

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

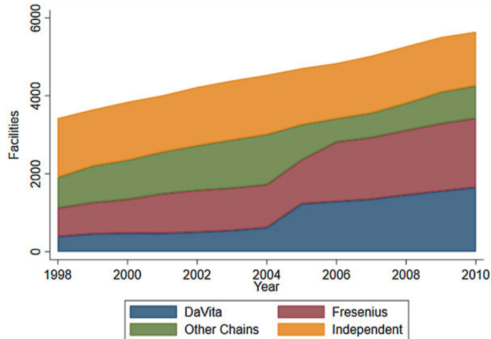
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Presented by: Linh Phan

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2. Preview of findings
3. Background on Dialysis Industry
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5. Econometrics, Identification, and Results
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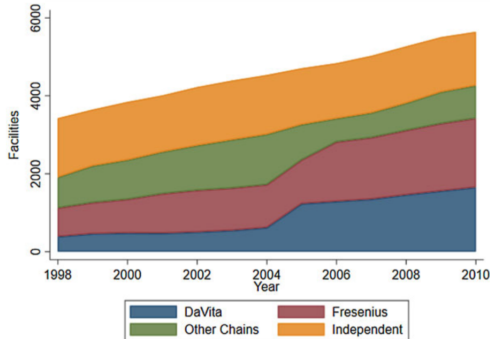
# Motivations- Dialysis market

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(A) Market Evolution, 1998–2010

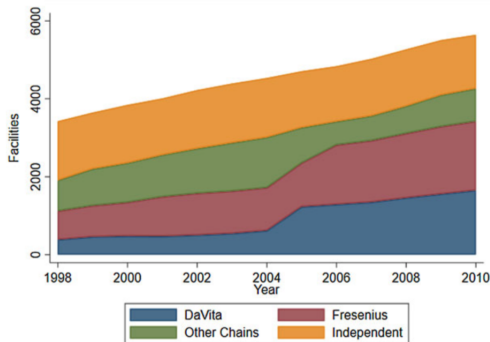
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- Availability of detailed Medicare claims and clinical data on the US's dialysis industry

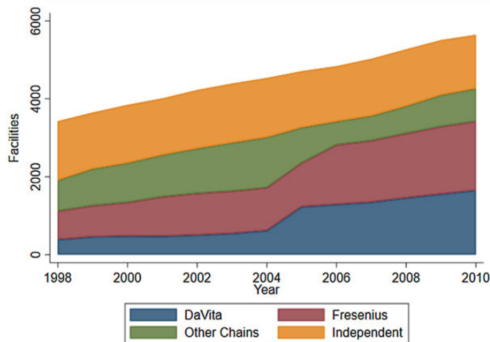
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- ▶ Dialysis: standardized treatment → direct comparison of providers

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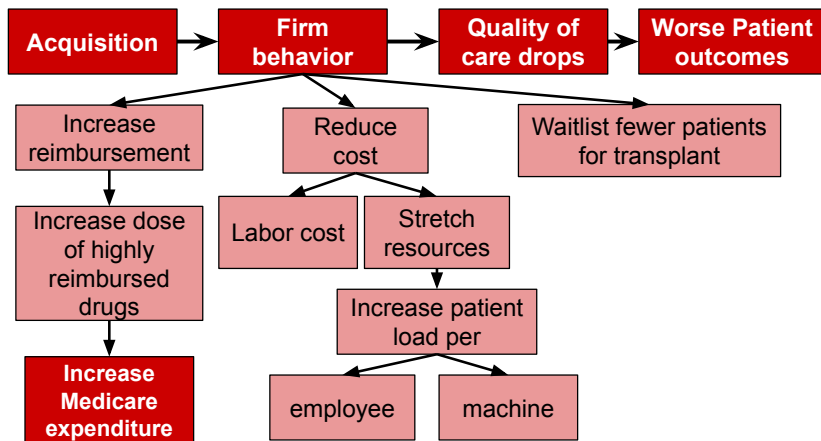
- ▶ Availability of detailed Medicare claims and clinical data on the US's dialysis industry
- ▶ Dialysis: standardized treatment → direct comparison of providers
- ▶ 6% total annual Medicare expenditure (\$33 billion)

# Research Questions

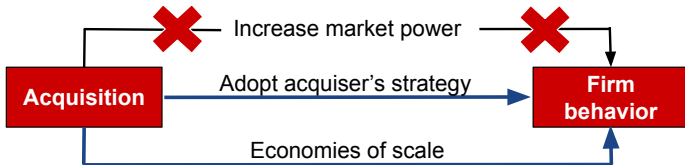
1. How dialysis chains' acquisitions affect the behavior of acquired facilities (firms), profit, quality of care and patient outcomes?
2. What mechanism through which acquisition affect firm behavior?
3. Why don't independent facilities imitate chains?



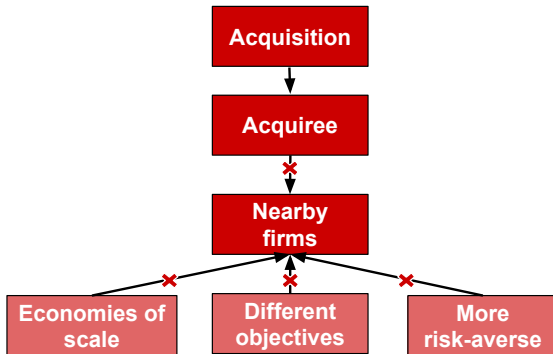
# Preview of findings - RQ1



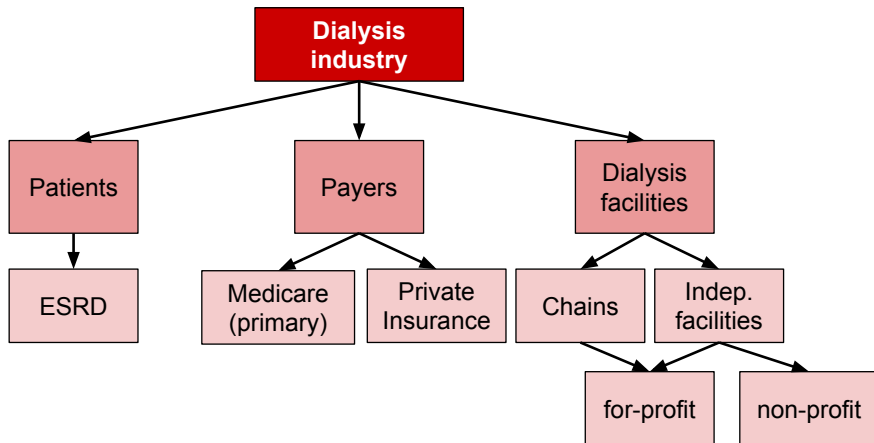
## Preview of findings - RQ2



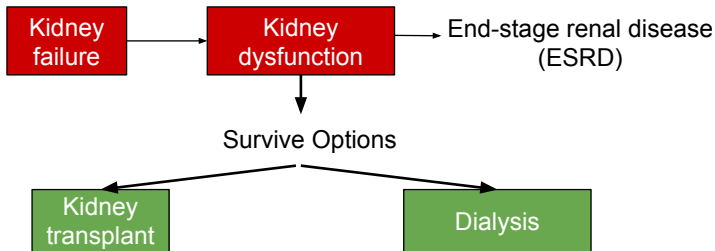
## Preview of findings - RQ3



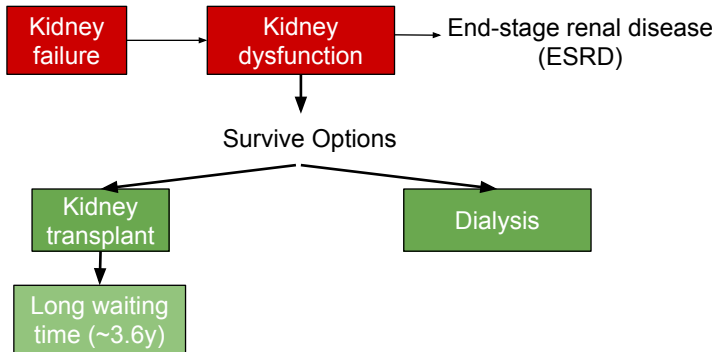
# Background on Dialysis Industry



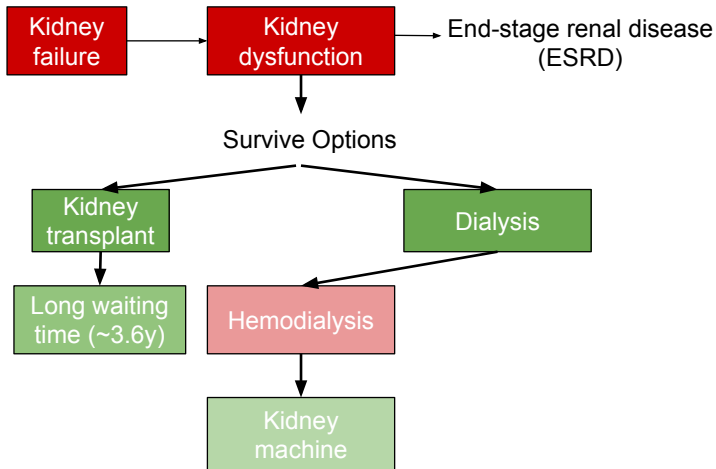
# Background on Dialysis Industry - Patients



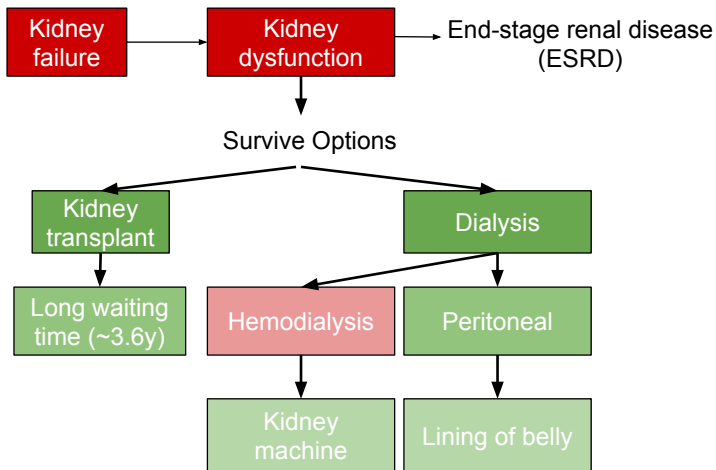
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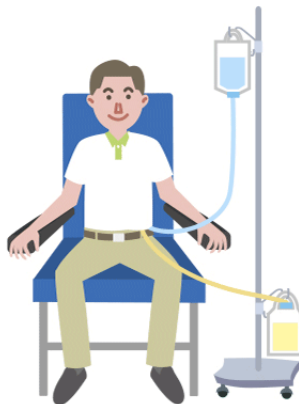


# Background on Dialysis Industry - Patients

Hemodialysis



Peritoneal dialysis

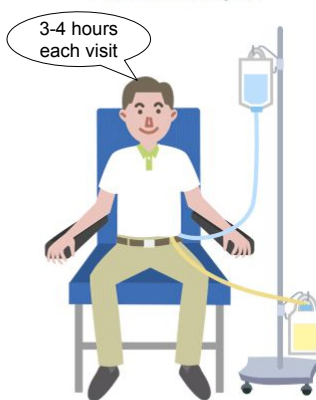


# Background on Dialysis Industry - Medical

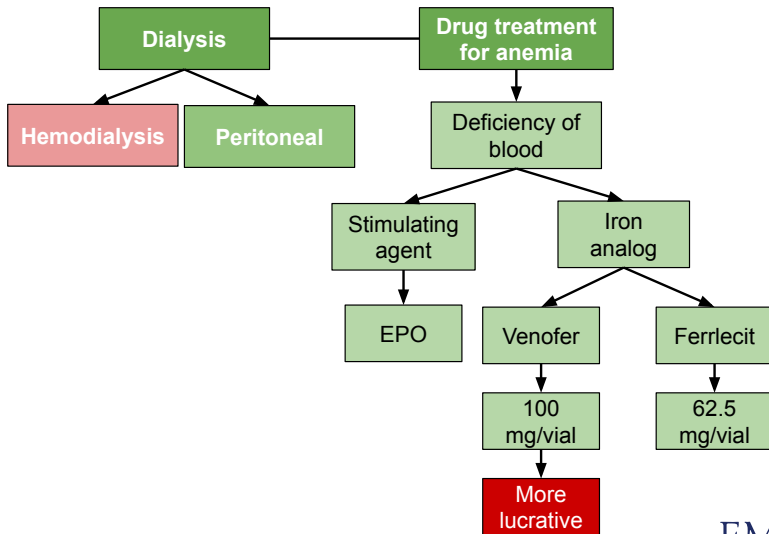
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Peritoneal dialysis



# Background on Dialysis Industry - Patients



# Background on Dialysis Industry - Payers

## 1. Medicare

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## 2. Private Insurance

- ▶ Patients with private insurance can retain coverage for the first 30 months of treatment before Medicare becomes primary payer.

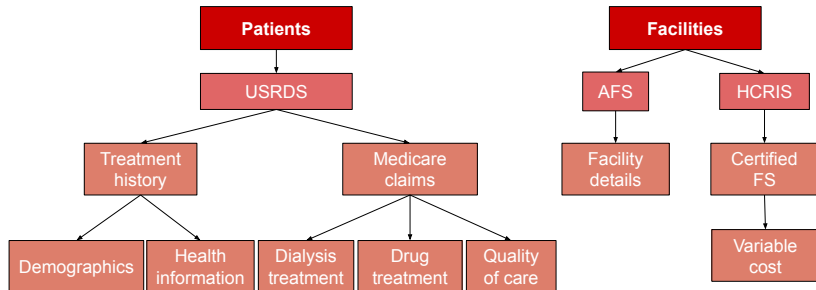


# Background on Dialysis Industry - Dialysis facilities

Advantages of chains over independent facilities:

- ▶ Economies of Scales: lower cost due to volume discount
- ▶ Stronger bargaining position with private insurance companies
- ▶ Firm-wide standards
- ▶ Brand and Networks

# Data



► Time frame: 1998 - 2010

# Descriptive Statistics - Patient and Treatment

Across 4 types of facilities: independent, pre-acquired, post-acquired, chain:

- ▶ Cardiovascular conditions are widespread.  
⇒ High EPO dose is hazardous
- ▶ Patient health: fairly constant
- ▶ Racial decomposition: Different because of long-run trend
- ▶ Treatment:
  - ▶ Chains: more EPO/session, more likely to receive Venofer

# RQ1: The impact of acquisition on firm strategy, patient outcomes, and the cost of dialysis care

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- Identification strategy: DD that compares independent facilities acquired by chains to those that are never acquired
- Assumption: Parallel trend
- Econometric model:

$$Y_{ijt} = \beta^{Pre} D_{jt}^{Pre} + \beta^{Post} D_{jt}^{Post} + \beta^{Chain} D_{jt}^{Chain} + \alpha X_{ijt} + \epsilon_{ijt}$$

$$1 = \begin{cases} D_{jt}^{Pre} & \text{facility } j \text{ in month } t \text{ will be acquired in the future} \\ D_{jt}^{Post} & \text{facility } j \text{ in month } t \text{ already been acquired} \\ D_{jt}^{Chain} & \text{facility } j \text{ always owned by a chain} \end{cases}$$

$$X = \begin{cases} \text{facility and patient controls} \\ \text{year and state FE} \\ \text{facility FE (Y/N)} \end{cases}$$

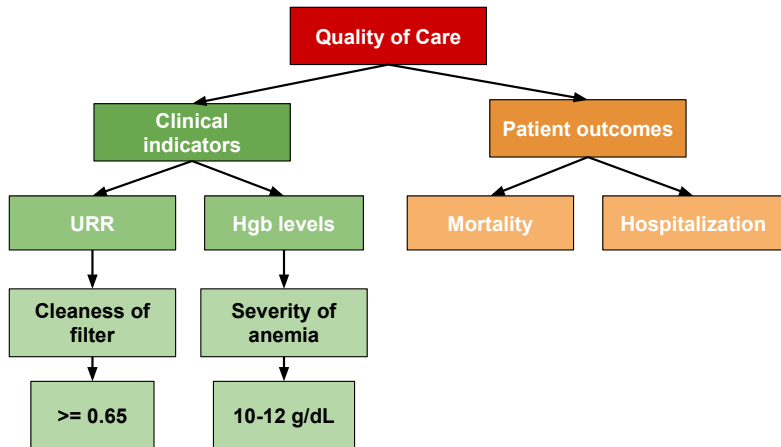
## RQ1: Outcomes of interest

► Econometric model:

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$$Y_{ijt} = \begin{cases} 1. \text{ Drug dose (log of EPO/Ferrlecit/Venefor per treatment)} \\ 2. \text{ Facility inputs (labor and capital decisions)} \\ 3. \text{ Quality of care and cost of treatment} \\ 4. \text{ Patient selection} \end{cases}$$

## RQ1: Measure of quality of care



- $Y_{ijt}$ : The probability of the outcomes occur



## 1. Drug Doses

## ACQUISITION EFFECTS ON DRUG DOSES

	Epogen (1)	Epogen (2)	Ferrlecit (3)	Ferrlecit (4)	Venofer (5)	Venofer (6)
Preacquisition	0.270* (0.124)		− 0.0188 (0.0558)		0.0650 (0.0604)	
Postacquisition	1.350*** (0.0822)	0.829*** (0.0725)	− 0.351*** (0.0466)	− 0.303*** (0.0627)	0.784*** (0.0555)	0.612*** (0.0751)
Always chain	1.343*** (0.0775)		− 0.335*** (0.0391)		0.722*** (0.0454)	
Observations	14,161,244		12,473,162		11,595,400	
Dep. var. mean	7.538		0.589		1.337	
Units	log(IU)		log(mg)		log(mg)	
Year × month FE	X	X	X	X	X	X
Controls	X	X	X	X	X	X
Facility FE		X		X		X

# RQ1: Results

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⇒ Acquired firms use more EPO and switch from Ferrlecit to Venofer.

## RQ1: Results

## 2. Facility Inputs

ACQUISITION EFFECTS ON FACILITY INPUT CHOICES

	Nurses (1)	Technicians (2)	HD patients (3)	Total stations (4)	Nurses per tech (5)	Patients per employee (6)	Patients per station (7)	Employees per station (8)
Postacquisition	-0.0204 (0.0194)	0.0456* (0.0230)	0.134*** (0.0187)	0.0210 (0.0410)	-0.146*** (0.0410)	0.599*** (0.107)	0.179* (0.0825)	-0.0289 (0.0185)
Observations	24,868	24,868	42,944	43,046	23,217	24,868	43,046	24,868
Dep. var. mean	1.548	1.703	61.554	18.574	0.969	5.129	3.992	0.814
Units	log(FTE)	log(FTE)	log(Patients)	log(Stations)	—	—	—	—
Year FE	X	X	X	X	X	X	X	X
Facility FE	X	X	X	X	X	X	X	X

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Year FE	X	X	X	X	X	X	X	X
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- ▶ Evidence of switching from nurses to technicians
- ▶ Treating more patients such that patients/employees and patients/station increase while employees/station decreases

# RQ1: Results

## 3. Quality of care and cost of dialysis treatment

### ACQUISITION EFFECTS ON OUTCOMES

	URR Good (1)	Hgb Good (2)	Hgb High (3)	Hospitalized any cause (4)	Payments per session (5)
Postacquisition	0.0183*** (0.00496)	− 0.0266** (0.00825)	0.0382*** (0.00899)	0.00599*** (0.00170)	0.0665*** (0.00617)
Observations	14,161,244	13,271,104	13,271,104	14,161,244	14,161,243
Dep. var. mean	0.881	0.523	0.382	0.141	5.150
Units	percentage points	percentage points	percentage points	percentage points	log(\$)
Year × month FE	X	X	X	X	X
Pat. & fac. controls	X	X	X	X	X
Facility FE	X	X	X	X	X

## RQ1: Results

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Year × month FE	X	X	X	X	X
Pat. & fac. controls	X	X	X	X	X
Facility FE	X	X	X	X	X

- ▶ (+) Chance that patients reach good URR increases
- ▶ (-) Chance that patients reach good (high) Hbg decreases (increases)
- ▶ (-) Chance of being hospitalized increases
- ▶ (-) Medicare payments per session increase

### 3. Quality of care and cost of dialysis treatment

## ACQUISITION EFFECTS ON TRANSPLANTS AND MORTALITY

	Waitlisted or transplanted within:		Survives for:	
	365 days (1)	730 days (2)	365 days (3)	730 days (4)
Postacquisition	− 0.0108* (0.00468)	− 0.0188* (0.00738)	− 0.0127** (0.00476)	− 0.0174** (0.00654)
Observations	610,955	498,056	539,487	457,184
Dep. var. mean	0.127	0.208	0.746	0.597
Units	percentage points	percentage points	percentage points	percentage points
Year FE	X	X	X	X
Pat. & fac. controls	X	X	X	X
Facility FE	X	X	X	X





## 4. Patient Selection

- ▶ DD strategy with facility and time FE:

$$X_{ijt} = \beta^{Post} D_{jt}^{Post} + \gamma_j + \delta_t + \epsilon_{ijt}$$

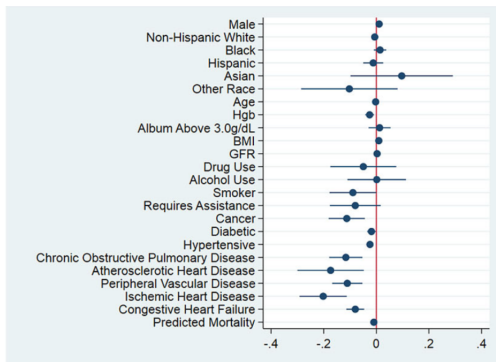
# RQ1: Results

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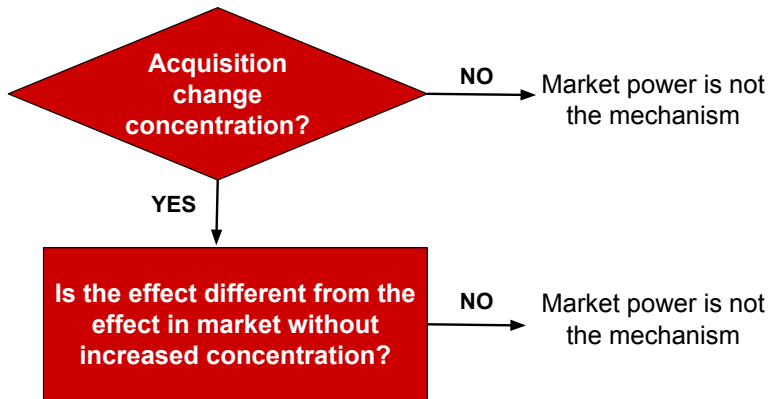
$$X_{ijt} = \beta^{Post} D_{jt}^{Post} + \gamma_j + \delta_t + \epsilon_{ijt}$$

- ▶ Result:



(B) New Patients

## RQ2: Mechanism of the effect



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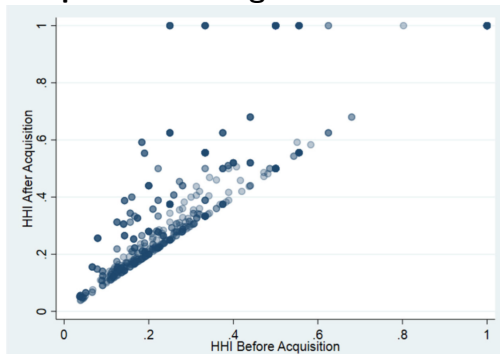
### 1. Do acquisitions change market concentration?



- HHI as measure of concentration but results are robust with other measures.

## RQ2: Mechanism of the effect

### 1. Do acquisitions change market concentration?



- ▶ HHI as measure of concentration but results are robust with other measures.
- ▶ HHI increases in so few markets  $\Rightarrow$  change in market power is not the channel of the effect

## RQ2: Mechanism of the effect

### 2. Is the effect on markets with increased HHI different from those without it?

► Econometric model:

$$Y_{ijt} = \beta^{Post} D_{jt}^{Post} + \gamma D_{jt}^{Post} \times IncreaseHHI_j + \alpha X_{ijt} + \epsilon_{ijt}$$

$IncreaseHHI_j = 1$  if acquisition of facility  $j$  increases HHI

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► Results:

ACQUISITION EFFECTS BY CONCENTRATION INCREASE: HSA MARKETS

	Drugs			Clinical outcomes			Hospitalized
	Epogen	Venofer	Ferlecit	Hgb high	Hgb good	URR good	Any cause
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Postacquisition	0.808*** (0.0752)	0.553*** (0.123)	-0.286** (0.100)	-0.0313** (0.0112)	-0.0123* (0.00533)	0.0174* (0.00708)	0.00800** (0.00250)
Postacquisition × increases HSA HHI	-0.0486 (0.0823)	0.0891 (0.151)	-0.0267 (0.124)	0.00747 (0.0153)	0.00120 (0.00614)	0.00156 (0.00893)	-0.00318 (0.00324)
Patient-months Units	14,161,244 log(UI)	11,595,400 log(mg)	12,473,162 log(mg)	13,271,104 percentage points	13,271,104 percentage points	14,161,244 percentage points	14,161,244 percentage points
Pat. & fac controls	X	X	X	X	X	X	X
Year × month FE	X	X	X	X	X	X	X
Facility FE	X	X	X	X	X	X	X

## RQ2: Results

- ▶ **Implication:** Acquisition can be detrimental irrespective of market concentration → Antitrust law may not be effective
- ▶ Why competition have no role?



## RQ2: Results

- ▶ **Implication:** Acquisition can be detrimental irrespective of market concentration → Antitrust law may not be effective
- ▶ Why competition have no role?  
Dialysis patients are rarely switch providers (demand is not elastic to quality) due to:
  - ▶ Travel cost
  - ▶ Behavioral inertia

# RQ3: Why don't independent facilities imitate chains

## 1. No economies of scale

### ► Econometric model:

$$Y_{jt} = \beta^{Pre} D_{jt}^{Pre} + \beta^{Post} D_{jt}^{Post} + \beta^{Chain} D_{jt}^{Chain} + \alpha X_{jt} + \epsilon_{ijt}$$

$$Y_{jt} = \begin{cases} \text{Cost} \\ \text{Profit} \end{cases}$$

# RQ3: Results

EFFECT OF CHAIN ACQUISITION ON PROFIT MEASURES

	Variable profits per session (1)	EPO margin (2)	EPO cost per 1,000 IUs (3)	EPO units per session (4)	Total EPO costs (5)
Preacq	1.360 (2.497)	-0.581 (1.652)	-0.371** (0.141)	222.5 (204.1)	-0.451 (1.723)
Postacq	18.17*** (2.205)	7.851*** (1.334)	-1.237*** (0.145)	778.8*** (171.9)	0.965 (1.464)
Always chain	22.16*** (2.344)	7.975*** (1.626)	-1.340*** (0.156)	812.2*** (193.4)	0.745 (1.724)
Constant	30.60*** (3.704)	1.113 (3.399)	9.190*** (0.205)	3,835.8*** (265.7)	35.36*** (2.833)
Year FE	X	X	X	X	X
State FE	X	X	X	X	X
Observations	25,934	25,934	25,934	25,934	25,934
Post – pre	16.81	8.432	-0.866	556.3	1.416
<i>p</i> -value	[.000]	[.000]	[.000]	[.000]	[.0720]
Always chain – post	3.993	0.123	-0.103	33.42	-0.220
<i>p</i> -value	[.002]	[.880]	[.000]	[.732]	[.806]

## RQ3: Why don't independent facilities imitate chains

1. No economies of scale
2. Different objective (For-profit vs Non-profit)
3. Not financially prepared for lawsuits due to malpractice behavior.

# Threats

- ▶ Hard to spot one!
- ▶ Results on patients referred for kidney transplant is not convincing

# Contributions

- ▶ Data
- ▶ First empirical study on the impact of M&A on quality in health care in general and dialysis industry in particular:
- ▶ Policy implication: Think again about current Antitrust law
- ▶ Illustrate the importance of well-designed payment system.
- ▶ Applicable to other settings.