How Acquisitions Affect Firm Behavior and Performance: Evidence from the Dialysis Industry

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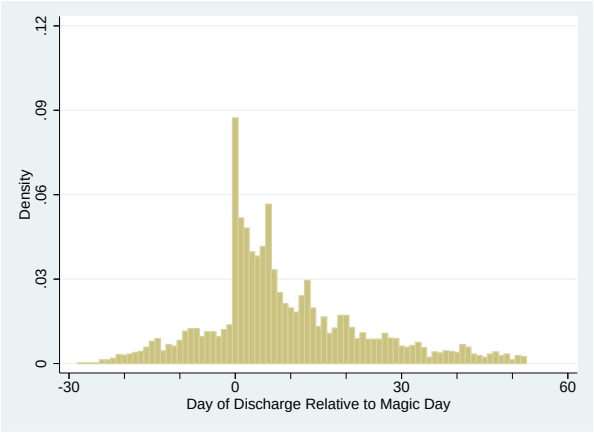
Motivation

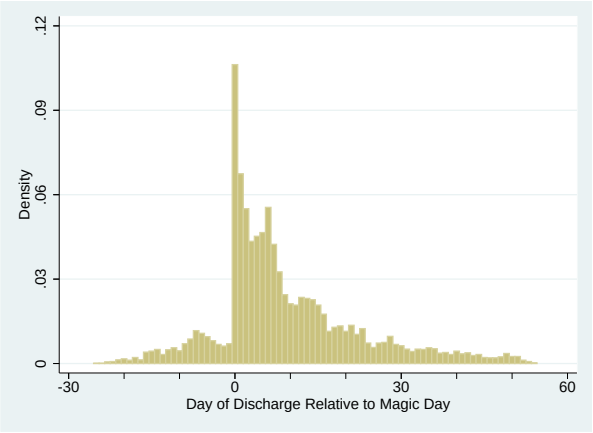
- Significant consolidation in U.S. healthcare markets
- Long tradition in IO of studying market structure & outcomes
  - Often find that ↑ concentration leads to ↑ prices, ↓ quality
  - Typically look at market power, not the mechanisms underlying these changes
  - But M&A may have effects independent of market power
- Much less work on how M&A directly affects firm behavior
  - Lack of data?
  - What behavior to compare?

Suggestive Results from Our Previous Work

LTCHs Adopt Acquirers' Discharge Policies (Eliason et al., 2018)

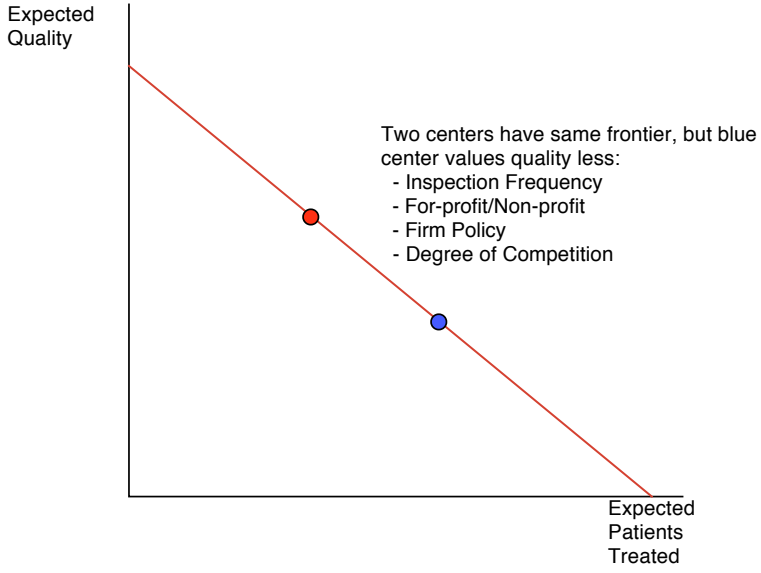


Pre-Acquisition



Post-Acquisition

Quality-Quantity Tradeoff in Dialysis (Grieco & McDevitt, 2017)



Our Paper Today

Study how provider behavior and patient outcomes change following ≈1200 acquisitions of independent dialysis facilities

1. Large chains have a different strategy than independents
   - Use more injectable drugs
   - Replace nurses with techs
   - Treat more patients per employee & station
2. This leads to worse outcomes for patients
   - Survival & transplant rates fall
   - Hospitalizations increase
3. And wastes scarce Medicare resources
   - Payments increase 7.5% for worse outcomes

Previous Work on This Topic

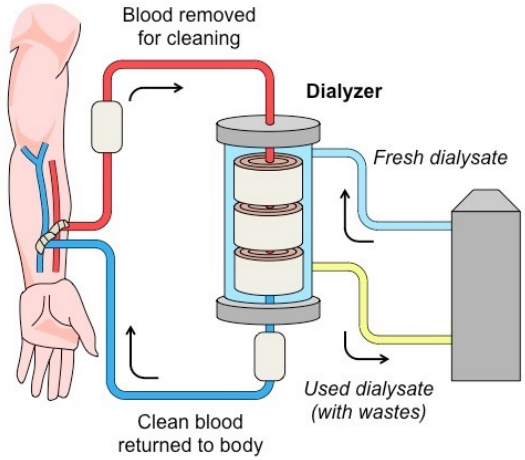
Relates to multiple literatures (too much to cover here)

1. Effects of mergers and acquisitions
   - Health care: Cutler et al. (2015), Dafny et al. (2016), Cooper et al. (2018)
   - Other industries: Prince & Simon (2017), Fan (2013), Natividad (2014)
   - Typically don't consider mechanisms, mostly about how market power affects prices & quality
2. Acquisitions and transference of firm behavior
   - Braguinsky et al. (2015), Dafny & Dranove (2009)
   - Evidence that new managers implement best practices
3. Payment structure and provider behavior
   - Eliason et al. (2018), as well as countless others
   - Healthcare providers respond to incentives

Institutional Details of the Dialysis Industry

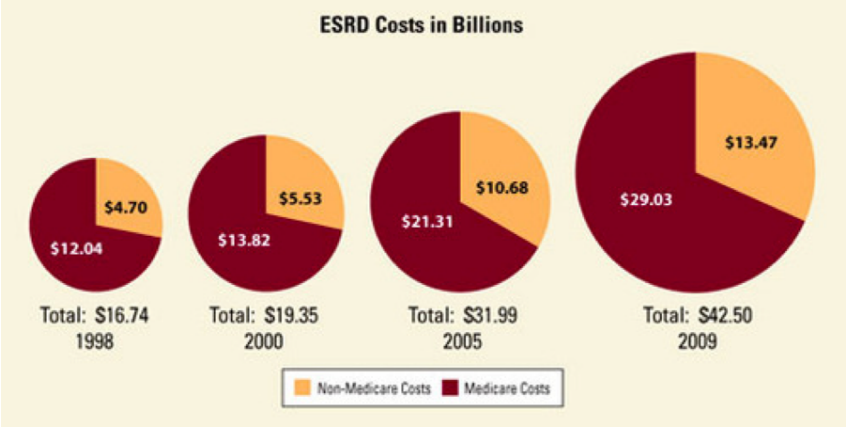
Background on Dialysis

- Kidney functions
  1. Filter toxins from blood
  2. Stimulate production of red blood cells
- ESRD (chronic kidney failure)
- Two treatment options
  1. Dialysis
     - >90% choose in-center hemodialysis
     - 3x/week
  2. Transplant
     - Kidneys scarce, not all patients are suitable



Background on Medicare's Role in Dialysis

- ~ 500,000 patients, 90% covered by Medicare
- Benefits extended to all patients regardless of age in 1972
- 80/20 split under Medicare Part B
- Private insurance covers first 30 months
- $34.3 billion in spending, 6% of budget
- ESRD costs take up 1% of entire federal budget
- Population growing at 3.4% per year



Background on Medicare Payments

Medicare initially had a blended payment (our study period)

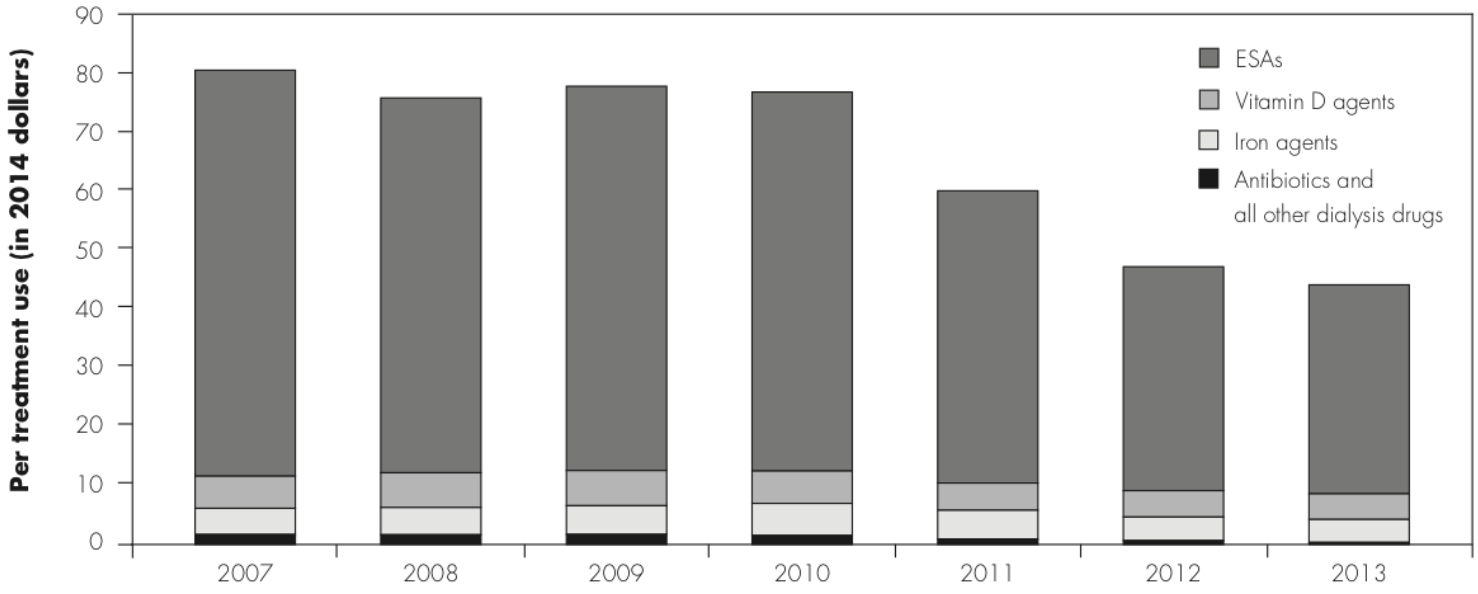
- Centers paid composite rate of $128 per treatment
- EPO and other drugs separate under FFS

Medicare implemented PPS in 2011 (our next paper)

- $230 for treatment + drugs

FIGURE 6–2

Dialysis drug utilization, overall and by drug class, 2007–2013

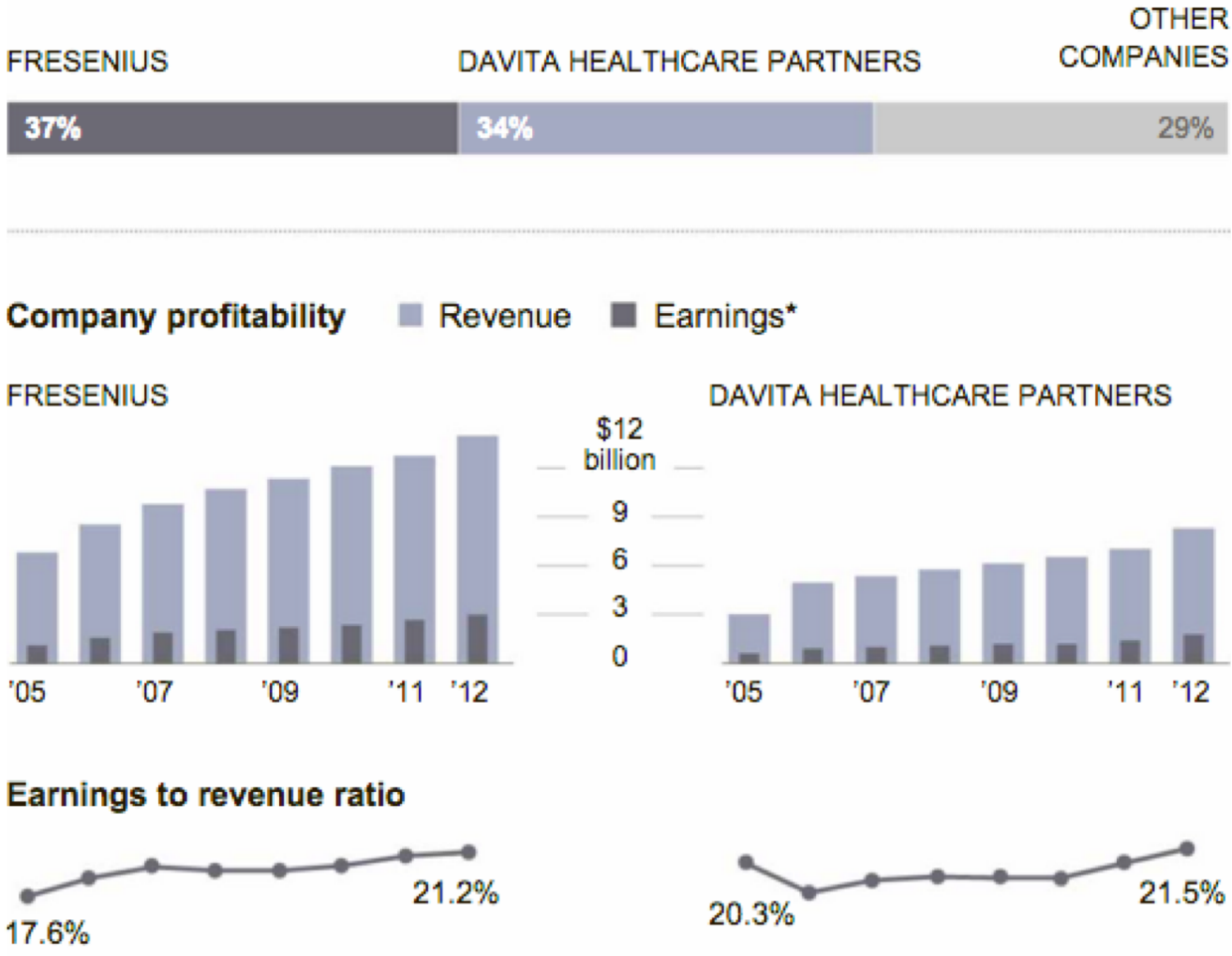


Background on EPO

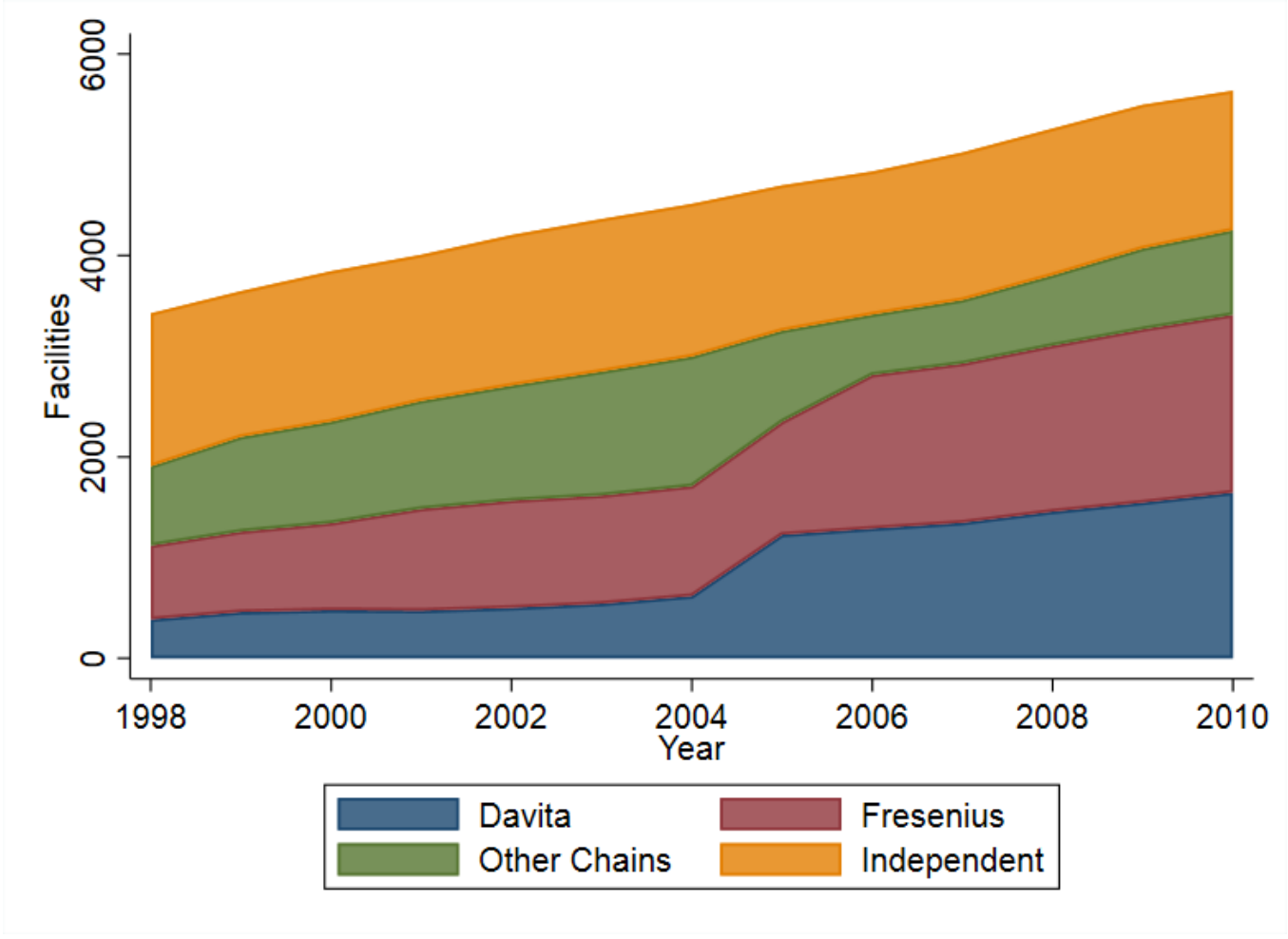
- Treats anemia
- Used by $>$90% of dialysis patients at any given time
- Largest CMS drug expenditure for many years
  - $\approx$ \$1.7bn in CMS expenditures in 2007 just for ESRD
  - $\approx$ \$10 per 1000 units in reimbursement
- 25% of DaVita revenue and 40% of profits
- Lots of leeway in dosing decisions due to disagreement on optimal hemoglobin target

Background on Dialysis Industry

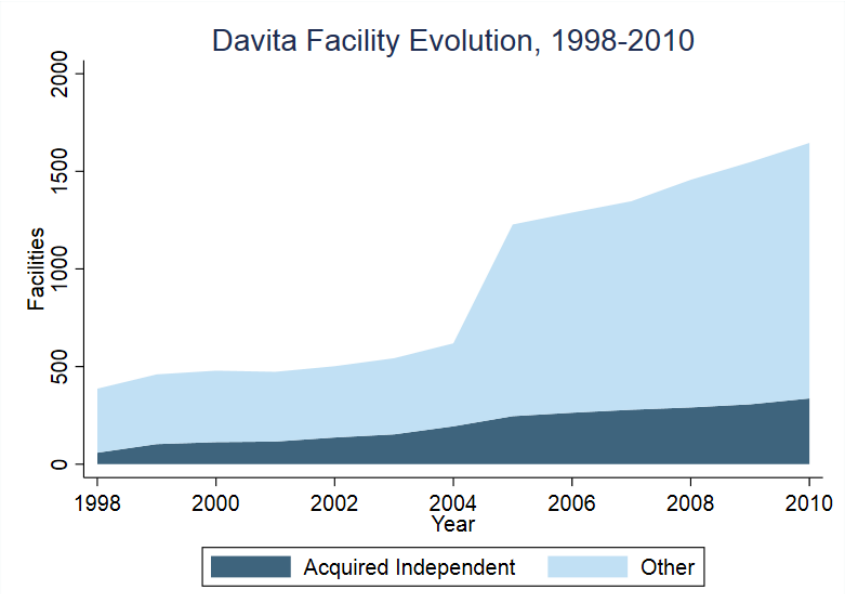
~7,000 dialysis centers across U.S.

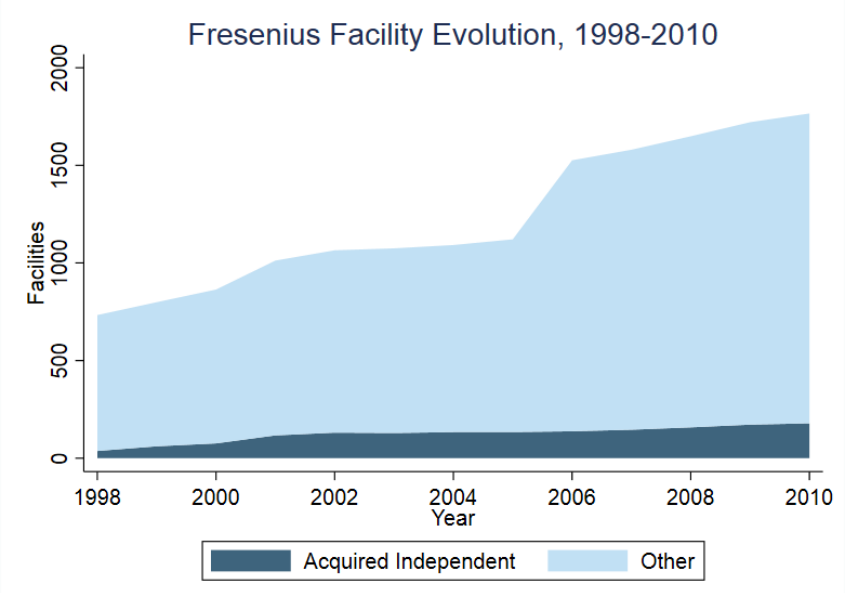


Dialysis Market Over Time

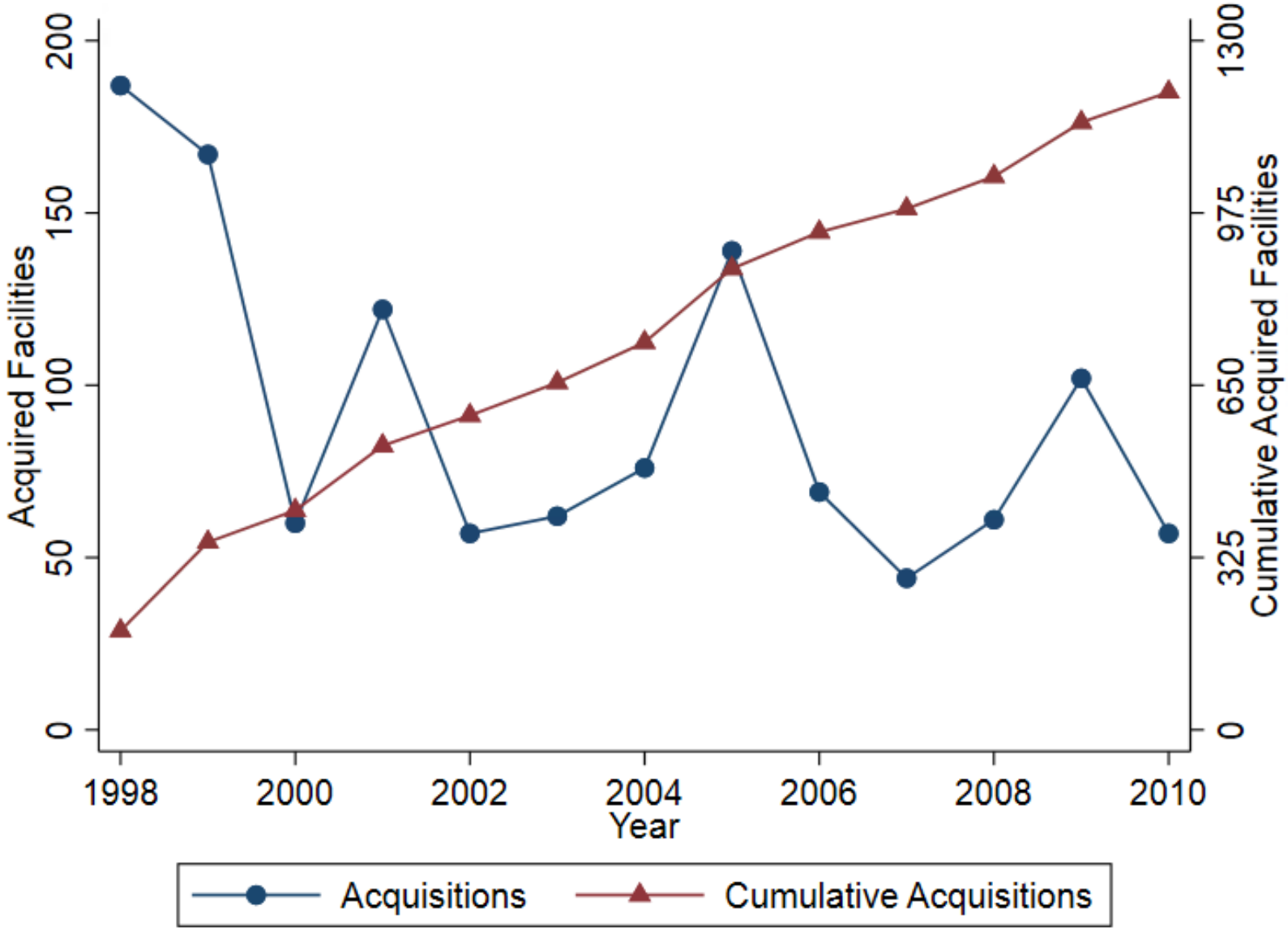


DaVita & Fresenius Over Time

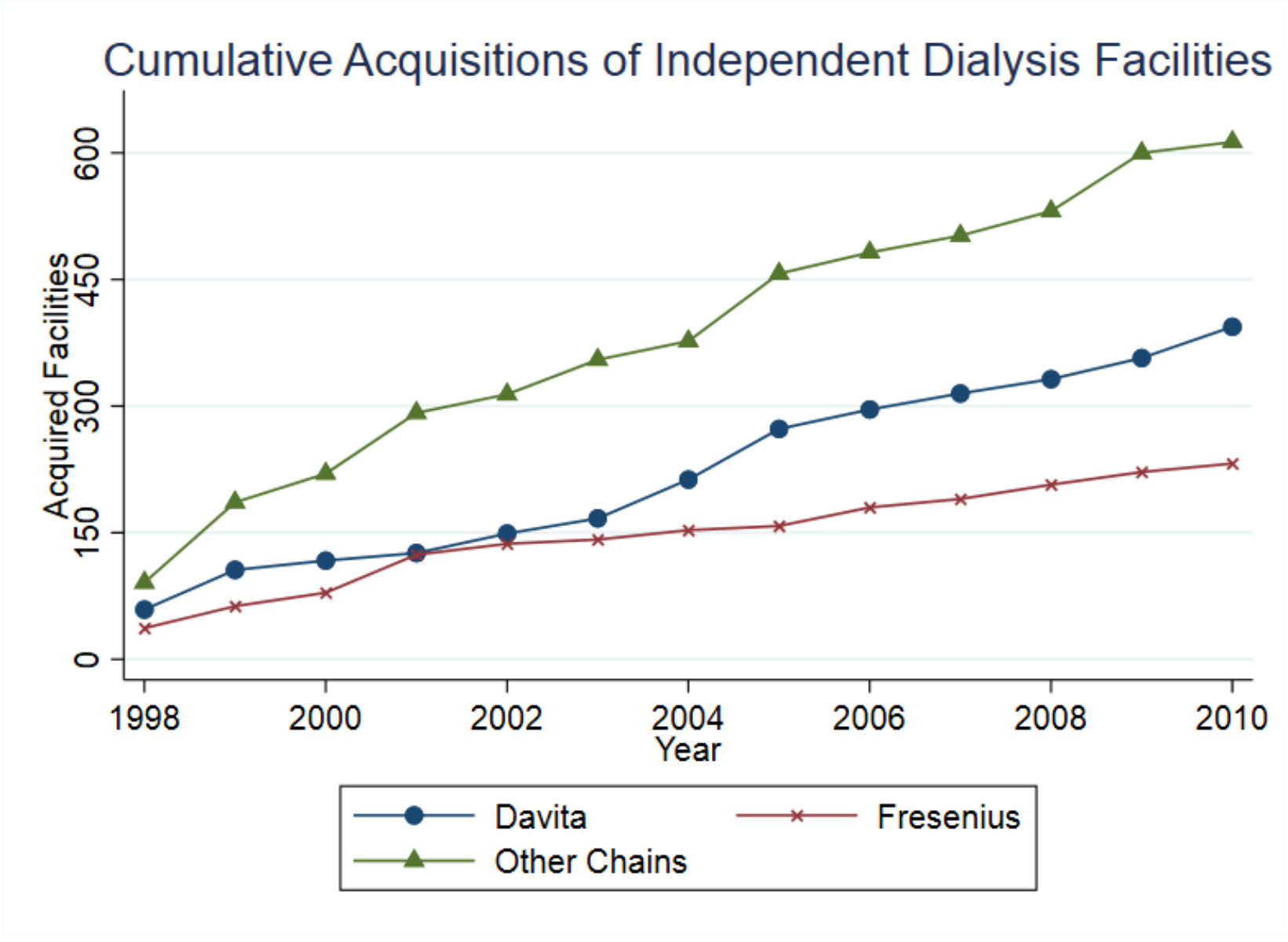




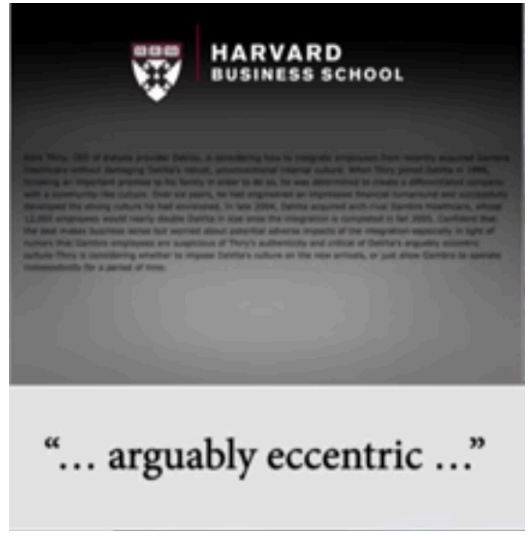
Independent Dialysis Facility Acquisitions Over Time



Dialysis Facility Acquisitions by Chains Over Time



Strategy Matters for Dialysis Chains



Measuring the Effects of Acquisitions

1. Observable provider choices
   - Injectable drugs
     - Most prominent is EPO (25% revenue, 40% profits)
   - Staffing decisions
     - Nurses vs. technicians
     - Overall staffing level
   - Capacity utilization
2. Clinical measures
   - Urea reduction ratio
   - Hemoglobin
3. Patient outcomes
   - Hospitalization
   - Mortality
   - Transplants

Evidence of Differences in Provider Strategy

Data

- United States Renal Data System (USRDS)
  - Medicare claims for ESRD patients
    - Drug doses
    - Monthly clinical outcomes
  - Medical evidence forms
    - Comorbidities
    - Clinical data at incidence (ESRD severity, anemia severity, BMI)
  - Waitlist and transplant dates
  - Annual facility surveys collected by the CDC and Medicare
    - Employed staff
    - Station counts
    - Supplement with Provider of Service files for acquisition dates
  - Facility cost reports from HCRIS
- Observations for $\sim$14m patient-months
  - Can track same patient over time, even if facility changes

Observable Patient Mix

Table: Patient Covariate Descriptive Statistics

	Always Independent	Pre-Acquisition	Post-Acquisition	Always Chain
Demographics				
Age	64.25	64.54	63.96	63.38
Months With ESRD	35.79	31.80	37.61	36.91
Private Insurance	6.53	7.43	6.66	6.79
Non-Hispanic White (%)	48.55	53.36	44.37	40.38
Black (%)	32.26	30.63	37.10	40.10
Hispanic (%)	13.04	10.01	12.78	14.72
Clinical Characteristics				
BMI	28.16	27.90	28.77	28.38
GFR	7.91	7.74	8.02	7.71
Ischemic Heart Disease (%)	17.26	20.48	14.05	13.75
Diabetic (%)	53.68	54.33	55.16	54.91

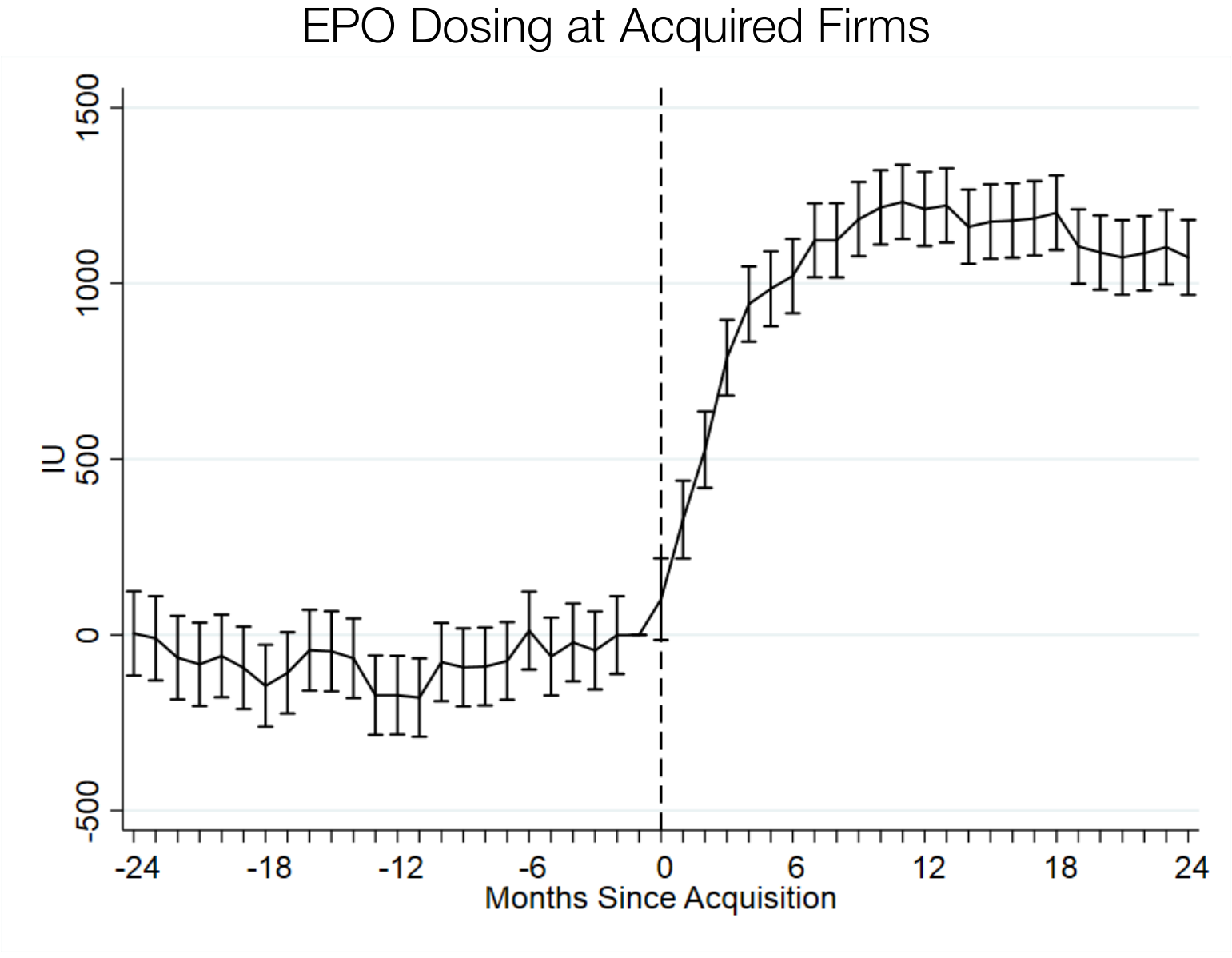
Identification of Key Effects

$$y_{ijt} = \beta Acquired_{jt} + \alpha X_{ijt} + \epsilon_{ijt}$$

- Two primary threats to identification of β:
  1. Changing patient mix after acquisition
     - Robust clinical & patient data
  2. Acquisition isn't random
     - Include facility fixed effects
     - Identification from within-facility changes in ownership
     - No trend prior to acquisition

- Advantages over previous studies:
  1. Large sample of acquisitions
  2. Clear channels through which strategies could change
  3. Limited scope for changing prices (at least for Medicare)
  4. Little evidence market power matters (at least for Medicare)

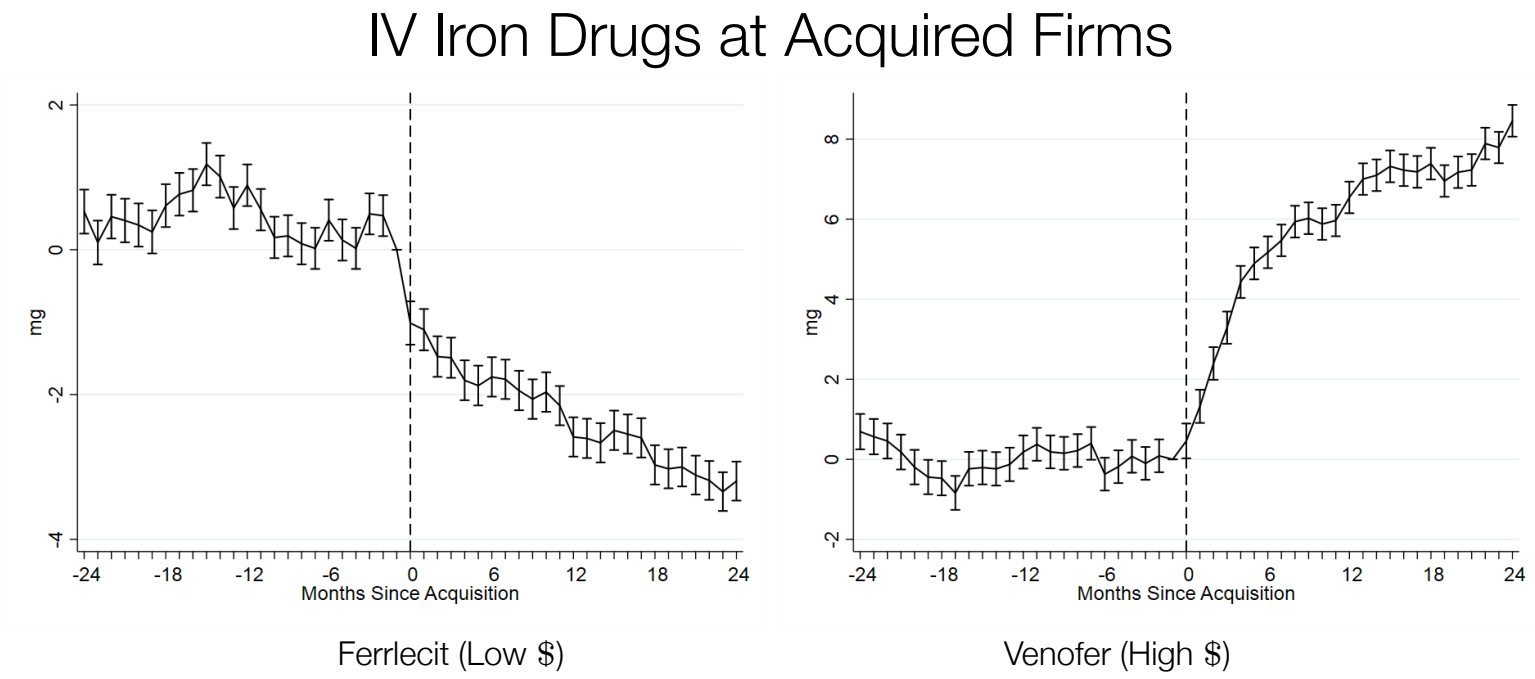
EPO Doses Increase Substantially After Acquisition



EPO Regressions

	(1) Epogen	(2) Epogen	(3) Epogen	(4) Epogen
Pre-Acquisition	0.269* (0.132)	0.271* (0.122)		
Post-Acquisition	1.529*** (0.0872)	1.413*** (0.0827)	0.843*** (0.0713)	0.782*** (0.0779)
Always Chain	1.511*** (0.0834)	1.361*** (0.0769)		
Observations	14,111,310	14,111,310	14,111,310	14,111,310
Dep. Var. Mean	7.536	7.536	7.536	7.536
Units	log(IU)	log(IU)	log(IU)	log(IU)
Year x Month FE	Yes	Yes	Yes	Yes
Pat. & Fac. Controls	No	Yes	Yes	Yes
Facility FE	No	No	Yes	Yes
Patient FE	No	No	No	Yes

Acquired Facilities Switch from Ferrlecit to Venofer



Ferrlecit (Low $)

Venofer (High $)

Acquired Facilities Change Inputs & Stretch Resources

	$\beta/\bar{y}$	$\bar{y}$
Nurses/Techs	-0.151***	0.974
Patients/Employee	0.119***	5.122
Patients/Station	0.046*	3.992

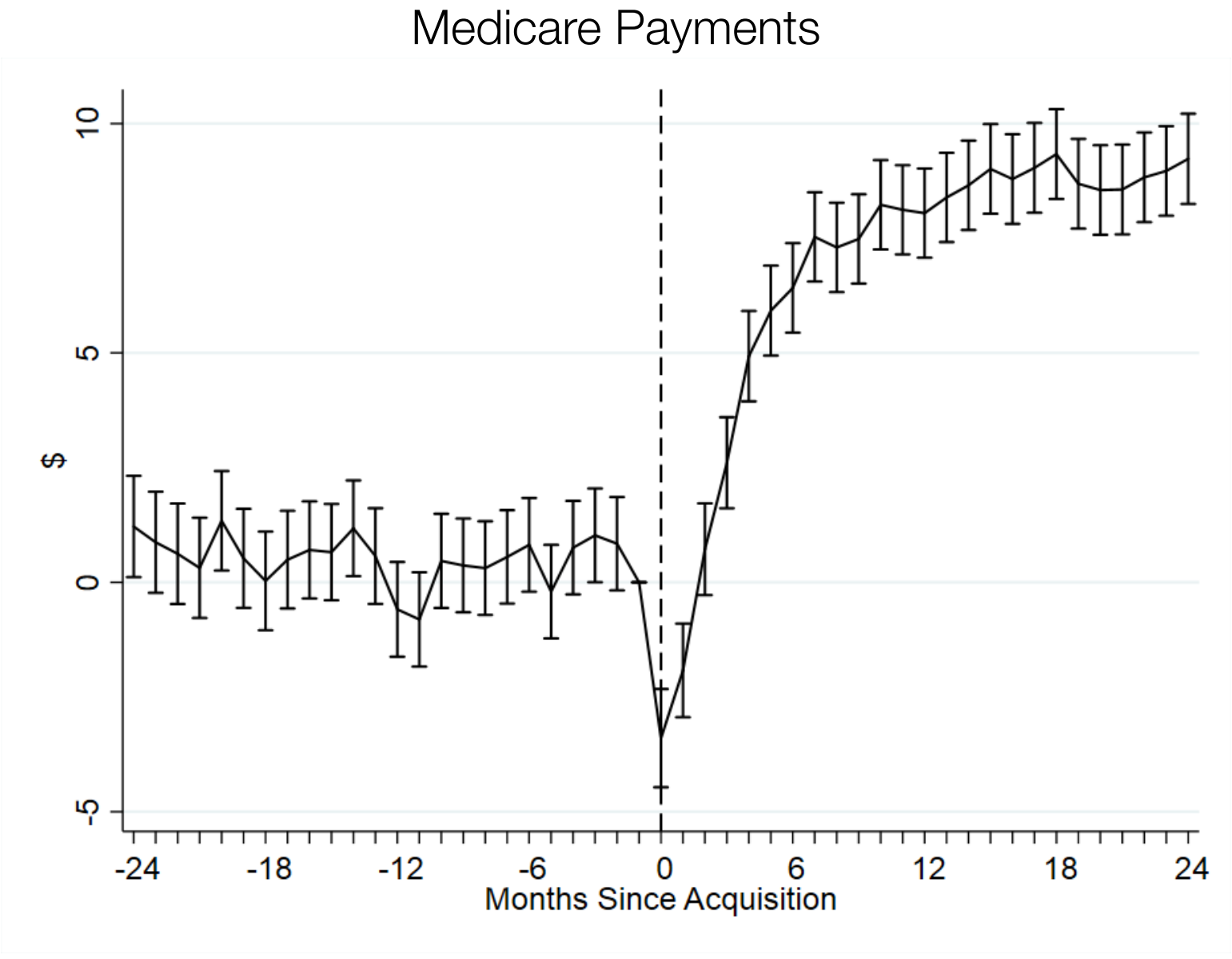
Patients at Acquired Facilities (Mostly) Fare Worse

	$\beta/\bar{y}$	$\bar{y}$
Hospitalizations		
All Cause	0.061***	0.141
Septicemia	0.129***	0.007
Cardiac Event	0.040*	0.030
Clinical Outcomes		
Good URR	0.025***	0.881
Low Hemoglobin	-0.0098***	0.095
High Hemoglobin	0.038***	0.381
Good Hemoglobin	-0.028***	0.523

New Patients Less Likely to Survive/Receive Transplant

	$\beta/\bar{y}$	$\bar{y}$
Waitlist or Transplant	-0.094**	0.127
Survive First Year	-0.017**	0.746

Medicare Payments Go Up After Acquisition



Conclusions & Next Steps

Summary & Future Projects

Summary

- Acquisitions lead to changes in providers' behavior
- Patient outcomes may change irrespective of market power

Future Projects

- Study EPO use after payment reform in 2011 (elevation IV)
- Model "make vs. buy" decision for dialysis chains