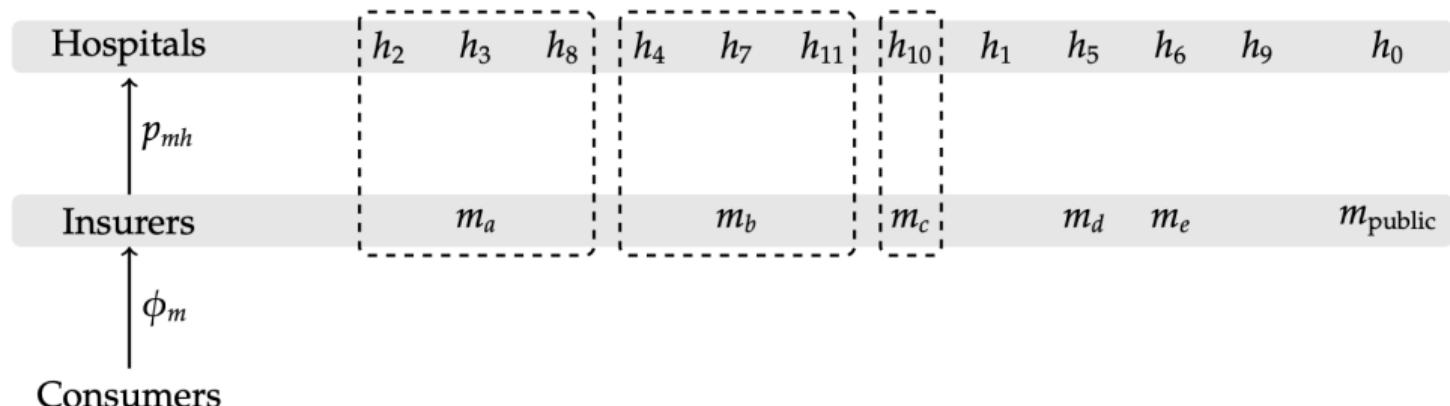


*Notes*: This figure displays the market structure in our settings. Downstream consumers pay premiums $\phi_m$ to insurers, which negotiate over prices $p_{mh}$ with upstream hospitals. Dashed lines indicate vertically integrated hospitals and insurers.

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  |  | **A - Full effect** | **B - Decomposition** | |
|  |  |  | Short run | Medium run |
|  | Baseline | Change | Change | Change |
| **Efficiency** |  |  |  |  |
| Moral hazard spending | 44.10% | -16.43 | -3.86 | -12.58 |
| Median marginal value of coverage | 15.01 | -8.87 | -6.48 | -2.39 |
| Spread marginal value of coverage | 57.22 | -37.70 | -30.97 | -6.73 |
| Adverse selection | 0.37 | 0.17 | 0.04 | 0.13 |
| **Consumer surplus** |  |  |  |  |
| VI Enrollees (thousands, per member) | - | -0.08 | -0.35 | 0.27 |
| Non-VI Enrollees (thousands, per member) | - | 0.52 | -0.15 | 0.67 |
| Total consumer surplus (millions) | - | 62.67 | -12.76 | 75.43 |
| **Total welfare (millions)** | - | 41.71 | -55.97 | 97.68 |

- ▶ A model of consumer demand for hospitals

- ▶ ...which feeds into a model of consumer demand for insurance plans

- ▶ ...which feeds into a model of hospital-insurance bargaining over prices
  (...and at the same time, insurance premium setting)

- ▶ ...which feeds into a model of (ex ante very complicated) insurance plan design

- ▶ ...which feeds into an equilibrium simulation w/ and w/o vertical integration

**A - Percent of plans in which hospital is in preferential tier**

|     | h1 | h2 | h3 | h4 | h5 | h6 | h7 | h8 | h9 | h10 | h11 |
|-----|----|----|----|----|----|----|----|----|----|-----|-----|
| m-a | 0.99 | 69.17 | 49.21 | 46.84 | 15.02 | 0.00 | 0.59 | 36.76 | 0.00 | 0.00 | 6.32 |
| m-b | 4.30 | 3.49 | 20.16 | 95.70 | 45.43 | 4.03 | 74.73 | 0.00 | 0.00 | 0.27 | 48.92 |
| m-c | 43.81 | 0.00 | 6.35 | 4.44 | 1.59 | 0.95 | 23.17 | 0.32 | 0.00 | 17.46 | 2.86 |
| m-d | 15.08 | 48.24 | 43.97 | 53.27 | 52.51 | 8.29 | 31.66 | 38.19 | 0.50 | 0.00 | 7.79 |
| m-e | 0.75 | 0.00 | 41.04 | 0.00 | 81.34 | 0.00 | 46.27 | 0.00 | 10.45 | 9.33 | 0.00 |

**B - Percent of admissions by patient insurer**

|     | h1 | h2 | h3 | h4 | h5 | h6 | h7 | h8 | h9 | h10 | h11 |
|-----|----|----|----|----|----|----|----|----|----|-----|-----|
| m-a | 5.17 | 57.13 | 63.84 | 11.48 | 8.40 | 4.84 | 4.10 | 42.93 | 19.91 | 2.91 | 16.53 |
| m-b | 30.74 | 10.93 | 7.31 | 70.76 | 18.29 | 35.81 | 56.44 | 18.38 | 0.73 | 17.94 | 66.70 |
| m-c | 31.42 | 7.77 | 5.57 | 5.21 | 22.06 | 30.96 | 15.86 | 16.15 | 8.78 | 58.87 | 5.99 |
| m-d | 25.55 | 21.49 | 21.86 | 10.88 | 24.28 | 20.55 | 17.46 | 18.51 | 69.84 | 14.86 | 8.40 |
| m-e | 7.11 | 2.68 | 1.43 | 1.67 | 26.97 | 7.84 | 6.14 | 4.03 | 0.74 | 5.42 | 2.38 |
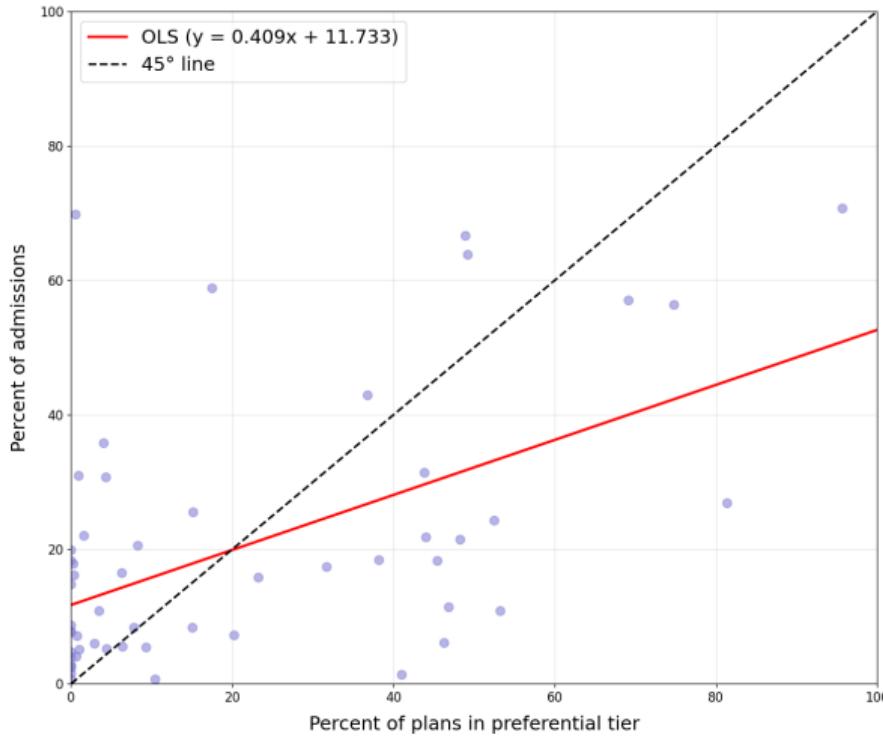
**Figure A.2:** Vertical integration, hospital choices, and expenditure (movers subsample)



**(a)** Plan coverage     **(b)** Any claims in VI hospital     **(c)** Expenditure in VI hospital
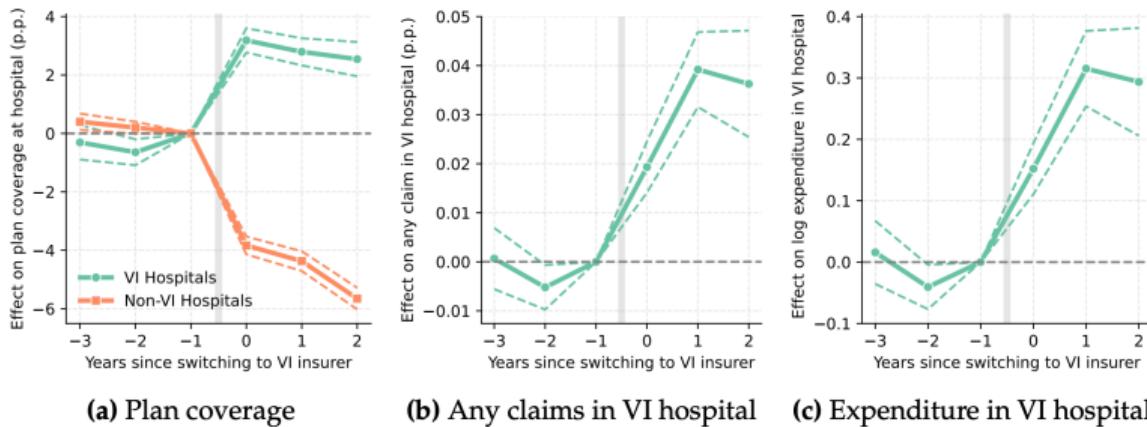
*Notes*: This figure displays event study estimates from equation (4) in the main text for a subsample of enrollees that move across neighborhoods. This subsample includes 18 percent of the enrollees in the main analysis. The coefficient for the year before the patient switches is set to zero. Green dots and orange squares are estimates of $\beta_\tau$ and $\gamma_\tau$ in equation (4), respectively. Dashed lines indicate 95% confidence intervals. The dependent variable in Figure A.2c is $\log(1 + y)$ to accommodate zeros, but the results are similar when using expenditure in levels.

**Figure A.3:** Estimates of hospital specialization
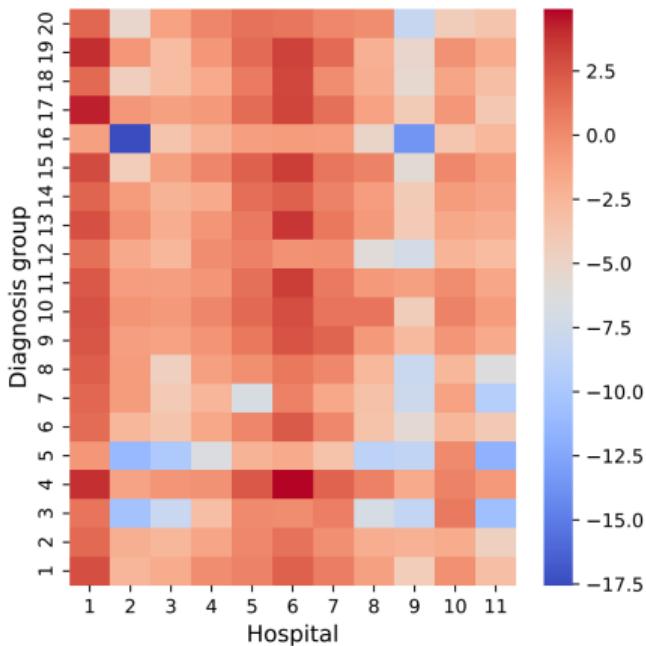
**Table A.4:** Vertical integration and market outcomes (within insurer-hospital)

|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
|  | A - Plan design | | B - Admission outcomes | | | | C - Hospital outcomes | |
|  | Preferential hospital | Coverage rate | log cost proxy | log # services | Re-admission | log price | Share of admissions | log revenue |
| VI | 0.169 | 5.224 | 0.040 | -0.012 | 0.005 | -0.076 | 0.044 | 0.297 |
|  | (0.006) | (0.325) | (0.025) | (0.011) | (0.006) | (0.021) | (0.004) | (0.051) |
| $N$ | 15,741 | 15,741 | 567,752 | 567,752 | 204,223 | 567,752 | 264 | 264 |
| $R^2$ | 0.212 | 0.254 | 0.212 | 0.613 | 0.059 | 0.694 | 0.988 | 0.976 |
| Mean non-VI | 0.137 | 63.101 | 2.534 | 16.039 | 0.081 | 5.269 | 0.128 | 8,865.659 |
| H-I FE | Y | Y | Y | Y | Y | Y | Y | Y |
| Year FE | Y | Y | N | N | N | N | Y | Y |
| Interacted FE | N | N | Y | Y | Y | Y | N | N |
| Plan FE | N | N | Y | Y | Y | Y | N | N |
| Cost proxy | N | N | N | Y | Y | Y | N | N |
| Controls | N | N | Y | Y | Y | Y | N | N |
| Observation | plan-hospital-year | | admission | | | | insurer-hospital-year | |

▶ Without vertical integration...

   ▶ Former VI insurers raise premiums

   ▶ Former VI hospitals raise (some) prices (and lower others)

   ▶ Former VI insurers increase coverage for attractive (star + central) hospitals

   ⇒ Consumers more efficiently sort into (often cheaper) hospitals

▶ What's missing?

   ▶ Any synergies from integration (e.g. cost synergies for hospitals; demand synergies for consumers)

   ▶ Extensive margin moral hazard (e.g. ↑ utilization of health care with ↑ coverage)

Concluding Thoughts