

Estimation and Identification of Merger Effects: An Application to Hospital Mergers

Leemore Dafny 2009

Presented by

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November 5, 2020

Overview

- 1 Motivation and background
- 2 Research question and contribution
- 3 Preview of findings
- 4 Model and identification
- 5 Data
- 6 Estimation
- 7 Threats

Motivations

Existing empirical estimates of merger effects are biased

Background

In this section, we will focus on 3 different points

- What caused mergers
- When did we observe mergers
- Why much attention on mergers

Background: Why much attention on mergers?

Health care economists vs antitrust enforcement agencies

- The volume of patients and revenues involved
- The nature of competition matters
Monopoly vs Oligopoly

Background: What caused mergers?

- By 1989, the majority of hospitals had negative margin earning on Medicare admissions
 - Aggravation of financial hardships due to the rise in managed care in the private sector
 - Then, a shift from fee-for-services to negotiated prices
 - Thus, consolidation motives intensified substantially during 1990
- An unprecedented wave of mergers, acquisitions, and closures.

Background: When?

- 1983 -1988 (Bazzoli et al. 2002) → 74 hospital mergers
- 1989 - 1996 → 190 hospital mergers

Research question

How to identify and estimate merger effects without bias?

Contribution

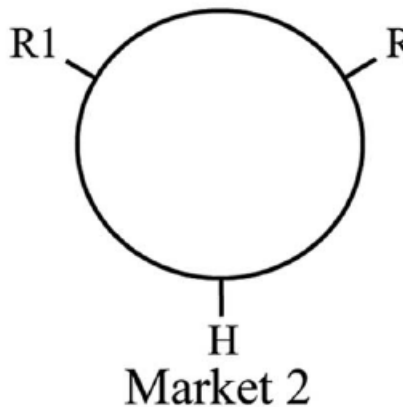
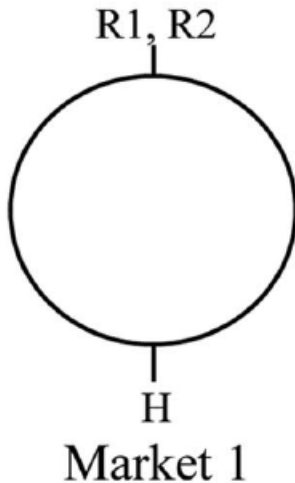
A framework to identify and estimate unbiased merger effects

Preview of findings

Using IV with data on hospital mergers occurring between 1989 and 1996,

- An evidence of substantial postmerger price increases by rivals of merging hospitals.

Salop's (1979) "circular city" model



Identification

- H enjoys local monopoly
- H unaffected by rival's action

→ Very sizeable increase in price (Market 1)

Unlike market 1, smaller effect in market 2

Identification

To identify the merger effect on price, Dafny used a 2SLS with collocation as an IV for rival merger

IV = Number of collocated rival hospital pairs

Data

Using Annual Survey of Hospitals & Annual Guide to Hospitals both by AHA following Dranove and Lindrooth (2003),

- Independent merger: Combination of 2 hospitals not affiliated with any hospital system into a single entity
→ 97 such mergers between 1989-1996

From the Healthcare cost Report Information system (HCRIS) from the CMS

- Financial and utilization data
→ All provider receiving reimbursement for programs under CMS

Data

- Average hospital price = inpatient revenue per case-mix adjusted charge
 - * dependent variables = change in log price for a given hospital for 1985-88, 1988-97, and 1997-2000
- Colocation = straight line distance between hospitals using longitude and latitude coordinate of the main address
 - Data from Tele Atlas's Geocode.com and Mapquest.com
- Market level control variables from the Area Resource File and Laurence Baker
 - Area Resource File comes from the US Department of Health and Human Resources

2SLS estimates

- ① 1st stage: Merged rivals on the number of colocated rivals
- ② 2nd stage: Price growth during the treatment (1989-1996) on the number of merged colocated rivals and controls

1st stage

Table 2

Relationship between Merger/Rival Merger and Colocation/Rival Colocation: First Stage

	Own Merger		Number of Rival Mergers	
	(1)	(2)	(3)	(4)
Colocated	.066** (.016)	.062** (.016)		
Colocated rival pairs			.119** (.018)	.112** (.019)
Hospital characteristics:				
For profit	-.005 (.009)	.003 (.009)	.071 (.044)	.090* (.046)
Government	-.045** (.007)	-.037** (.008)	-.067 (.047)	-.045 (.047)
Teaching hospital	.027* (.015)	.022 (.015)	-.008 (.045)	-.006 (.044)
Medicaid share	.040 (.031)	.037 (.032)	.399** (.130)	.321* (.130)
Debt/asset ratio	-.009 (.008)	-.008 (.008)	-.006 (.049)	-.059 (.048)
Occupancy rate	.012 (.020)	-.004 (.021)	.189 (.120)	-.125 (.126)
Beds:				
100-199	.009 (.008)	.013 (.008)	-.156* (.067)	-.118* (.064)
200-299	.019* (.010)	.023* (.010)	-.153* (.067)	-.129* (.064)
300-399	-.018 (.013)	-.010 (.013)	-.153* (.070)	-.089 (.067)
400+	-.019 (.014)	-.009 (.014)	-.184* (.072)	-.127* (.069)
Market characteristics:				
MSA population:				
<250,000	.047** (.011)	.053** (.011)	.047 (.092)	.110 (.092)
250,000-499,999	-.001 (.012)	.004 (.012)	.055 (.087)	.101 (.087)
500,000-1,000,000	-.003 (.012)	.001 (.012)	.056 (.089)	.059 (.091)
1,000,000-2,500,000	-.038** (.012)	-.019 (.013)	-.030 (.090)	.021 (.092)
>2,500,000	-.050** (.014)	-.035* (.015)	.056 (.093)	.141 (.096)

2nd Stage:

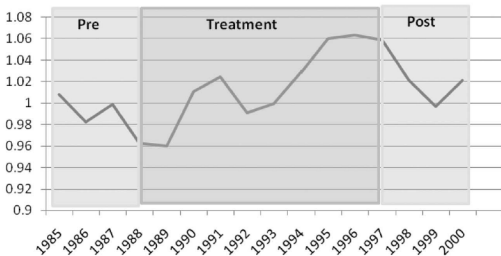


Figure: Ratio of mean prices for hospitals with and without colocated rivals

2nd Stage:

Table 3
Relationship between Price Growth and Rival Colocation: Reduced Form

	ln(1988 Price) - ln(1985 Price)		ln (1997 Price) - ln(1988 Price)		ln (2000 Price) - ln(1997 Price)	
	(1)	(2)	(3)	(4)	(5)	(6)
Colocated rival pairs	-.016 (.010)	-.013 (.011)	.045** (.014)	.034* (.015)	-.008 (.013)	-.001 (.014)
Hospital characteristics:						
For profit	.001 (.024)	-.009 (.025)	-.087* (.035)	-.052 (.036)	-.026 (.027)	-.018 (.029)
Government	.062* (.025)	.056* (.026)	.021 (.037)	.042 (.037)	.023 (.034)	.034 (.035)
Teaching hospital	-.052* (.024)	-.048* (.024)	.014 (.035)	.018 (.035)	-.013 (.030)	-.007 (.031)
Medicaid share	-.501** (.079)	-.441** (.082)	.315** (.102)	.224* (.103)	.066 (.073)	.059 (.077)
Debt/asset ratio	-.155** (.033)	-.040 (.035)	.046 (.038)	.004 (.038)	.021 (.032)	.012 (.034)
Occupancy rate	-.255** (.071)	-.024 (.078)	.107 (.093)	-.079 (.100)	.025 (.073)	.033 (.078)
Beds:						
100-199	-.048 (.037)	-.060+ (.036)	.028 (.052)	.048 (.050)	.021 (.048)	.027 (.048)
200-299	-.017 (.037)	-.025 (.036)	.013 (.053)	.040 (.051)	-.033 (.048)	-.017 (.049)
300-399	-.011 (.039)	-.032 (.038)	.003 (.055)	.024 (.053)	.005 (.049)	.028 (.050)
400+	.007 (.040)	-.005 (.040)	.022 (.056)	.045 (.055)	-.005 (.050)	.016 (.051)

Threats

- This estimation uses a 2SLS
- Not the average impact of merger
→ Merger effects identified by responses of nearby competitors