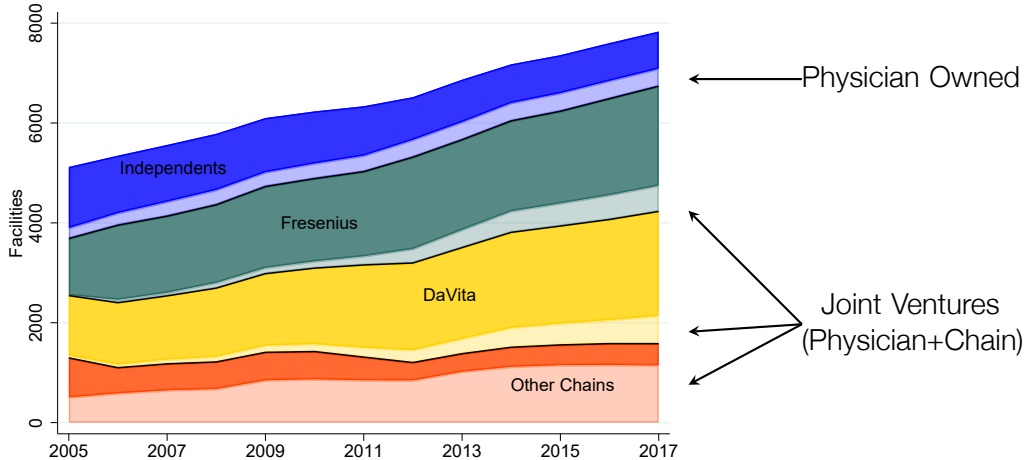
Profit Sharing & Patient Steering: Joint Ventures and Other Vertical Ties in Dialysis

Paul Eliason
BYU

Ryan McDevitt
Duke

Jimmy Roberts
Duke

Growing Horizontal & Vertical Consolidation in Dialysis/Health Care

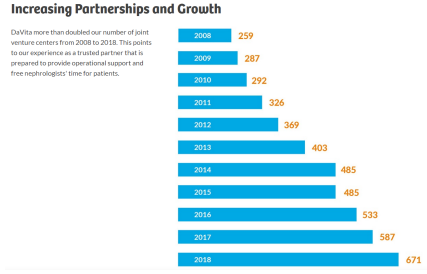


"I remain very concerned about the rapid rate of consolidation among healthcare providers...we have seen providers increasingly pursue alternatives to traditional mergers such as affiliation arrangements, joint ventures, and partnerships, all of which could also have significant implications for competition." — Edith Ramirez, Former FTC Chair

Dialysis Joint Ventures

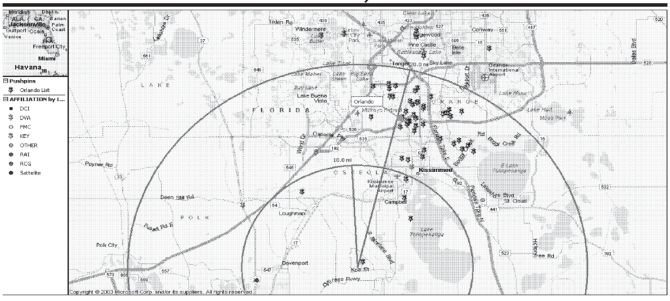
Dialysis chains partner with local physicians through joint ownership of facilities

- Chains provide dialysis
- Physicians manage & coordinate care
- Potential benefits
  - Improved efficiency, coordination
- Potential risks
  - Agency problems: treatment distortions, ...
  - Anticompetitive effects: business stealing, foreclosure, ...



Dialysis JV Case Study: Barbetta v. DaVita, 2014

Orlando, FL



5 patients inside the 10 mi. radius (3-4 of which are IMS referred)

4 patients closer to Poinciana (3 of which are IMS referred)

At least 45 (maybe up to 51) of the 70 local pts are IMS referred

- DaVita manipulated revenue projections to mask how lucrative deals were
- Prohibited physicians from advising patients to go to rivals (non-disparagement)
- DaVita's financial analysts took notes on a criminal conspiracy

Policy Tools to Mitigate Distortions & Anticompetitive Behavior

- Antitrust enforcement
  - Most dialysis acquisitions fall below HSR threshold for review
  - Little consensus on how to treat vertical mergers
- Stark Law
  - Blocks physicians from referring patients to entities where they hold financial stake
  - Freestanding dialysis services excepted
- Anti-kickback statutes
  - Prohibits compensation for patient referrals
  - Barbetta v. DaVita (2014), Flanagan v. Fresenius (2021) $\rightarrow$ sold ownership shares at below-market prices or bought at above-market prices to get referrals
  - Allegations that some chains pay medical directors inflated salaries to get referrals

Regulators Don't Know What's Happening at These JVs

There is a striking lack of transparency regarding joint-venture arrangements. Virtually no information about these partnerships, including which facilities have joint ownership, who the partners are, how the partnerships are structured, or even the total number of joint ventures that exist, is collected or made publicly available by dialysis companies or regulatory agencies.

NEJM, Berns et al. 2018

Detailed ownership information (including information on joint ventures and similar financial arrangements) would help policymakers and researchers assess conflicts of interest and establish policies to prevent adverse impacts.

MedPAC, Jan 2022

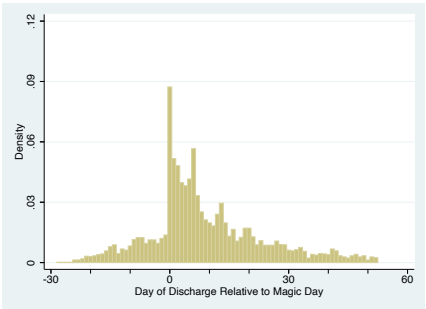
What We Do in This Paper

Study consequences of horizontal & vertical integration in dialysis

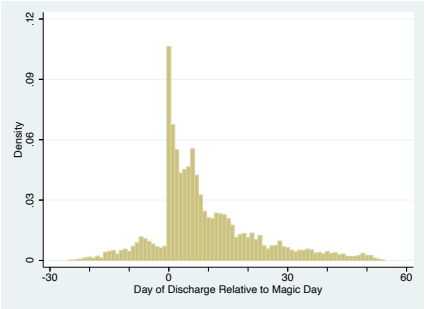
- First-of-its-kind dataset of joint ventures and medical directors
  - Identify participating facilities and physicians
  - Document growth of dialysis JVs over past two decades
  - Show variation in director pay $\rightarrow$ link to referrals
- Study effects of these arrangements
  - Compare health and business implications of horizontal/vertical mergers
  - Dialysis ideal setting for this
    - Data on thousands of facilities
    - Extensive consolidation over past 30 years
    - Repeated patient encounters
    - Detailed process and quality measures
- Today: mostly descriptive
  - Future: will model JV/M&A/MD decisions and evaluate counterfactual policies like anti-steering, foreclosure, and breakups

Connection to Our Previous Work on LTACs (AER 2018)

Long-term acute care hospitals adopt acquirer's profitable discharge policies



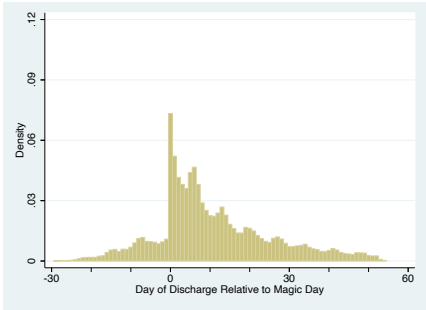
Pre-Acquisition



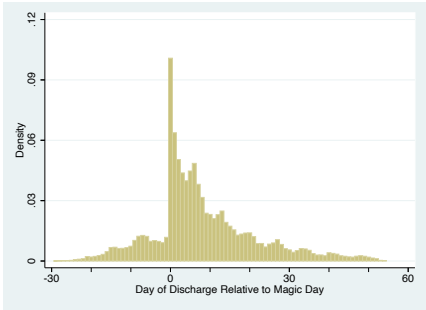
Post-Acquisition

Connection to Our Previous Work on LTACs (AER 2018)

Effect more pronounced at hospitals-within-hospitals



Standalone



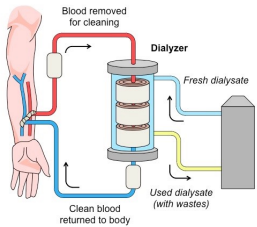
Co-Located

"Management will use its data analytics capability to identify compliant volume from the acute care hospital they serve" — Select Medical analyst report

Institutional Details of Dialysis

Background on Dialysis

- Healthy kidneys
  1. Filter toxins from blood
  2. Stimulate red blood cell production
- For those with end-stage renal disease (ESRD) this no longer happens
- Two treatment options
  1. Transplant
     - Kidneys scarce
     - Not all patients eligible
  2. Dialysis
     - >90% in-center hemodialysis
     - 3 times per week
     - Also receive drugs like EPO



Medicare's Role in Dialysis

- ~500,000 patients in US, 90% on Medicare
- All ages Medicare-eligible (not just 65+)
- Medicare Part B 80/20 split, no OOP cap
  - Medigap options vary by state
- Private insurance covers first 30 months
  - Pay about 7X Medicare (≈$250K/year)
  - Charitable premium assistance controversial
  - MSPA Supreme Court decision last year
- Costs $92,000 a year per HD patient
- Medicare spends $36B per year
  - 7% of CMS budget
  - 1% of entire federal budget
- Population growing at 2.6% per year

Background on Physicians & Dialysis Chains

Dialysis Chains

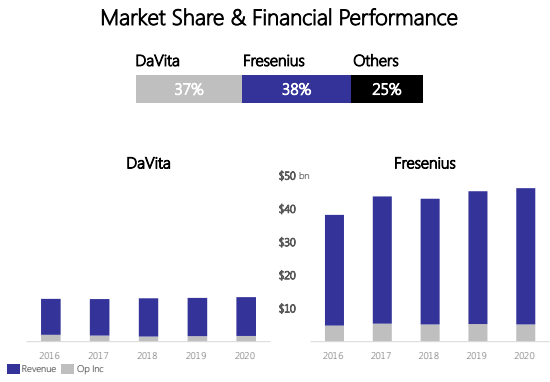
- Provide regular renal replacement therapy (dialysis + drugs)
- Operate and manage facilities
  - Dialysis machines
  - Water purification
  - Staff training
  - Best practices
- Manage infections and VA
- Economies of scale from bulk buying and centralized labs

Physicians

- Usually nephrologists
- Manage care for ESRD patients
  - Pre-dialysis ($\approx$ 60%)
    - Dialysis prep and planning
    - Create vascular access/fistula
    - Referral to dialysis facility
  - Dialysis
    - Manage dialysis + drugs
    - Round at facilities $\approx$ once a month
    - Provide information to patients
    - Coordinate VA maintenance
- Serve as facility medical directors

Background on Dialysis Industry

- ~7,000 facilities across US
- Consolidation over past 30 years
  - Non-chain from 86% to 21%
  - Big Two now own 3/4 facilities
- $4M annual revenue per facility
- Extensive lobbying & lawsuits
  - $100M to defeat Calif. Prop 8
  - DaVita has paid out $1B in lawsuits since 2013



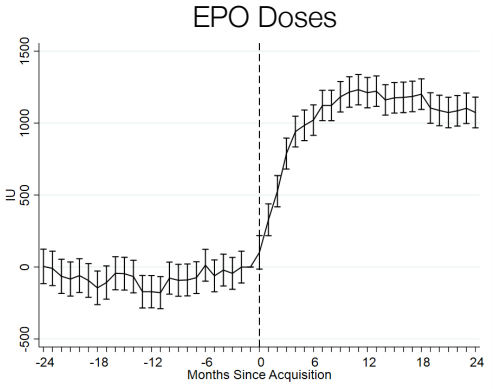
Strategy of Dialysis Chains

"If I had 1,400 Taco Bells and 32,000 people who worked in them, I'd be doing all the same stuff" — Kent Thiry, Former DaVita CEO

Connection to Our Previous Work (QJE 2020)

Dialysis facilities adopt acquirer's profitable strategies

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



Connection to Our Previous Work (QJE 2020)

Chains have lower EPO costs, had higher EPO profits

	(1) Variable Profits Per Session	(2) EPO Margin	(3) EPO Cost Per 1000 IUs	(4) Total EPO Costs	(5) EPO Units Per Session
Pre-Acq	1.360	-0.581	-0.371**	-0.451	222.5
	(2.497)	(1.652)	(0.141)	(1.723)	(204.1)
Post-Acq	18.17***	7.851***	-1.237***	0.965	778.8***
	(2.205)	(1.334)	(0.145)	(1.464)	(171.9)
Always Chain	22.16***	7.975***	-1.340***	0.745	812.2***
	(2.344)	(1.626)	(0.156)	(1.724)	(193.4)
Constant	30.60***	1.113	9.190***	35.36***	3835.8***
	(3.704)	(3.399)	(0.205)	(2.833)	(265.7)
Year FE	1	1	1	1	1
State FE	1	1	1	1	1
Observations	25,934	25,934	25,934	25,934	25,934

Connection to Our Previous Work (QJE 2020)

Adopting these strategies harms patients

	$\beta/\bar{y}$	$\bar{y}$
Hospitalizations		
All Cause	0.061***	0.141
Septicemia	0.129***	0.007
Cardiac Event	0.040*	0.030
Outcomes		
Waitlist or Transplant	-0.094**	0.127
Survive First Year	-0.017**	0.746

- DaVita's Chief Medical Officer appeals to Larry Katz for retraction: "The linear models used are inappropriate for considering discrete outcomes data."

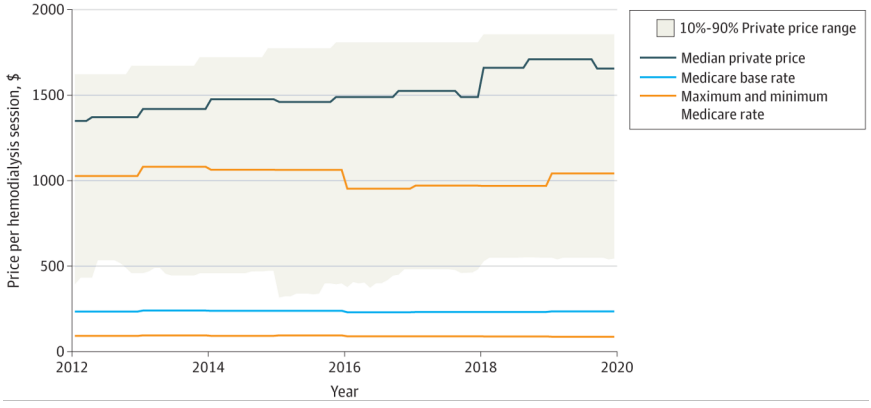
Connection to Our Previous Work (QJE 2020)

Harm not related to local market power

	EPO	Venofer	Ferrlecit	Low HGB	High HGB	Good HGB	Good URR	Hosp.
Market = Hospital Service Area								
Post-Acquisition	0.806***	0.500***	-0.251**	-0.00941*	0.0320**	-0.0226*	0.0236***	0.00581**
	(0.0809)	(0.114)	(0.0926)	(0.00426)	(0.0103)	(0.00978)	(0.00666)	(0.00223)
Increases HSA HHI	0.0479	0.188	-0.0927	-0.00301	0.00925	-0.00624	-0.00341	0.000933
	(0.0892)	(0.146)	(0.120)	(0.00564)	(0.0163)	(0.0153)	(0.00881)	(0.00315)
Market = Core Based Statistical Area								
Post-Acquisition	0.940***	0.490**	-0.202	-0.0134	0.0359**	-0.0225	0.0124	0.00533
	(0.124)	(0.159)	(0.124)	(0.00759)	0.0134)	(0.0137)	(0.00780)	(0.00308)
Increases CBSA HHI	-0.137	0.150	-0.131	0.00301	0.00153	-0.00453	0.0119	0.00126
	(0.122)	(0.179)	(0.141)	(0.00804)	(0.0166)	(0.0164)	(0.00919)	(0.00354))
Patient-Months	14,011,137	11,471,833	12,340,156	13,130,676	13,130,676	13,130,676	14,011,137	14,011,137
Units	log(UI)	log(mg)	log(mg)	%	%	%	%	%
Pat. & Fac Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

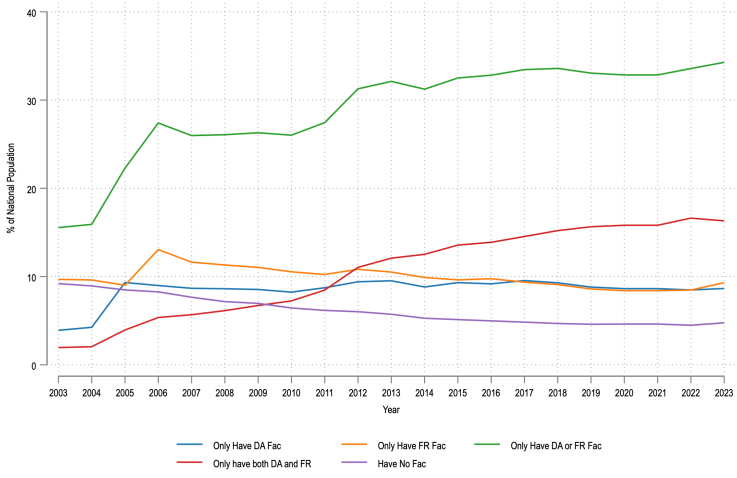
Connection to Our Previous Work (JAMA Open 2022)

Chains get much higher payments from private payers, most have one **national** price



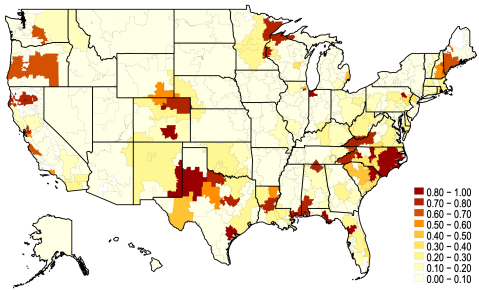
Connection to Our Contemporaneous Work (WP 2023)

Over 1/3 of US now has access to only DaVita and/or Fresenius in their HSA

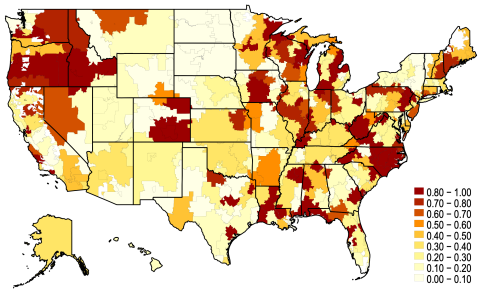


Connection to Our Contemporaneous Work (WP 2023)

Choices available for dialysis provider have fallen sharply across most of US → spread of LDO mono/duopoly HSAs



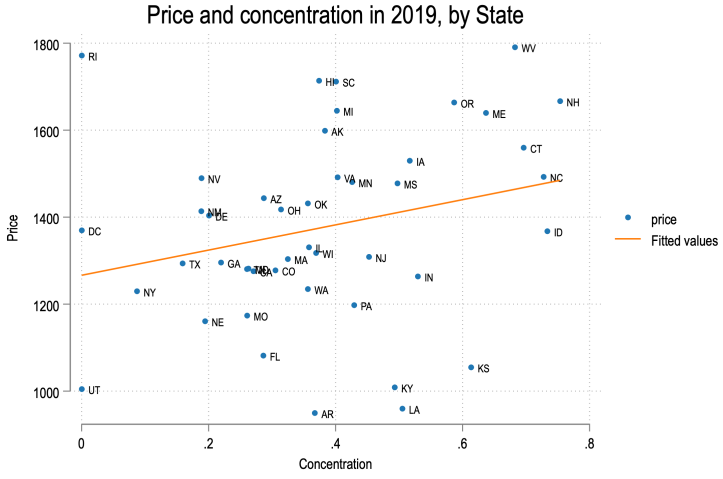
2003



2023

Connection to Our Contemporaneous Work (WP 2023)

State-wide commercial rates correlated with dialysis duopoly market share



Growing Scrutiny of Dialysis Industry

Statement of Commissioner Christine S. Wilson,
Joined by Commissioner Rohit Chopra
Concerning Non-Reportable Hart-Scott-Rodino Act Filing 6(b) Orders
February 11, 2020

We support the Commission's decision to issue a 6(b) study designed to assess the sufficiency of the Hart-Scott-Rodino Antitrust Improvement Act of 1976 ("HSR Act") thresholds with respect to technology mergers and acquisitions of competitive significance. The Commission will benefit from a deeper understanding of the kinds of transactions – and the nature of their competitive impact – that were not reportable under the HSR requirements.

While non-reportable deals involving technology companies garner significant attention, academic work in other industries raises similar questions about the sufficiency of the HSR notification process. Given the FTC's significant expertise in the healthcare industry, and the vital importance of quality healthcare services at competitive prices to every American consumer, we encourage the Commission to analyze sub-HSR deals in that industry next. During the last three decades, the share of independent dialysis facilities has shrunk drastically and two national chains now own the majority of dialysis facilities and earn nearly all of the industry's revenue, with most acquisitions occurring below the HSR thresholds.[1] Similar patterns of "stealth consolidation" have been observed in pharmaceutical and hospital markets.[2] We urge the Commission to consider similar 6(b) studies across ot sure that we have a more complete understanding about the competitive eff ble mergers writ large.

We're Footnote 1

Measuring Effects of JVs & MDs

Research Questions

Health econ VI lit: some evidence of steering, mixed effects on prices, little on quality

- How common are JVs?
- How do JVs and MDs affect patient loads?
  - Business stealing? Market expansion?
- How do JVs affect care, outcomes, & spending?
- How do horizontal acquisitions compare to vertical integration?
  - Do JVs mitigate the negative effects of horizontal acquisitions?
- Future: what strategies do firms use when forming JVs and hiring MDs?
  - How do chains & physicians match to form JVs or become MDs?
  - What are the implications for competition and market structure?

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)
- On-site surveillance system (CROWN)
- Waitlist, transplant, and death dates
- Annual facility surveys collected by the CDC and Medicare
  - Employee & station counts
- Observations for 36m patient-months
  - Can track same patient over time (even if facility changes)

Medicare Provider Enrollment, Chain, & Ownership System (PECOS)

- Medicare certified providers required to report changes to
  - Ownership (>5% share)
    - Both direct & indirect owners (e.g., Warren Buffett)
    - Individual and group/organizational owners
  - Managing/directing employees
- Addresses, names, dates of ownership
- FOIA filled November 2018, fulfilled October 2019
- Fulfillment came with lots of challenges

Owner Classification

Individual Owners

1. Match to NPI by name and state using NPPES (2,420 matches)
2. Supplement with individual owners listed in HCRIS (+76)

Group/Organizational Owners

1. Classify each as: LLCs owned by a single physician, physician group, hospital or university, institutional investor, chains, other
   - Manual search by name and state in OpenCorporates, Bizapedia, and state corporation registration records to classify and identify company officers
2. For LLCs and physician groups
   - Match names to NPI whenever possible

Ownership Types and Transitions

New facilities

- Independent & not physician owned (e.g., hospital owned, entrepreneur)
- Independent & physician owned
- Chain & not JV
- Chain & JV

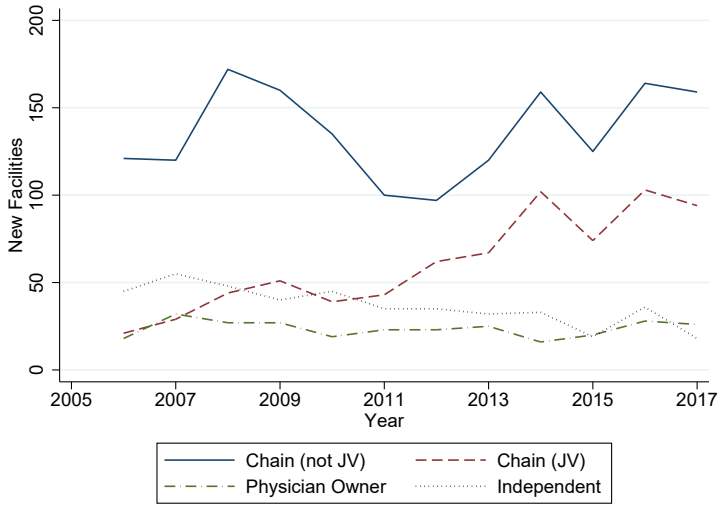
Common transitions

- Physician invests in independent $\rightarrow$ vertical
- Chain acquires independent that's not JV $\rightarrow$ horizontal
- Chain acquires physician-owned facility to form JV $\rightarrow$ horizontal & vertical
- Chain forms JV by selling ownership stake $\rightarrow$ vertical

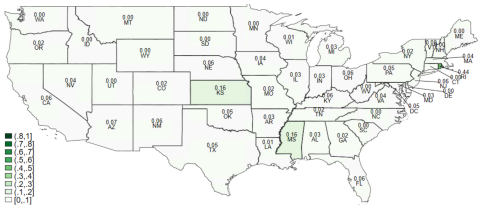
Common Facility Ownership Types & Transitions Over Sample Period

	N	%
Always Chain	4406	56.2
Always Independent	1017	13.0
Always Joint Venture	684	8.7
Always Physician Owned	315	4.0
Chain to Joint Venture	437	5.6
Independent to Chain	434	5.5
Physician to Joint Venture	92	1.2
Independent to Physician	46	0.6

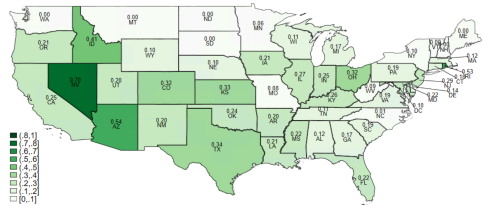
Types of New Facilities Over Sample Period



Joint Ventures Have Increased Across Much of US



2005



2017

Physician Ownership Statistics

	All		DaVita		Fresenius	
	Mean	SD	Mean	SD	Mean	SD
Total Facilities	1.79	2.00	1.74	1.43	2.01	2.63
DaVita	0.32	0.89	1.62	1.39	**0.01**	0.10
Fresenius	0.12	0.5	**0.00**	0.07	1.60	1.38
Other Chain	0.59	1.77	0.05	0.24	0.35	2.03
Independent	0.76	1.15	0.06	0.30	0.05	0.36
Owner–Month Obs	77953		15315		5879	

- Over 60% of owners with NPI classified as nephrologists
- No other specialty $>5\%$
- Chains often require non-competes for JV owners

Facility Summary Statistics

	(1) Independent	(2) Phys Owned	(3) Chain	(4) Joint Venture
Patients	**65.87**	76.85	73.79	75.12
HD Patients	59.18	71.13	67.73	67.37
Home Patients	5.58	4.87	5.33	6.81
Privately Insured	3.14	3.25	3.70	**4.39**
Dialysis Stations	16.75	18.61	18.66	18.44
Employees (FTE)	15.91	14.67	13.13	13.74
Nurses (FTE)	6.38	4.63	4.21	4.50
Technicians (FTE)	6.25	7.11	6.52	6.74
Nurses per Tech	**1.71**	0.85	0.81	0.85
Patients per Emp	**3.71**	4.66	5.11	4.78
Patients per Station	3.37	3.66	3.56	3.61
Emp per Station	**1.08**	0.83	0.71	0.78
DaVita	0.00	0.00	0.43	0.31
Fresenius	0.00	0.00	0.44	0.32
Other Chain	0.00	0.00	0.13	0.37
Independent	1.00	1.00	0.00	0.00
Facility–Year Obs	9593	3479	46638	9328

Main Specification

$$y_{jt} = \beta_0 + \beta_1 Phys_{jt} + \beta_2 ChainAcqNonJV_{jt} + \beta_3 ChainAcqJV_{jt} + \beta_4 ChainFormJV + \alpha X_{jt} + \lambda_t + \gamma_j + \varepsilon_{jt}$$

- Reference group: Independents without physician owner
- $Phys_{jt}$: Physician invests in independent facility
- $ChainAcqNonJV_{jt}$: Chain acquires facility that's not a JV
- $ChainAcqJV_{jt}$: Chain acquires facility that is a JV
- $ChainFormJV_{jt}$: Chain forms a JV by selling ownership stake

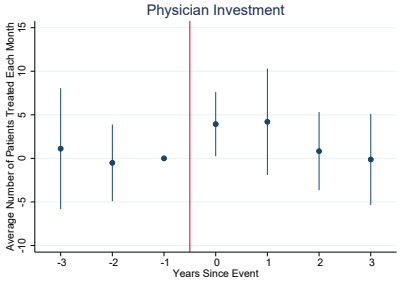
Outcomes

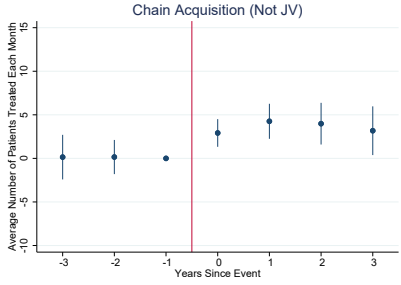
1. Patient loads
   - Business stealing or market expansion?
2. Facility inputs
3. Practice patterns
4. Health outcomes
5. Patient selection
6. Medicare spending

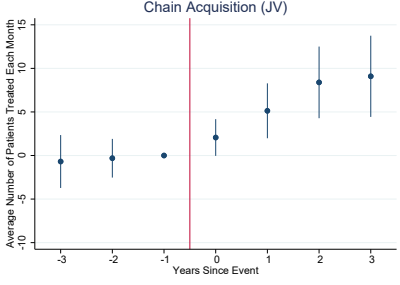
Threats to Identification

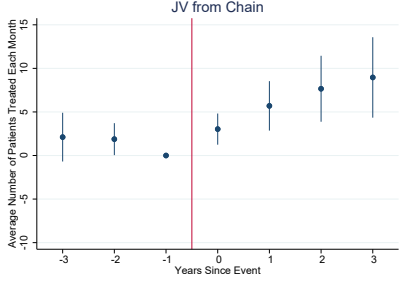
- Acquisitions and JV conversion aren't exogenous
- Changing patient mix around conversion
  - Facility fixed effects to identify from within-facility changes
  - Robust clinical & patient controls
  - Event studies to assess pre-trends
  - *Work in progress*: All the diff-in-diff methods
  - *Work in progress*: Patient fixed effects
- *Work in progress*: Structural model that endogenizes M&A and JV choices

Patient Load Event Studies









Patient Load Regressions

	(1) Patients	(2) Patients	(3) Patients
Pre-Physician Investment	15.32*	-3.853	
	(6.031)	(5.131)	
Physician Owned Indepependent	18.41**	1.352	4.664
	(6.229)	(5.408)	(2.597)
Pre-Chain Acquisition	8.797**	-6.869**	
	(2.733)	(2.619)	
Chain Acquisition & not JV	12.91***	-5.372***	2.397*
	(1.567)	(1.462)	(1.131)
Pre-JV Physician Owned	-11.15	-5.845	
	(6.750)	(5.696)	
Chain Acquisition & JV	20.53***	6.608	10.60***
	(3.993)	(3.429)	(2.789)
Pre-JV & Chain Owned	-2.571	-0.215	
	(2.227)	(2.010)	
JV from Chain	24.61***	3.871	9.501***
	(2.690)	(2.385)	(1.656)
Observations	60,494	59,897	59,589
Dep. Var. Mean	71.25	71.08	71.36
Year FE	Yes	Yes	Yes
Fac. Controls	No	Yes	Yes
Facility FE	No	No	Yes

Standard errors clustered by facility in parentheses

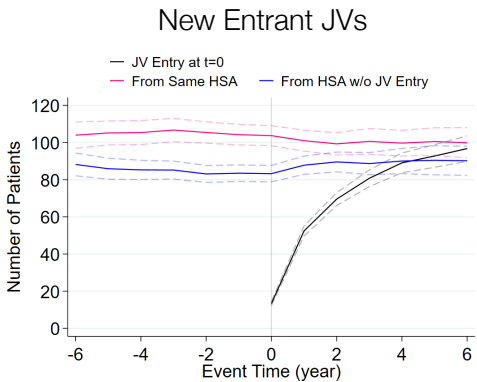
* p<0.05, ** p<0.01, *** p<0.001

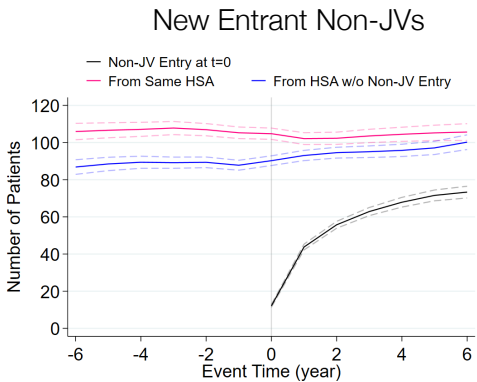
Comparing New Entrant JVs & Non-JVs

Quick detour from main specification to consider event study for new entrants

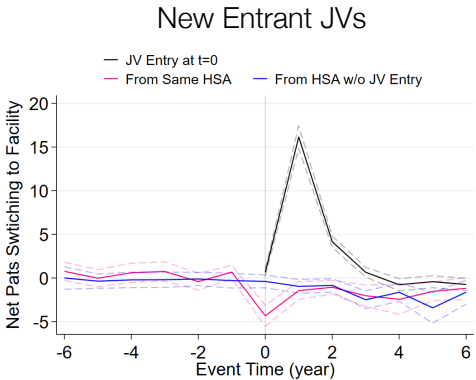
- Randomly match all new entrants to two comparison facilities
  - One from same HSA
  - One from different HSA
- Exclude facilities that entered in same year from potential comparison pool
- Align comparison facilities with entrant in event time

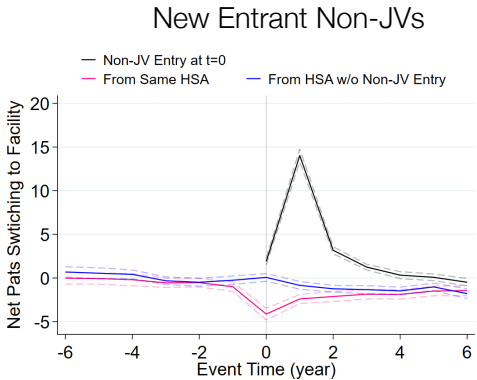
Patient Loads at New Entrant JVs & Non-JVs



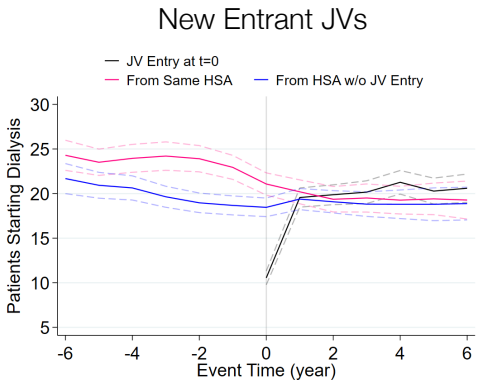


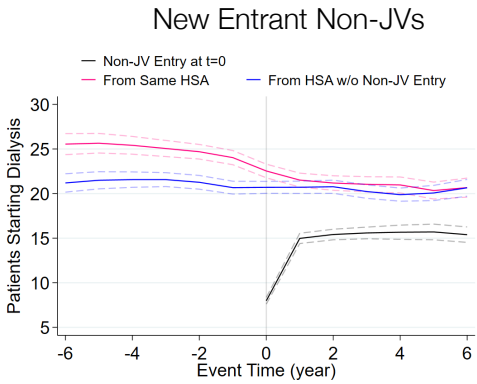
Net Patient Switching at New Entrant JVs & Non-JVs





Patients Starting Dialysis at New Entrant JVs & Non-JVs





Facility Inputs

Now back to main specification...

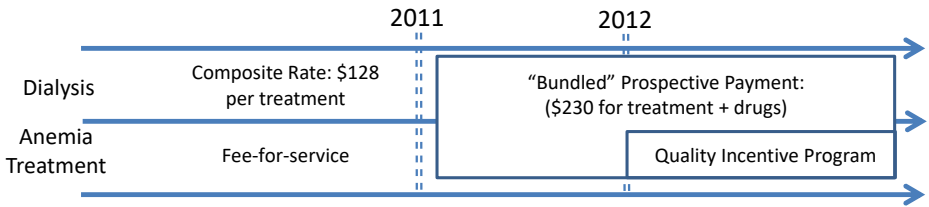
	(1) Stations	(2) Emp	(3) Nurses	(4) Techs	(5) Patients Per Station	(6) Patients Per Emp	(7) Nurses Per Tech
Physician Owned	0.120	0.422	0.204	0.158	0.0839	0.249	-0.0473
Independent	(0.239)	(0.734)	(0.264)	(0.442)	(0.104)	(0.175)	(0.105)
Chain Acquisition	0.204	**-1.029*****	**-0.539*****	**-0.318***	0.0744	**0.481*****	-0.0856*
& not JV	(0.160)	(0.219)	(0.100)	(0.132)	(0.0515)	(0.0695)	(0.0336)
Chain Acquisition	0.412	0.311	0.0918	0.220	**0.285***	**0.741*****	-0.0866
& JV	(0.266)	(0.661)	(0.246)	(0.396)	(0.118)	(0.162)	(0.0743)
Joint Venture	0.421	0.153	-0.105	0.236	**0.291*****	**0.418*****	-0.0660
from Chain	(0.224)	(0.304)	(0.129)	(0.182)	(0.0734)	(0.0956)	(0.0415)
Observations	59,973	59,843	59,843	59,843	59,054	58,926	56,225
Dep. Var. Mean	17.84	12.68	4.20	6.10	3.47	4.88	0.83
Horiz = Vert	0.474	0.035	0.011	0.154	0.078	0.104	0.991
JV Chain = JV Acq	0.979	0.813	0.447	0.968	0.963	0.063	0.819
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fac. Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

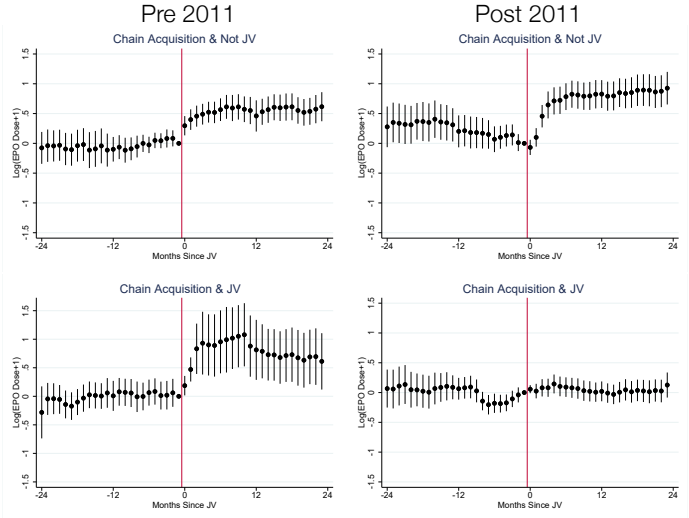
* p<0.05, ** p<0.01, *** p<0.001

Policy Changes Altered Incentives for Care, Spending, & Outcomes

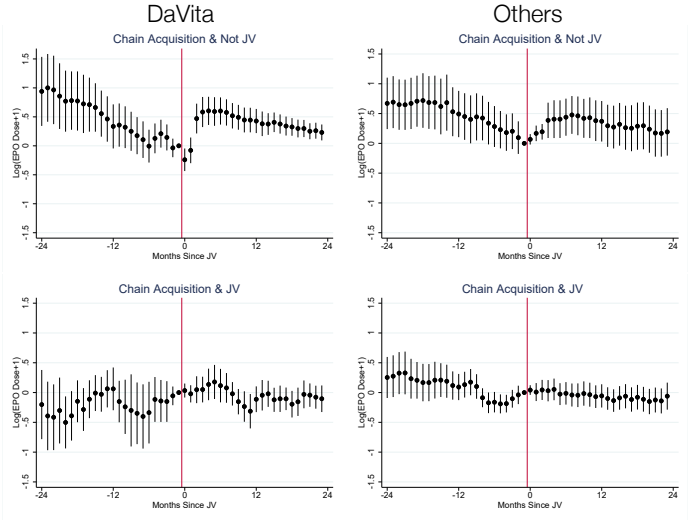
- Financial incentives around dialysis changed in 2011 & 2012
  - EPO
  - Quality Incentive Program
- Main results based on sample from 2012–2017
- Patient-month observations



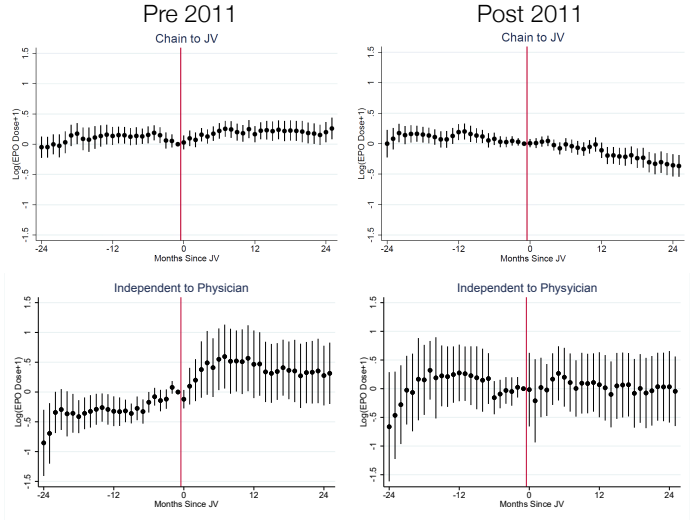
EPO Doses Post Acquisition



EPO Doses Post Acquisition: DaVita vs. Other Chains Since 2011



EPO Doses After Vertical Integration



Practice Patterns Post 2011

	(1) Log EPO	(2) Sessions	(3) 10<HGB<12	(4) URR > .65	(5) Time Dialyzing	(6) AV Fistula
Physician Owned	0.105***	-0.0626	-0.0219***	0.00685***	10.88***	-0.0225***
Independent	(0.00916)	(0.0351)	(0.00295)	(0.00151)	(0.245)	(0.00284)
Chain Acquisition	0.334***	-0.0110	0.00948***	-0.00216***	2.031***	-0.00520***
& not JV	(0.00368)	(0.0141)	(0.00118)	(0.000606)	(0.0966)	(0.00114)
Chain Acquisition	0.297***	-0.143***	-0.0168***	0.00435*	11.19***	-0.0104**
& JV	(0.0112)	(0.0428)	(0.00360)	(0.00184)	(0.293)	(0.00347)
Joint Venture	-0.0278***	-0.0227	0.000848	-0.0000577	1.408***	-0.00226*
from Chain	(0.00369)	(0.0142)	(0.00119)	(0.000609)	(0.0928)	(0.00115)
Observations Observations	11771910	11771910	11771910	11771910	8908111	11771910
Dep. Var. Mean	2.19	12.03	0.66	0.94	221.81	0.64
Pat. & Fac. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Health Outcomes Post 2011

	(1) Transfusion	(2) Hospitalizations	(3) Septicemia	(4) Fluid Overload	(5) Heart Disease	(6) Heart Attack
Physician Owned	-0.00161	0.00519*	-0.000367	0.000535	0.000639	-0.000349
Independent	(0.00182)	(0.00242)	(0.000620)	(0.000712)	(0.000796)	(0.000338)
Chain Acquisition of	-0.00290***	0.00184	-0.0000541	0.000772**	0.000385	-0.000369**
Non Joint Venture	(0.000732)	(0.000971)	(0.000249)	(0.000286)	(0.000320)	(0.000136)
Chain Acquisition of	-0.00167	0.0119***	0.00198**	0.000960	-0.000956	-0.000779
Joint Venture	(0.00223)	(0.00296)	(0.000759)	(0.000871)	(0.000974)	(0.000413)
Joint Venture	-0.000488	0.00298**	0.000297	0.000781	0.000454	-0.000146
from Chain	(0.000736)	(0.000977)	(0.000251)	(0.000288)	(0.000322)	(0.000136)
Observations	11822777	11822777	11822777	11822777	11822777	11822777
Dep. Var. Mean	0.039	0.136	0.010	0.012	0.015	0.003
Pat. & Fac. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

First Year Mortality & Transplants for Incident Patients Post 2011

	(1) Mortality	(2) Waitlisted	(3) Transplant	(4) Trans/Wait
Physician Owned	0.00406	0.00357	-0.000481	0.00299
Independent	(0.00398)	(0.00276)	(0.00156)	(0.00283)
Chain Acquisition of	0.00547*	-0.00408*	-0.00133	-0.00410*
Non Joint Venture	(0.00237)	(0.00165)	(0.000927)	(0.00170)
Chain Acquisition of	**0.0123****	0.000734	-0.000703	0.000405
Joint Venture	(0.00439)	(0.00305)	(0.00172)	(0.00312)
Joint Venture	-0.00128	-0.0121***	-0.00292*	**-0.0123*****
from Chain	(0.00356)	(0.00248)	(0.00139)	(0.00254)
Observations	1512834	1451808	1512834	1451808
Dep. Var. Mean	0.18	0.08	0.02	0.08
Time FE	Yes	Yes	Yes	Yes
Pat. & Fac. Controls	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Characteristics of Incident Patients Post 2011

	(1) GFR	(2) Predicted Mortality	(3) Predicted Transplant	(4) Privately Insured
Physician Owned	0.0365	-0.00394**	0.000955*	**0.0141*****
Independent	(0.0593)	(0.00140)	(0.000372)	(0.00421)
Chain Acquisition of	**0.0832***	-0.00113	-0.000232	0.00298
Non Joint Venture	(0.0354)	(0.000836)	(0.000222)	(0.00251)
Chain Acquisition of	0.0450	0.000199	0.000225	**0.0155*****
Joint Venture	(0.0654)	(0.00154)	(0.000410)	(0.00464)
Joint Venture	**0.117***	-0.00155	0.000624	-0.00544
from Chain	(0.0531)	(0.00125)	(0.000333)	(0.00377)
Observations	1490260	1490373	1490373	1490599
Dep. Var. Mean	9.696	0.185	0.024	0.228
Fac. Controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Another Quick Detour: Cherry Picking & Lemon Dropping for QIP

	(1)	(2)	(3)
	Bad QIP Patient	Bad QIP Patient	Bad QIP Patient
Joint Venture	0.100***	0.000353	-0.0118**
	(0.00519)	(0.00200)	(0.00424)
Chain	0.00660	-0.0326***	0.000496
	(0.00765)	(0.00264)	(0.00498)
Constant	0.439***	0.714***	0.668***
	(0.0279)	(0.0183)	(0.0215)
Patient Controls	Yes	Yes	Yes
Facility Controls	Yes	Yes	Yes
Year-Month FE	No	Yes	Yes
Facility FE	No	No	Yes
Observations	770154	770154	770019
Dep. Var. Mean	0.482	0.482	0.482

Standard errors clustered by facility in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Monthly Medicare Spending Per Patient Post 2011

	(1) Total	(2) Inpatient	(3) Outpatient	(4) Dialysis	(5) Part D
Physician Owned	91.99	85.65	-8.874	-0.500	15.71
Independent	(51.52)	(50.64)	(9.875)	(3.709)	(9.669)
Chain Acquisition of	54.54**	26.07	4.970	19.93***	3.566
Non Joint Venture	(20.69)	(20.33)	(3.965)	(1.490)	(3.883)
Chain Acquisition of	221.8***	213.5***	34.96**	-13.02**	-13.72
Joint Venture	(63.02)	(61.94)	(12.08)	(4.537)	(11.83)
Joint Venture	4.103	-0.476	6.751	-0.473	-1.699
from Chain	(20.82)	(20.47)	(3.991)	(1.499)	(3.908)
Observations	11822777	11822777	11822777	11822777	11822777
Dep. Var. Mean	5766.87	2081.11	479.55	2433.41	772.80
Pat. & Fac. Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Business Stealing & Market Expansion

A facility's patient load depends on

- Patients continuing at current facility
- Patients switching among facilities
- Patients starting dialysis
- Patients stopping dialysis
  - Mortality
  - Transplant

How Do JVs Affect Patient Loads at Nearby Rivals?

- Focus on 781 markets (HSAs) with
  - Two facilities operated by different firms
  - At most one JV
  - Drop market if JV exits
- Estimate impact of JV formation on rival facility patient load, flow of new patients, net switching, and dialysis termination
- Pooling JVs of different origins
- Average over three years following JV's start

Business Stealing or Market Expansion?

	(1) Patients	(2) New Patients	(3) Market Share New	(4) Private	(5) Net Switches
Joint Venture	9.420***	2.387*	0.0367*	1.022***	-0.245
	(2.739)	(1.112)	(0.0186)	(0.273)	(0.664)
Rival to JV	-5.436*	-0.885	-0.0368*	-0.314	0.330
	(2.566)	(0.799)	(0.0185)	(0.222)	(0.823)
Observations	10,205	10,205	10,205	10,205	10,205
Dep. Var. Mean	61.18	17.58	0.50	3.23	0.71
Fac. Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Business Stealing or Market Expansion?

	(1) Deaths	(2) Mortality Rate	(3) Transplants	(4) Transplant Rate
Joint Venture	1.456*	-0.00489	0.492**	0.0000831
	(0.601)	(0.00629)	(0.178)	(0.00216)
Rival to JV	-0.881	-0.000933	-0.0571	0.00266
	(0.728)	(0.00534)	(0.126)	(0.00189)
Observations	10,205	10,146	10,205	10,146
Dep. Var. Mean	12.78	0.16	2.01	0.02
Fac. Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Business Stealing or Market Expansion?

	(1) GFR	(2) Referred	(3) T/W Year 1	(4) Fistula
Joint Venture	0.111	-0.0140	-0.0189**	0.00920
	(0.135)	(0.0111)	(0.00614)	(0.00862)
Rival to JV	0.225	-0.0657***	-0.000815	-0.0193*
	(0.136)	(0.0112)	(0.00617)	(0.00862)
Observations	140,374	120,847	137,006	126,518
Dep. Var. Mean	10.15	0.70	0.08	0.15
Fac. Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Facility FE	Yes	Yes	Yes	Yes

Standard errors clustered by facility in parentheses

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Joint Ventures & Market Structure

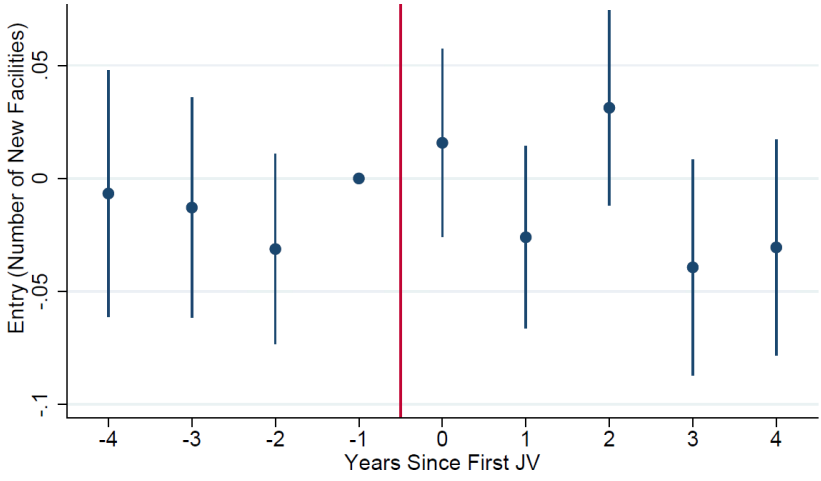
Do JVs Foreclose Market Entry?

Event study

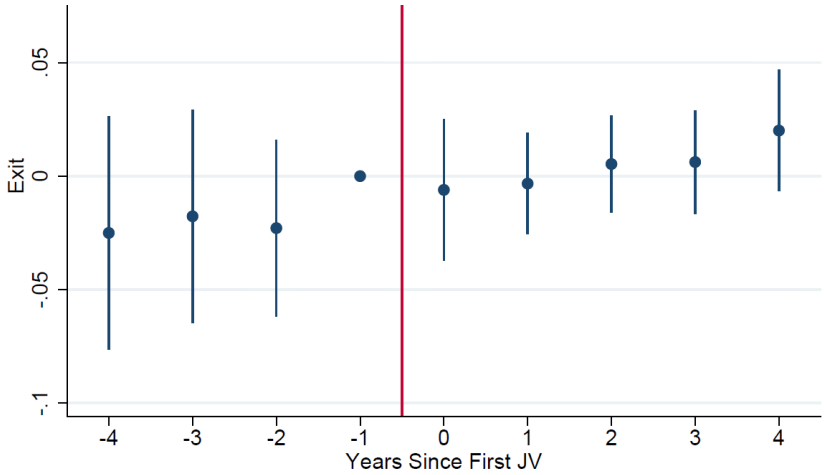
$$y_{mt} = \sum_{s=-K}^{-2} \beta_s T_{mt}(s) + \sum_{s=0}^{L} \beta_s T_{mt}(s) + \lambda_m + \delta_t + \varepsilon_{mt}$$

- Event: first JV in market, with s time relative to event
- Dependent variables: number of entering facilities, exiting facilities
  - Net out entry of JV facilities at $s = 0$

Entry Following First JV in Market



Exit Following First JV in Market



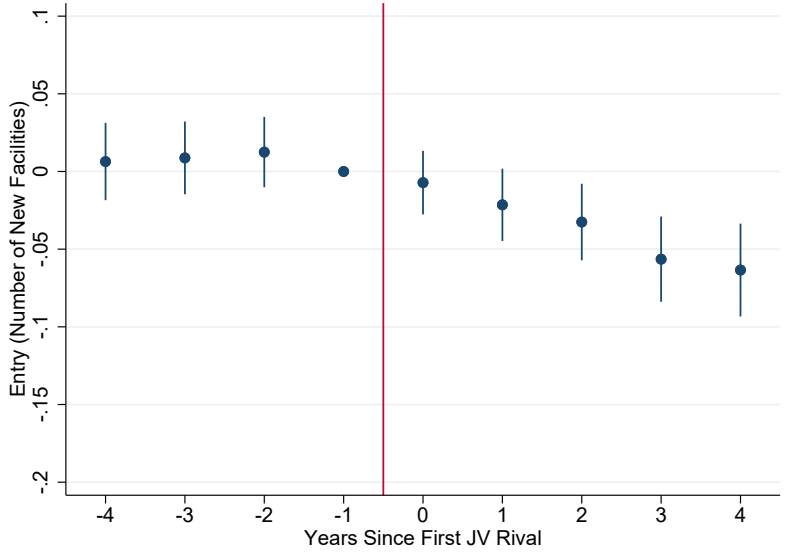
Incorporating Firm Identities

- Does the presence of a JV impact *who* enters?

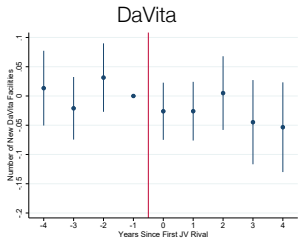
$$y_{cmt} = \sum_{s=-K}^{-2} \beta_s T_{cmt}(s) + \sum_{s=0}^{L} \beta_s T_{cmt}(s) + \lambda_{cm} + \delta_t + \varepsilon_{cmt}$$

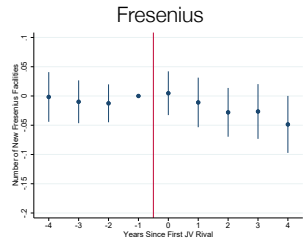
- Unit of analysis: chain c in market m in year t
  - Group independents together
- Outcome: number of new facilities opened by firm c in market m in year t
- Compare effect of first rival JV in market to effect of first non-JV rival

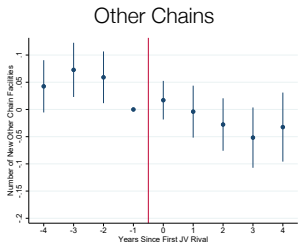
Entry Following First Rival JV

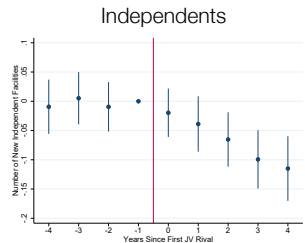


Entry Following First Rival JV by Chain

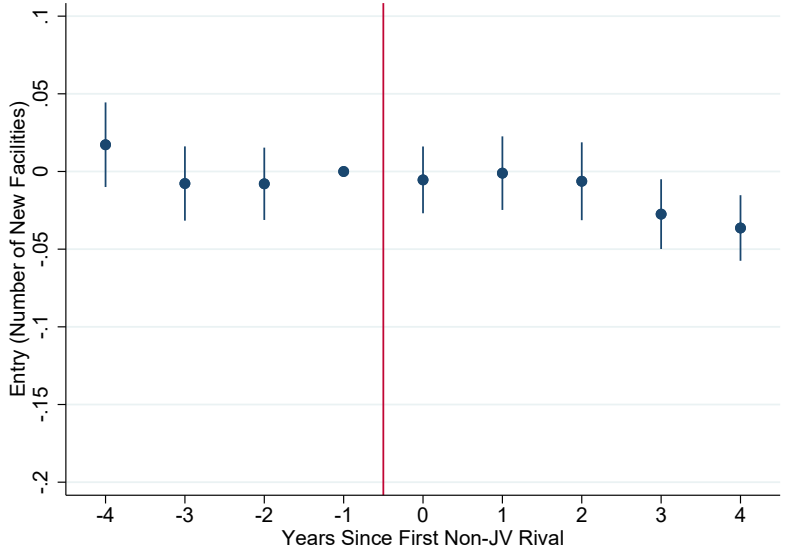




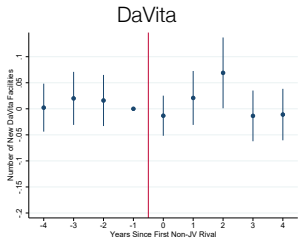


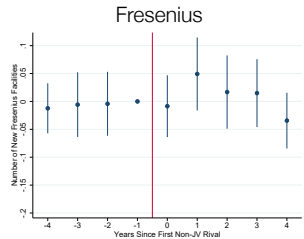


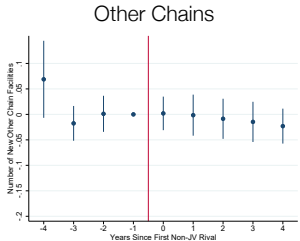
Entry Following First Rival Non-JV

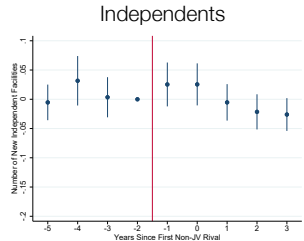


Entry Following First Rival Non-JV by Chain

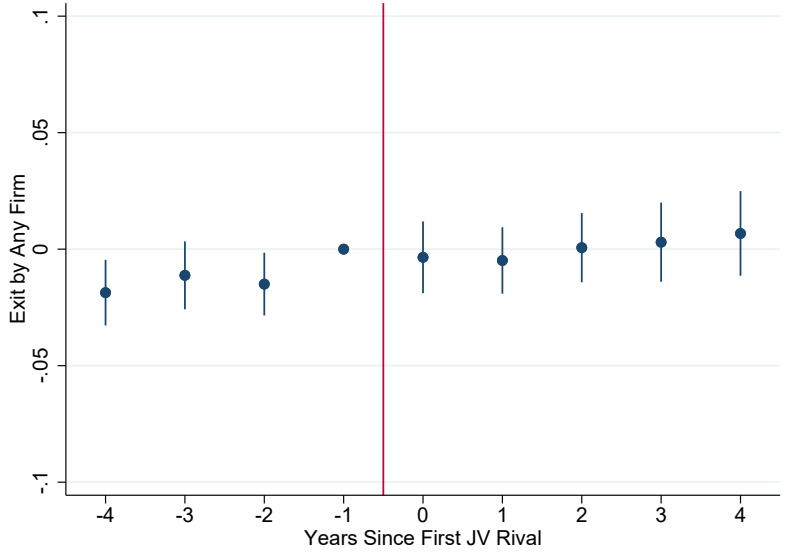




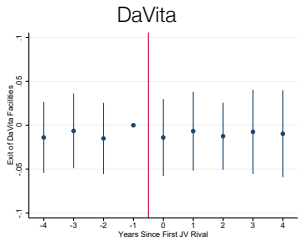


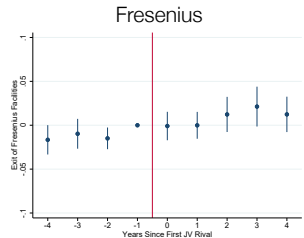


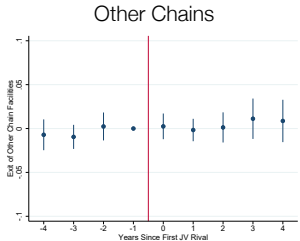
Exit Following First Rival JV

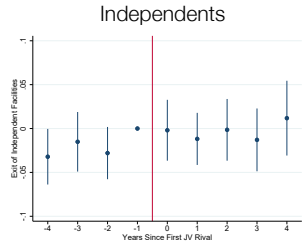


Exit Following First Rival JV by Chain

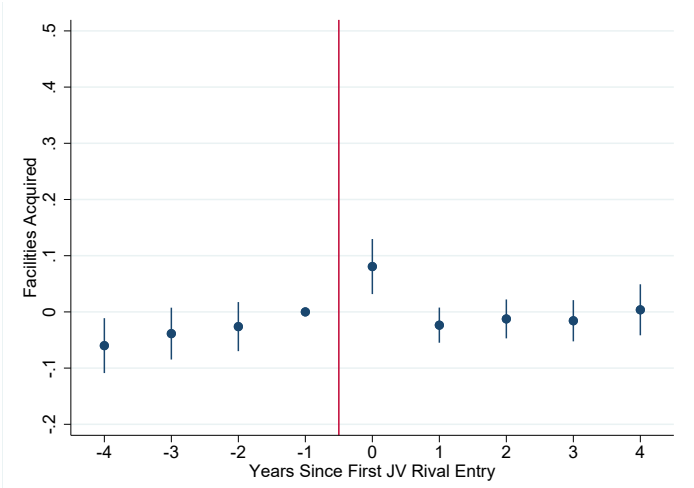




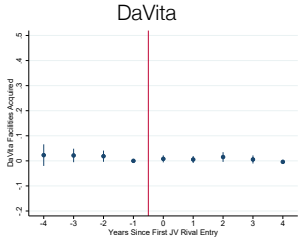


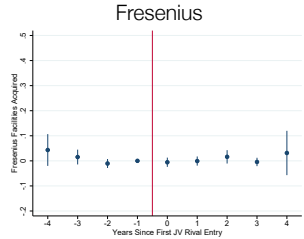


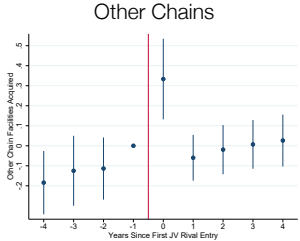
Acquisitions Following First Rival JV

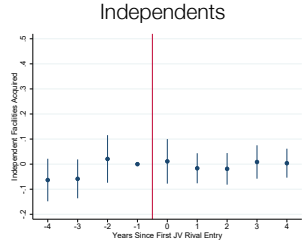


Acquisitions Following First Rival JV by Chain









Medical Directors

Medical Director Compensation

		Mean	Median	Std Dev	Obs
2011	All Facilities	111,199	91,840	75,625	4472
	DaVita	104,363	92,626	59,496	1817
	Fresenius	133,897	110,302	90,798	1798
	Other Chains	80,939	74,488	48,670	610
	Independent	70,993	54,486	61,002	247
2017	All Facilities	108,829	92,785	67,704	6105
	DaVita	104,460	95,000	48,768	2609
	Fresenius	122,631	97,137	85,802	2408
	Other Chains	93,930	85,000	50.147	852
	Independent	70,095	53,989	60,675	236

- Adjusted for inflation

Exclusive Relationships for Medical Director vs. Owners

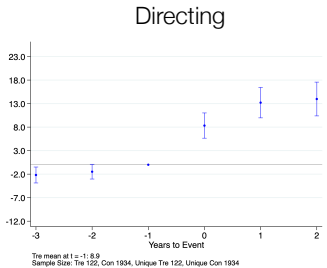
- Conditional on directing any facility

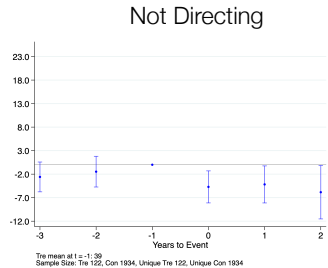
	DaVita	Fresenius	Other	Indep
DaVita	**1.39**	0.05	0.11	0.10
Fresenius	0.06	**1.35**	0.08	0.06
Other Chains	0.03	0.02	**1.26**	0.03
Independent	0.03	0.02	0.02	**1.26**

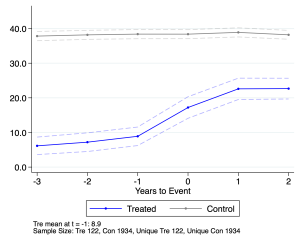
- Conditional on owning any facility

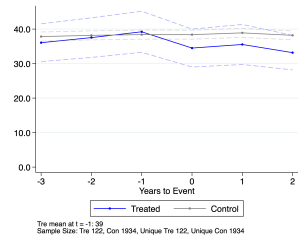
	DaVita	Fresenius	Other	Indep
DaVita	**2.35**	0.12	0.35	0.13
Fresenius	0.21	**5.21**	0.13	0.14
Other Chains	0.33	0.14	**2.41**	0.26
Independent	0.10	0.09	0.31	**2.26**

Patient Referrals for Medical Directors





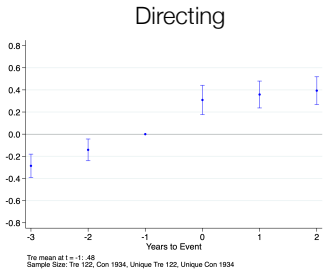


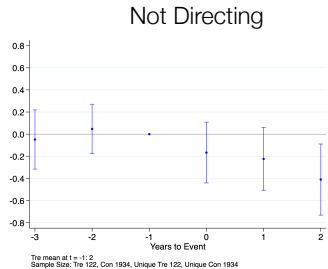


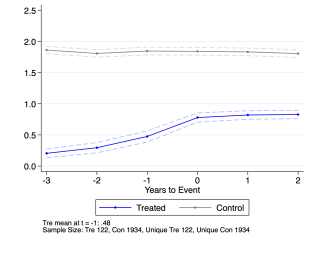
Patient Referrals for Medical Directors

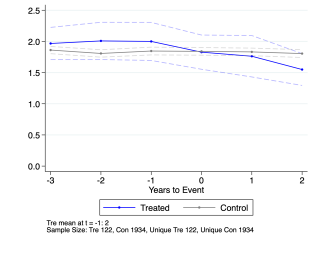
	(1)	(2)	(3)	(4)	(5)
Owns Any Facility	-0.638***	-0.287***	-0.359***	-0.467***	-0.0449
	(0.0265)	(0.0251)	(0.0246)	(0.0555)	(0.0310)
Owns This Facility	5.214***	4.269***	5.047***	4.702***	**0.458***
	(0.0669)	(0.0633)	(0.0654)	(0.0671)	(0.0990)
Owns Facility of Same Chain	0.415***	0.495***	0.527***	0.546***	-0.0343
	(0.0416)	(0.0383)	(0.0389)	(0.0408)	(0.0428)
Facility Is Chain	0.460***	0.245***	0.188	0.311***	0.0373
	(0.0252)	(0.0253)	(0.0962)	(0.0251)	(0.0513)
Facility Is Chain JV	-0.860***	-0.557***	-0.704***	-0.589***	-0.0663
	(0.0254)	(0.0250)	(0.0762)	(0.0248)	(0.0434)
Is MD of This Facility	25.54***	21.69***	21.68***	22.75***	**7.431***
	(0.0559)	(0.0536)	(0.0521)	(0.0541)	(0.0945)
Is MD Any Facility	-1.215***	-1.105***	-1.056***	-1.776***	-0.0851**
	(0.0233)	(0.0216)	(0.0210)	(0.0476)	(0.0278)
Is MD of Same Chain	1.672***	1.302***	1.203***	1.524***	0.0162
	(0.0320)	(0.0294)	(0.0290)	(0.0310)	(0.0398)
Constant	1.914***	2.101***	2.170***	2.319***	2.644***
	(0.0237)	(0.0237)	(0.0759)	(0.0338)	(0.0423)
Observations	721,121	721,100	721,091	721,046	681,952
Dep. Var. Mean	2.80	2.80	2.80	2.80	2.90
Year FE	Yes	Yes	Yes	Yes	Yes
Market FE	No	Yes	No	No	No
Facility FE	No	No	Yes	No	No
Physician FE	No	No	No	Yes	No
Fac. x Phys FE	No	No	No	No	Yes

Facility Referrals for Medical Directors









Compensation Correlated with Referrals

	(1)	(2)	(3)	(4)	(5)
Facility Patient Count	919.18***	932.07***	1,016.12***	485.80***	484.89***
	(42.09)	(38.89)	(38.30)	(37.83)	(38.32)
Referrals to Facility in Previous Year	**153.78****	**136.33****	**116.03***	**30.50**	**44.32***
	(54.04)	(51.58)	(51.30)	(21.62)	(21.56)
Not Chain		-61,344.72***	30,336.60**	1,090.93	-584.05
		(6241.97)	(11,037.37)	(10,838.76)	(12,170.56)
Med Dir is Fac Owner		-12,359.97***	-12,245.18***	165.49	1,190.77
		(2,717.19)	(2,669.39)	(2,290.97)	(2,783.07)
Facility Patient Count x Not Chain			-782.59***	-238.21	-247.12
			(76.84)	(148.87)	(152.78)
Ref to Fac in Prev Yr x Not Chain			-228.90	45.05	67.08
			(191.37)	(114.18)	(111.76)
Med Dir is Fac Owner x Not Chain			12,467.45	10,499.34	8,159.79
			(10,320.99)	(8,314.06)	(8,413.72)
Observations	17,827	17,827	17,827	17,396	17,241
Dep Var Mean	117,205	117,205	117,205	117,641	117,660
Year FE	Yes	Yes	Yes	Yes	Yes
Market FE	Yes	Yes	Yes	Yes	Yes
Facility FE	No	No	No	Yes	No
Facility x Med Dir FE	No	No	No	No	Yes

Conclusions

What We've Done So Far

Novel descriptive work on horizontal and vertical consolidation

- Chain JVs seem to be mostly about increasing patient loads
  - Comes from both business stealing and market expansion (e.g., higher GFR)
  - Also some evidence of cream skimming $\rightarrow$ more private patients, fewer bad QIP
- JV's effect on quality is mixed
  - Good: time dialyzing goes up
  - Bad: sessions/month and good HGB falls, hospitalization and infections rates rise
  - Mortality increase following acquisition not mitigated by JV
  - Transplant/waitlist rates fall a lot at purely vertical JV
  - Can't find any evidence of better coordination following vertical integration
- Horizontal acquisitions seem to be mostly about being more efficient
  - Fewer employees, lower nurse-tech ratio, more patients per employee
  - Large increase in Medicare spending $\rightarrow$ mostly spillovers not mitigated by JV

Medical directors steer patients to their facilities

- Effect even stronger than JVs

What We're Doing Next

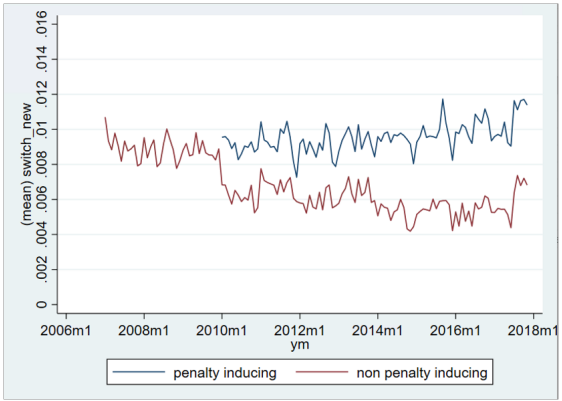
Structural model of entry, acquisition, vertical integration, and MD compensation

- JV dilemma: mostly zero-sum business stealing + smaller share of profits
  - Foreclosure reduces entry by independents (i.e., JVs lock up private payers?)
  - Foreclosure spurs M&A among small chains (i.e., JVs lock up private payers?)
  - Do JVs then lead to higher prices for private payers (i.e., look at HCCI data)?
- Could be useful variation from state CON laws (e.g., NC & WA have few JVs)
- Also study steering/foreclosure from medical director positions
  - Flanagan v. Fresnius suggests chains pay above-market rates to lock in referrals
  - We have preliminary evidence that higher pay $\rightarrow$ more referrals
- Counterfactual policies: anti-steering, prohibit JVs, regulate MDs, divestitures

Current Research Agenda

Gaming & Effort in Performance Pay

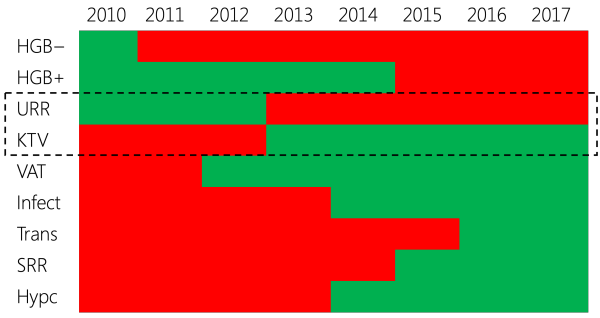
QIP "starts" in 2012 → facilities appear to kick out patients who induce penalties



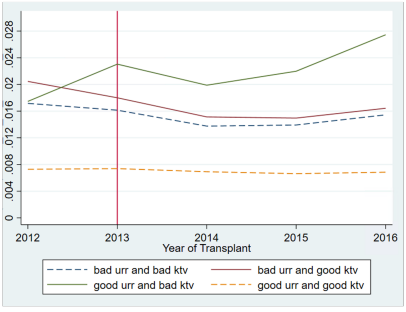
Gaming & Effort in Performance Pay

Identification comes from criteria changing year to year

QIP Measures



URR vs. KTV Dropping



Gaming & Effort in Performance Pay

Patients more likely to switch facilities in years QIP criteria make them undesirable

	Probability of Switching			Probability of Switching at Discharge		
	(1)	(2)	(3)	(4)	(5)	(6)
Penalty Inducing	0.00255***	0.00277***	0.00263***	0.00394***	0.00502***	0.00480***
	(0.0000562)	(0.0000585)	(0.0000585)	(0.000266)	(0.000269)	(0.000267)
Constant	0.0196***	0.0191***	0.00907***	0.0286***	0.0264***	0.00343
	(0.00113)	(0.00114)	(0.00136)	(0.00531)	(0.00530)	(0.00600)
Baseline QIP values	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes
Facility Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	No	Yes	Yes	No	Yes	Yes
Facility FE	No	No	Yes	No	No	Yes
Observations	13112497	13112497	13112427	971108	971108	970988
Mean Dep. Var.	0.00660	0.00660	0.00660	0.0129	0.0129	0.0129

Standard errors clustered by patient in parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Gaming & Effort in Performance Pay

Patients more likely to switch facilities in years QIP criteria make them undesirable

	Probability of Switching			Probability of Switching at Discharge		
	(1)	(2)	(3)	(4)	(5)	(6)
Low HGB	0.00148***	0.00149***	0.00143***	0.00103***	0.00105***	0.000915***
	(0.0000726)	(0.0000727)	(0.0000731)	(0.000261)	(0.000261)	(0.000264)
High HGB	0.000604***	0.000592***	0.000551***	-0.000518	-0.000543	-0.000553
	(0.0000843)	(0.0000844)	(0.0000849)	(0.000443)	(0.000443)	(0.000449)
Low URR	0.00310***	0.00309***	0.00296***	0.00359**	0.00364**	0.00335**
	(0.000358)	(0.000358)	(0.000359)	(0.00125)	(0.00126)	(0.00126)
Catheter	0.00297***	0.00297***	0.00276***	0.00244***	0.00237***	0.00225***
	(0.000118)	(0.000118)	(0.000119)	(0.000424)	(0.000424)	(0.000435)
Fistula	-0.0000944	-0.0000911	-0.0000565	0.000896*	0.000918**	0.00107**
	(0.0000833)	(0.0000833)	(0.0000847)	(0.000348)	(0.000348)	(0.000361)
Low Kt/V	0.00210***	0.00214***	0.00199***	0.00210	0.00203	0.00194
	(0.000402)	(0.000402)	(0.000405)	(0.00136)	(0.00136)	(0.00136)
Infection	0.00276***	0.00275***	0.00260***	0.00000565	0.0000102	0.0000120
	(0.000356)	(0.000356)	(0.000355)	(0.000411)	(0.000411)	(0.000414)
Transfusion	0.00131***	0.00135***	0.00143***	-0.000284	-0.000138	0.0000125
	(0.000362)	(0.000362)	(0.000361)	(0.000517)	(0.000517)	(0.000523)
Readmission	0.00415***	0.00415***	0.00402***	0.00243*	0.00238*	0.00224*
	(0.000784)	(0.000784)	(0.000782)	(0.000958)	(0.000960)	(0.000960)
High Calcium	0.000937***	0.000986***	0.000950***	0.00246**	0.00251**	0.00246**
	(0.000172)	(0.000173)	(0.000173)	(0.000822)	(0.000823)	(0.000823)
Constant	0.0185***	0.0185***	0.00413	0.0217***	0.0214***	0.00140
	(0.00132)	(0.00132)	(0.00221)	(0.00559)	(0.00559)	(0.00959)
Baseline QIP values	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes
Facility Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	No	Yes	Yes	No	Yes	Yes
Facility FE	No	No	Yes	No	No	Yes
Observations	8178958	8178958	8178936	546619	546619	546522
Mean Dep. Var.	0.00557	0.00557	0.00557	0.00789	0.00789	0.00788

Standard errors clustered by patient in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Gaming & Effort in Performance Pay

Suggestive evidence these switches aren't voluntary

	Involuntary Switch Death Rate + Distance			Involuntary Switch Hosp Rate + Distance			Involuntary Switch Infect Rate + Distance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Penalty Inducing	0.0165***	0.0177***	0.0210***	0.000600	0.00399	0.0141**	0.0115*	0.0122*	0.0207***
	(0.00464)	(0.00479)	(0.00476)	(0.00462)	(0.00477)	(0.00470)	(0.00461)	(0.00477)	(0.00470)
Constant	0.361***	0.358***	0.341***	0.404***	0.396***	0.262**	0.222*	0.210*	0.0835
	(0.0874)	(0.0875)	(0.0985)	(0.0859)	(0.0859)	(0.100)	(0.0874)	(0.0875)	(0.0991)
Baseline QIP values	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Facility Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-Year FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Facility FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	46764	46764	46169	46658	46658	46072	46934	46934	46376
Mean Dep. Var.	0.441	0.441	0.440	0.414	0.414	0.413	0.430	0.430	0.428

Standard errors clustered by patient in parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Gaming & Effort in Performance Pay

Unique opportunity to distinguish gaming vs. real improvements

	(1) Δ Time	(2) Δ Time	(3) Δ Time	(4) Δ Time	(5) Δ Time	(6) Δ Time
KtV Bad	7.793***	8.460***	8.459***	8.555***	10.16***	10.19***
	(0.183)	(0.226)	(0.226)	(0.224)	(0.269)	(0.270)
QIP KTV	-0.00775	0.00520				
	(0.0123)	(0.0143)				
KtV Bad × QIP KTV	1.625***	0.956***	0.960***	0.980***	1.501***	1.492***
	(0.186)	(0.233)	(0.233)	(0.234)	(0.273)	(0.274)
Constant	-0.335***	-0.406*	-0.364*	-0.680*	4.313	7.252**
	(0.0117)	(0.181)	(0.181)	(0.325)	(2.399)	(2.418)
Patient Controls	No	Yes	Yes	Yes	Yes	Yes
Facility Controls	No	Yes	Yes	Yes	Yes	Yes
Baseline QIP Values	No	Yes	Yes	Yes	Yes	Yes
Year-Month FE	No	No	Yes	Yes	Yes	Yes
Facility FE	No	No	No	Yes	No	Yes
Patient FE	No	No	No	No	Yes	Yes
Observations	9165092	5904890	5904890	5904878	5892185	5892170
Dep. Var. Mean	-0.105	-0.105	-0.105	-0.105	-0.106	-0.105

Standard errors clustered by patient in parantheses

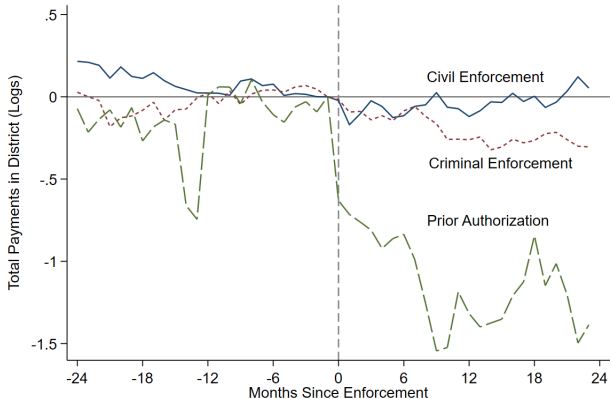
* p<0.05, ** p<0.01, *** p<0.001

Outline of Paper

1. Show that facilities strategically drop patients likely to induce penalties
   - Penalty-inducing patients 25-30% more likely to switch facilities in any month
   - Identified off of criteria changing year to year
   - Long panel and detailed patient characteristics
2. Show that some facilities reallocate effort to improve outcomes
   - Results like longer run times for low Kt/V patients indicate positive policy response

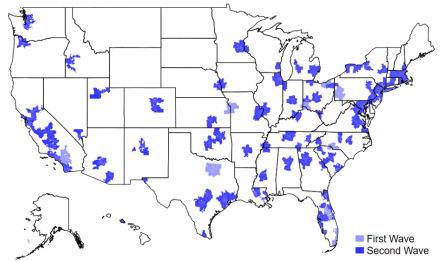
Ambulance Taxis (JPE R&R)

Regulation is much more effective than litigation at preventing Medicare fraud



Auctions as Anti-Fraud

Competitive bidding for DME leads to larger payment reductions for fraudulent firms



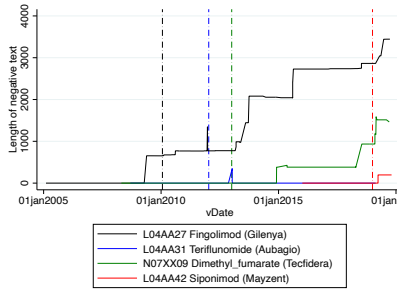

```
HDFE Linear regression                            Number of obs   =  205862688
Absorbing 2 HDFE groups                           F(   5,  31664) =     842.64
Statistics robust to heteroskedasticity           Prob > F        =     0.0000
                                                  R-squared       =     0.1390
                                                  Adj R-squared   =     0.1377
                                                  Within R-sq.    =     0.0037
Number of clusters (zip)     =        31,665      Root MSE        =     1.3717

                                              (Std. err. adjusted for 31,665 clusters in zip)
------------------------------------------------------------------------------
             |               Robust
asinh_linepmt|  Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        1.cb |   -.1810615   .0079027   -22.91   0.000    -.1965511   -.1655718
    1.tagged |    .2767746   .0105131    26.33   0.000     .2561686    .2973807
             |
  cb#tagged |
         1 1 |   -.3687123    .040566    -9.09   0.000    -.4482231   -.2892014
             |
 1.suspicious|    .5201645   .0097479    53.36   0.000     .5010583    .5392708
             |
cb#suspicious|
         1 1 |   -.3442296   .0273503   -12.59   0.000    -.3978372   -.290622
             |
       _cons |    .4401997   .0003012  1461.68   0.000     .4396094     .44079
------------------------------------------------------------------------------
```

Funded by Arnold Ventures grant

Strategic Information Disclosure

Looks like drug companies post negative information about rivals on Wikipedia



	Clustering on molecule			Clustering on drug group		
	(1)	(2)	(3)	(4)	(5)	(6)
Own entry this period	-0.019**	-0.014**	-0.018**	-0.019	-0.014	-0.018
	(0.008)	(0.007)	(0.007)	(0.011)	(0.010)	(0.011)
Own entry next period	-0.020***	-0.016**	-0.020***	-0.020*	-0.016*	-0.020*
	(0.007)	(0.007)	(0.007)	(0.010)	(0.009)	(0.010)
Own entry last period	-0.022***	-0.017**	-0.020***	-0.022*	-0.017*	-0.020*
	(0.008)	(0.007)	(0.007)	(0.010)	(0.009)	(0.010)
Competitor entry this period	0.007**	0.007**	0.002	0.007***	0.007***	0.002
	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
Competitor entry next period	0.006**	0.006**	0.003	0.006***	0.006***	0.003
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Competitor entry last period	0.006*	0.006*	0.002	0.006**	0.006**	0.002
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Months since entry	No	Yes	Yes	No	Yes	Yes
Time period FE	No	No	Yes	No	No	Yes
Molecules	100	100	100	100	100	100
Clusters	100	100	100	15	15	15
Observations	14927	14927	14927	14927	14927	14927

Funded by NBER grant

Last Six Courses

Established Track Record of Successful MBA Teaching

- Health Care Markets
  - MBA elective on economics and strategy in health care
  - Last taught at Fuqua in 2021 with instructor rating of 6.8/7.0
- Analysis of Health Care Effectiveness & Outcomes
  - MSQM core course applying causal inference to health care topics
  - Fuqua teaching awards in 2020 & 2021
- Managerial Economics for Health Care
  - MSQM core course applying microeconomics to health care topics
  - Last taught at Fuqua in 2021 with instructor rating of 6.8/7.0
- Managerial Economics
  - Core microeconomics course across all Fuqua programs
  - Fuqua MBA teaching award in 2019, MSQM in 2022, MMS in 2023
- Competitive Strategy
  - MBA core or elective course applying microeconomics to strategy
  - Have taught at Booth (4.7/5.0), Kellogg (9.4/10.0) & Simon (teaching award in 2012)
- Empirical Analysis for Strategy
  - MSQM core on causal inference for competitive strategy
  - Last taught at Fuqua in 2021 with instructor rating of 6.9/7.0

Thank You!!!