Owning the Agent: Hospital Influence on Physician Behaviors

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Motivation

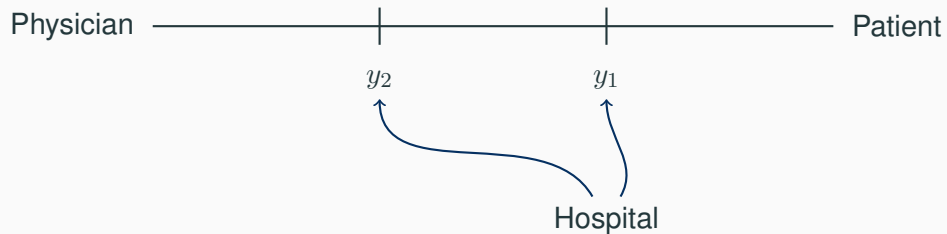# Hospital in Physician Agency Problem

Physician ———————————————————————— Patient
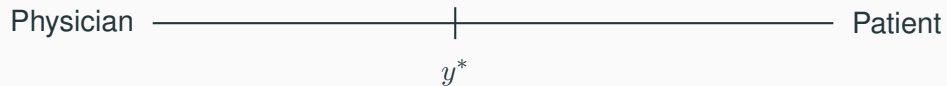
Hospital in Physician Agency Problem

Physician $\longrightarrow$ y_2 $\quad$ y_1 $\longrightarrow$ Patient

Hospital

Hospital in Physician Agency Problem

Physician ——————————————|——————————————— Patient

y^*

Physician & Hospital —————————————|————————————— Patient

y^*

Hospital in Physician Agency Problem

Physician & Hospital —————|————|————————————— Patient

$$y_h^* \qquad y^*$$
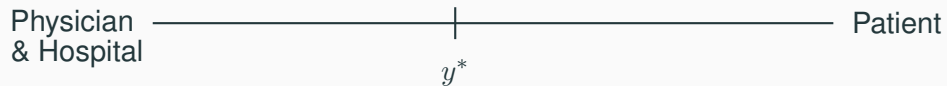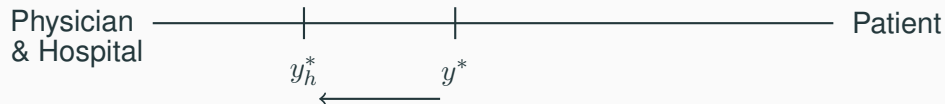
Changing Physician Relationships

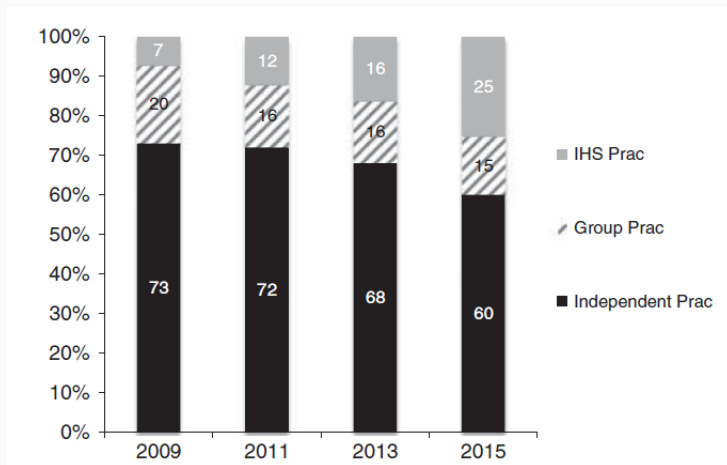Richards *et al.*, Medical Care, 2016

- Physician agency (Clemens & Gottlieb 2014, AER; Afendulis & Kessler 2007, AER; Gruber & Owings 1996, RAND; Iizuka 2012, AER)
- Supply-side variation (Finkelstein *et al.* 2016, QJE; Molitor 2018, AEJ: Policy)
- Vertical integration (Cuellar & Gertler 2006, JHE; Ciliberto & Dranove 2006, JHE; Baker *et al.* 2016, JHE; Koch *et al.* 2017, JHE)

Estimation Strategy

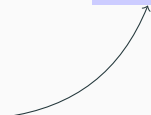## Estimation Strategy

Observed care at time t is

$$y_{ijk} = \boxed{\alpha_i + x_i\beta} + \Gamma_{jk} + \epsilon_{ijk}$$

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Patient Preferences

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Patient Preferences

Physician and hospital characteristics

Data

Data Sources

- CMS: 100% inpatient and institutional outpatient Medicare claims data (2008-2015)
- SK&A: Hospital ownership of physician practices and practice characteristics

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- SK&A: Hospital ownership of physician practices and practice characteristics
- AHA, HCRIS, POS: Hospital characteristics
- Annual IPPS Impact Files: Hospital cost-to-charge ratios (CCR)
- ACS: County-level demographics, education, income, and employment

Data Structure

- Measure annual spending per patient for each physician/hospital pair
- Planned inpatient stays (elective admissions initiated by a physician, clinic, or HMO referral) and outpatient operations

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- Planned inpatient stays (elective admissions initiated by a physician, clinic, or HMO referral) and outpatient operations

$\longrightarrow$ 518,398 unique observations at the physician/hospital/year

$\longrightarrow$ 7.5mm inpatient stays (47% of total) and 24mm outpatient procedures

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Vertical Integration and Treatment Intensity

Estimated Effects of Vertical Integration

Two-step estimation strategy:

1. Estimate $y_{ijk} = \alpha_i + x_i\beta + \Gamma_{jk} + \epsilon_{ijk}$ at patient level (separately by year)
2. Estimate $\hat{\Gamma}_{jkt} = \gamma_j + \gamma_k + \tau_t + z_{jkt}\delta + \eta_{jkt}$ with physician-hospital panel

Estimated Effects of Vertical Integration

$$\hat{\Gamma}_{jkt} = \gamma_j + \gamma_k + \tau_t + z_{jkt}\delta + \eta_{jkt},$$

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Outcome	Estimate	St. Error

* p-value <0.1, ** p-value <0.05, *** p-value <0.01

Estimated Effects of Vertical Integration

$$\hat{\Gamma}_{jkt} = \gamma_j + \gamma_k + \tau_t + z_{jkt}\delta + \eta_{jkt},$$

Outcome	Estimate	St. Error
Total Medicare Payments	76.176**	(30.911)

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Outcome	Estimate	St. Error
Total Medicare Payments	76.176**	(30.911)
Total Hospital Costs	133.063***	(42.099)

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Estimated Effects of Vertical Integration

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Outcome	Estimate	St. Error
Total Medicare Payments	76.176**	(30.911)
Total Hospital Costs	133.063***	(42.099)
Total Procedures	0.014***	(0.004)

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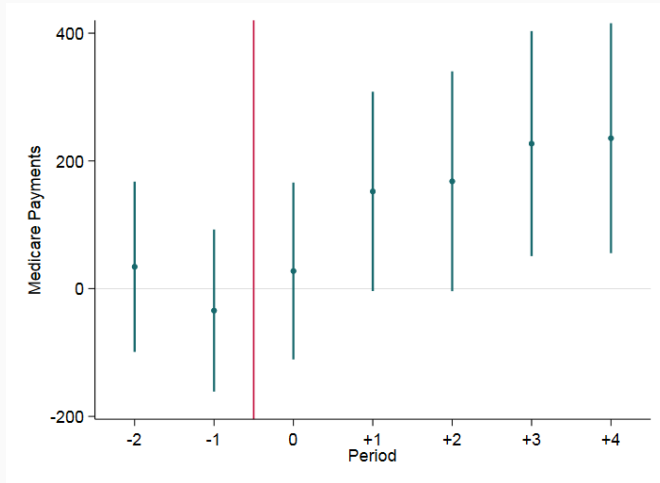## Threats to Identification and Interpretation

At least three concerns to interpret as effect on treatment intensity:

1. Standard issues with two-way FE estimator and time-varying treatment
2. Reallocation from other OP facilities (without matching hospital NPI)
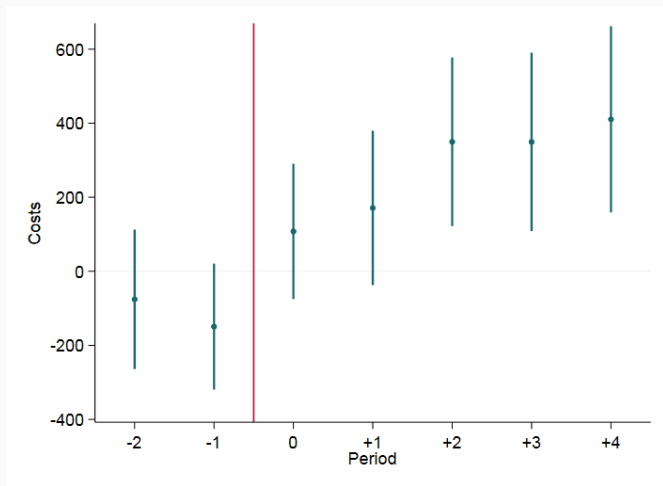3. Moving from clinic (unobserved) to OP facility

Event Studies

Total Medicare Payments

Total Hospital (IP & OP) Costs

Takeaways

- Increase in payments and costs
- Evidence consistent with common trends assumption for total payments and costs
- Concerns about limited pre-period data

Treatment Intensity vs Reallocation

Want to isolate treatment intensity effect

1. Focus on patients with no change in physician/hospital pairs over time
2. Examine outcomes within an inpatient stay

Outcome	Estimate	St. Error

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Aggregate Outcomes without Reallocation

Outcome	Estimate	St. Error
Total Medicare Payments	64.134**	(30.858)

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Aggregate Outcomes without Reallocation

Outcome	Estimate	St. Error
Total Medicare Payments	64.134**	(30.858)
Total Hospital Costs	122.894***	(42.130)

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Aggregate Outcomes without Reallocation

Outcome	Estimate	St. Error
Total Medicare Payments	64.134**	(30.858)
Total Hospital Costs	122.894***	(42.130)
Total Procedures	0.013**	(0.004)

* p-value <0.1, ** p-value <0.05, *** p-value <0.01

Effects on Components of Inpatient Stay

Outcome	Estimate	St. Error
Charges for:		
Total Inpatient	180.997***	(49.771)
Medical Supplies	40.564	(30.024)
Operating Room	-11.029	(22.928)
Anesthesia	5.278	(4.999)
Labs	9.286	(8.826)
Radiology	-5.943	(6.058)
MRI	-0.514	(1.359)

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Effects on Components of Inpatient Stay

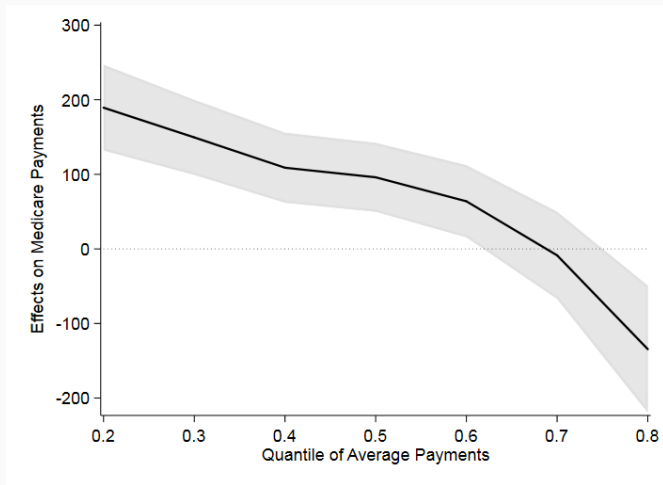| Outcome	Estimate	St. Error
Counts of:		
ICU Days	0.021	(0.013)
Procedures	0.030***	(0.009)
Medicare payments:	338.846**	(138.981)

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Heterogeneous Effects
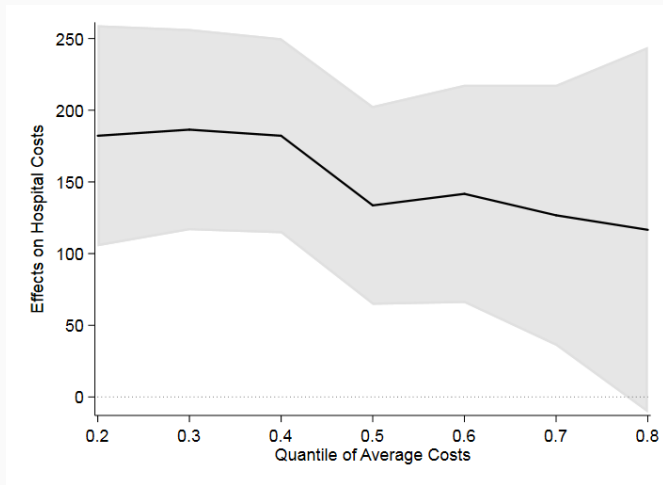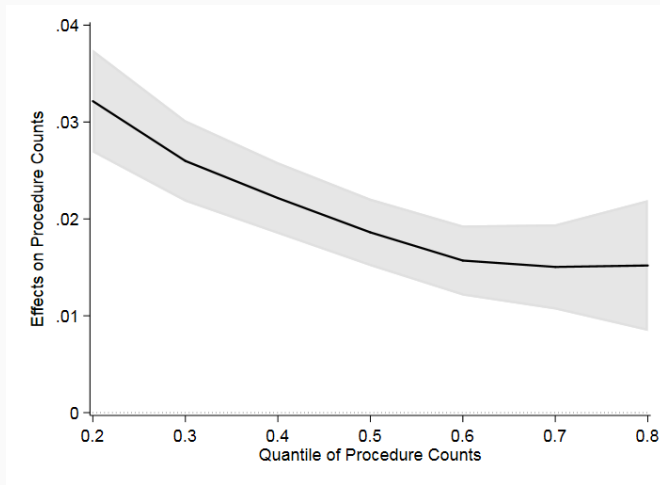
Unconditional Quantile Results: Payments

Unconditional Quantile Results: Hospital Costs

Unconditional Quantile Results: Procedures

Main Takeaways

Summary of Results

Overall Results

- Increase in Medicare payments ($75-$200) and hospital costs ($130-$350)
- Extrapolates to between $55mm and $146mm in additional Medicare payments per year
- 4-10% of within-physician variation across hospitals explained by vertical integration

Thank You