

HOW VERTICAL INTEGRATION AFFECTS THE QUANTITY AND COST OF CARE FOR MEDICARE BENEFICIARIES

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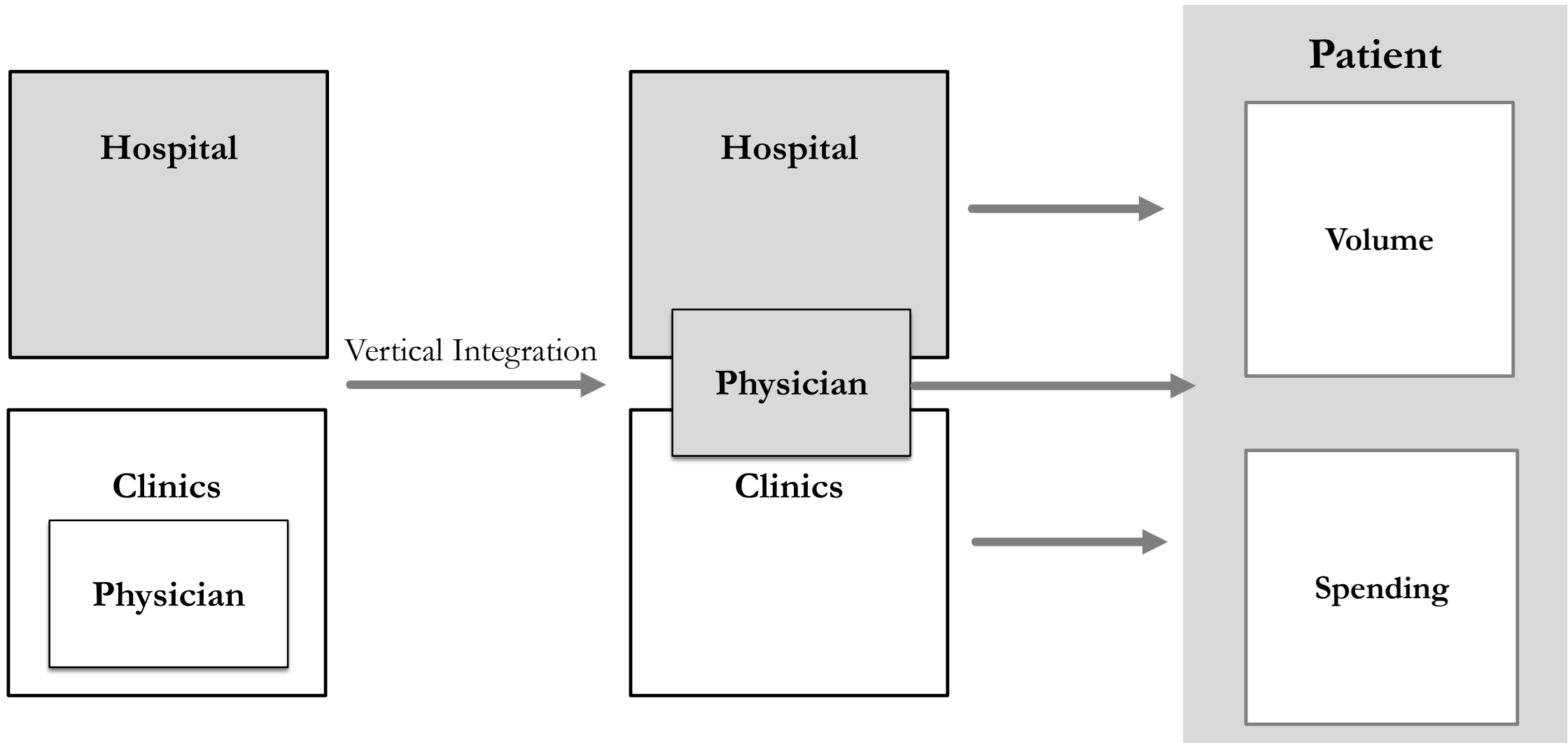
XIN HU, MSPH

ECON 771 2ND PRESENTATION, NOV 17TH 2020

BACKGROUND

- **Vertical Integration (Physician acquired by hospitals)**
 - **Growing trend: 16% - 29% (2007-08 to 2012-13)**
 - **Motivation: CMS reimbursement policy – Provider-Based Billing (PBB)**
 - Example: **\$69** (office-based) vs. **\$124** (hospital outpatient) for a 15-min established patient visit
 - Based on employment relationship rather than physical location of services
 - **Financial and clinical consequences unclear (on hospitals level and physician level)**
 - Limited evidence showing ↑ prices & spending
 - **Mechanism unclear**
 - Due to market power vs. physician behavior

CONCEPTUAL FRAMEWORK





DATA

- **Data source**

- Levin Health Care Acquisition Reports 2005-2010 (Mergers)
- SK&A Surveys of registered physician 2005-2014 (Affected Physicians)
- 5% Sample Medicare Outpatient and Carrier Claims 2005-2010 (Utilization)

MEASURES (MERGERS)

Announce date	Buyer	Target	Hosp	Phys	Fam Prac ^b	Spclst	States	3-Digit zip codes
12-May-06	Butler Memorial Hospital	DiCuccio practice	1	9	9	0	PA	160, 177, 153
26-Mar-07	Good Samaritan Hospital of Suffern	New York Institute of Same Day Surgery	1	2	0	2	NY, NJ	109, 074
22-Jun-07	Presbyterian Healthcare	Mid Carolina Cardiology	8	47	0	47	NC ^a	282, 280, 281 ^a
25-Jul-07	Aurora Health Care	Advanced Healthcare	12	253	108	145	WI ^a	530, 532, 531 ^a
7-Aug-07	Allina Hospitals and Clinics.	Aspen Medical Group	12	165	81	84	MN ^a	551, 553, 554 ^a
15-Nov-07	ProHealth Care	Medical Associates Health Center	2	95	39	56	WI ^a	530, 532, 531
16-Jan-08	Essentia Health	Dakota Clinic, Ltd.	10	210	77	133	ND, MN, SD	581, 585, 565, 580, 584
3-Mar-08	Christ Hospital	Hyde Park Internists, Inc.	1	9	9	0	OH	452
23-May-08	Jefferson Regional Medical Center	Jefferson Hills Surgical	1	7	0	7	PA	150, 152
10-Jul-08	Aurora Health Care	Comprehensive Cardiology Care Group	12	1	0	1	WI	532, 530, 531
4-Aug-08	North Memorial Health Care	Cardiovascular Consultants, Ltd.	1	16	0	16	MN, WI ^a	554, 548, 553, 558 ^a
25-Aug-08	Carilion Clinic	Consultants in Cardiology	7	20	0	20	VA ^a	240, 244, 245 ^a
10-Sep-08	The Christ Hospital	Ohio Heart & Vascular Ctr.	1	54	2	52	OH, KY, IN	452, 410, 450, 470, 456 ^a
26-Sep-08	OhioHealth Corp.	MidOhio Cardiology and Vascular associates	8	28	1	27	OH ^a	432, 457, 430, 456, 455 ^a
28-Nov-08	Bridgeport Hospital	Radiation Oncology of Southern Connecticut	1	10	0	10	CT ^a	065, 069, 066 ^a
8-Jan-09	Aurora Health Care	Northern Lake Medical Ltd.	12	6	6	0	IL, WI	600, 531
8-Jan-09	Scripps Health	Penn Elm Medical Group	4	11	10	1	CA ^a	920, 921 ^a
1-Jun-09	ThedaCare	Nelson Family Clinic	3	2	2	0	WI	543, 541, 542
6-Jul-09	Spectrum Health System	Michigan Medical, PC	5	216	92	124	MI ^a	495, 494, 490, 493, 488 ^a
27-Jul-09	Advocate Health Care, Inc.	Midwest Physician Group	10	55	22	33	IL, IN ^a	604, 463, 606, 609, 601 ^a
27-Jul-09	Roper St. Francis Healthcare	Lowcountry Medical Associates	2	146	22	124	SC ^a	294, 299, 291, 295 ^a
1-Oct-09	Mission Medical Associates, Inc.	Asheville Cardiology	4	32	1	31	NC ^a	288, 287, 274 ^a
30-Oct-09	HCA Midwest Health System	Midwest Cardiology	3	14	0	14	KS, MO ^a	662, 640, 641, 660, 650
1-Jan-10	St. David's HealthCare Partnership, LP	Austin Heart	4	6	1	5	TX ^a	787, 786
21-Jan-10	Baptist Memorial Health Care Corp.	NEA Clinic	1	26	7	19	AR, TX ^a	724, 759, 723, 784, 754
3-Feb-10	Legacy Community Health Services	Southwest Community Health Center	2	20	16	4	CT ^a	066, 064, 068, 060 ^a
26-May-10	St. Elizabeth Healthcare	Comprehensive Cardiology Consultants, Inc.	3	14	0	14	OH, KY, IN ^a	452, 410, 456, 470, 451 ^a

MEASURES (VOLUME AND SPENDING)

Table 2

Descriptive statistics for parties affected by transactions. Observations at quarterly level.

		Total claims	Clinical visits	Total spending
(a) Acquired groups in office settings				
Pre-merger	N	878	878	878
	Mean	416.60	222.92	47,863.82
	SD	833.85	450.72	89,873.09
Post-merger	N	401	401	401
	Mean	197.78	104.87	22,736.31
	SD	462.65	241.22	52,630.58
(b) Acquired physicians in acquiring hospitals				
Pre-merger	N	5722	5722	5722
	Mean	3.54	0.31	1578.18
	SD	4.94	1.89	4648.38
Post-merger	N	4244	4244	4244
	Mean	6.14	1.83	1900.09
	SD	10.15	5.36	4711.86
(c) Acquiring hospitals				
Pre-merger	N	1809	1809	1809
	Mean	417.43	32.76	11,4689
	SD	464.79	57.58	119,465
Post-merger	N	1044	1044	1044
	Mean	425.92	45.01	13,6347
	SD	505.25	83.24	150,268

Table 3

Visit, claim, and spending statistics for merging and non-merging parties. Observations at quarterly level.

		Total claims	Clinical visits	Total spending
(a) Physician groups in office settings				
Non-merging	N	6,151,557	6,151,557	6,151,557
	Mean	45.80	19.49	5,521.39
	SD	307.63	88.95	27,051.55
Merging	N	1,279	1,279	1,279
	Mean	347.99	185.91	39,985.69
	SD	744.28	400.77	80,905.85
(b) Physicians in specific hospitals				
Non-merging	N	8,328,293	8,328,293	8,328,293
	Mean	4.39	0.63	1046.97
	SD	7.32	2.97	2853.83
Merging	N	323518	323,518	323,518
	Mean	3.60	0.50	1058.49
	SD	5.27	2.33	2605.42
(c) Hospitals				
Non-merging	N	103,650	103,650	103,650
	Mean	360.95	29.44	85,493
	SD	475.87	60.10	113,316
Merging	N	2853	2853	2853
	Mean	420.54	37.24	122,614
	SD	479.92	68.35	131,963

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MODEL SPECIFICATION

$$y_{dhmt} = \alpha_{dh} + \beta AFTER_{ht} + \sigma ACQ_{dt} + \lambda ACQ_AFTER_{dht} + \Gamma_{mt} + \epsilon_{dhmt}, \quad (1)$$

$$y_{hmt} = \alpha_h + \beta AFTER_{ht} + \Gamma_{mt} + \epsilon_{hmt}, \quad (2)$$

$$y_{gmt} = \alpha_g + \sigma ACQ_{gt} + \Gamma_{mt} + \epsilon_{gmt}. \quad (3)$$

RESULT

Physician Group Effects

$$y_{gmt} = \alpha_g + \sigma ACQ_{gt} + \Gamma_{mt} + \epsilon_{gmt}. \quad (3)$$

Table 4

Merger effects for physician groups.

$$\% \Delta y = 100 \times (e^{\xi} - 1),$$

	log(Claims)		log(Clinical)		log(Spending)	
ACQ	-1.219*** 0.194	-1.190*** 70% 0.192	-1.329*** 0.226	-1.311*** 0.225	-1.454*** 0.243	-1.421*** 0.242
Obs	6,152,784	6,152,784	6,152,784	6,152,784	6,152,784	6152784
Group FE	Yes	Yes	Yes	Yes	Yes	Yes
Qtr FE	Yes	Yes	Yes	Yes	Yes	Yes
State trends	No	Yes	No	Yes	No	Yes

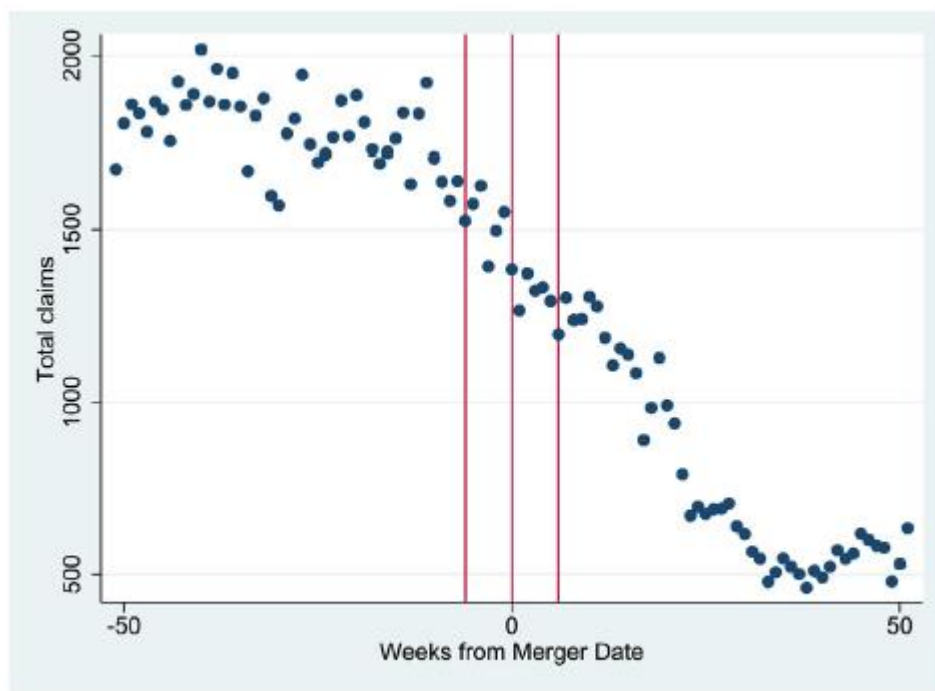
* $p < 0.1$.

** $p < 0.05$.

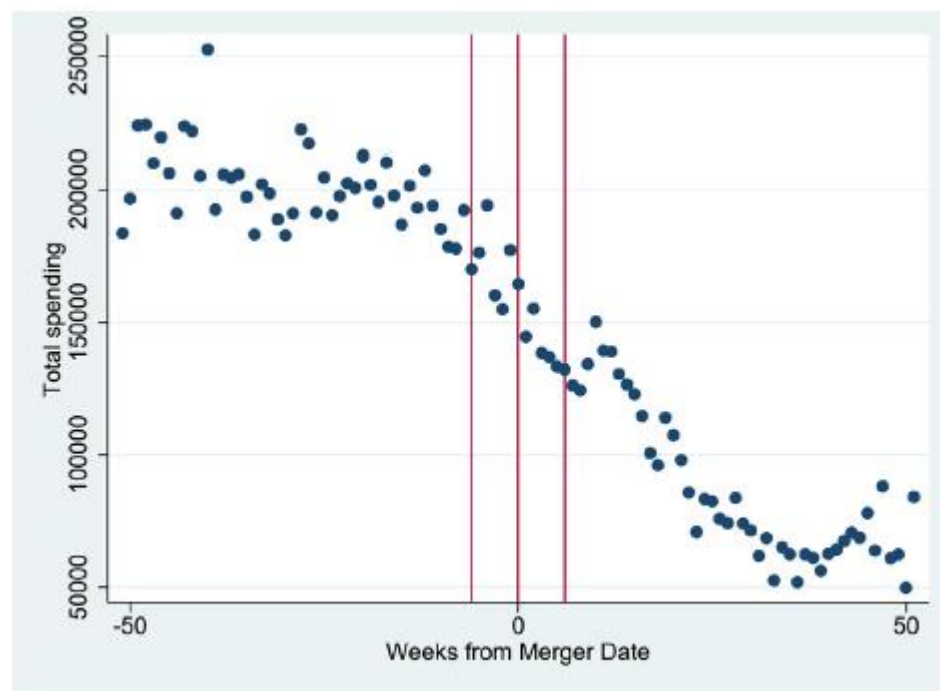
*** $p < 0.01$. Cluster robust standard errors.

RESULT

Physician Group Effects



(a) Office-based claims



(b) Office-based spending

RESULT

Physician-Hospital Effects

Table 5
Merger effects on physicians practicing in hospitals.

	log(Claims)		log(Clinical)		log(Spending)	
AFTER	0.00	−0.002	0.018***	0.010***	0.003	0.026*
	0.006	0.006	0.004	0.004	0.01	0.242
ACQ	−0.035	−0.032	−0.002	−0.015	−0.097**	−0.098**
	0.024	0.024	0.012	0.012	0.039	0.039
ACQ* AFTER	0.426***	0.432***	0.264***	0.282***	0.382***	0.605***
	0.062	0.061	0.055	0.054	0.084	0.15
Obs	8,545,629	8,545,629	8,545,629	8,545,629	8,540,522	8,540,522
Doc-Hosp FE	Yes	Yes	Yes	Yes	Yes	Yes
Qtr FE	Yes	Yes	Yes	Yes	Yes	Yes
State trends	No	Yes	No	Yes	No	Yes

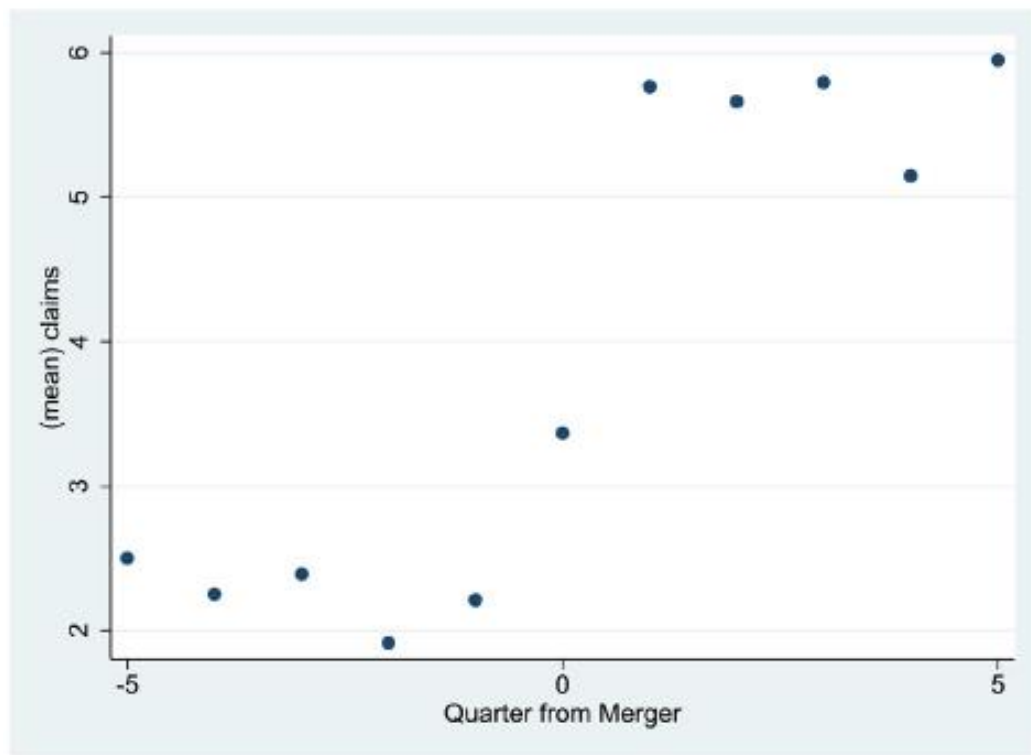
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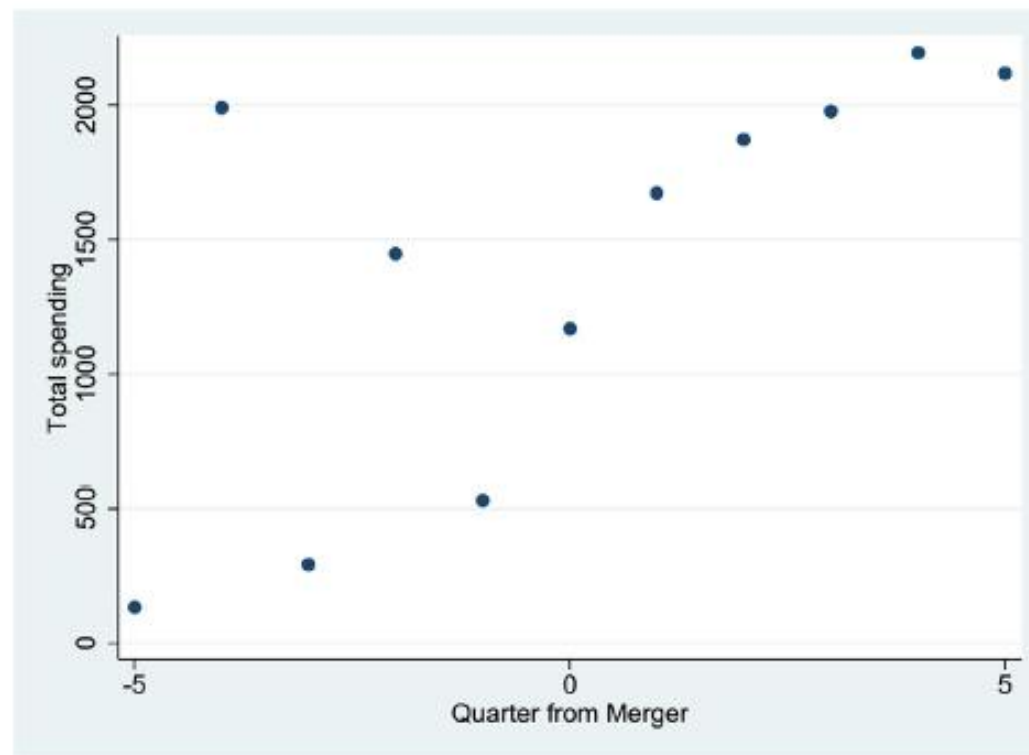
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RESULT

Physician-Hospital Effects



(c) Hospital-based visits, merging doctors



(d) Total hospital spending, merging doctors

RESULT

Hospital-Level Effects

Table 6
Merger effects for hospitals.

	log(Claims)			log(Clinical)			log(Spending)	
AFTER	0.076	0.087*	~10%	0.177	0.142	15%	0.024	0.037 2-3%
	0.067	0.051		0.138	0.105		0.046	0.039
Observations	105,487	105,487		105,487	105,487		105,483	105,483
Group FE	Yes	Yes		Yes	Yes		Yes	Yes
Qtr FE	Yes	Yes		Yes	Yes		Yes	Yes
State trends	No	Yes		No	Yes		No	Yes

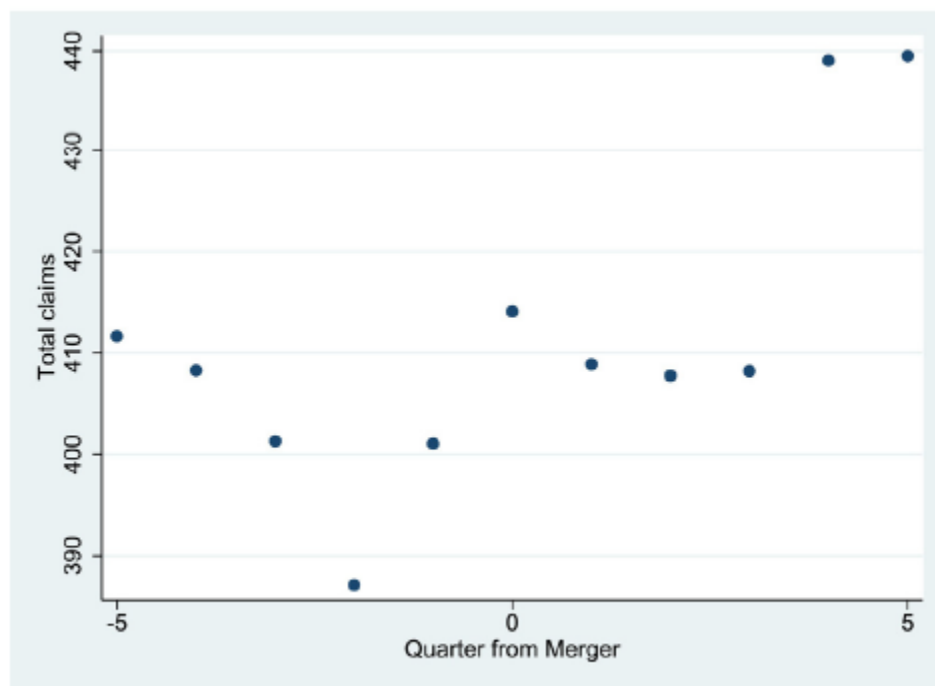
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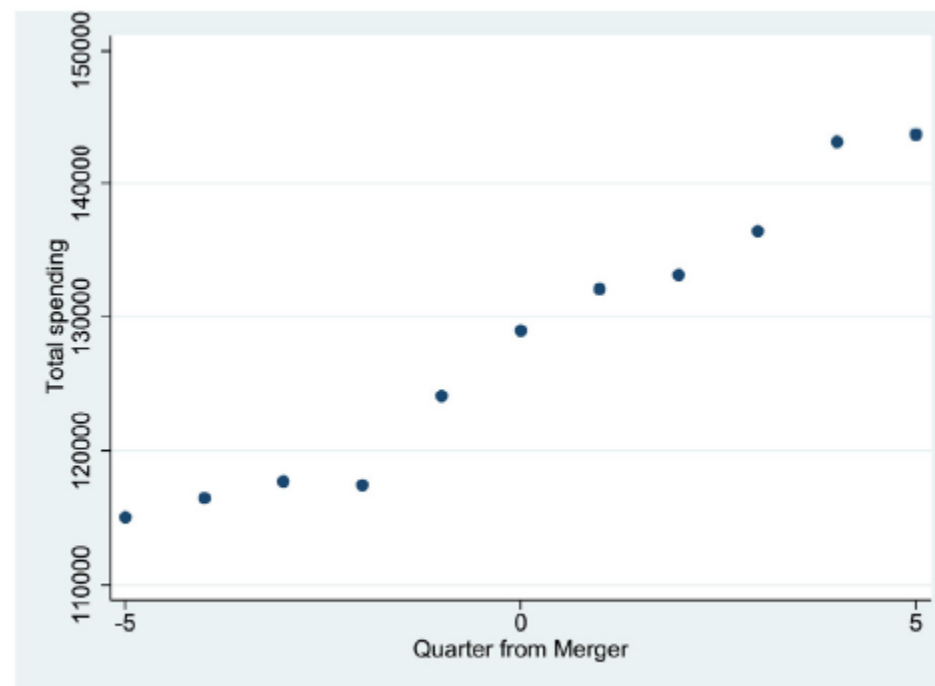
*** $p < 0.01$. Cluster robust standard errors.

RESULT

Hospital-Level Effects



(e) Hospital-based visits, all doctors



(f) Total hospital spending, all doctors

RESULT

Net Effects

Table 7
Net effects on expenditures.

	Physicians	Groups	Groups limited to continuing physicians
AFTER	0.168 ^{***} 18% 0.035	−0.645 ^{***} -47% 0.151	0.306 ^{***} 36% 0.102
<i>N</i>	29,463	660	644
Group FE	No	Yes	Yes
Physician FE	Yes	No	No

* $p < 0.1$.

** $p < 0.05$.

*** $p < 0.01$. Cluster robust standard errors.

CONCLUSION & IMPLICATION

- I. Vertical integration is associated with billing and/or care practices at physician and physician groups level
- II. The impact of vertical integration on hospital is idiosyncratic
- III. Questions:
 - I. Not clear how the “AFTER” was codes for hospitals that acquired multiple physician groups at different time points. Especially for hospital-level analysis.
 - II. Pre-trend of total spending among merging doctors is very noisy