Online Appendix

Mergers With Intermediation: The Price Effect of Distant Hospital Mergers

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This Online Appendix accompanies the article of the same title. Supplementary exhibits and the formal theoretical results are in Appendices A and B of the article. References to the article are identified explicitly; other references are internal to this Online Appendix.

Contents

OA.1 Data Construction and Sample Details

This section describes how we construct our different datasets and how certain key variables are computed. We first describe the restrictions and construction of the four main datasets and then explain how we construct the key variables.

OA.1.1 Claims

To form our claims panel, we first select all paid facility claims that have a positive allowed amount (i.e., the total payment to a hospital) from any patient who has had any care delivered in an inpatient setting within the same year. We define those patients as those with claims from inpatient hospitals, inpatient psychiatric facilities, psychiatric residential treatment facilities, and comprehensive inpatient rehabilitation facilities. Additionally, we include all patients with claims for inpatient care, room and board, surgical procedures, and deliveries, as well as any claim with a DRG code. Having collected all facility claims for this population, we drop observations associated with DRGs that code "unknown conditions" and observations for services provided at skilled nursing facilities, nursing facilities, custodial-care facilities, or hospice facilities. We also exclude all hospice-related charges, regardless of their location. We mark a claim row as part of an inpatient event if it has a nonmissing DRG and records care provided at an inpatient hospital, inpatient psychiatric facility, psychiatric residential treatment facility, or comprehensive inpatient rehabilitation facility. From our provider data, we extract more accurate information about the type of facility involved in each claim. We select the subset of facilities registered as hospitals in that data and merge those with our claims data. We then drop any claim that has no rows marked as inpatient or contains no hospital services. In the extremely rare case of multiple facility providers per claim (the 1st and 99th percentiles of providers per claim are 1), we keep the provider that is paid the largest fraction of the bill. Unless stated otherwise, our analysis is also limited to claims flagged as in-network.

OA.1.2 Enrollment and Firm Identifiers

We obtain data on all members of commercial plans associated with an employer. We exclude the few members with missing gender or age (less than 0.1%) and those that belong to firms that never (in the entire sample) cover more than 100 individuals, or that ever cover more than 300,000. These restrictions drop about 40% of all member records. We do so to exclude a few small firms that might be directly on the margin of switching to an ACA exchange plan, and a few extremely large employers. Those large employers might be able to negotiate special deals with hospitals directly, in addition to the insurance contracts captured in our data, and thus their exposure to merger effects might differ from that of the typical American firm.

To construct firm identifiers, we begin by forming a panel of movers across plans and flagging plans as either entering or exiting. We say that a plan is renamed, and link the old and new plans, if the original plan exits and, in the following year, a new plan contains more than half of the exiting plan's members while more than half of the new plan's members came from the exiting plan. We also apply the same logic to plans that exit the market in two years, but in

the first year, they lose more than 90% of their enrollment. In that case, we combine the exiting plan with its renamed successor. We then iteratively apply the following linkage rule: we flag plan A and plan B as being of the same firm if (i) there are at least five movers in both directions in a year; (ii) plan A exits without being renamed and the majority of its members end up in plan B (or in plans of the same firm as plan B); or (iii) plan A is a new plan and it gets most of its enrollees from plan B (or from plans marked as being from the same firm as plan B). Finally, we perform a connected-component graph analysis to cluster all plans that have formed links via this strategy. The algorithm flags 95% of group-years as independent employers. Among the 38,700 firm-years with more than one group, the mean and median numbers of groups per firm are 2.2 and 2, respectively. Firms with multiple groups tend to be substantially larger: the mean and median number of beneficiaries for single-group firms are 174 and 33, while for multiple-group firms, they are 919 and 120.

OA.1.3 Hospital Panel

Our hospital panel consists of detailed information from the AHA survey linked with two additional sources. First, we link the AHA with the HCRIS data source. From this, we obtain reported expenses, admissions, and revenues. Second, we link the AHA with data on providers from our administrative data provider — the private national insurer. Crucially, the insurer keeps provider identifiers that are more detailed and more consistent over time than the AHA identifiers. In some cases, it identifies units of the same hospital that are registered as separate entities in the AHA. In others, it correctly detects that two AHA identifiers in different years belong to the same hospital, which had undergone restructuring, renaming, or a change of ownership.

OA.1.4 Commercial Price Index

We construct our price index following Cooper et al. (2019) and run the regression

$$\ln(p^*_{idht}) = \alpha_{Age(i)\times Fem(i)} + \delta_{ht} + \xi_d + \epsilon_{idht}$$

where i indexes patients, h indexes hospitals, d indexes diagnoses (DRG codes), and t indexes years. p^*_{idht} is the observed total allowed amount for the medical event, $\alpha_{Age(i)\times Fem(i)}$ is an age-group-by-gender fixed effect, δ_{ht} are hospital-year fixed effects, ξ_d are diagnosis fixed effects, and ϵ_{idht} is the residual. Age groups are defined as under 18, between 18 and 25, and in 5-year increments up to 65. We exclude members older than 65. We trim extreme payments by diagnosis cell: within each DRG-year sample, we drop medical events whose total allowed amount falls below the 1st percentile or above the 99th percentile of p^*_{idht} for that DRG. The estimated δ_{ht} constitutes our first price index, which we call the log negotiated price. We normalize the age-gender and diagnosis fixed effects relative to a regular vaginal delivery (DRG 768) for a woman aged 31 to 35, such that δ_{ht} is measured in prices relative to a birth. We find that this makes the prices easier to interpret than the usual approach of setting the mean of δ_{ht} to match the mean spending. Applying this alternative normalization, as in Cooper et al. (2019), does not affect any results or the predictive power of this index.

OA.1.5 Distance Measurements

Distance plays a key role in defining local care markets and merger types. We use two sources for measuring distance based on the level of detail we have on the location of agents. For hospitals, we know exact latitude and longitude, and so we use precise geodesic distances. For enrollees, however, we only observe five-digit ZIP codes. To determine their distance to hospitals, we use publicly available NBER tabulations of distances between ZIP-code centroids.

OA.1.6 Sample Characteristics

Table OA.1: Descriptive Statistics of Merger Hospitals Observed in Private Insurance Data

	Within-HSA		Cross-HSA	
	Target	Acquirer	Target	Acquirer
Hospitals involved in merger	151	622	1,070	10,505
↪ coverage	66.5%	80.2%	71.9%	76.6%
Systems involved in merger	58	143	395	275
↪ coverage	60.4%	67.8%	67.2%	83.6%
# Affected Markets	85	315	752	1,452
↪ coverage	68.5%	81.6%	78.3%	83.7%
Average Bed Size	93.841	212.017	131.235	147.385
Average System Members	34.761	40.711	16.840	23.141
Share Stand-Alone	0.418	0.092	0.536	0.022
Share Rural	0.062	0.127	0.280	0.207
Share Critical Access	0.046	0.063	0.141	0.116
Share General Care	0.556	0.768	0.802	0.672
Share For-Profit	0.512	0.393	0.300	0.551
Average Nurses/Bed	0.111	0.117	0.128	0.119
Average Doctors/Bed	0.105	0.089	0.105	0.078
Average Occupancy Rate	0.485	0.592	0.523	0.577
Average log price pre-merger	-0.269	-0.141	-0.352	-0.163
Average log price post-merger	-0.178	-0.016	-0.240	-0.059
Miles to nearest counterpart				
25th Percentile	2.040	2.346	15.847	15.847
Median	5.247	6.246	28.489	29.745
75th Percentile	11.582	14.653	59.945	68.010

Notes: This table presents descriptive statistics for the subsample of hospitals with private insurance price data, grouped by their merger status for the years 2011–2020. The number of systems and system members, as well as stand-alone and for-profit status, are computed based on the status of the merging hospitals in the year prior to the merger. Negotiated prices are relative to a vaginal delivery for a woman aged 31 to 35, the level of which is kept masked for confidentiality reasons. Pre-merger prices are in the year prior to the merger, while post-merger prices are in the year after the merger.

Table OA.2: Baseline Characteristics of Treated and Control Hospitals

	Treated	**Control**
Average Bed Size	131.452	140.729
Average System Members	21.583	6.635
Share Stand-Alone	0.439	0.681
Share Rural	0.330	0.391
Share Critical Access	0.161	0.252
Share General Care	0.831	0.768
Share For-Profit	0.317	0.146
Average Nurses/Bed	0.155	0.253
Average Doctors/Bed	0.096	0.150
Average Occupancy Rate	0.535	0.528
Hospital-event observations	797	69,565

Notes: This table presents baseline characteristics of treated and control hospitals in the cross-HSA merger event-study panel. The sample includes all hospitals passing the filters for inclusion in our stacked and matched panel but is not restricted to hospitals with prices available in our private insurance data. Hospital characteristics are measured in the year prior to the merger event ($t = -1$). Treated hospitals are hospitals acquired in a cross-HSA merger, while control hospitals are the corresponding hospitals in the stacked event-study comparison groups.

OA.2 Supplementary Price and Employer-Overlap Results

Table OA.3: Annual Negotiated Price Growth for Control Hospitals (Cross-HSA)

Event-Time Transition	Mean $\Delta \log p$	Mean log growth (%)	SE($\Delta \log p$)	SD($\Delta \log p$)	N
$-5 \to -4$	0.0322	3.2229	0.0049	0.5247	11,543
$-4 \to -3$	0.0498	4.9850	0.0041	0.5252	16,811
$-3 \to -2$	0.0346	3.4570	0.0034	0.5134	23,029
$-2 \to -1$	0.0273	2.7291	0.0032	0.5371	27,582
$-1 \to 0$	0.0387	3.8669	0.0030	0.5316	31,401
$0 \to 1$	0.0315	3.1475	0.0029	0.5438	35,222
$1 \to 2$	0.0330	3.2963	0.0026	0.5423	43,174
$2 \to 3$	0.0227	2.2735	0.0027	0.5305	39,742
$3 \to 4$	0.0330	3.2998	0.0027	0.5274	38,617
$4 \to 5$	0.0333	3.3252	0.0029	0.5372	33,922
Overall average	0.0326	3.2589	0.0010	0.5331	301,043

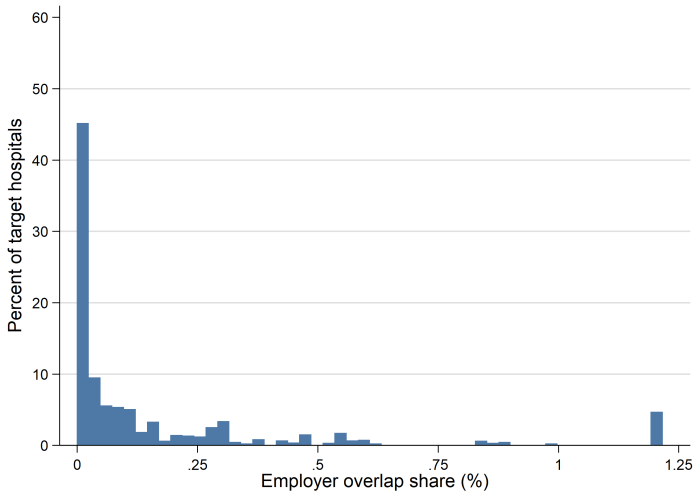
Notes: This table reports annual negotiated-price growth among control hospitals in the cross-HSA merger event-study panel. Each observation is a hospital-event pair observed in two consecutive event years. $\Delta \log p$ is the within-hospital-event change in log negotiated price. Mean log growth (%) equals $100 \times E[\Delta \log p]$.

Table OA.4: Cross-Geography Merger Effects on Prices (Binary Heterogeneity)

	Log Negotiated Price			
	Largest Systems (1)	Rural (2)	Critical Access (3)	Low Income (4)
Post × Treated	0.018	0.040***	0.045***	0.036**
	(0.013)	(0.014)	(0.013)	(0.015)
↪ ×H	0.008	-0.046**	-0.130***	-0.031
	(0.043)	(0.023)	(0.031)	(0.023)
↪ × Overlap ×$(1-H)$	18.347***	9.592***	6.872***	11.076***
	(2.409)	(2.042)	(2.058)	(2.225)
↪ × Overlap ×H	3.308	3.755	15.532**	6.015**
	(4.083)	(3.352)	(6.113)	(2.666)
Mean dep. var.	-0.592	-0.592	-0.592	-0.592
Mean H pre-merger	0.003	0.439	0.297	0.400
Observations	358,919	352,414	369,793	352,287
R^2	0.789	0.789	0.790	0.790

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Heterogeneity variables vary by column as indicated. Largest Systems is an indicator for the 5 largest systems in our sample, defined by the average number of hospitals over time. Rural and Critical Access are hospital-level indicators for whether the hospital is in a rural area or designated as a critical access hospital. "Low Income" is a county-level indicator for whether the hospital's county has a lower median household income than the sample median.
The specifications are reparameterizations of the corresponding binary heterogeneity specifications in Table 6 in the article. Post × Treated × Overlap ×$(1-H)$ reports the effect of employer overlap for hospitals for which the listed heterogeneity indicator equals zero, while Post × Treated × Overlap ×H reports the effect for hospitals for which the indicator equals one. Thus, the difference between the two overlap coefficients corresponds to the Post × Treated × Overlap ×H interaction reported in Table 6 in the article. The mean dependent variable is measured in the year before the merger.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure OA.1: Distribution of Employer Overlap in Cross-HSA Mergers



Notes: This figure reports the distribution of employer overlap shares for target hospitals involved in cross-HSA mergers. Employer overlap is measured in the year prior to the merger. For each employer, exposure is the smaller of its covered employee counts in the acquirer and target market groups; employer overlap sums those minima across employers and divides by the insurer's total covered population. The histogram is constructed at the target-hospital level using 50 bins, trimming observations outside the 1st and 99th percentiles of the overlap distribution. Employer overlap is multiplied by 100 in this figure and shown in percentage points.

OA.2.1 Evidence on Acquiring Hospitals

Here we discuss briefly the evidence on acquiring hospitals, which was omitted from our main analysis. Following the regression in Equation (5) in the article, we estimate how within- and cross-geography acquisitions affect acquiring hospitals. The panel is constructed in the same way for acquirers as for targets, with the same standards applied for controls and treatment inclusion. Crucially, as shown in Appendix Table A.1 in the article, cross-geography acquirers tend to engage in frequent local acquisitions, which limits our ability to distinguish whether price effects stem from their cross-geography or within-geography mergers. Here, we focus on the narrow—and likely not representative—subsample of acquirers that engaged in no other local merger within the five-year windows centered on our target cross-geography acquisition.

Table OA.5 shows the estimates. The price effects for acquirers are similar to those for targets, notably so for cross-geography acquisitions. Within-geography mergers are associated with a 7.7% increase in prices at acquirers, compared to a 6% increase at targets. Similarly, cross-geography effects are 4.7% at acquirers and 4.6% at targets. The final column of Table OA.5 shows the effect of employer overlap share on acquirers' prices. As with targets, the effect is positive and significant. However, the effect is smaller in magnitude and explains only 16% of the merger effect. This is consistent with acquiring systems being significantly larger than targets, with the employer overlap channel being effective only for the subset of acquiring hospitals that overlap with the acquisition target. As integrated hospital systems are known to negotiate rates as a block, with the threat of removing their entire system from insurers' networks, even hospitals that are not in the direct overlap path can still benefit from it.

Table OA.5: Merger Effects on Log Negotiated Prices for Acquiring Hospitals

	Within-Geography			**Cross-Geography**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post × Treated (α)	0.077***	0.077***	0.077***	0.046***	0.046***	0.047***	0.039***
	(0.012)	(0.012)	(0.012)	(0.009)	(0.009)	(0.009)	(0.009)
Post × Treated × Overlap							5.237***
							(1.414)
Total beds		0.000	0.000		0.000*	0.000**	0.000**
		(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Doctors per bed			0.028			0.019	0.018
			(0.026)			(0.019)	(0.020)
Nurses per bed			0.004			0.007	0.007
			(0.009)			(0.007)	(0.007)
Mean dep. var.	-0.567	-0.567	-0.567	-0.563	-0.563	-0.563	-0.563
Observations	371,161	371,161	371,161	2,193,665	2,193,665	2,193,665	2,188,996
R^2	0.819	0.819	0.819	0.809	0.809	0.809	0.803

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions are estimated on acquiring hospitals and include hospital-event and year-event fixed effects. Column (7) adds the interaction between Post × Treated and employer overlap. The mean dependent variable is measured in the year before the merger event. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

OA.3 Healthcare Production and Demand

Table OA.6: Heterogeneity in Effects on Staffing and Capacity

	HHI			**Rural**		
Outcome	Nurses	Doctors	Staffed Beds	Nurses	Doctors	Staffed Beds
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treated	-0.039***	-0.041***	0.812	-0.033***	-0.030***	-3.648***
	(0.008)	(0.009)	(2.031)	(0.004)	(0.006)	(1.225)
Post × Treated ×H	0.012	0.012	-6.557***	0.011	-0.005	-1.166
	(0.009)	(0.009)	(2.473)	(0.008)	(0.006)	(1.683)
Mean dep. var.	0.252	0.150	140.623	0.252	0.150	140.099
Mean H	0.675	0.675	0.675	0.390	0.390	0.390
Observations	680,934	680,934	681,006	630,992	630,992	631,064
R^2	0.742	0.859	0.972	0.745	0.858	0.971
	Critical Access			**Low Income**		
Outcome	Nurses	Doctors	Staffed Beds	Nurses	Doctors	Staffed Beds
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treated	-0.030***	-0.028***	-4.516***	-0.026***	-0.033***	-3.530***
	(0.004)	(0.005)	(1.131)	(0.005)	(0.006)	(1.214)
Post × Treated ×H	0.003	-0.022**	1.739	-0.008	0.004	-1.446
	(0.012)	(0.009)	(1.279)	(0.007)	(0.006)	(1.734)
Mean dep. var.	0.252	0.150	140.623	0.252	0.150	140.095
Mean H	0.251	0.251	0.251	0.389	0.389	0.389
Observations	680,934	680,934	681,006	630,878	630,878	630,950
R^2	0.742	0.859	0.972	0.745	0.858	0.971

Notes: The table reports heterogeneity in merger effects on healthcare production. The dependent variables are full-time equivalent nurses per bed, full-time equivalent doctors per bed, and total facility beds set up and staffed. H denotes the heterogeneity measure listed at the top of each column. All regressions include hospital-event and year-event fixed effects. HHI is computed using hospital admission shares at the HSA level. Rural and Low Income are county-level indicators; Critical Access is a hospital-level indicator. The mean dependent variable and mean H are measured in the year before the merger event. Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.7: Merger Effects on Local Healthcare Labor Markets

	Log Wages					
	Internist Wage		LPN Wage		OB/GYN Wage	
	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treated	-0.002	-0.008	0.000	-0.001	-0.002	-0.015
	(0.011)	(0.015)	(0.002)	(0.002)	(0.010)	(0.013)
↪ × Overlap		2.562		0.113		4.057**
		(2.422)		(0.298)		(1.724)
Mean dep. var.	12.147	12.147	10.684	10.684	12.228	12.229
Observations	211,708	210,939	317,053	315,917	170,836	170,238
R^2	0.856	0.847	0.979	0.977	0.872	0.864

	Log Wages					
	PCP Wage		PT Wage		RN Wage	
	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap
	(7)	(8)	(9)	(10)	(11)	(12)
Post × Treated	0.010	0.006	0.003	-0.002	0.002	0.001
	(0.007)	(0.008)	(0.004)	(0.005)	(0.002)	(0.002)
↪ × Overlap		1.651		1.237*		0.471
		(1.452)		(0.648)		(0.374)
Mean dep. var.	12.108	12.108	11.326	11.326	11.125	11.126
Observations	287,606	286,555	313,548	312,426	314,499	313,388
R^2	0.798	0.786	0.872	0.857	0.978	0.975

Notes: We exclude control hospitals found in the same county as target hospitals for these regressions. This is done to avoid mechanically biasing the estimates towards zero by using the same wage for treated and control hospitals. Standard errors in parentheses, clustered by BLS Occupational Employment and Wage Statistics (OEWS) wage area (CBSA). All regressions include hospital-event and year-event fixed effects. Overlap columns additionally include the interaction between Post × Treated and overlap. The mean dependent variable is measured in the year before the merger. Regressions use analytic event-stack weights following Wing et al. (2024). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.8: Merger Effects on Production and Costs by Median Distance

	Healthcare Production and Costs							
	Log Staffed Beds		Log Nurses per Bed		Log Doctors per Bed		Log Cost per Admission	
	Below (1)	Above (2)	Below (3)	Above (4)	Below (5)	Above (6)	Below (7)	Above (8)
Post × Treated	-0.127***	-0.055**	-0.036	-0.027	-0.115**	0.141***	0.020	0.035
	(0.021)	(0.025)	(0.042)	(0.041)	(0.048)	(0.054)	(0.025)	(0.033)
↪ × Overlap Q2	0.064**	0.020	-0.187***	-0.057	0.073	0.001	-0.072**	-0.087**
	(0.026)	(0.031)	(0.060)	(0.062)	(0.064)	(0.074)	(0.030)	(0.036)
↪ × Overlap Q3	0.135***	0.011	-0.110*	-0.015	0.187***	0.031	-0.076***	-0.215***
	(0.025)	(0.030)	(0.059)	(0.057)	(0.070)	(0.087)	(0.029)	(0.053)
↪ × Overlap Q4	0.049	0.091***	-0.155**	-0.304***	0.048	-0.268***	-0.044	-0.177***
	(0.030)	(0.031)	(0.062)	(0.054)	(0.096)	(0.070)	(0.029)	(0.039)
Mean dep. var.	4.418	4.179	-1.955	-1.777	-2.276	-2.296	10.223	10.247
Observations	340,829	338,139	320,286	314,449	244,285	217,771	305,360	304,045
R^2	0.972	0.973	0.841	0.850	0.853	0.858	0.863	0.794

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Columns split the sample by whether the treated hospital's distance to the acquirer is below or above the sample median. The omitted category for overlap quartiles is Q1. The mean dependent variable is measured in the year before the merger.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.9: Effects on Markup

	Markups							
	Base Regressions				**Heterogeneity**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
H					HHI	Rural	Critical Acc.	Low Income
Post × Treated	0.038***	0.036***	0.034***	0.034***	0.064***	0.057***	0.049***	0.038***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.010)	(0.005)	(0.005)	(0.005)
Post × Treated ×H					-0.033***	-0.053***	-0.069***	-0.001
					(0.012)	(0.007)	(0.006)	(0.007)
Mean Markup	-0.708	-0.708	-0.708	-0.708	-0.708	-0.708	-0.708	-0.708
Mean H					0.715	0.459	0.302	0.415
Bed Controls		✓	✓	✓				
Staffing Controls			✓	✓				
Service Controls				✓				
Observations	337,960	308,095	308,095	308,095	337,960	321,550	337,960	321,447
R^2	0.894	0.904	0.904	0.904	0.894	0.893	0.894	0.893

Notes: The dependent variable is markup. Columns (1)–(4) report base specifications with progressively added controls. Columns (5)–(8) report heterogeneity specifications, where H is listed at the top of each column. Bed controls account for total staffed beds, obstetric beds, and pediatric beds. Staffing controls include full-time equivalent doctors, nurses, and workers per bed, as well as total payroll costs. Service controls additionally include access to a CT scanner, an MRI machine, an emergency room, hemodialysis, mammography, oncology, surgical, and psychiatric services. All regressions include hospital-event and year-event fixed effects. Markups are trimmed at the 2.5th and 97.5th percentiles. The mean markup is measured in the year before the merger event. Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.10: Merger Effects on Network Exclusion

	Dropped From Network	
	(1)	(2)
Post × Treated	-0.032***	-0.030***
	(0.005)	(0.006)
Post × Treated × Overlap		-0.459
		(0.824)
Share dropped	0.053	0.053
Mean overlap	–	0.002
SD overlap	–	0.004
Observations	330,037	330,037
R^2	0.499	0.499

Notes: Column (1) estimates Equation (5) in the article; column (2) estimates Equation (7) in the article, with hospital exclusion from the network as the outcome. Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

OA.4 Acquisition Choices

Table OA.11: Predicted Acquisition Choice Estimates

	Chosen Target Hospital	
	(1)	(2)
Employer overlap	-0.889	
	(0.606)	
↪ × distance	0.015***	
	(0.005)	
↪ × distance Q1		-0.966
		(0.719)
↪ × distance Q2		1.609*
		(0.880)
↪ × distance Q3		0.743
		(1.187)
↪ × distance Q4		1.666***
		(0.484)
Distance to acquirer	-0.026***	-0.018***
	(0.003)	(0.006)
Distance Q1		0.532
		(1.074)
Distance Q2		-0.354
		(0.895)
Distance Q3		-0.605
		(0.650)
No acquirer within 300 miles	3.671***	1.993*
	(1.275)	(1.122)
Critical access hospital	-0.765***	-0.744***
	(0.195)	(0.195)
Medicare certified	-0.127	-0.172
	(0.773)	(0.767)
Medical school affiliation	-0.044	-0.055
	(0.183)	(0.185)
Total staffed beds	-0.001*	-0.001
	(0.001)	(0.001)
Workers per bed	0.002	0.001
	(0.026)	(0.026)
Nurses per bed	-1.511***	-1.541***
	(0.470)	(0.481)
Doctors per bed	-0.015	-0.019
	(0.325)	(0.333)
Observations	12,833	12,833
Pseudo R^2	0.192	0.201
Overlap elasticity	0.043	0.026
Hospital-type fixed effects	Yes	Yes
Merger Clusters	247	247
Choice Sets	282	282

Notes: This table reports conditional logit estimates of target-hospital choice. Standard errors in parentheses, clustered by source merger-year. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

OA.5 Alternative Mechanisms

OA.5.1 Within-System Pricing

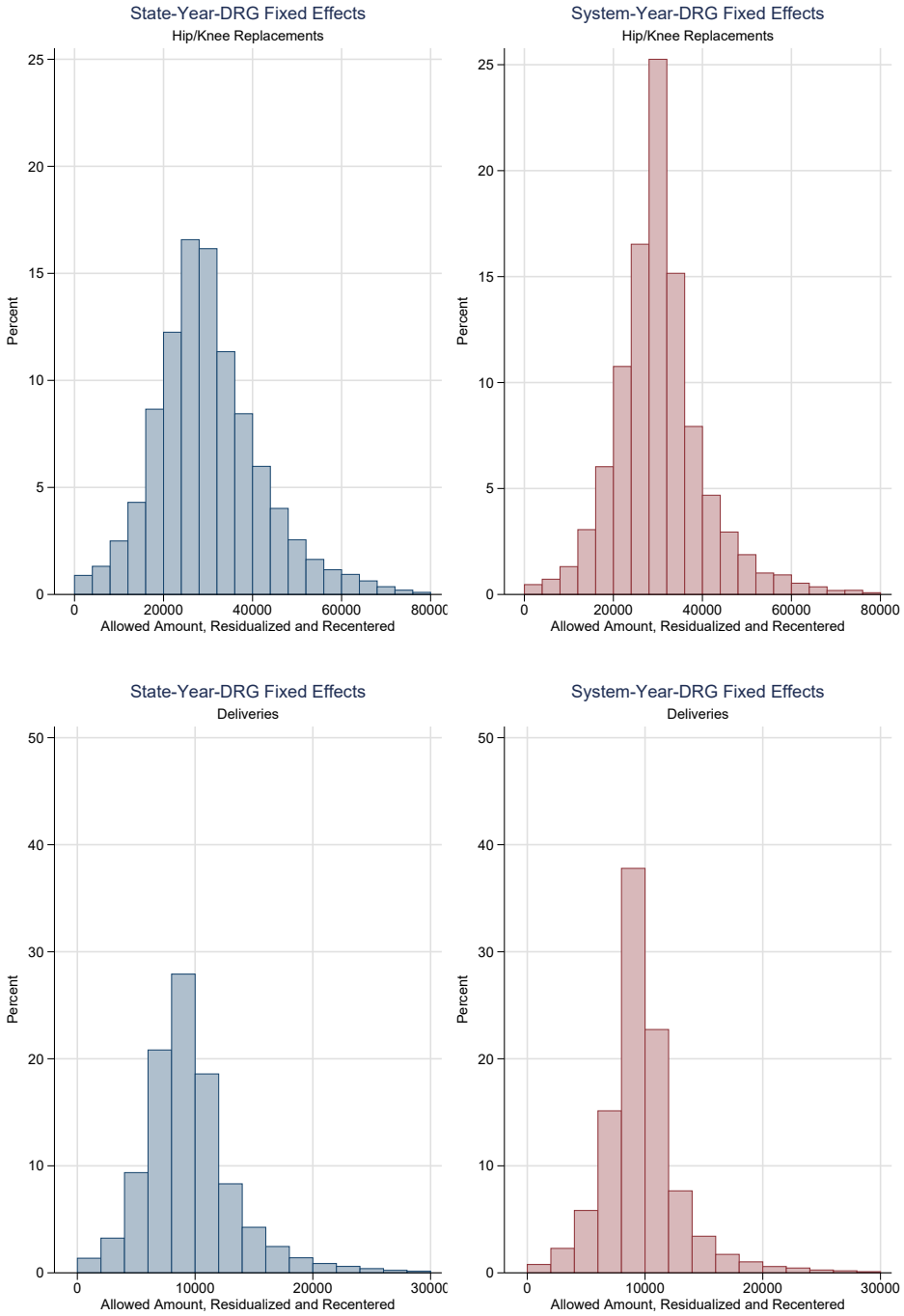


Figure OA.2: Price Dispersion Within State-Year vs. System-Year

Notes: This figure reports the distributions of allowed amounts (prices) for hip/knee replacements and deliveries. The left panels show prices residualized and recentered after regressing on state-year-DRG fixed effects; the right panels show prices residualized and recentered after regressing on system-year-DRG fixed effects. We exclude systems with fewer than three member hospitals and DRG-year-system rows with fewer than three observations.

From the perspective of the theory of mergers across markets, a critical question is whether system-member hospitals negotiate a single payment or transfer to the entire system. As we

show in the theory, the standards for harm are much higher when systems negotiate a single transfer, because unifying the transfer helps resolve contracting frictions between hospitals and insurers. In practice, hospitals and insurers contract over prices rather than flat transfers, so to examine this empirically, we ask whether hospital prices are uniform within a hospital system.

We begin by examining prices for a few high-volume, profitable procedures: hip and knee replacements, and deliveries. These procedures account for a sizable fraction of hospital profits and, accordingly, are actively negotiated. We focus on hospital systems with at least 3 members and DRG codes with at least 3 observations per system-year. Figure OA.2 shows the distribution of prices for these procedures in our data. In the left panels, we residualize prices on DRG-state-year fixed effects and recenter. Hence, the plotted distribution captures variation across hospitals within a state-year and does not account for system identifiers. If prices were uniform within a system, then residualizing prices on DRG-system-year fixed effects should collapse the distribution to a mass point, up to measurement error. The right panels show that this is not the case. In practice, prices are more homogeneous within a system than across hospitals, but they are far from uniform. Even within a system-year, prices for these procedures can vary by more than 100% across system hospitals. The center mass in the plots accounts for about 25% of the variation in hip and knee replacements and slightly less than 40% in deliveries.

Table OA.12: Partial R^2 from Hospital Fixed Effects

Outcome	Restricted RSS	Unrestricted RSS	ΔR^2
Log Negotiated Price	6029.14	2197.49	0.636
Negotiated Price	6968.48	2692.18	0.614

Notes: Restricted Residual Sum of Squares (RSS) is computed from a model with system-year fixed effects only. Unrestricted RSS is computed from a model that additionally includes hospital fixed effects. The ΔR^2 is calculated as $(RSS_R - RSS_U)/RSS_R$.

To systematically expand the analysis to the rest of the data, we examine the variation in our negotiated price index explained by the system. Recall that the negotiated price controls for heterogeneity in conditions and population across hospitals, so it is more likely to reflect the true contracted price between the insurer and each hospital. Consider the following two regressions:

$$\ln(p_{ht}) = \delta_{s(h)t} + \epsilon_{ht} \tag{OA.1}$$

$$\ln(p_{ht}) = \delta_{s(h)t} + \gamma_h + \tilde{\epsilon}_{ht} \tag{OA.2}$$

The first regression projects prices on system-year fixed effects, while the second also includes a hospital fixed effect. Under the hypothesis that prices are uniform within a system, the ability of the second regression to fit the price data should be comparable to that of the first. In particular, we can define RSS_R as the residual sum of squares of Equation (OA.1) and RSS_U as

the residual sum of squares of Equation (OA.2). We can then evaluate

$$\Delta R_s^2 = \frac{RSS_R - RSS_U}{RSS_R} \tag{OA.3}$$

Under the hypothesis of uniform system-year pricing, $\Delta R_s^2 \approx 0$. If hospital fixed effects explain nearly all of the residual dispersion left after system-year fixed effects, then $\Delta R_s^2 \approx 1$. Table OA.12 shows the results for negotiated prices measured in logs and levels. In both cases, $\Delta R_s^2 > 0.6$, which strongly suggests that prices are not uniform within a system. We note that in both of our explorations, we use the system identifiers as developed by Brot et al. (2024), which have been thoroughly validated in the prior literature.

OA.5.2 Distant Patient Demand

Table OA.13: Distribution of Allowed Inpatient Spending by Patient-Provider Distance

Statistic	Distance ≤ 66 miles	Distance > 66 miles
Mean	17,148	27,430
Standard deviation	31,169	47,587
Minimum	4.43	6.64
25th percentile	3,879	5,337
Median	8,522	12,821
75th percentile	17,882	29,480
Maximum	1,636,098	1,606,933
Observations	8,586,826	213,540

Notes: This table reports the distribution of allowed inpatient spending, separately for patients traveling no more than 66 miles and patients traveling more than 66 miles, where 66 miles is the fourth-quartile threshold for distance between merging hospitals.

Table OA.14: Effect on Total Revenue by Distance Quartiles

	Total Revenue							
	Baseline				With Overlap			
	Revenue Q1	Revenue Q2	Revenue Q3	Revenue Q4	Revenue Q1	Revenue Q2	Revenue Q3	Revenue Q4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treated	-23.617***	-6.076***	-2.220	0.523	-20.502***	-6.124***	-3.956**	-2.201
	(4.752)	(1.925)	(1.572)	(1.622)	(4.973)	(2.000)	(1.676)	(1.666)
Post × Treated × Overlap					-1235.812*	18.568	560.480**	719.275**
					(700.051)	(349.009)	(225.752)	(326.267)
Mean outcome	208.418	70.273	31.624	13.696	219.458	73.089	31.728	12.401
Mean overlap	–	–	–	–	0.002	0.003	0.003	0.003
SD overlap	–	–	–	–	0.004	0.004	0.005	0.005
Observations	341,988	251,824	172,395	98,030	340,999	251,097	171,920	97,783
R^2	0.974	0.966	0.948	0.892	0.974	0.966	0.948	0.892

Notes: Standard errors, reported in parentheses, are clustered by hospital. Revenue is computed using allowed amounts and is measured in tens of thousands of dollars. Columns Q1–Q4 restrict the sample to mergers with target-to-acquirer distances at or above the respective quartile lower bounds (0.933, 18, 34, and 66 miles) and measure revenue from patients traveling at least the corresponding distance. All regressions include hospital-event and year-event fixed effects and use analytic event-stack weights following Wing et al. (2024). Mean outcomes in the baseline columns are measured at $t = -1$, while those in the overlap columns are measured at $t = +1$; this timing convention is intentional and explains why the Q4 overlap-column mean of 12.401 differs from the $t = -1$ mean of 13.696 reported in Table 9 in the article. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table OA.15: Effect on Total Admissions by Distance Quartiles

	Total Admissions							
	Baseline				With Overlap			
	Admissions Q1	Admissions Q2	Admissions Q3	Admissions Q4	Admissions Q1	Admissions Q2	Admissions Q3	Admissions Q4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treated	-22.013***	-1.738	-1.847***	-0.943*	-25.899***	-2.992**	-3.524***	-2.344***
	(5.018)	(1.178)	(0.678)	(0.566)	(5.645)	(1.218)	(0.781)	(0.671)
Post × Treated × Overlap					1541.051***	481.527**	541.414***	369.840***
					(554.493)	(194.687)	(100.288)	(104.028)
Mean outcome	128.516	33.698	12.933	4.944	127.362	33.270	12.590	4.269
Mean overlap	–	–	–	–	0.002	0.003	0.003	0.003
SD overlap	–	–	–	–	0.004	0.004	0.005	0.005
Observations	341,988	251,824	172,395	98,030	340,999	251,097	171,920	97,783
R^2	0.933	0.954	0.945	0.893	0.929	0.953	0.945	0.892

Notes: Standard errors, reported in parentheses, are clustered by hospital. Columns Q1–Q4 use the same target-to-acquirer merger-distance lower bounds as the corresponding revenue columns and measure admissions by patients traveling at least the corresponding distance. All regressions include hospital-event and year-event fixed effects and use analytic event-stack weights following Wing et al. (2024). Mean outcomes in the baseline columns are measured at $t = -1$, while those in the overlap columns are measured at $t = +1$; this timing convention is intentional and explains why the Q4 overlap-column mean of 4.269 differs from the $t = -1$ mean of 4.944 reported in Table 9 in the article. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

OA.5.3 Acquirer Dominance and Network Breadth

Table OA.16: Cross-Geography Merger Effects on Prices — Acquirer Dominance Heterogeneity

	Log Negotiated Price							
	Monopoly Market		Max HHI		Weighted Mean HHI		Weighted Mean HHI (Adj.)	
	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treated	0.017	-0.026	-0.088**	-0.169***	0.058***	0.010	0.009	0.009
	(0.026)	(0.031)	(0.045)	(0.053)	(0.019)	(0.021)	(0.013)	(0.014)
↪ ×H	0.032	0.054*	0.139***	0.199***	-0.037	0.035	2.937***	1.975***
	(0.027)	(0.032)	(0.046)	(0.054)	(0.039)	(0.043)	(0.591)	(0.727)
↪ × Overlap		33.177***		241.273***		26.020***		0.514
		(10.497)		(74.285)		(5.766)		(5.308)
↪ × Overlap ×H		-25.567**		-233.587***		-64.427***		169.143
		(10.598)		(74.363)		(21.936)		(169.918)
Mean dep. var.	-0.592	-0.592	-0.592	-0.592	-0.592	-0.592	-0.592	-0.592
Mean H pre-merger	0.799	0.799	0.918	0.918	0.335	0.335	0.012	0.012
SD H pre-merger	0.401	0.401	0.208	0.208	0.229	0.229	0.016	0.016
Observations	310,668	310,365	310,668	310,365	310,668	310,365	310,668	310,365
R^2	0.791	0.791	0.791	0.791	0.791	0.791	0.791	0.791

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Heterogeneity variables vary by column as indicated. Baseline columns include interactions between Post × Treated and the listed heterogeneity variable. Overlap columns additionally include interactions with cross-geography overlap and the triple interaction between Post × Treated, Overlap, and the heterogeneity variable. Monopoly Market indicates whether the acquiring system has at least one monopolistic market. Max HHI is the maximum HHI for the acquiring system. Weighted Mean HHI averages the HHI for the acquiring system, weighted by the total number of employees in the insurer's network located in the acquiring hospital HSAs. Weighted Mean HHI (Adj.) uses a similar weighted average but applies it across the entire employee population. The mean dependent variable is measured in the year before the merger. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.17: Effects on Log Negotiated Price — Narrow Network and Adjusted HHI (HRR-Level)

	Log Negotiated Price							
	Not Narrow Network				Narrow Network			
	Below Median HHI		Above Median HHI		Below Median HHI		Above Median HHI	
	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap	Baseline	Overlap
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Treated	0.033	-0.015	0.060***	0.033	0.006	0.000	0.067***	0.036*
	(0.025)	(0.029)	(0.019)	(0.023)	(0.018)	(0.020)	(0.016)	(0.019)
↪ × Overlap		324.344***		5.195*		17.561		9.395***
		(95.056)		(2.776)		(20.316)		(2.694)
Mean dep. var.	-0.549	-0.549	-0.564	-0.564	-0.504	-0.504	-0.656	-0.656
Mean overlap		0.000150		0.004835		0.000261		0.003399
Observations	30,585	30,486	52,459	52,459	87,503	87,299	140,121	140,121
Events	68	68	90	90	255	255	242	242
R^2	0.803	0.803	0.790	0.790	0.782	0.781	0.792	0.793

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Columns split the sample by narrow network status and whether the acquiring system's adjusted HHI is above its median value. A target is in a narrow network when its HRR-year comparison group contains a comparable out-of-network hospital, where comparability uses hospital type and the side of the year-by-hospital-type bed median; adjusted HHI is the acquiring system's employee-weighted HHI numerator divided by the insurer's entire employee population. Overlap columns additionally include the interaction between Post × Treated and overlap. The mean dependent variable is measured in the year before the merger. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

OA.5.4 For-Profit Targets

Table OA.18: Merger Effects on Log Negotiated Prices: Full Sample and For-Profit Targets

	Log Negotiated Prices			
	Full Sample		For-Profit Targets	
	Baseline (1)	With Overlap (2)	Baseline (3)	With Overlap (4)
Post × Treated	0.044***	0.023*	0.071***	0.023
	(0.012)	(0.013)	(0.020)	(0.027)
Post × Treated × Overlap		8.656***		7.616***
		(2.021)		(2.613)
Mean dep. var.	-0.592	-0.592	-0.691	-0.691
Observations	370,810	369,793	137,059	136,669
R^2	0.798	0.790	0.804	0.792

Notes: This table reports the effects of hospital mergers and employer overlap on negotiated prices. Columns (1) and (2) report estimates using the full sample of acquired hospitals and their corresponding control hospitals. Columns (3) and (4) restrict treated target hospitals to those classified as for-profit in the year before acquisition while retaining the original control hospitals in the corresponding merger-event stacks. Columns (1) and (3) report the baseline difference-in-differences specification. Columns (2) and (4) additionally interact Post × Treated with employer overlap. Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. The mean dependent variable is measured in the year before the merger event. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

OA.6 Alternative Price Measures

OA.6.1 HCRIS-Based Price Indices

This section describes how we construct the HCRIS-based comparison prices and assess the correlation between these indices and our private prices. We conclude with a comparison of this article's key analysis, in which we replace our observed private prices with proxy metrics.

Construction We construct two common variants of the proxy price, one following Lewis and Pflum (2017) and the other following Dafny et al. (2019). The Lewis and Pflum (2017) measure is defined as

$$P_{ht}^{LP} = \frac{\widetilde{R}_{ht}^{IP}\left(1 - \frac{CA_{ht}}{\widetilde{R}_{ht}^{IP} + \widetilde{R}_{ht}^{OP}}\right) - MS_{ht}}{Q_{ht}^{LP}}. \tag{OA.4}$$

Here, h indexes hospitals and t indexes years; $\widetilde{R}^{IP}$ denotes inpatient revenue net of ambulatory surgery center and hospice components; $\widetilde{R}^{OP}$ denotes the analogous outpatient revenue; and Q^{LP} denotes non-Traditional Medicare discharges. CA denotes contractual adjustments, and MS denotes Medicare settlement payments.

The second measure follows Dafny et al. (2019). For hospital h in year t, this measure can be written as

$$P_{ht}^{DHL} = \frac{\left(R_{ht}^{GEN} + R_{ht}^{INT} + R_{ht}^{ANC}\right)\left(1 - \frac{CA_{ht}}{TPR_{ht}}\right) - (MP_{ht} + MPA_{ht})}{D_{ht} - D_{ht}^{M}}. \tag{OA.5}$$

Here, R^{GEN}, R^{INT}, and R^{ANC} denote general, intensive, and ancillary inpatient revenue, respectively. TPR denotes total patient revenue, MP denotes Medicare payments received, MPA denotes Medicare amounts payable, and D^M denotes Medicare discharges.

For both measures, when revenue, payment, or discharge components enter an additive expression, missing components are treated as zero. In addition, discharge denominators are set to missing whenever they equal zero, so the corresponding hospital-year price measure is not defined.

Correlation with Private Prices Table OA.19 reports the results of regressing our private prices on the HCRIS index prices. The overall correlation between private and HCRIS-based index prices is computed as the square root of the within-R^2 estimate (adjusted for fixed effects) and signed according to the main coefficient. The reported overall correlation in the introduction corresponds to the first column, while the reported time-series correlation corresponds to the second column. Mechanically, we obtain the same number when looking at the simple correlation between private and index prices, before and after demeaning within a hospital. The estimates indicate that these index prices are limited in their ability to capture time-series variation in our private prices.

Table OA.19: Correlation Between Commercial Prices and HCRIS Price Indices (in logs)

	Log Negotiated Price							
	Dafny et al. (2019) Index				Lewis and Pflum (2017) Index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log price index	0.208***	0.173***	0.200***	0.170***	0.069***	-0.006	0.074***	0.043***
	(0.008)	(0.019)	(0.008)	(0.007)	(0.009)	(0.008)	(0.008)	(0.009)
Hospital FE		✓				✓		
Year FE			✓				✓	
State-Year FE				✓				✓
N	22,025	21,881	22,025	22,015	34,400	34,111	34,400	34,399
R-squared	0.172	0.766	0.219	0.405	0.008	0.721	0.043	0.151
Within R-squared	0.172	0.013	0.168	0.145	0.008	0.000	0.010	0.003
Correlation	0.415	0.115	0.410	0.381	0.090	-0.005	0.098	0.057

Notes: The dependent variable is our log negotiated price. Standard errors are clustered at the hospital level. Correlation reports the fixed-effect-adjusted correlation implied by the corresponding specification. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Merger effects We use the price index of Dafny et al. (2019) (DHL) and apply their empirical strategy to our sample to further illustrate the impact of using proxy prices. The first three columns of Table OA.20 show the results from DHL, copied verbatim for comparison. The last three columns show the estimates for our data, applying the same market definitions,

sample restrictions, and regression strategy as in the original article. In the language of DHL, the cross-market merger effect equivalent to our main estimates corresponds to "Adj Treated $*(t > 0)$", which is the price change on non-local, within-state hospitals. We stress that this is not a replication, as our samples have only two years in common. In fact, it is quite likely that as private and public insurance healthcare prices have diverged, the ability of HCRIS-based prices to detect meaningful changes in private prices has deteriorated.

Table OA.20: Comparison with Dafny, Ho, and Lee (2019) Main Pre-Post Regression Results

	1996–2012 mergers (Dafny, Ho, and Lee (2019))			2011–2019 mergers (New)		
	(1) Control Group 1	(2) Control Group 2	(3) Control Group 2 No Targets	(4) Control Group 1	(5) Control Group 2	(6) Control Group 2 No Targets
Adj Treated*($t = 0$)	0.032	0.035	0.040	-0.005	-0.031	-0.030
	(0.030)	(0.029)	(0.030)	(0.009)	(0.019)	(0.021)
Adj Treated*($t > 0$)	0.102**	0.093**	0.101**	0.011	-0.007	-0.004
	(0.046)	(0.046)	(0.047)	(0.010)	(0.017)	(0.017)
Non-Adj Treated*($t = 0$)	-0.017	-0.019	-0.019	-0.014	-0.042	-0.045
	(0.025)	(0.027)	(0.027)	(0.015)	(0.029)	(0.029)
Non-Adj Treated*($t > 0$)	-0.031	-0.032	-0.028	0.026	0.051*	0.053**
	(0.030)	(0.034)	(0.034)	(0.016)	(0.028)	(0.027)
ln(Case Mix Index)	0.258***	0.213	0.213	0.118*	0.122	0.133
	(0.056)	(0.160)	(0.161)	(0.061)	(0.085)	(0.085)
ln(Beds)	0.092***	0.117*	0.115*	0.231***	0.191***	0.192***
	(0.018)	(0.067)	(0.067)	(0.027)	(0.037)	(0.037)
For-Profit	0.040**	0.072	0.069	-0.000	0.021	0.006
	(0.019)	(0.049)	(0.049)	(0.042)	(0.059)	(0.067)
% Medicaid	0.103**	0.164	0.166	0.011***	0.011***	0.011***
	(0.051)	(0.149)	(0.150)	(0.002)	(0.002)	(0.002)
Observations	40,994	4,422	4,392	13,855	6,455	6,396
Number of Hospitals	4,174	711	705	1,979	894	892
Within R^2	0.462	0.435	0.436	0.268	0.229	0.233

Notes: Columns (1)–(3) reproduce the published Dafny, Ho, and Lee (2019) estimates; columns (4)–(6) apply the same specifications to our sample. Treatment is defined as being part of a system involved in a cross-market merger in a given year. Directly affected hospitals (hospitals involved in the merger or located within a 30-minute drive of a target or acquirer) are excluded. Adjacent treatment is for hospitals in the same state as the target, while non-adjacent treatment is for hospitals in a different state from the target. As in Dafny, Ho, and Lee (2019), we control for case mix index, bed size, for-profit status, and percent Medicaid patients. We include hospital and year fixed effects, and cluster standard errors at the hospital level. Control Group 1 imposes no additional restrictions on the control group. Control Group 2 excludes hospitals within a 30-minute drive of any treated hospital in the 3 years following and including the merger year. Control Group 2, No Targets further excludes hospitals that were targets in any merger. We express prices in constant year-2000 dollars and trim the price index using the same criteria as Dafny, Ho, and Lee (2019). * p<0.10, ** p<0.05, *** p<0.01.

OA.6.2 Unit-Adjusted Inpatient and Outpatient Prices

Table OA.21: Merger Effects on Inpatient and Outpatient Prices

	Log Prices					
	Baseline			With Overlap		
	Inpatient (Unit-Adjusted) (1)	Outpatient (APC) (2)	Outpatient (RVU) (3)	Inpatient (Unit-Adjusted) (4)	Outpatient (APC) (5)	Outpatient (RVU) (6)
Post × Treated	0.039***	0.060***	0.082***	0.023*	0.050***	0.070***
	(0.011)	(0.008)	(0.008)	(0.013)	(0.008)	(0.009)
Post × Treated × Overlap				6.740***	4.605***	5.356***
				(1.901)	(1.584)	(1.733)
Mean dep. var.	8.420	5.438	4.825	8.420	5.438	4.825
Mean overlap	–	–	–	0.002	0.002	0.002
SD overlap	–	–	–	0.004	0.004	0.004
Observations	370,810	364,713	365,164	369,793	363,863	364,309
R^2	0.808	0.908	0.909	0.801	0.905	0.907

Notes: This table reports the merger effects on a unit-adjusted inpatient price index and two outpatient price indices for acquired hospitals. Columns (2) and (5) report results using outpatient prices calculated by collapsing outpatient services at the CMS Ambulatory Payment Classification (APC) level. Columns (3) and (6) report results using outpatient prices standardized using Medicare relative value units (RVUs). Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. The mean dependent variable is measured in the year before the merger event. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

OA.7 Network Adequacy

This section describes our construction of network adequacy and our key findings based on this alternative overlap metric. The evidence in this section complements that in the main text and serves as an alternative standard for measuring exposure and potential harm.

The network adequacy standard was introduced to Medicare Advantage (MA) markets in 2011 as a guideline for evaluating whether an insurer's network is sufficiently broad to meet patients' basic demand (Centers for Medicare & Medicaid Services, 2011). The MA network adequacy standard stipulates maximum distances and travel times between enrollees' residences and certain types of providers, with these distances and times varying by the rurality of the enrollee's locality. While, to our knowledge, no legal requirements tie employer-sponsored insurance to these adequacy standards, anecdotal evidence suggests that employers and insurers consult these guidelines when evaluating coverage. One reason for this use is that MA insurance is similar in structure and composition to employer-sponsored insurance, making the MA adequacy standard the closest regulatory standard for network adequacy in the US.

Given that our sample does not include all provider types specified in the MA network adequacy rules, we construct adequacy as follows. An employee is considered to have adequate coverage if they are within a maximum distance of an in-network acute inpatient hospital and an in-network critical care hospital. We compute the distance between patients and hospitals using their ZIP codes. We follow the maximum distance requirements laid out by CMS using the HSD Criteria Reference Tables from 2011.[1] A firm is considered to meet adequacy requirements if more than 90% of all employees living in Metro counties have adequate coverage, and if more than 85% of all employees living in other counties have adequate coverage. Table OA.22 reports summary statistics for network adequacy in our sample.

Table OA.22: Employer Network Adequacy Summary Statistics

Statistic	Full sample	≥ 50 employees	≥ 100 employees
Average network adequacy	97.0%	96.8%	96.7%
Share of employers with full adequacy	69.5%	46.5%	32.5%
Share of employers with adequacy < 95%	14.5%	17.2%	17.2%
Share of employers with adequacy < 90%	8.1%	7.4%	6.9%
Share of employers with adequacy < 85%	5.3%	4.3%	3.8%

Notes: Network adequacy is defined as the share of an employer's employees for whom adequacy requirements are met, given the providers included in the network. The average network adequacy row shows the average adequacy among employers. The share of employers with full adequacy measures the fraction of employer-years for which the insurance network is adequate for all employees. The remaining rows measure the share of employer-years for which the network is adequate for less than x% of their employee population, where x ranges from 85 to 95.

Using network adequacy, we compute how removing a merged system from the data provider's network would affect the network's adequacy for each employer. We measure the *adequacy*

[1] https://web.archive.org/web/20120504005941/http://www.cms.gov/Medicare/Medicare-Advantage/MedicareAdvantageApps/index.html

leverage of a merger as the share of overall covered employees in the year prior to the merger for whom removing the merged system would turn the data provider's network from adequate to inadequate for their employer. The first column of Table OA.23 presents estimates obtained by replacing employer overlap in Equation (7) in the article with adequacy leverage. The table shows that adequacy leverage, like employer overlap, is positively and significantly associated with post-merger price changes in the specification without heterogeneity controls (column (0)). The effect of leverage also decreases with target hospital bed size, acquirer size, the number of non-governmental hospitals, and in rural areas. As for employer overlap, the effect is larger when public hospitals make up a larger share of the target's market competition. The two metrics, however, differ in their connection with income and with the five largest systems in our sample.

In addition to this metric, we compute a Δ adequacy leverage, defined as the difference between the merged system's leverage and the sum of each party's leverage. Theoretically, this is the extent to which the joint system has more leverage on adequacy than the sum of its parts, which should govern its price effects. Table OA.24 shows the estimated effect of this Δ adequacy leverage on cross-geography price effects. Since the adequacy leverage of the merged system can be smaller or larger than the sum of its parts, we also present estimates broken out by sign. The results are mixed: when Δ adequacy leverage is not weighted by the employee population, mergers that decrease leverage see larger price increases; in contrast, when weighted, mergers that increase leverage are associated with price increases. Thus, the evidence supports some role for network adequacy in determining prices, but leverage losses are not associated with price reductions, suggesting that adequacy alone does not govern negotiations. Weighted adequacy leverage nonetheless performs very similarly to our employer overlap in explaining merger price increases, offering an alternative measurement approach for practitioners.

Table OA.23: Cross-Geography Merger Effects on Prices Using Adequacy Leverage

	Base	Heterogeneity (H)								
		Beds (100s)	Acquirer Size	Largest System	HHI	Non-Gov. Hospitals	Share Gov. Hospitals	Rural	Critical Access	Low Income
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post × Treated	0.006	-0.065***	-0.021	0.007	0.069**	-0.017	0.019	0.015	0.031**	0.031*
	(0.013)	(0.018)	(0.016)	(0.014)	(0.033)	(0.016)	(0.015)	(0.015)	(0.013)	(0.016)
↪ × H		0.052***	0.000	-0.036	-0.077*	0.012***	-0.076**	-0.022	-0.135***	-0.059**
		(0.008)	(0.000)	(0.043)	(0.040)	(0.004)	(0.030)	(0.025)	(0.035)	(0.025)
↪ × Leverage	12.403***	18.929***	28.827***	13.293***	0.954	16.186***	8.227***	13.828***	9.869***	7.451**
	(2.885)	(4.336)	(6.472)	(3.466)	(5.924)	(3.589)	(3.120)	(3.011)	(2.945)	(3.444)
↪ × Leverage × H		-5.004***	-0.163***	1.998	14.290*	-1.688***	41.725***	-6.867	10.518	11.371**
		(1.534)	(0.059)	(6.998)	(7.930)	(0.551)	(11.254)	(6.065)	(8.940)	(5.190)
Mean dep. var.	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570
Mean *H* pre-merger	-	1.337	37.811	0.004	0.711	4.944	0.344	0.435	0.298	0.398
Observations	245,446	244,505	245,172	244,505	245,446	245,379	245,379	245,418	245,446	245,283
R^2	0.792	0.792	0.789	0.792	0.792	0.792	0.792	0.792	0.792	0.792

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Heterogeneity variables vary by column as indicated. Leverage is the employee-weighted change in employers' adequacy status, as a share of the insurer's total covered population. The mean of Leverage is 0.003 with a standard deviation of 0.003. "Beds" is measured in hundreds. "Acquirer Size" is the number of hospitals in the relevant system. "Largest Systems" is an indicator for the five largest systems. HHI is defined as the sum of squared admission shares within an HSA. "Non-Gov. Hospitals" counts the number of non-government hospitals at the HSA level, while "Share Gov. Hospitals" measures the share of government hospitals within an HSA. Rural and Critical Access are hospital-level indicators of whether a hospital is in a rural area or is designated as a critical access hospital. "Low Income" is a county-level indicator for whether the hospital's county has a lower median household income than the sample median. The mean dependent variable is measured in the year before the merger. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table OA.24: Effect of Δ Adequacy Leverage on Log Negotiated Price

	Log Negotiated Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treated	0.039***	-0.006	0.028**	-0.005	0.026**	-0.006
	(0.012)	(0.019)	(0.012)	(0.018)	(0.013)	(0.018)
↪ × Δ	0.007					
	(0.045)					
↪ × Negative Δ		0.059***				
		(0.020)				
↪ × Positive Δ		0.048				
		(0.034)				
↪ × Weighted Δ			44.216**		37.775*	
			(18.881)		(20.610)	
↪ × Negative Weighted Δ				0.036		0.036
				(0.031)		(0.031)
↪ × Positive Weighted Δ				0.062***		0.056***
				(0.020)		(0.020)
↪ × Overlap					1.668	1.928
					(2.757)	(2.635)
Mean dep. var.	-0.570	-0.570	-0.570	-0.570	-0.570	-0.570
Observations	245,446	245,446	245,446	245,446	245,446	245,446
R^2	0.792	0.792	0.792	0.792	0.792	0.792

Notes: Standard errors in parentheses, clustered by hospital. Regressions use analytic event-stack weights following Wing et al. (2024). All regressions include hospital-event and year-event fixed effects. Δ refers to the difference between the adequacy leverage of the merged system and the sum of the separately calculated adequacy leverages of the acquirer and target. "Weighted Δ" is the employee-population-weighted transformation of that measure, shown in columns (3)–(6). The mean dependent variable is measured in the year before the merger. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

References

Brot, Z., Cooper, Z., Craig, S. V., and Klarnet, L. (2024). Is there too little antitrust enforcement in the us hospital sector? *American Economic Review: Insights*, 6(4):526–42.

Centers for Medicare & Medicaid Services (2011). 2011 CMS Medicare Advantage Network Adequacy Criteria Development Overview. https://www.cms.gov/Medicare/Medicare-Advantage/MedicareAdvantageApps/downloads/2011_ma_network_adequacy_criteria_overview.pdf. Accessed June 8, 2026.

Cooper, Z., Craig, S. V., Gaynor, M., and Van Reenen, J. (2019). The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured*. *The Quarterly Journal of Economics*, 134(1):51–107.

Dafny, L., Ho, K., and Lee, R. S. (2019). The price effects of cross-market mergers: theory and evidence from the hospital industry. *RAND Journal of Economics*, 50(2):286–325.

Lewis, M. S. and Pflum, K. E. (2017). Hospital systems and bargaining power: evidence from out-of-market acquisitions. *The RAND Journal of Economics*, 48(3):579–610.

Wing, C., Freedman, S. M., and Hollingsworth, A. (2024). Stacked difference-in-differences. Working Paper 32054, National Bureau of Economic Research.