Online Appendix for In the Shadow of Antitrust Enforcement: Price Effects of Hospital Mergers from 2009-2016

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A Willingness-to-Pay

In this appendix, we describe the Willingness to Pay (WTP) per patient calculation for hospitals using the framework of Capps et al. (2003).[1]

Using the choice probabilities described in Section 3 and Appendix Section C, we can compute the WTP per patient for each hospital or hospital system. For a hospital system denoted h, this is given by the formula

$$\overline{WTP_h} = -\sum_i \log(1 - \sum_{j \in J_h} s_{ij}) / \sum_i \sum_{j \in J_h} s_{ij},$$

where i denotes a patient; J_h denotes the set of all hospitals j in system h; and s_{ij} is the estimated choice probability for hospital j by patient i given by the demand model.

B Data Description and Case Mix Adjustment

In this appendix, we provide a description of our data. We begin with 8,202,908 inpatient admission events generated from the HCCI inpatient claims database covering 2008-2016. These inpatient events exclude psychiatric and behavioral inpatient events (i.e., events with MDC 19 or 20). These

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[1]See Capps et al. (2003) and Balan and Brand (2022) for a discussion of the relevance of WTP in the context of bilateral bargaining between hospitals and insurers.

data contain basic patient characteristics such as age category, gender, the MS-DRG associated withe the inpatient event, the admission date, the length of stay, and an encrypted identifier of the hospital that treated the patient. We merge these data with the MS-DRG weight provided by the CMS based on the DRG and admission date of the inpatient event. We drop 9,794 events for which the MS-DRG weight is missing. We drop an additional 1,518 events for the the observed patient gender is inconsistent with the observed MS-DRG.[2] This leaves a sample of 8,190,828 inpatient events.

Following Cooper et al. (2019), we drop inpatient events if the patient was less than 18 years of age. We also drop inpatient events for all Critical Access Hospitals and if the observed hospital treated no Medicare patients.[3] To control for outlier events, we drop events for which the observed payment to the hospital was greater than the 99^{th} percentile or less than the first percentile conditional on the MS-DRG. We also drop events for which the observed length-of-stay is greater than the 99^{th} percentile again conditional on the MS-DRG. After dropping these events, there are 459 events for which the observed payment is zero. We drop these events. Finally, we drop each hospital-year combination for which there are fewer than 50 events. This leaves 7,196,728 inpatient events and 2,624 unique hospitals.

We also exclude specialty hospitals. Broadly speaking, we define a specialty hospital as a hospital for which a small number of service lines account for a large share of its patients. We use the Major Diagnostic Category (MDC) code associated with the MS-DRG as our definition of a service line. To identify specialty hospitals, we construct a concentration index based on within-hospital shares of the MDC codes for the patients treated by the hospital. This concentration index is similar to an HHI in that we sum the squared shares of events accounted for by specific MDC code values. We define a specialty hospital as a hospital for which this concentration index exceeds 0.9. After dropping hospitals that meet this criterion, we have a final sample of 7,157,244 inpatient events and 2,596 unique hospitals.

In Table OA1, we give the number of inpatient events and the number of unique hospitals by fiscal year. Of the 2,596 unique hospitals in our data, 1,555 appear in each of the nine years. 1,650 unique hospitals appear in at least five years. This is the set of hospitals that we use in our baseline analyses in Section 5.

[2]For example, we drop an inpatient event if the observed MS-DRG corresponds to MDC 12 (diseases of the male reproductive system) and the observed patient gender is female.

[3]We determine if the hospital treated no Medicare patients using AHA data.

Table OA1: Summary Statistics

Fiscal Year	Inpatient Events	Unique Hospitals
2008	608,835	1,908
2009	827,286	2,111
2010	904,956	2,191
2011	904,527	2,164
2012	876,984	2,131
2013	849,681	2,088
2014	755,117	2,069
2015	713,714	1,974
2016	716,144	1,956

Source: HCCI inpatient claims data

We now turn to our casemix adjustment procedure. Broadly speaking, we apply a linear regression model using the natural log of the payment to the hospital for each inpatient event as the dependent variable and explanatory variables that include fixed effects for hospitals and patient characteristics. The primary patient characteristic that captures variation in casemix across hospitals is the MS-DRG, though we include patient gender and age category as well. We estimate this linear regression model separately for each fiscal year. The output of this analysis is an estimate of a price for each hospital under the hypothetical scenario that each hospital treated exactly the same set of patients within fiscal years.

Let i index inpatient events, j denote the hospital associated with inpatient event i, and R_{ij} denote the raw payment to hospital j for inpatient event i as generated from the HCCI inpatient claims data. Let I_t denote the set of inpatient events in year t. The linear regression model we estimate is

$$\ln(R_{ij}) = drg_i + age\_cat_i + gender_i + \alpha_j + \epsilon_{ij}, \forall i \in I_t, \tag{OA1}$$

where drg_i denotes a fixed effect for the MS-DRG associated with inpatient event i, age_cat_i denotes a fixed effect for the age category of the patient, $gender_i$ denotes a fixed effect for the gender of the patient, α_j denotes a hospital fixed effect, and ϵ_{ij} is the residual.

Using the fitted model of equation (OA1), the variation in the casemix adjusted prices across hospitals is based on differences the fitted values $\exp\{\widehat{\alpha_j}\}$. We scale these fitted values by the mean value of the exponential of the fitted components of $\ln(R_{ij})$ based patients characteristics (DRG,

Table OA2: Volume-Weighted Mean Casemix Adjusted Prices

Fiscal Year	Mean Price	Growth Rate
2008	11,812	NA
2009	12,727	0.077
2010	13,685	0.075
2011	14,397	0.052
2012	15,341	0.066
2013	16,305	0.063
2014	17,112	0.049
2015	17,676	0.033
2016	18,890	0.069

Source: HCCI inpatient claims data

age category, and gender) as well as the fitted residuals, $\widehat{\epsilon_{ij}}$.[4] That is, we calculate the casemix adjusted price for each hospital k in year t, denoted $price_{kt}$, as

$$price_{kt} = \exp\{\widehat{\alpha_k}\} \frac{\sum_{i \in I_t} \exp\{\widehat{drg_i} + \widehat{age\_cat}_i + \widehat{gender}_i + \widehat{\epsilon_{ij}}\}}{\# I_t}. \tag{OA2}$$

Table OA2 gives the volume-weighted mean casemix adjusted price by fiscal year and the year-over-year growth rate in this mean price. During the period 2008-2016, the volume-weighted mean casemix adjusted price grew by an average of 6% per year. We also find considerable variation in hospitals' casemix adjusted prices even after accounting for average increases over time. After regressing out hospital and year fixed effects, we find that, on average, the standard deviation in a given hospital's residual casemix adjusted price is 8.9% of its mean casemix adjusted price.[5]

C Demand Estimation

We estimate hospital demand using the approach outlined in Raval et al. (2017). For that estimation approach, we need to select covariates, order them, and select a minimum group size. In this paper, we use gender, age (in bands), diagnosis code (MS-DRG), diagnosis category (MDC), patient zip

[4] Even though the fitted residuals are mean zero by construction, they nonetheless affect the scaling of the casemix adjusted prices because of the log transformation of the dependent variable.

[5] We calculate this as follows. First, we regress the full set of casemix adjusted prices on a set of year fixed effects and hospital effects. Second, we evaluate the fitted residuals from this regression and calculate the standard deviation of the residuals for each hospital across time. Third, we calculate the volume-weighted mean (across hospitals) of the ratio of each hospital's residual standard deviation to its mean casemix adjusted price. This volume-weighted mean is the reported 8.9%.

code (5 digit), patient zip code (3 digit) , and patient hospital referral region. We eliminate these in reverse order in our estimation strategy. We use a minimum group size of 25.

In practice, this means that we first group all patients by all 7 of these covariates. For any groups that do not have 25 people in them, we drop gender and then regroup all of the patients keeping those groups with above 25 people. After that grouping, we drop age and then regroup. We continue to do this until we have gone through all of the covariates. Within each of these groups, we estimate the choice probability for hospitals – and treat that as the estimated choice probability for all individuals within each group.

We eliminate the 16,390 patients whom we could not include in a group of 25 after doing this procedure. This leaves 8,186,133 patients in our demand estimation.

D Synthetic Control Analysis

In this appendix, we described our synthetic control analysis and present additional results. Throughout, we base our analysis on the synthetic control group method described in Abadie and Gardeazabal (2003), Abadie et al. (2010), Abadie et al. (2011), and Abadie et al. (2015). For each treated hospital, we construct a synthetic control hospital from a subset of never-treated by matching on hospital characteristics and pre-merger prices. Using the weights that define the optimal linear combination of control hospital characteristics, we construct the price vector for the synthetic control hospital.

The specifics of our analysis are as follows. We begin with 645 ever-treated hospitals and 505 never-treated hospitals for which we have a casemix adjusted price for each year in 2008-2016. For each hospital, we limit the set of possible control hospitals to those that are not in the same Hospital Referral Region as the focal hospital and to hospitals that have a bed count within a given range of the bed count of the focal hospital. For hospitals with a bed count in the [50,500] range, which account for 84% of the hospitals in our analysis, we apply a relatively narrow bed count range of 25. For smaller and larger hospitals, we apply a larger range in order to bring more hospitals into the possible control hospital set. Table OA3 contains the bed count thresholds that we apply. For example, if the focal hospital has 400 beds, we limit the set of control hospitals to those that have a bed count in (375,425). If the focal hospital has 800 beds, we limit the set of control hospitals that to those have a bed count in (600,1000). Across all treated hospitals in our analysis, the mean number of hospitals in the set of possible controls is 49.5 and the standard deviation is 13.9.

Table OA3: Bed Count Limits in Control Group Definition

Bed Count of Hospital	Bed Count Range
(0,50)	50
[50,500]	25
(500-750]	100
(750-1,000]	200
(1,000-1,500]	500
>1,500	1000

Sources: HCCI inpatient claims data and Cooper, et al. and authors' merger data

Given the set of control hospitals for each focal hospital, we solve for the optimal control by matching on the following characteristics: bed count, nursing FTEs, the number of technologies, the mean length-of-stay, the mean MS-DRG weight, and WTP per patient. We evaluate WTP per patient at the hospital level, i.e., we ignore system affiliation. Our purpose in including WTP per patient is to match based on being similarly situated in terms of the presence or absence of nearby alternative hospitals. In all of the above characteristics, we match based on their mean values across all years in our data.

We also match on two price related terms. First, we match on the price in the year prior to the merger. Second, we match on the mean price across all years prior to the year before the merger.

The search algorithm in the synthetic control analysis failed for 8 treated hospitals. This leaves us with a sample of 637 treated hospitals and 505 never-treated control hospitals.

Table OA4 gives the mean weight from the synthetic control analysis for each of characteristics on which we match treated hospitals to control hospitals. These mean weights give some information on the relative importance of these characteristics in constructing the optimal synthetic control. The table indicates that the price during the year prior to the merger is by far the most important characteristic, with a mean weight of about 50%. The mean price across all years prior to the year before the merger is the second most important characteristic with a mean weight of 26%. Each of the non-price characteristics has a mean weight in the 3%-4% range.

Table OA4: Mean Synthetic Control Weight by Hospital Characteristic

Characteristic	Mean Synthetic Control Weight
ln(Price), T-1	0.505
ln(Price), T-2 and before	0.262
Beds	0.036
FTEs	0.040
Number of Technologies	0.037
Mean LOS	0.041
Mean MS-DRG Weight	0.038
WTP per patient	0.041

Sources: HCCI inpatient claims data, FTC PNO data, Cooper, et al. and authors' hospital merger data

E Supplemental Figures

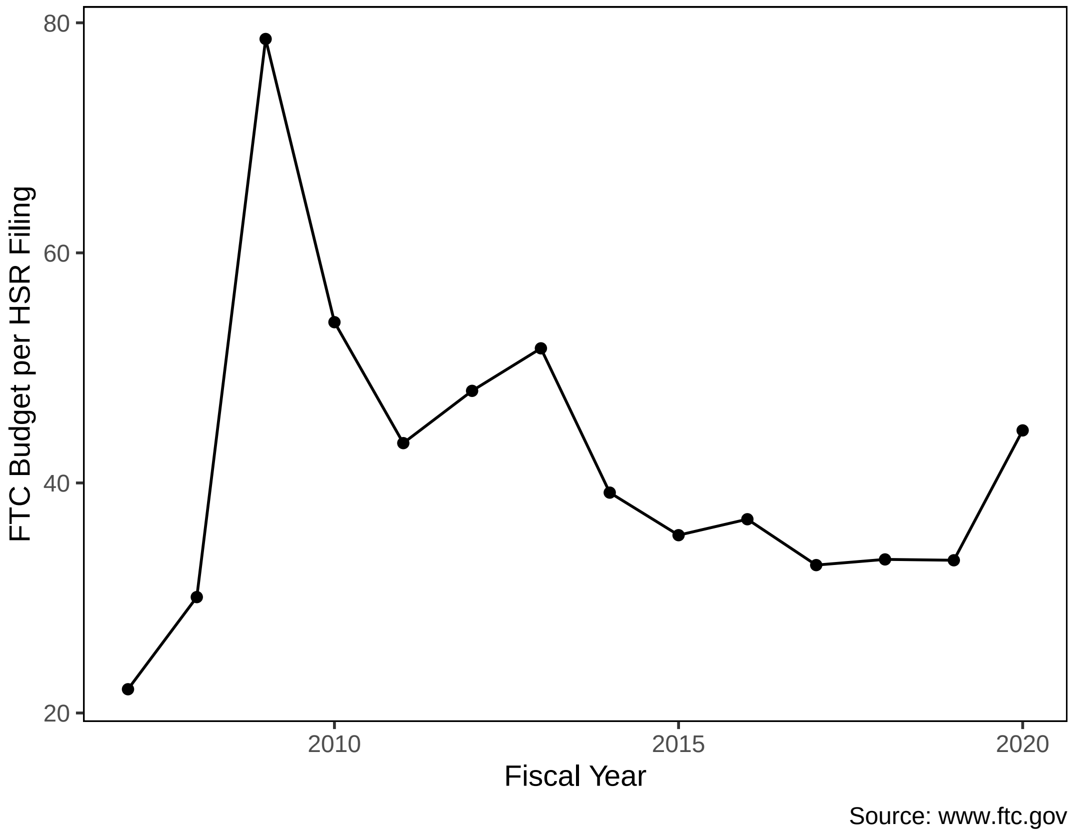

Figure OA1: FTC Maintain Competition Budget per HSR Filing, 2007-2020
(in thousands of dollars)

Table OA5: Comparison of Hospitals Included and Excluded from Regression Analysis

	All			In Analysis		
	N	mean	sd	N	mean	sd
Beds	7666	184.11	176.88	2960	258.00	199.27
WTP Per Patient	7017	1.14	0.14	2948	1.18	0.14
For Profit (Binary)	7666	0.40	0.49	2960	0.41	0.49
Not for Profit (Binary)	7666	0.55	0.50	2960	0.57	0.50
Teaching Hospital (Binary)	7666	0.26	0.44	2960	0.41	0.49

Sources: HCCI inpatient claims data, FTC PNO data, Cooper, et al. and authors' hospital merger data

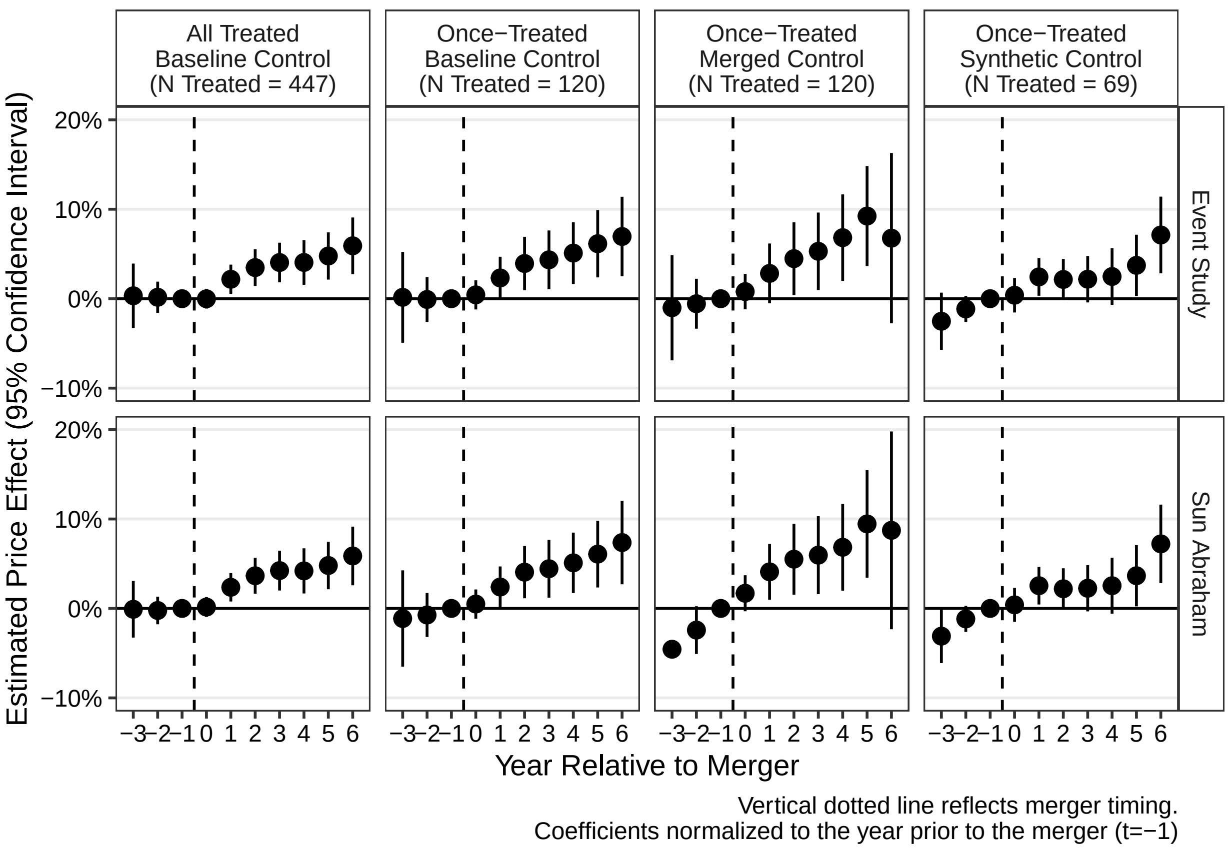

Figure OA2: Unconditional Price Effects, Mergers Pre-2012

Results from regressions described in text. Tables of coefficients in Appendix Tables OA8 and OA9.

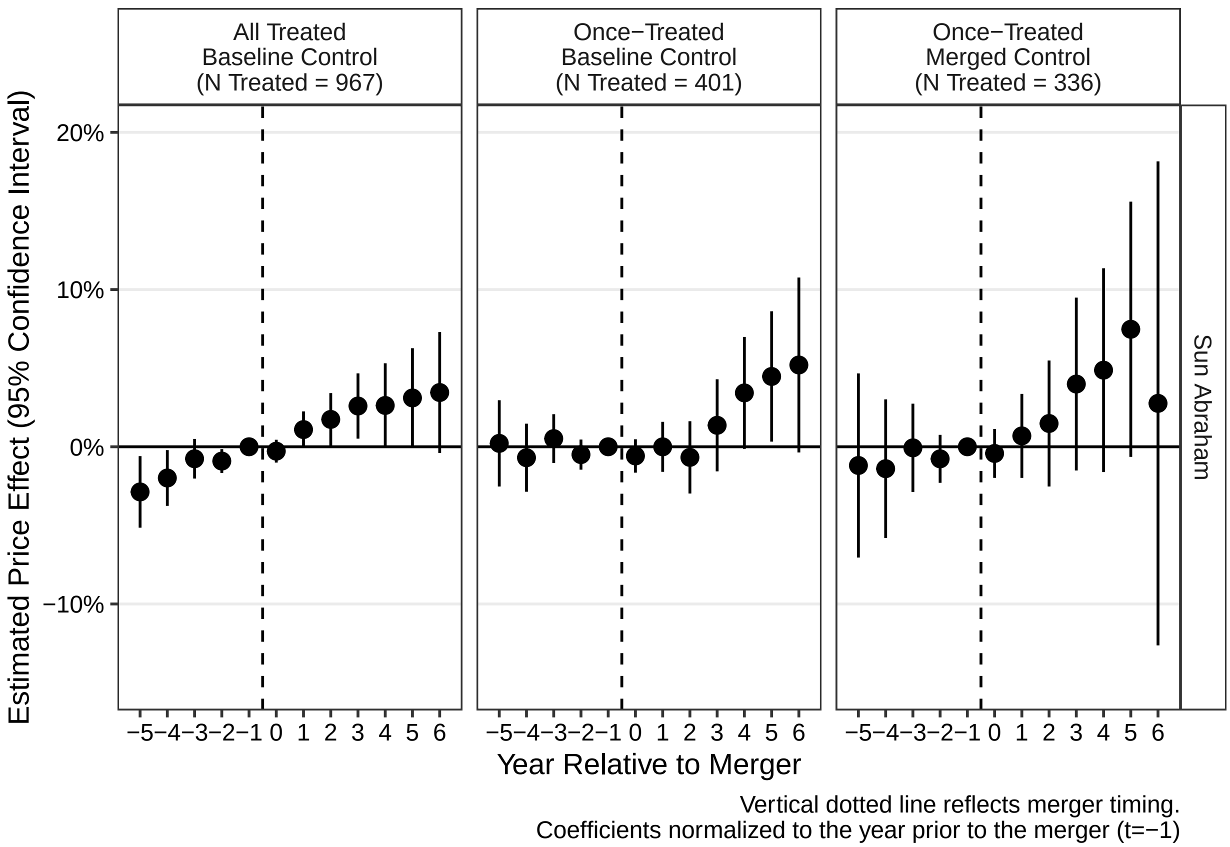

Figure OA3: Unconditional Price Effects Weighted by Number of Beds

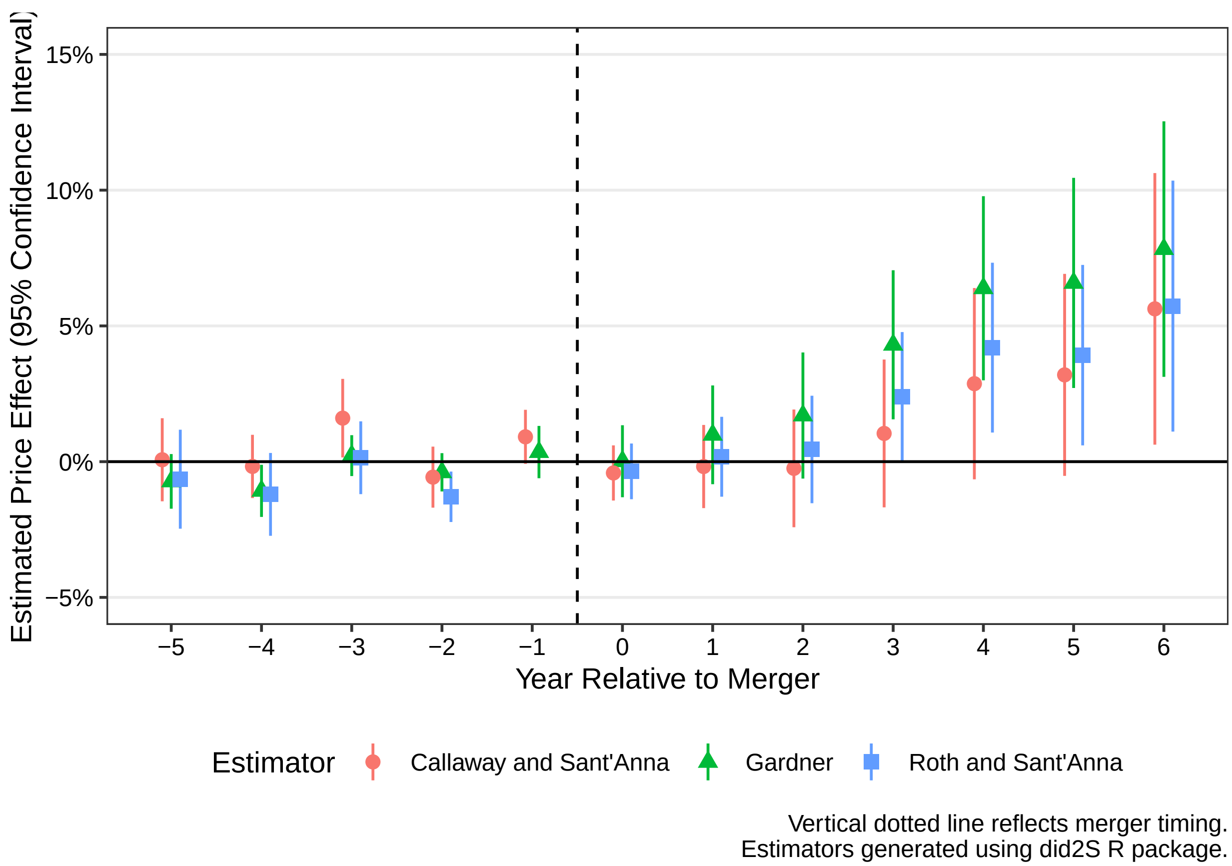

Figure OA4: Unconditional Price Effects Using Different DiD Methods

F Supplemental Tables

Table OA6: Price Effects: By Year Relative to Merger - Event Study Results

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::-8	0.004	0.043		0.038
	(0.021)	(0.021)		(0.015)
Year::-7	-0.007	0.020	0.033	0.024
	(0.016)	(0.018)	(0.031)	(0.011)
Year::-6	-0.009	0.024	0.030	0.013
	(0.013)	(0.015)	(0.025)	(0.009)
Year::-5	-0.027	0.000	-0.007	-0.005
	(0.010)	(0.012)	(0.020)	(0.006)
Year::-4	-0.016	-0.007	-0.014	-0.014
	(0.009)	(0.011)	(0.015)	(0.006)
Year::-3	-0.007	0.005	0.001	-0.001
	(0.006)	(0.008)	(0.011)	(0.005)
Year::-2	-0.007	-0.005	-0.005	-0.006
	(0.004)	(0.006)	(0.007)	(0.004)
Year::0	-0.002	-0.003	0.005	0.001
	(0.004)	(0.005)	(0.007)	(0.006)
Year::1	0.015	0.004	0.021	0.006
	(0.006)	(0.008)	(0.011)	(0.008)
Year::2	0.028	0.009	0.042	0.008
	(0.008)	(0.011)	(0.016)	(0.010)
Year::3	0.034	0.026	0.053	0.025
	(0.009)	(0.013)	(0.020)	(0.012)
Year::4	0.037	0.047	0.073	0.038
	(0.011)	(0.015)	(0.023)	(0.016)
Year::5	0.045	0.053	0.102	0.041
	(0.012)	(0.016)	(0.027)	(0.017)
Year::6	0.057	0.061	0.081	0.073
	(0.016)	(0.021)	(0.047)	(0.022)

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::7	0.069	0.019		
	(0.022)	(0.038)		
Num.Obs.	13946	9110	3082	5418
R2	0.907	0.912	0.908	0.925
AIC	-21766.0	-14704.9	-5562.1	-11062.8
BIC	-21645.3	-14591.0	-5477.6	-10963.9
RMSE	0.11	0.11	0.10	0.09
Std.Errors	by: id_e	by: id_e	by: id_e	by: sc_id
FE: year	X	X	X	X
FE: id_e	X	X	X	
FE: sc_id				X

Table OA7: Price Effects: By Year Relative to Merger - Sun and Abraham Results

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::-8	-0.007	0.018		0.025
	(0.036)	(0.041)		(0.014)
Year::-7	-0.003	0.023	0.009	0.021
	(0.023)	(0.027)	(0.050)	(0.039)
Year::-6	-0.007	0.028	0.027	0.010
	(0.016)	(0.018)	(0.039)	(0.022)
Year::-5	-0.029	0.002	-0.012	-0.005
	(0.012)	(0.014)	(0.030)	(0.022)
Year::-4	-0.020	-0.007	-0.014	-0.012
	(0.009)	(0.011)	(0.022)	(0.016)
Year::-3	-0.008	0.005	-0.001	0.001
	(0.006)	(0.008)	(0.014)	(0.022)
Year::-2	-0.009	-0.005	-0.008	-0.004
	(0.004)	(0.005)	(0.008)	(0.042)
Year::0	-0.003	-0.006	-0.004	0.002

	All Treated	Baseline Control	Merged Control	Synthetic Control
	(0.004)	(0.005)	(0.008)	(0.022)
Year::1	0.011	0.000	0.007	0.007
	(0.006)	(0.008)	(0.014)	(0.018)
Year::2	0.017	-0.007	0.015	0.006
	(0.009)	(0.012)	(0.020)	(0.029)
Year::3	0.026	0.014	0.040	0.024
	(0.011)	(0.015)	(0.028)	(0.046)
Year::4	0.026	0.034	0.049	0.036
	(0.014)	(0.018)	(0.033)	(0.020)
Year::5	0.031	0.045	0.075	0.036
	(0.016)	(0.021)	(0.041)	(0.010)
Year::6	0.035	0.052	0.028	0.073
	(0.020)	(0.028)	(0.078)	(0.012)
Year::7	0.029	0.002		
	(0.027)	(0.067)		
Num.Obs.	13946	9110	3082	5418
R2	0.909	0.909	0.919	0.927
AIC	-21731.1	-14734.2	-5600.6	-11186.0
BIC	-21610.5	-14620.4	-5516.1	-11087.1
RMSE	0.11	0.11	0.10	0.09
Std.Errors	by: id_e	by: id_e	by: id_e	by: sc_id
FE: year	X	X	X	X
FE: id_e	X	X	X	
FE: sc_id				X

Table OA8: Price Effects: By Year Relative to Merger - Event Study Results (2009-2011)

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::-3	0.003	0.002	-0.010	-0.025
	(0.018)	(0.026)	(0.030)	(0.016)

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::-2	0.002	-0.001	-0.006	-0.011
	(0.009)	(0.013)	(0.014)	(0.007)
Year::0	0.000	0.004	0.008	0.004
	(0.006)	(0.008)	(0.010)	(0.010)
Year::1	0.022	0.023	0.028	0.024
	(0.008)	(0.012)	(0.017)	(0.011)
Year::2	0.035	0.039	0.045	0.022
	(0.010)	(0.015)	(0.021)	(0.012)
Year::3	0.040	0.043	0.053	0.022
	(0.011)	(0.017)	(0.022)	(0.013)
Year::4	0.041	0.051	0.068	0.025
	(0.013)	(0.018)	(0.025)	(0.016)
Year::5	0.048	0.061	0.092	0.037
	(0.013)	(0.019)	(0.029)	(0.017)
Year::6	0.059	0.070	0.068	0.071
	(0.016)	(0.023)	(0.049)	(0.022)
Year::7	0.070	0.027		
	(0.022)	(0.039)		
Num.Obs.	9377	6609	1398	3330
R2	0.907	0.914	0.905	0.946
AIC	-14480.2	-10638.0	-2745.3	-8298.4
BIC	-14401.6	-10563.3	-2692.8	-8237.3
RMSE	0.11	0.11	0.09	0.07
Std.Errors	by: id_e	by: id_e	by: id_e	by: sc_id
FE: year	X	X	X	X
FE: id_e	X	X	X	
FE: sc_id				X

Table OA9: Price Effects: By Year Relative to Merger - Sun and Abraham Results (2009-2011)

	All Treated	Baseline Control	Merged Control	Synthetic Control
Year::-3	-0.001	-0.011	-0.046	-0.031
	(0.016)	(0.027)	(0.029)	(0.015)
Year::-2	-0.002	-0.007	-0.024	-0.012
	(0.008)	(0.013)	(0.014)	(0.007)
Year::0	0.002	0.005	0.017	0.004
	(0.006)	(0.008)	(0.010)	(0.010)
Year::1	0.024	0.024	0.041	0.025
	(0.008)	(0.012)	(0.016)	(0.011)
Year::2	0.037	0.041	0.055	0.022
	(0.010)	(0.015)	(0.020)	(0.012)
Year::3	0.042	0.044	0.060	0.023
	(0.011)	(0.016)	(0.022)	(0.013)
Year::4	0.042	0.051	0.068	0.025
	(0.013)	(0.017)	(0.025)	(0.016)
Year::5	0.048	0.061	0.094	0.037
	(0.014)	(0.019)	(0.031)	(0.017)
Year::6	0.059	0.074	0.087	0.072
	(0.017)	(0.024)	(0.056)	(0.022)
Year::7	0.075	0.047		
	(0.025)	(0.050)		
Num.Obs.	9377	6609	1398	3330
R2	0.907	0.914	0.907	0.946
AIC	-14490.5	-10659.4	-2773.6	-8316.5
BIC	-14411.9	-10584.6	-2721.2	-8255.4
RMSE	0.11	0.11	0.09	0.07
Std.Errors	by: id_e	by: id_e	by: id_e	by: sc_id
FE: year	X	X	X	X
FE: id_e	X	X	X	
FE: sc_id				X

	All Treated	Baseline Control	Merged Control	Synthetic Control

Table OA10: Price Effects by Distance Band

Model	Distance Band	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	<5	26	0.0560454	0.0326451	1.7168064	0.0863026
Merged Control	<5	24	0.0699642	0.0405321	1.7261415	0.0850941
Synthetic Control	<5	18	0.1021551	0.0336888	3.0323208	0.0026387
Baseline Control	5-15	87	0.0778427	0.0267400	2.9110969	0.0036759
Merged Control	5-15	76	0.1050746	0.0379400	2.7694903	0.0058758
Synthetic Control	5-15	71	0.0517740	0.0182438	2.8378949	0.0048508
Baseline Control	15-30	79	0.0782068	0.0314483	2.4868379	0.0130393
Merged Control	15-30	72	0.0844739	0.0343852	2.4566960	0.0144460
Synthetic Control	15-30	60	0.0581055	0.0346241	1.6781784	0.0943536
Baseline Control	30-50	71	0.0108769	0.0376793	0.2886703	0.7728893
Merged Control	30-50	48	0.0453950	0.0445836	1.0182006	0.3091981
Synthetic Control	30-50	49	-0.0464156	0.0371722	-1.2486625	0.2127621
Baseline Control	>50	138	0.0296197	0.0208132	1.4231166	0.1549925
Merged Control	>50	116	0.0535966	0.0302739	1.7703932	0.0774233
Synthetic Control	>50	103	0.0292449	0.0173874	1.6819602	0.0936171

Table OA11: Price Effects by Diversion Ratio Band

Model	Diversion Band	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	>15%	31	0.1281530	0.0508873	2.5183680	0.0119343
Merged Control	>15%	24	0.1534693	0.0700073	2.1921900	0.0289414
Synthetic Control	>15%	22	0.1402886	0.0588390	2.3842794	0.0177340
Baseline Control	10%-15%	24	0.0338905	0.0450578	0.7521567	0.4521215
Merged Control	10%-15%	24	-0.0027107	0.0476510	-0.0568861	0.9546643
Synthetic Control	10%-15%	20	0.0430219	0.0348432	1.2347304	0.2178971
Baseline Control	5%-10%	33	0.0151014	0.0349174	0.4324905	0.6654717
Merged Control	5%-10%	29	0.0216091	0.0410005	0.5270443	0.5984550
Synthetic Control	5%-10%	24	0.0350352	0.0301249	1.1629992	0.2457541
Baseline Control	<5%	313	0.0461503	0.0167201	2.7601632	0.0058755
Merged Control	<5%	259	0.0697386	0.0252174	2.7654919	0.0059470
Synthetic Control	<5%	235	0.0308890	0.0140094	2.2048871	0.0282207

Table OA12: Price Effects for Distant Mergers Within and Out of State

Model	HHI Band	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	In State	89	0.0522049	0.0207620	2.514447	0.0121163
Merged Control	In State	73	0.1349540	0.0368710	3.660166	0.0003588
Synthetic Control	In State	68	0.0548371	0.0212078	2.585706	0.0111304
Baseline Control	Out of State	49	-0.0339193	0.0287765	-1.178715	0.2388610
Merged Control	Out of State	43	0.0479019	0.0463105	1.034362	0.3027894
Synthetic Control	Out of State	35	-0.0421132	0.0282293	-1.491829	0.1388304

Table OA13: Price Effects by Insurer HHI

Model	HHI Band	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	0-2,500	74	0.0921610	0.0232779	3.9591569	0.0000802
Merged Control	0-2,500	61	0.1040272	0.0347780	2.9911777	0.0029510
Synthetic Control	0-2,500	60	0.0627846	0.0212904	2.9489685	0.0034391
Baseline Control	2,500-3,500	172	0.0681558	0.0193554	3.5212802	0.0004475
Merged Control	2,500-3,500	149	0.0916689	0.0270071	3.3942496	0.0007569
Synthetic Control	2,500-3,500	124	0.0639067	0.0161112	3.9666118	0.0000912
Baseline Control	3,500-10,000	155	-0.0131041	0.0248108	-0.5281618	0.5974961
Merged Control	3,500-10,000	126	0.0006611	0.0320120	0.0206512	0.9835342
Synthetic Control	3,500-10,000	117	-0.0295444	0.0237505	-1.2439496	0.2144892

Table OA14: Price Effects from Merger Size

Model	Merger Type	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	Big to Big	103	0.0416122	0.0225650	1.8441049	0.0655361
Merged Control	Big to Big	95	0.1285248	0.0385188	3.3366732	0.0010916
Synthetic Control	Big to Big	78	0.0465623	0.0187224	2.4869767	0.0145055
Baseline Control	Small to Big	14	-0.0535639	0.0302495	-1.7707382	0.0769836
Merged Control	Small to Big	12	-0.1237151	0.0265363	-4.6620992	0.0000073
Synthetic Control	Small to Big	10	-0.0338664	0.0216063	-1.5674299	0.1201114
Baseline Control	Small to Small	20	-0.0655857	0.0453613	-1.4458490	0.1486097
Merged Control	Small to Small	9	0.0402291	0.0550848	0.7303127	0.4664461
Synthetic Control	Small to Small	14	-0.0674602	0.0910088	-0.7412489	0.4602457

Table OA15: Difference in Price Effects for Non-HSR Mergers

Model	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	-0.0025546	0.0274278	-0.0931382	0.9258111
Merged Control	-0.0093051	0.0299745	-0.3104329	0.7563935
Synthetic Control	0.0156891	0.0267028	0.5875443	0.5572802

Table OA16: Difference in Price Effects for Non-HSR Mergers: Diversion Ratio Above 10%

Model	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	0.0111681	0.0582645	0.1916796	0.8480472
Merged Control	0.0690231	0.0867791	0.7953887	0.4298699
Synthetic Control	0.0158456	0.0463726	0.3417016	0.7343207

Table OA17: Price Effects by Agency Investigation Status

Model	Investigation Status	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	Early ET	78	0.0877536	0.0249365	3.519080	0.0004557
Merged Control	Early ET	65	0.1243363	0.0398352	3.121269	0.0020744
Synthetic Control	Early ET	51	0.0363503	0.0223726	1.624765	0.1063844
Baseline Control	No ET or 2R	73	-0.0366021	0.0222270	-1.646735	0.0999774
Merged Control	No ET or 2R	56	-0.0295589	0.0287547	-1.027971	0.3052371
Synthetic Control	No ET or 2R	60	-0.0383241	0.0251582	-1.523323	0.1298558
Baseline Control	2R	45	0.0787925	0.0204940	3.844666	0.0001296
Merged Control	2R	45	0.1109159	0.0406422	2.729083	0.0069319
Synthetic Control	2R	35	0.0622005	0.0181887	3.419738	0.0008143

Table OA18: Price Effects By Merger Cohort: Year 2 Post-Merger

Model	Year of Merger	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	2009	27	0.0801270	0.0309448	2.5893471	0.0097457
Merged Control	2009	27	0.1161707	0.0343103	3.3858831	0.0007797
Baseline Control	2010	54	0.0298166	0.0160709	1.8553160	0.0638247
Merged Control	2010	54	0.0475445	0.0247132	1.9238509	0.0550826
Synthetic Control	2010	43	0.0263502	0.0128896	2.0443027	0.0417964
Baseline Control	2011	37	0.0273993	0.0325101	0.8427932	0.3995316
Merged Control	2011	37	0.0214498	0.0348542	0.6154163	0.5386298
Synthetic Control	2011	26	0.0112929	0.0227198	0.4970491	0.6195185
Baseline Control	2012	24	-0.0060696	0.0414662	-0.1463750	0.8836528
Merged Control	2012	24	0.0002465	0.0436307	0.0056493	0.9954953
Synthetic Control	2012	22	0.0035921	0.0390308	0.0920327	0.9267335
Baseline Control	2013	67	0.0079139	0.0213487	0.3706968	0.7109364
Merged Control	2013	67	0.0040427	0.0338936	0.1192755	0.9051170
Synthetic Control	2013	58	0.0267115	0.0222033	1.2030437	0.2299079
Baseline Control	2014	61	-0.0453856	0.0216217	-2.0990765	0.0360429
Synthetic Control	2014	51	-0.0366610	0.0220879	-1.6597739	0.0980048

Table OA19: Price Effects By Merger Cohort: Year 3 Post-Merger

Model	Year of Merger	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	2009	26	0.0907944	0.0385008	2.3582474	0.0185397
Merged Control	2009	26	0.1254533	0.0431664	2.9062724	0.0038610
Baseline Control	2010	54	0.0320089	0.0191996	1.6671630	0.0957733
Merged Control	2010	54	0.0406402	0.0263535	1.5421190	0.1238354
Synthetic Control	2010	43	0.0347905	0.0160147	2.1724125	0.0306073
Baseline Control	2011	35	0.0290046	0.0315633	0.9189327	0.3583369
Merged Control	2011	35	0.0398900	0.0345762	1.1536832	0.2493189
Synthetic Control	2011	26	0.0056925	0.0219085	0.2598294	0.7951736
Baseline Control	2012	24	0.0022800	0.0426255	0.0534899	0.9573515
Merged Control	2012	24	-0.0032930	0.0475350	-0.0692749	0.9448055
Synthetic Control	2012	22	0.0182485	0.0417310	0.4372883	0.6622169
Baseline Control	2013	67	0.0074986	0.0219126	0.3422025	0.7322654
Synthetic Control	2013	58	0.0263965	0.0223514	1.1809783	0.2385468

Table OA20: Price Effects By Merger Cohort: Year 4 Post-Merger

Model	Year of Merger	N Treated	Estimate	Std. Error	t value	Pr(>|t|)
Baseline Control	2009	27	0.1023885	0.0359018	2.8519023	0.0044290
Merged Control	2009	27	0.1279566	0.0405785	3.1533080	0.0017361
Baseline Control	2010	52	0.0568495	0.0200685	2.8327726	0.0047008
Merged Control	2010	52	0.0822499	0.0289604	2.8400756	0.0047406
Synthetic Control	2010	43	0.0459848	0.0180346	2.5498151	0.0112752
Baseline Control	2011	35	0.0025779	0.0340337	0.0757442	0.9396367
Merged Control	2011	35	0.0018457	0.0401937	0.0459204	0.9633966
Synthetic Control	2011	26	-0.0055103	0.0288992	-0.1906730	0.8489107
Baseline Control	2012	23	0.0581770	0.0508879	1.1432389	0.2531939
Synthetic Control	2012	22	0.0638729	0.0456919	1.3979027	0.1631750

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