Price Spillovers and Specialization in Health Care: The Case of Children's Hospitals
SUPPLEMENTAL ONLINE APPENDIX

In this appendix, we first discuss details of our dataset construction and other descriptive statistics. We then compare prices and quality among CH and NCH in Section 2, and we present visual evidence of our entry events over time in Section 3. We revisit our main results for several alternative regression specifications and samples in Section 4, and in Section 5, we examine an alternative bargaining mechanism for observed price differences, in which higher payments for routine procedures are thought to derive from a hospital's monopoly power in other, more specialized, areas of care.

1 Data and Descriptive Statistics

Table 1 lists our procedures of interest and the CPT/ICD-9 codes used to identify these procedures in the data. Table 2 similarly lists the different categories and codes that we define as a "complication" in the data. We also consider readmission and mortality rates, all of which are infrequent as discussed in the main text.

We have access to the HCCI data over the period from January 2010 through October 2015. Over this time, we observe around 13 million inpatient claims and 55 million outpatient claims. After limiting to pediatric cases and aggregating the claims to the visit level, our data consist of around 460,000 inpatient stays and 3 million outpatient visits. Finally, after excluding newborns and focusing only on "routine procedures," our final analytic data consist of nearly 32,000 inpatient stays and 336,000 outpatient visits. A more detailed breakdown of our data is presented in Tables 3 and 4.

Figure 1 presents the count of hospitals by CH and NCH in our final data over time, limited to hospitals with at least 5 patients among our selected procedures in a year. Interestingly, we see an initial increase in the number of NCH, from 783 in 2010 to 960 in 2012, with a large decrease to 774 hospitals in 2015. Conversely, the number of CHs in our data increased, up from 179 in 2010 to

212 in 2015. In total, we observe 1,324 hospital-year observations for CH and 10,712 hospital-year observations for NCH.

2 Evidence of Price and Quality Differential

Although it is commonly understood that CH command a substantial price premium relative to NCH among commercial insurers (Raval *et al.*, 2022), this has not been well-documented among routine procedures in a large-scale empirical setting. Table 6 presents procedure-level summary statistics for prices and quality, separately by CH and NCH. Mean commercial insurance payments among the set of routine procedures of interest are just over $6,200 for CH and around $4,800 for NCH. Table 6 also suggests comparable quality outcomes for CH and NCH, with mean complication rates of 0.4% for CH and 0.3% for NCH, as well as mean readmission rates of 1.7% for CH and 1.1% for NCH. Finally, we see from hospital-level summaries in Table 5 that CH are generally much larger than NCH, reflective of CH associations with academic medical centers (53% of CH are teaching hospitals compared to only 6% of NCH). Specifically among our HCCI claims data, CH account for about 141 patients per year while NCH account for less than 13 patients per year. Note, however, that because the total number of NCH far exceed that of CH across the U.S., the total number of procedures in our data are nearly equally split between the two hospital types.

While mean prices and quality outcomes are informative, CH also tend to attract less healthy patients relative to NCH. For example, the share of patients with at least one pediatric complex condition is 6% for CH compared to 1.7% for NCH. Similarly, patients going to CH are more likely to receive treatment in an inpatient setting, with 10.1% of all procedures being in an inpatient setting for CH compared to 7.1% for NCH. For a more appropriate comparison, we estimated by ordinary least squares (OLS) the following regression equation:

$$y_{it} = \beta x_{it} + \gamma z_{ht} + \lambda w_{mt} + \delta \text{CH}_i + \theta_g + \theta_t + \epsilon_{it}, \tag{1}$$

where y_{it} denotes the outcome (log price, 90-day readmission, or 90-day complication) for patient i in year/month t;[1] x_{it} denotes patient and procedure characteristics including an indicator for the procedure, an indicator for whether the patient has any CCC, an indicator for the procedure taking place in an inpatient setting, and an indicator for whether the patient is female; z_{ht} denotes hospital characteristics including bed size, number of nurse, physician, resident, and other FTEs, total hospital discharges, total hospital Medicare discharges, and total hospital Medicaid discharges; w_{mt} denotes

[1] Embedded in the i subscript is the patient's insurance product g, hospital h, and market m.

market-level variables including percentage of residents of different age categories, race, income, and education; CH denotes an indicator for whether the hospital is a children's hospital (either a free-standing structure or a designated pediatric wing of an otherwise general acute care hospital); θ_g and θ_t capture fixed effects for the patient's insurance product (the insurance group ID) and year/month fixed effects; and ϵ_{it} is an error term.

Figure 2 presents the estimated coefficient and 95% confidence interval for $\hat{\delta}$. We present these results overall and separately when estimating the regression only for inpatient or outpatient procedures. From Figure 2, we find point estimates reflecting between 12% and 27% higher prices among CH relative to NCH after adjusting for observable patient, hospital, and market characteristics, as well as adjusting for insurer and year fixed effects.[2] Conversely, we see no evidence of quality improvement among CH relative to NCH. Our estimates for inpatient readmissions and complications are noisy due to few instances of such events in our data, and as such, we cannot definitively rule out higher or lower quality inpatient care among CH relative to NCH. However, following outpatient procedures, we estimate economically meaningful and statistically significantly higher readmission rates for CH relative to NCH. This could be due to unexpected readmissions following a given procedure, which would arguably reflect lower quality, but it could also be due to additional procedures (arranged as separate outpatient/inpatient visits) at CH relative to NCH.

3 Visual Evidence of Entry Events

Figures 3 and 4 present the baseline entry events for CH and NCH in our data, respectively. To aid in visualization, we limit these figures to markets with at least 50 observed procedures in each year. Each row in the figures reflects a market and each column reflects a year. The shaded markets in Figure 3 depict markets in which a new CH emerged in the data (i.e., the treated group), and similarly for NCH in Figure 4. We highlight two important points from these figures: 1) the figures reveal the staggered nature of treatment in our data, with different markets affected by entry at different times; and 2) a large number of markets are affected by CH and NCH entry at some point in our panel. This second point also helps to alleviate concerns regarding endogeneity of entry in our context. Entry events are relatively minor in our setting, typically reflecting a slight realignment of hospital services into pediatric care rather than an entirely new structure.

[2] We cannot adjust for hospital fixed effects since CH and NCH status is predominantly time-invariant.

4 Alternative Specifications and Estimators

4.1 Results from Different Estimators

Our preferred estimator is that proposed in Callaway & Sant'Anna (2021), as discussed in the main text; however, we employ a residualized version of this estimator to better accommodate the nature of our claims-level data. Since this is a slight modification of Callaway & Sant'Anna (2021), we present results from alternative estimators and specifications here:

1. Sun & Abraham (2021): We present regression results from the Sun and Abraham estimator, which is akin to a standard event study with heterogeneous event study coefficients for each treatment cohort. These results are presented in Figures 5-6. The results for CH entry in Figure 5 are similar to our initial findings; however, the Sun and Abraham estimator also suggests a negative effect of entry of NCH, particularly on other NCH prices (Figure 6).

2. Standard event study: We present standard event study graphs in Figures 7 and 8. These figures closely resemble those from the Sun and Abraham estimator.

3. Additional Callaway & Sant'Anna (2021) estimates: We consider an alternative first-step adjustment in which we residualize prices only using time-invariant fixed effects for procedure, hospital, location of procedure, and time. The goal of this analysis is to consider the sensitivity of our results to concerns regarding time-varying controls which may be directly affected by treatment. These results are presented in Figures 9 and 10 and closely match the baseline results in the main text.

4.2 Determination of Entry Events

Our results in the main paper identify CH and NCH entry simply by the emergence of routine pediatric claims in the data, without any minimum threshold for such claims per hospital. In this section, we consider the sensitivity of our results by imposing a minimum of 5 and 10 pediatric claims when defining entry.

Results based on a minimum of 5 claims are presented in Figures 11-14. Figures 11 and 12 describe our entry events over time under a minimum entry threshold of 5 claims, and Figures 13 and 14 present the dynamic treatment effect results analogous to those in the main text. Results based on a minimum of 10 claims are presented in Figures 15-18. Figures 15 and 16 again describe our entry events over time under a minimum entry threshold of 10 claims, and Figures 17 and 18 present the dynamic treatment effect results analogous to those in the main text. Figures 13-18 further support our takeaways from the main text — CH are sufficiently differentiated such that they are largely unaffected by additional NCH competitors. Price competition instead arises only from other CH.

5 Price Spillovers from Market Power in Other Areas of Care

The nature of an all-or-nothing bargaining process with insurers may also facilitate higher negotiated prices. In this context, CH may be a monopolist in some highly specialized procedure, and including access to such treatment in-network may require insurers to accommodate a higher price on more routine procedures that NCH also offer. In this section, we present our analysis of this bargaining effect from hospital specialization.

5.1 Expansion and Procedure-level Competitiveness

The central argument for this type of bargaining effect is that market exclusivity for a highly specialized procedure may spillover into the negotiation for prices of other routine procedures. The magnitude of this effect would therefore be determined, in part, by the competitiveness of the market for these highly specialized procedures, wherein exposure to an additional competitor for such procedures should dampen any spillover from the all-or-nothing negotiation.

We measure expansion into highly specialized procedures with a two step process. First, we identify CH with monopoly power for any one of the following highly specialized procedures: 1) extracorporeal membrane oxygenation (ECMO); 2) congenital heart surgery (CHS); 3) heart, lung, kidney, liver, or pancreas transplants; and 4) skull-based neurosurgery or brain surgery. Second, we identify expansions into these specialized procedures from the data. Similar to our definition of entry, we define expansion in this case as any instance in which we observe, for the first time, some positive number of claims among the four highly specialized procedures.[3] Treated observations constitute all routine procedures in areas exposed to such expansion, where we again set the treatment indicator to one in the first period of expansion and in all subsequent periods. The control observations consist of routine procedures in areas not yet exposed to expansion. Expansion events are presented graphically in Figure 19, where we again limit the figure to markets with at least 50 total pediatric procedures in each year. As with our entry events in the main analysis, treatment timing in this analysis is based on the first observed year of expansion in a market.

[3] Unlike the case of CH or NCH entry, we are unable to consider increases in thresholds when defining expansion due to the already very small counts of claims observed for such specialized and relatively uncommon procedures.

5.2 Results

We have two ATTs of interest in this case, one for CH and another for NCH:

$$ATT_{\text{CH},\tau} = \text{E}[p^1_{i(jh)\tau} - p^0_{i(jh)\tau} | \text{Expansion}, h = \text{CH}, \quad t = \tau] \tag{2}$$

$$ATT_{\text{NCH},\tau} = \text{E}[p^1_{i(jh)\tau} - p^0_{i(jh)\tau} | \text{Expansion}, h = \text{NCH}, t = \tau] \tag{3}$$

Recall that the prices in Equations (2) and (3) reflect negotiated payments for routine procedures, and we are interested in the effect of additional competition among a different set of highly specialized procedures on the prices for routine procedures. If the bargaining effect plays a major role, then we would expect to see a meaningful reduction in prices for routine procedures.

Results from our preferred estimator are presented in Figure 20. Here, we estimate economically small and statistically insignificant effects of expansion into highly specialized procedures on CH prices. We find some evidence of a negative effect on NCH prices; however, this estimate is small in magnitude and insignificant for each individual time period. We also find some evidence of differential pre-trends for NCH in this analysis, suggesting that the key parallel trends assumption may fail in this case, such that results for NCH may be an unreliable estimate of the ATT of interest.

Ultimately, while the results for expansion into highly specialized procedures are less definitive, the magnitudes of the estimates are relatively small. Moreover, we estimate null effects for CH, where we would expect spillovers in this context to be greatest in the presence of bargaining effects. We therefore conclude from Figure 20 that any price spillovers from highly specialized procedures due to an all-or-nothing negotiation are minimal.

References

Callaway, Brantly, & Sant'Anna, Pedro H. C. 2021. Difference-in-Differences with multiple time periods. *Journal of Econometrics*, **225**(2), 200–230.

Piper, Kaitlin N, Baxter, Katherine J, McCarthy, Ian, & Raval, Mehul V. 2020. Distinguishing Children's Hospitals From Non–Children's Hospitals in Large Claims Data. *Hospital pediatrics*, **10**(2), 123–128. Publisher: Am Acad Pediatrics.

Raval, Mehul V., Reiter, Audra J., & McCarthy, Ian M. 2022. Association of Children's Hospital Status With Value for Common Surgical Conditions. *JAMA Network Open*, **5**(6), e2218348.

Sun, Liyang, & Abraham, Sarah. 2021. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, **225**(2), 175–199.

Tables and Figures

Table 1: **Procedures and Codes**

Description	CPT Codes	ICD-9 Procedure Code
Routine Procedures		
Ear Tubes	69420, 69421, 69433, 69436	200, 2001, 2009
Tonsillectomy	42820, 42821, 42825, 42826, 42830, 42831, 42835, 42836	282, 283, 286
Appendectomy	44950, 44960, 44970	470, 4701, 4709
Inguinal Hernia	49491, 49492, 49495, 49496, 49500, 49501, 49505, 49507, 49520, 49521, 49525, 49529, 49595, 49650	171, 172, 530, 531
Circumcision	54150, 54160, 54161	640
Strabismus	67311, 67312, 67314, 67316, 67318	1511, 1512, 1513, 152, 1521, 1522, 154
Broken Arm	24500, 24505, 24515, 24516, 24530, 24535, 24538, 24545, 24546, 24560, 24565, 24566, 24575, 24576, 24577, 24579, 24582	7901, 7911, 7921, 7931
Umbilical Hernia	49570, 49572, 49580, 49582, 49585, 49587	534, 5342, 5349, 5441
Orchiopexy	54560, 54640, 54650, 54692	625
Spine	22800, 22802, 22804	810, 8100, 8103, 8105, 8108
Anti-Reflux	43280, 43327, 43328	4466, 4467
Knee Arthroscopy	27332, 27333, 29879, 29880, 29881, 29882, 29883, 29888	8006, 8016, 8026, 8036, 8046, 806, 8076, 8086, 8096, 8122, 8142, 8143, 8144, 8146, 8147
Gallbladder Removal	47562, 47563, 47564	5123

Table 2: **Codes for Selected Complications**

Description	ICD-9 Diagnosis Code
Wound Complications	99883, 99812, 99813, 9983, 9986
Superficial SSI	99832, 9985, 99851, 99859
Deep/organ SSI	99831, 56722, 99859
UTI	5990, 99664
Post-operative Renal Insufficiency	584*, 586*
Pneumonia	480*, 482*, 483*, 481, 484, 485, 486, 4870, 99731
Respiratory Failure	5185, 51882
Sepsis	038*, 78552, 7907, 99591, 9980
Deep Vein Thrombosis	4534*, 4539
Pulmonary Embolism	4151, 41519
Myocardial Infarction	4100*, 4101*
Cardiac Arrest	4275
Cerebrovascular Accident	99702
Intraoperative Complications	99811, 9982, 9984
System-specific Complications	9971 (cardiac), 9974 (GI), 9975 (Urinary)

Table 3: **Inpatient Claims Breakdown**

	2010	2011	2012	2013	2014	2015	Total
Full claims:							
All Conditions	2,625,146	2,487,174	2,472,447	2,298,198	1,967,087	1,440,078	13,290,130
Pediatric Only	975,257	943,603	951,983	903,378	809,319	575,078	5,158,618
With NPI	894,521	858,559	860,467	815,349	786,070	568,557	4,783,523
With Type of Bill[a]	891,490	855,238	856,870	811,727	781,999	566,710	4,764,034
Aggregate to Unique Visits:							
Unique admits[b]	81,344	84,153	82,293	79,648	77,906	56,325	461,669
Within 180 miles	78,573	81,711	80,079	77,574	75,608	54,800	448,345
Excluding transfers	78,129	81,312	79,629	77,189	75,180	54,496	445,935
Excluding outliers[c]	71,311	74,135	73,345	71,182	69,178	50,064	409,215
Specific Exclusions:							
Excluding Newborns	19,824	21,359	20,633	18,446	17,146	13,904	111,312
Excluding Missing HNPIs[d]	19,587	21,119	20,399	18,175	15,801	12,735	107,816
Routine procedure	7,141	6,429	5,958	4,932	4,334	2,929	31,723

[a]Claims limited to type of bill listed as “inpatient,” “non-medical hospital,” or “critical access hospital.”
[b]Denotes claims aggregated to a single inpatient visit.
[c]Defined as visits with allowed amount/charge payment ratios below the 5th or above the 9th percentile.
[d]HNPI refers to a “consolidated NPI” provided by HCCI, which is intuitively similar to an AHA ID.

Table 4: **Outpatient Claims Breakdown**

	2010	2011	2012	2013	2014	2015	Total
Full claims:							
All Conditions	8,424,848	9,304,755	9,761,181	9,778,564	9,058,887	8,320,846	54,649,081
Pediatric Only	2,786,359	3,049,836	3,171,140	3,142,754	2,875,340	2,694,525	17,719,954
With NPI	2,509,104	2,732,981	2,820,214	2,795,720	2,798,139	2,653,435	16,309,593
With Type of Bill[a]	1,353,283	2,024,754	2,750,845	2,721,227	2,720,499	2,588,237	14,158,845
Aggregate to Unique Visits:							
Unique admits[b]	287,806	443,624	610,644	600,505	599,372	549,476	3,091,427
Within 180 miles	266,355	421,934	588,294	578,435	576,198	530,341	2,961,557
Excluding outliers[c]	239,721	394,904	551,740	542,662	540,514	498,343	2,767,884
Specific Exclusions:							
Matching IP NPI[d]	233,923	385,444	537,644	528,522	524,733	483,404	2,693,670
Excluding Missing HNPIs[e]	207,838	349,294	488,715	481,702	450,180	408,463	2,386,192
Routine procedure	39,855	51,748	65,772	62,234	57,333	59,555	336,497

[a] Claims limited to type of bill listed as "hospital outpatient," "ambulatory surgery center," or "critical access hospital."

[b] Denotes claims aggregated to a single outpatient visit.

[c] Defined as visits with allowed amount/charge payment ratios below the 5th or above the 9th percentile.

[d] Our CH versus NCH designation excludes outpatient facilities that are not connected to a larger inpatient hospital. We therefore excluded all outpatient visits that cannot be matched to an NPI from the set of hospitals in the inpatient claims.

[e] HNPI refers to a "consolidated NPI" provided by HCCI, which is intuitively similar to an AHA ID.

Table 5: **Summary Statistics by Hospital Type**[a]

	Children's Hospitals					Non-Childen's Hospitals				
Variable	Mean	St. Dev.	10th Pctl	90th Pctl	Count	Mean	St. Dev.	10th Pctl	90th Pctl	Count
Bed Size	5.80	3.33	2.50	9.43	1,324	2.15	1.72	0.43	4.31	10,712
Nonprofit	0.77	0.42	0.00	1.00	1,324	0.73	0.44	0.00	1.00	10,712
Teaching Status	0.53	0.50	0.00	1.00	1,324	0.06	0.23	0.00	0.00	10,712
System Status	0.63	0.48	0.00	1.00	1,324	0.67	0.47	0.00	1.00	10,712
Nurse FTEs	1,370.80	840.01	530.20	2,393.80	1,324	393.81	386.89	79.00	818.00	10,712
Physician FTEs	149.08	292.23	0.00	407.00	1,324	27.40	93.50	0.00	63.00	10,712
Total Discharges	27,129.08	16,506.72	10,378.50	45,410.20	1,324	9,788.46	8,674.51	1,412.20	20,672.10	10,712
Medicare Discharges	6,739.01	5,400.95	58.00	12,704.70	1,324	3,311.90	2,799.23	529.00	6,968.60	10,712
Medicaid Discharges	4,636.37	3,628.39	945.00	9,603.00	1,324	1,217.61	1,567.17	86.00	2,937.00	10,712
HCCI Patients	141.33	265.38	5.00	331.70	1,324	12.44	21.64	1.00	31.00	10,712

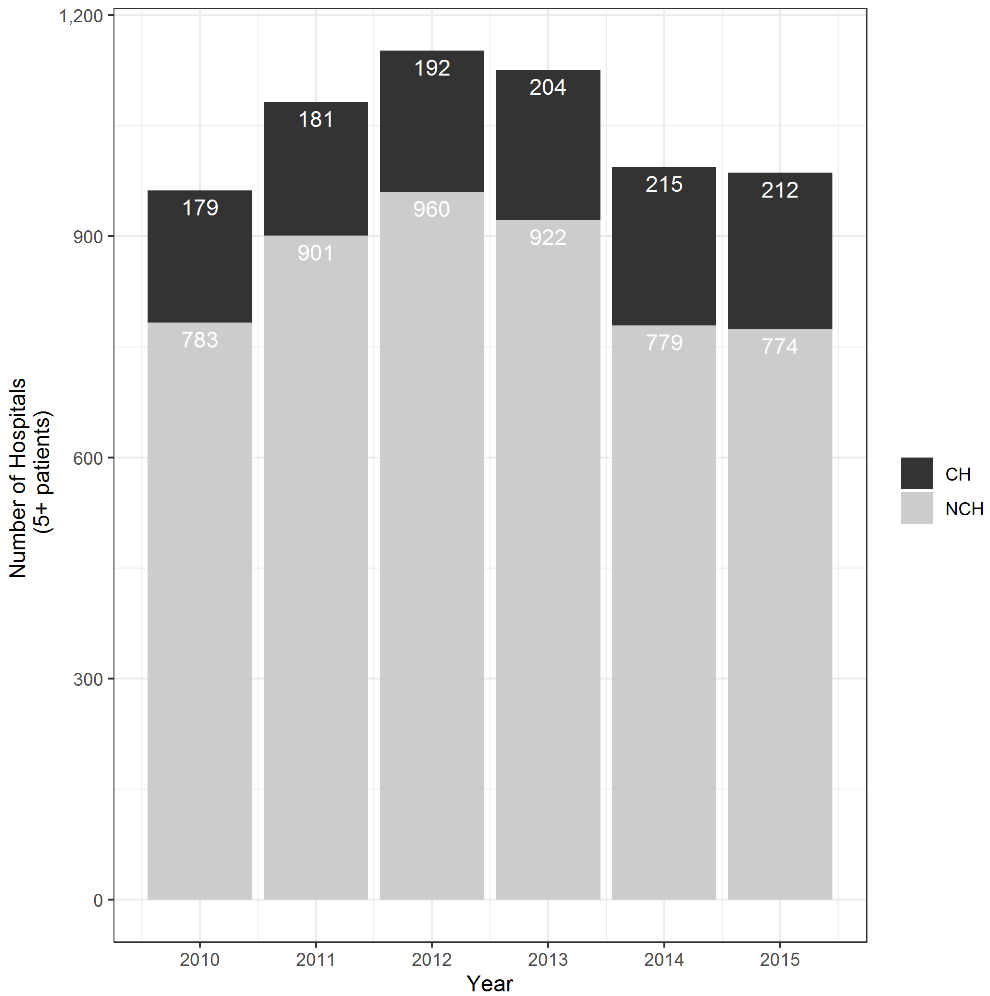
[a]Mean, standard deviation, and percentiles for selected hospital variables. All statistics are based on hospital-year level observations (e.g., HCCI patients is the number of patients per year, per hospital).

Table 6: **Summary Statistics for Selected Procedures by Hospital Type**[a]

Surgery	Mean Price	St. Dev. Price	Readmission	Complication	Inpatient	Female	CCC	Count
Children's Hospitals								
Ear Tubes	3,899	3,654	0.014	0.000	0.020	0.407	0.052	48,722
Tonsillectomy	5,474	3,920	0.016	0.001	0.035	0.476	0.034	46,942
2+ procedures	5,943	3,601	0.014	0.001	0.026	0.327	0.028	23,653
Appendectomy	14,033	9,333	0.037	0.027	0.558	0.409	0.039	17,209
Inguinal Hernia	6,027	3,671	0.011	n/a	0.001	0.191	0.026	11,764
Circumcision	4,942	5,607	0.016	0.002	0.039	0.004	0.050	10,721
Strabismus	5,808	3,062	0.013	n/a	0.002	0.486	0.074	9,571
Broken Arm	7,408	6,256	0.011	n/a	0.200	0.468	0.017	9,229
Umbilical Hernia	5,314	3,886	0.009	n/a	0.025	0.504	0.046	6,217
Orchiopexy	6,621	4,599	0.010	n/a	0.034	n/a	0.049	5,804
Spine	17,645	11,758	0.053	0.051	n/a	0.707	n/a	3,309
Anti-Reflux	12,357	9,911	0.189	0.022	0.870	0.478	0.750	699
Knee Arthroscopy	11,406	8,609	0.054	n/a	0.317	0.417	0.087	230
Gallbladder Removal	11,391	6,598	0.123	n/a	0.399	0.656	0.160	163
All	6,280	5,890	0.017	0.004	0.101	0.382	0.060	194,233
Non-Children's Hospitals								
Tonsillectomy	4,218	2,687	0.008	0.001	0.010	0.523	0.008	44,064
Ear Tubes	3,045	2,054	0.007	n/a	0.003	0.407	0.012	38,908
2+ procedures	4,925	3,050	0.007	0.001	0.010	0.390	0.007	16,285
Appendectomy	10,733	6,676	0.028	0.024	0.468	0.407	0.024	15,105
Circumcision	3,516	3,995	0.014	n/a	0.072	0.017	0.020	4,579
Broken Arm	5,558	6,823	0.020	n/a	0.158	0.428	0.010	4,060
Inguinal Hernia	5,711	3,494	0.007	n/a	n/a	0.169	0.012	3,366
Strabismus	4,891	2,939	0.004	n/a	n/a	0.495	0.036	2,729
Umbilical Hernia	4,658	2,815	n/a	n/a	0.019	0.506	0.025	1,488
Orchiopexy	6,344	4,283	n/a	n/a	0.063	n/a	0.022	1,469
Spine	17,641	15,818	0.042	0.056	n/a	0.654	n/a	503
Knee Arthroscopy	8,583	6,844	n/a	n/a	0.036	0.409	n/a	364
Gallbladder Removal	8,439	5,116	n/a	n/a	0.152	0.806	n/a	217
Anti-Reflux	12,724	10,507	0.145	n/a	0.780	0.569	0.732	123
All	4,874	4,430	0.011	0.003	0.071	0.425	0.017	133,260

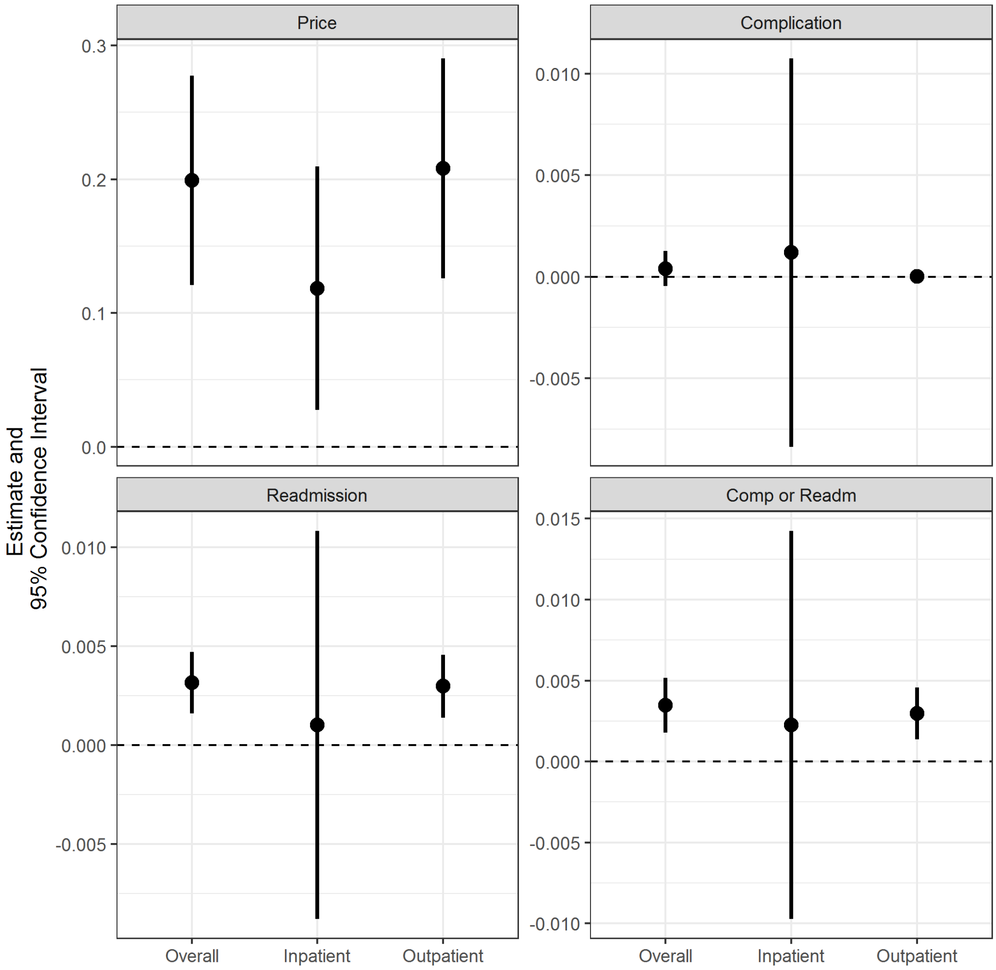
[a] Statistics based on inpatient and outpatient procedures, separately by CH and NCH. ICD-9 codes to identify each procedure are listed in the supplemental appendix. "n/a" reflects cell sizes of 10 or fewer patients, and "2+ procedures" denotes patients with more than one of the selected procedures in the same visit. Complication and readmission rates are defined for a 90-day period after the inpatient or outpatient visit.

Figure 1: **Count of CH and NCH**[a]



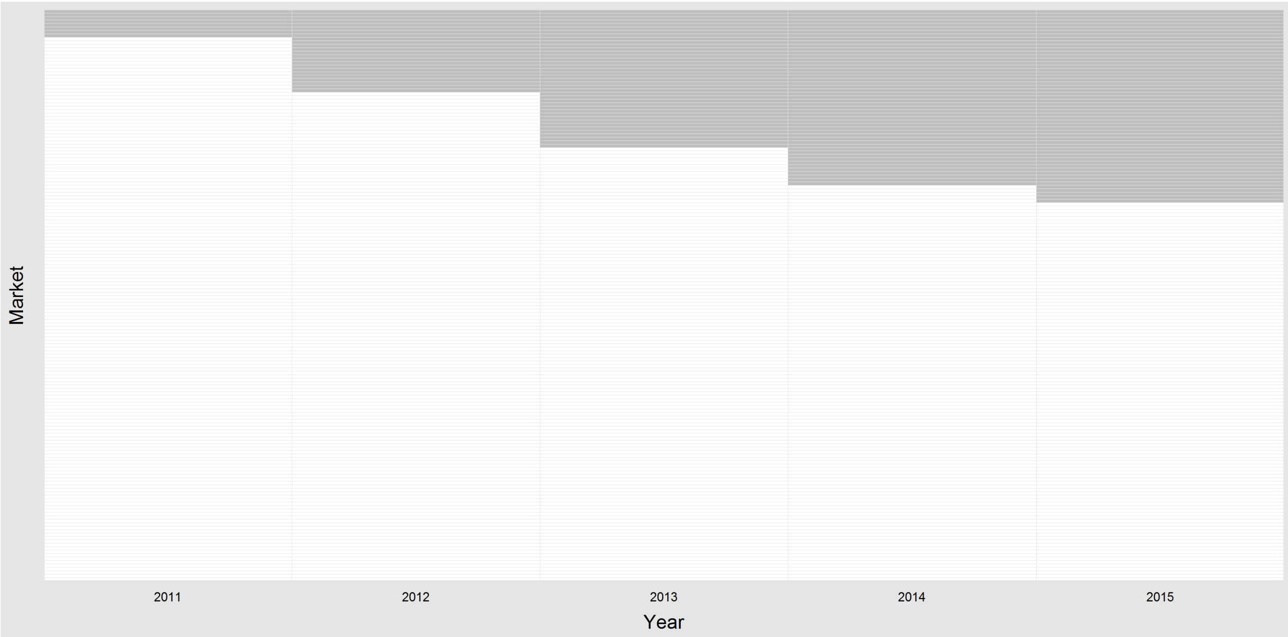
[a]Children's Hospital (CH) versus Non-Children's Hospital (NCH) designation based on tiers described in Piper *et al.* (2020) and discussed in Section **??**.

Figure 2: **Price and Quality Differences by CH and NCH**[a]



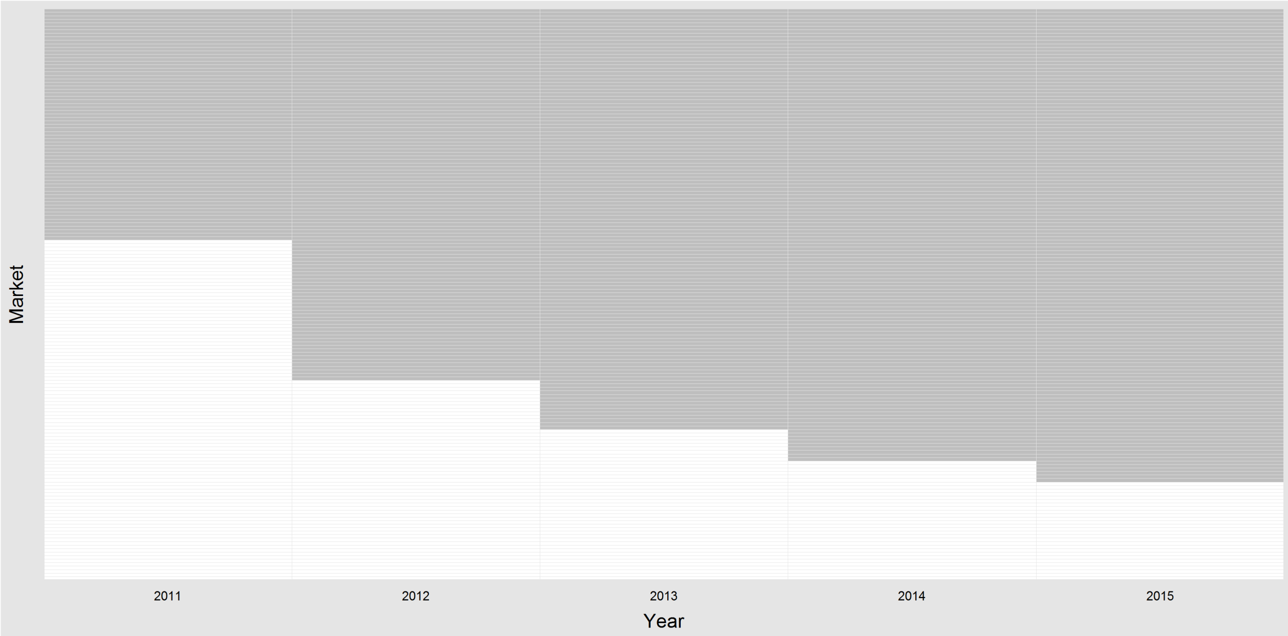
[a]Estimated coefficients for the Children's Hospital (CH) indicator as reflected in Equation 1.

Figure 3: **Entry of Children's Hospitals** [a]



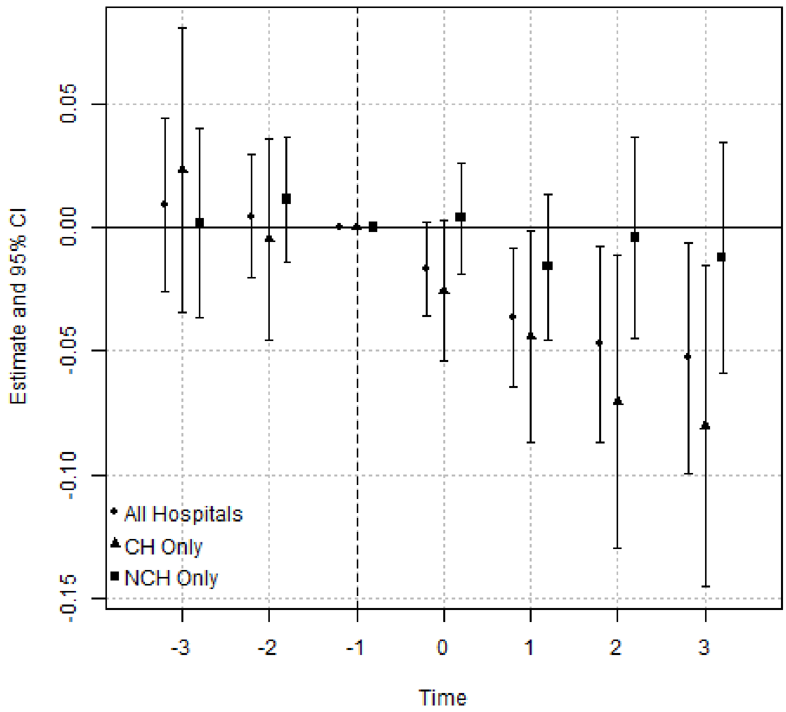
[a]Shaded markets reflect those experiencing entry of a Children's Hospital (CH) in the data, as defined and discussed in Section **??**.

Figure 4: **Entry of Non-Children's Hospitals** [a]



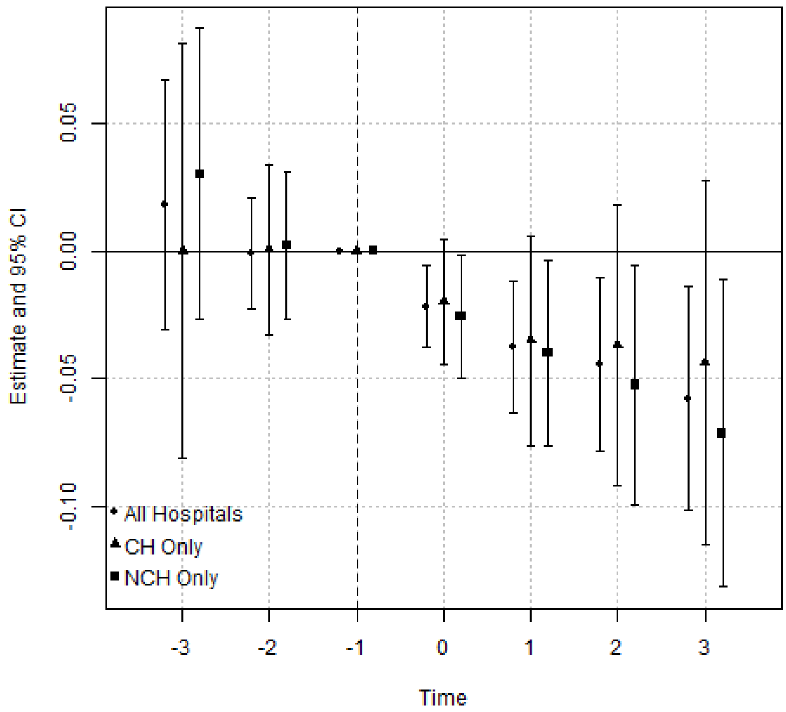
[a]Shaded markets reflect those experiencing entry of a Non-Children's Hospital (NCH) in the data, as defined and discussed in Section **??**.

Figure 5: **CH Entry Effects with SA Estimator**[a]



[a]Dynamic treatment effects estimated using Sun & Abraham (2021).

Figure 6: **NCH Entry Effects with SA Estimator**[a]



[a]Dynamic treatment effects estimated using Sun & Abraham (2021)

Figure 7: **CH Entry Effects with Standard Event Study**

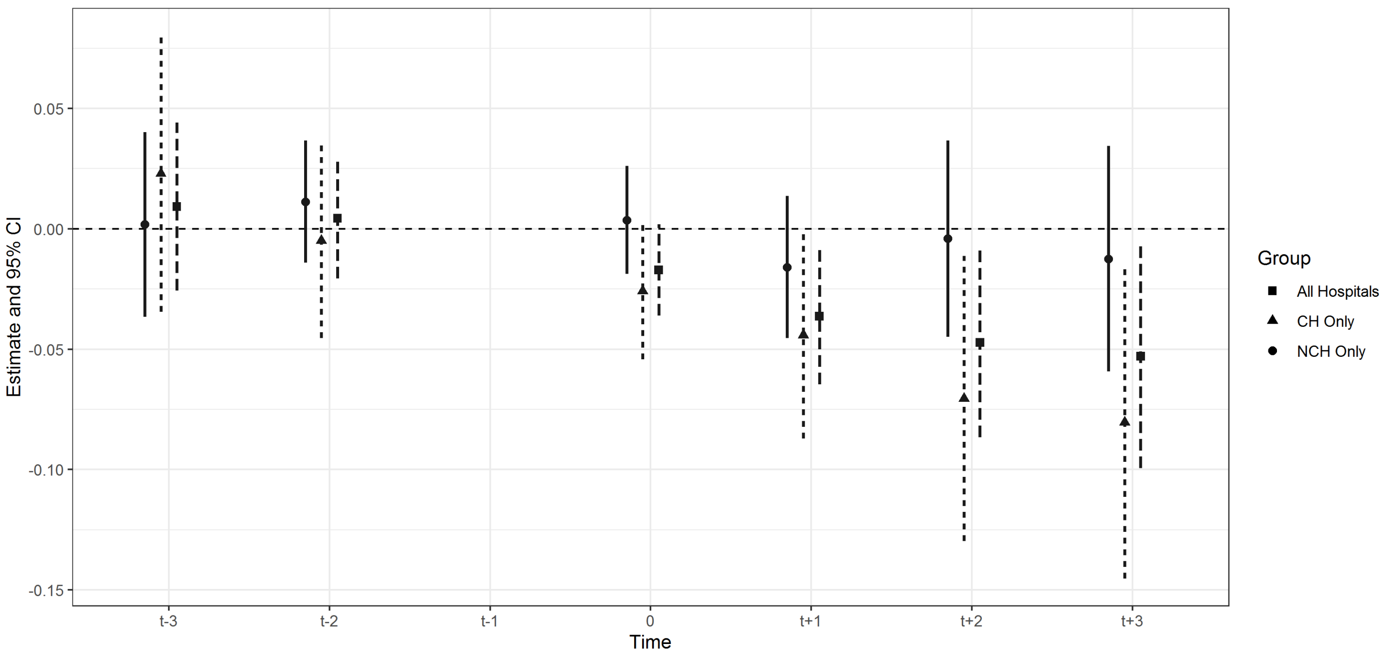


Figure 8: **NCH Entry Effects with Standard Event Study**

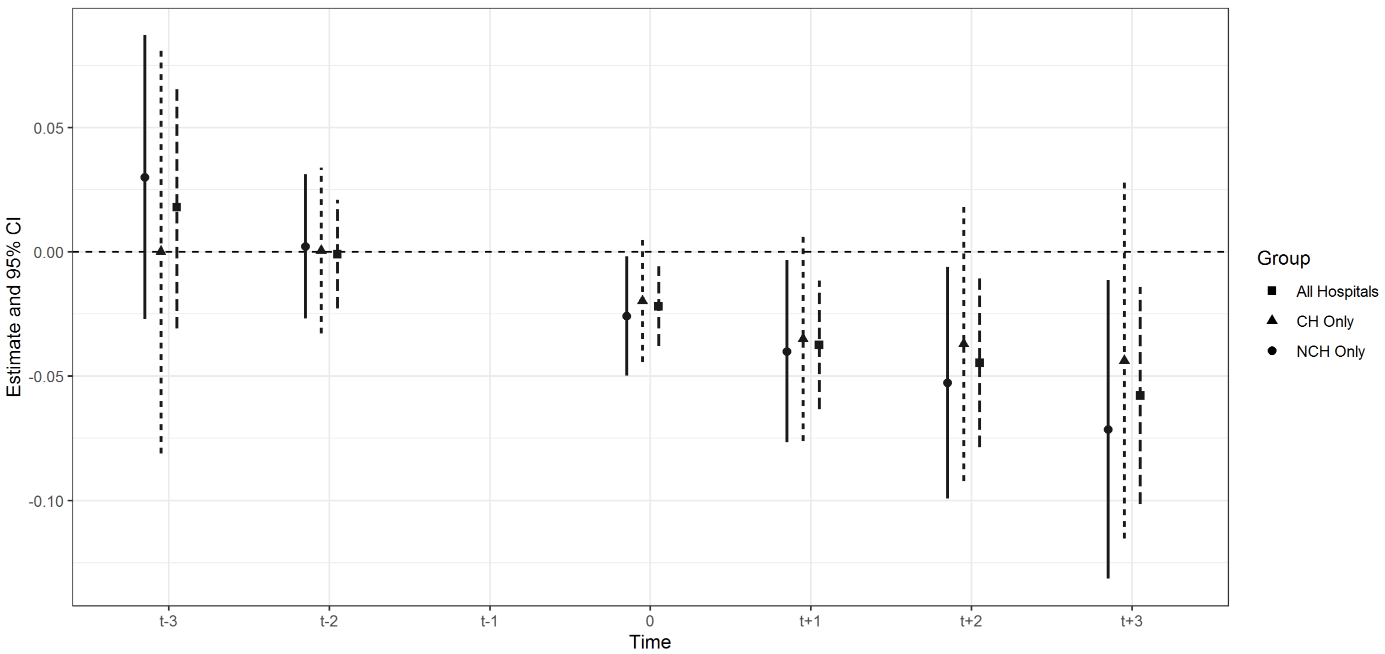


Figure 9: **CH Entry Effects Excluding Time-varying Controls**

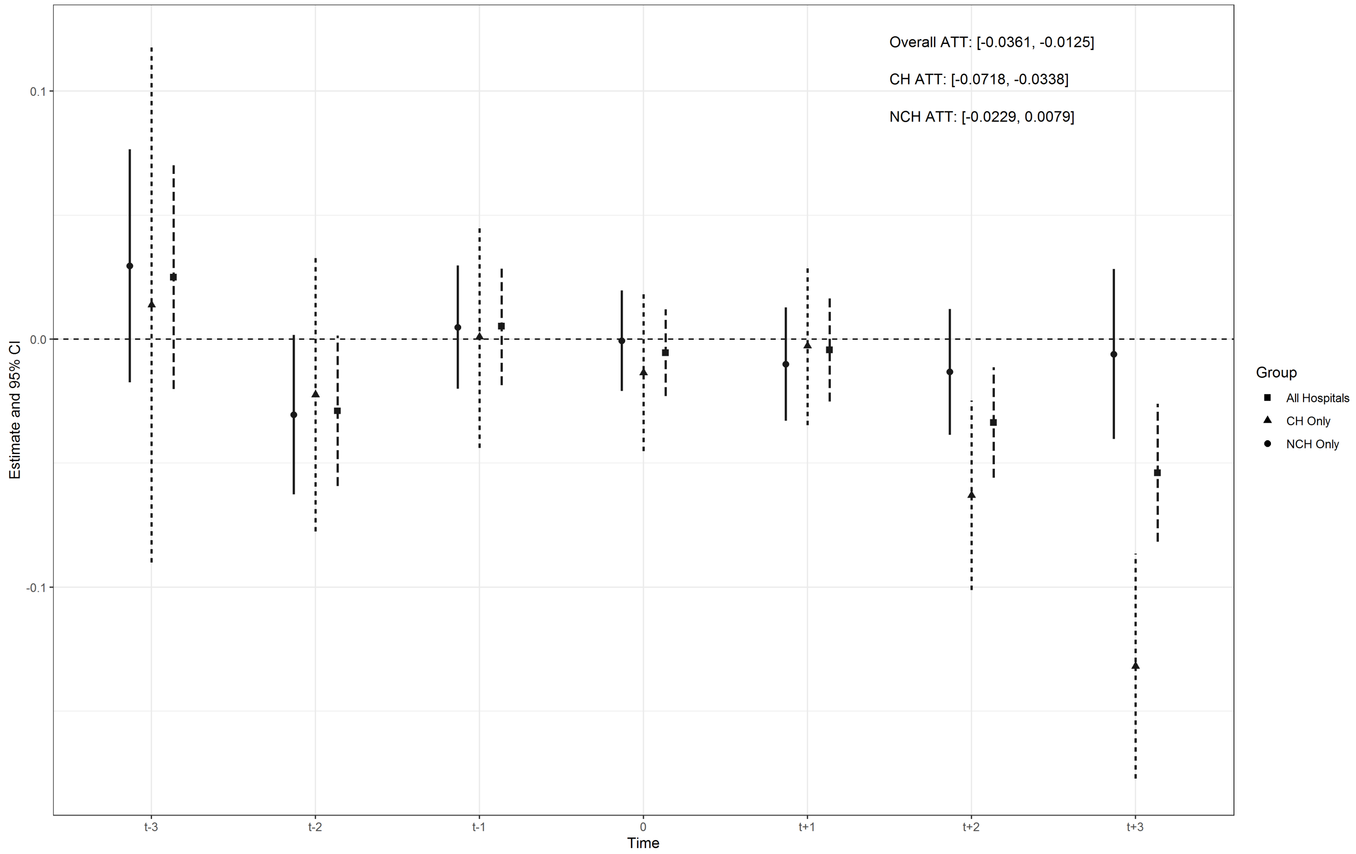


Figure 10: **NCH Entry Effects Excluding Time-varying Controls**

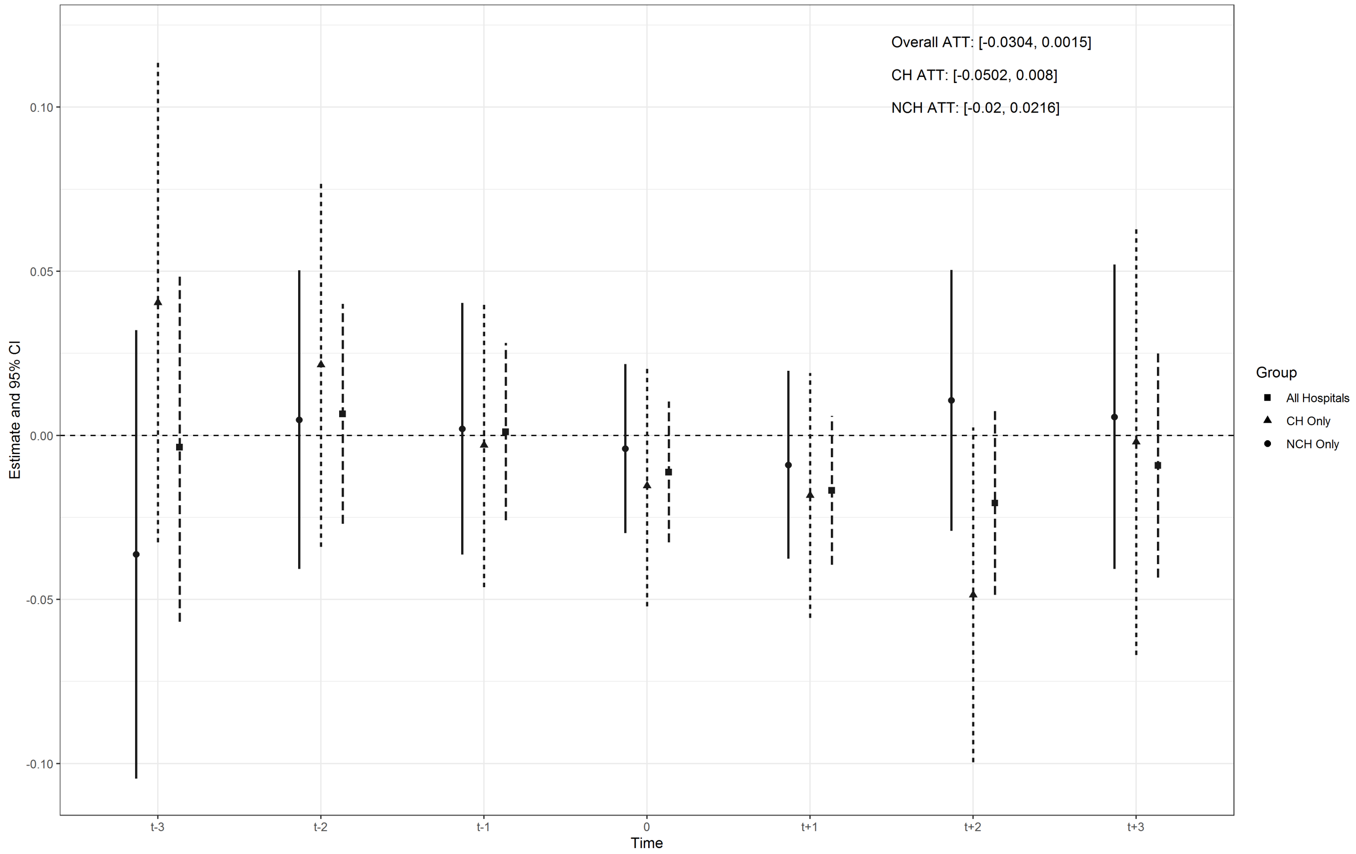
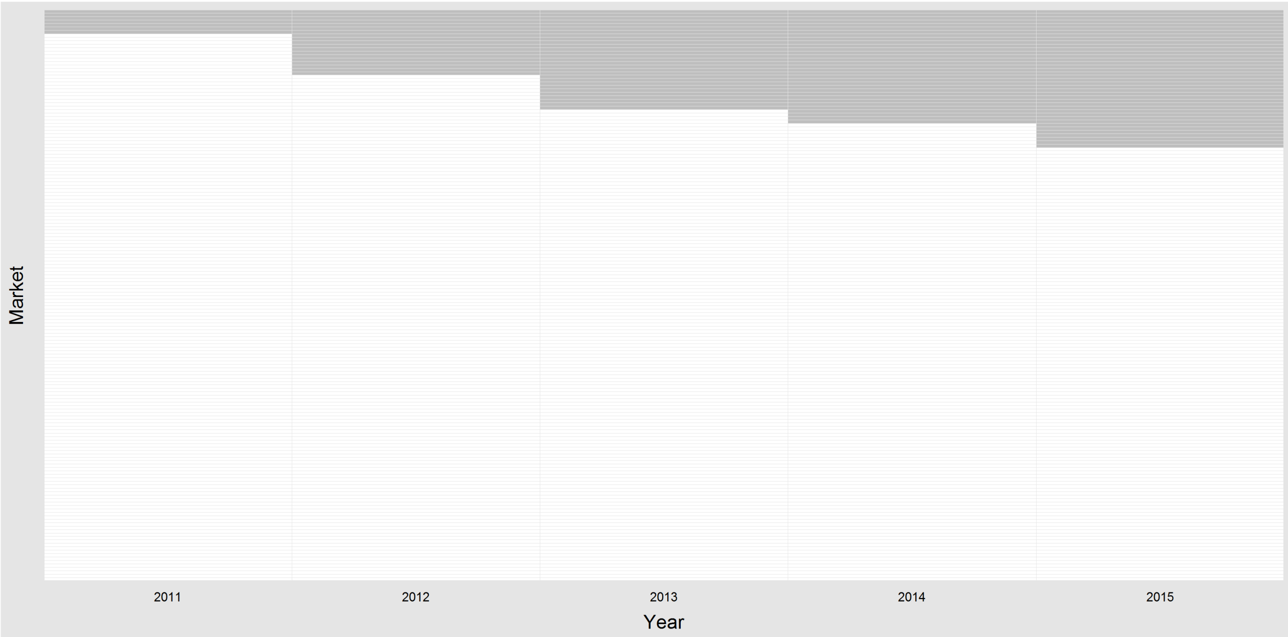
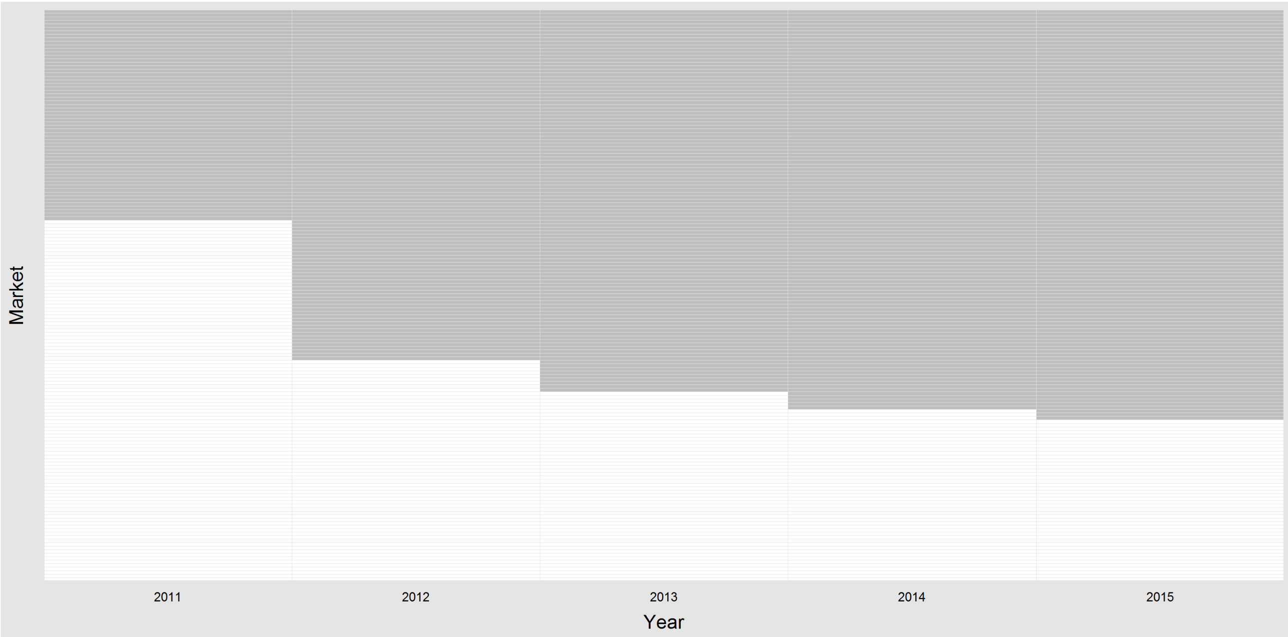


Figure 11: **CH Entry Events with Minimum 5-claim Threshold**[a]



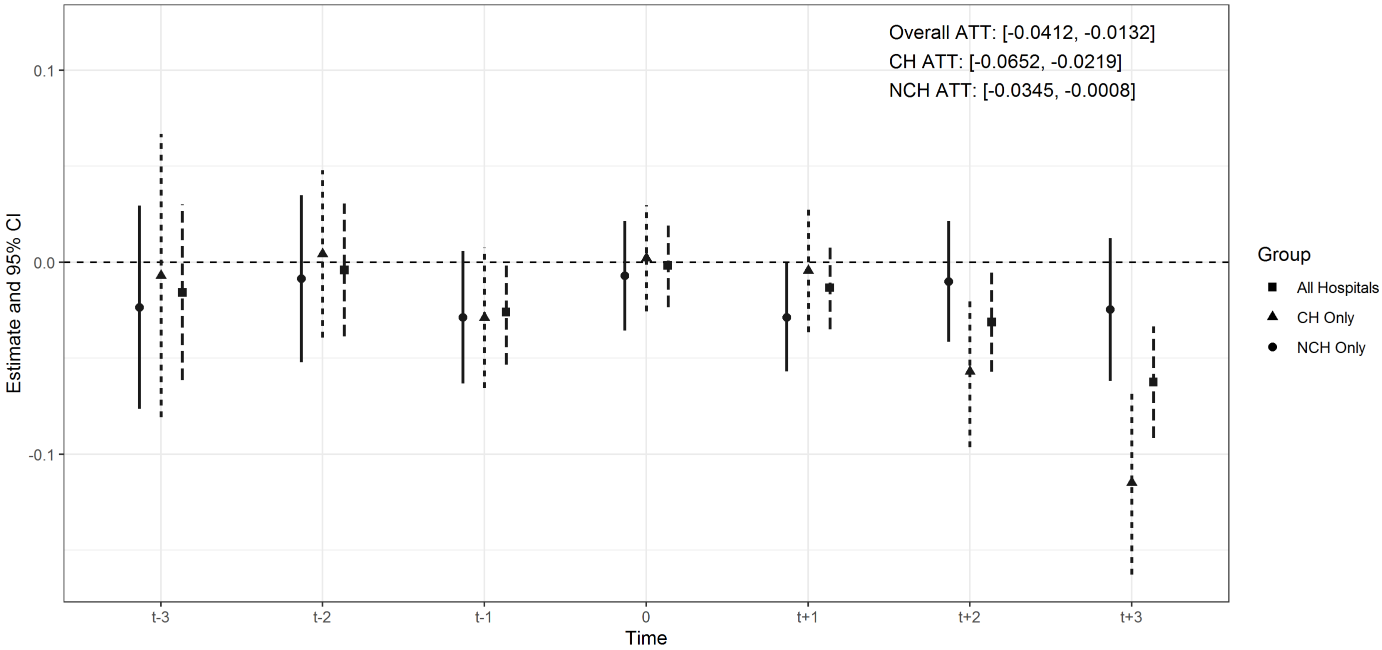
[a]Shaded markets reflect those experiencing entry of a new CH in the data, with entry defined and discussed in the main text.

Figure 12: **NCH Entry Events with Minimum 5-claim Threshold**[a]



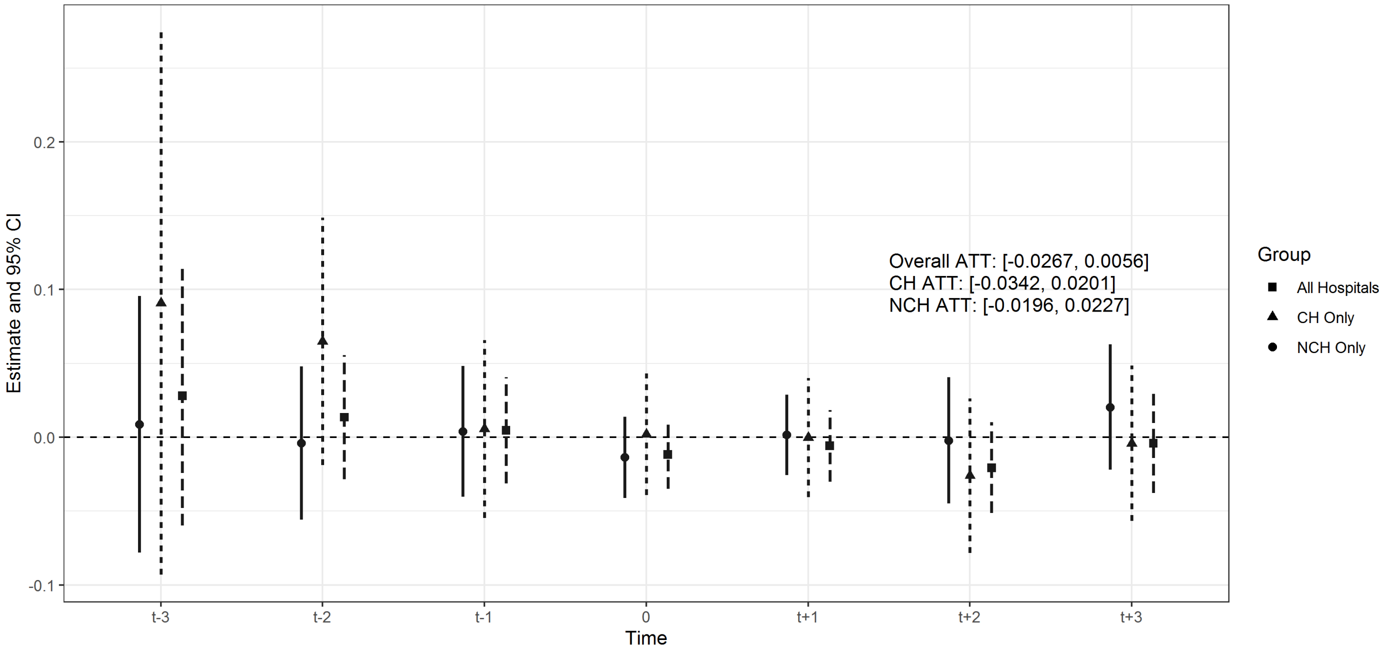
[a]Depiction of markets experiencing an entry of a non-children's hospital over time, where "entry" requires a hospital to have had at least 5 routine pediatric claims following a year in which we observed 0 such claims. Shaded markets reflect those experiencing entry.

Figure 13: **CH Entry Effects with Minimum 5-claim Threshold**[a]



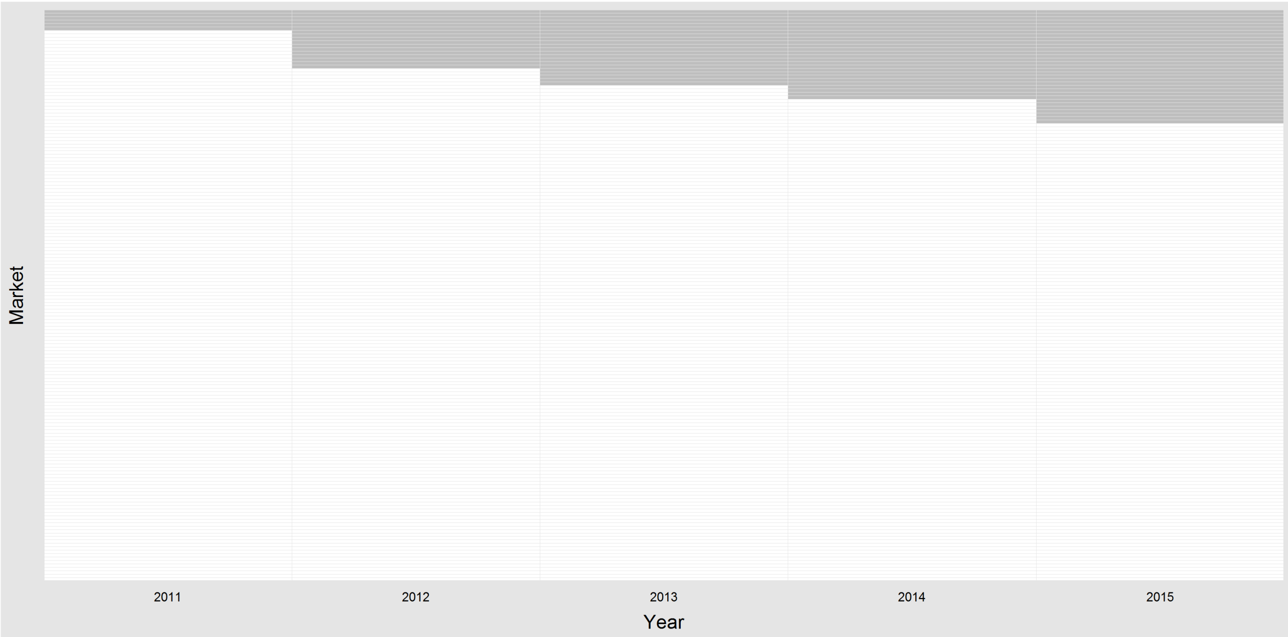
[a] Estimated treatment effects on price from entry of children's hospitals using a 10-claim threshold for identifying entry events. Dynamic treatment effects estimated using Callaway & Sant'Anna (2021), with our residualized price outcome as described in the main text.

Figure 14: **NCH Entry Effects with Minimum 5-claim Threshold**[a]



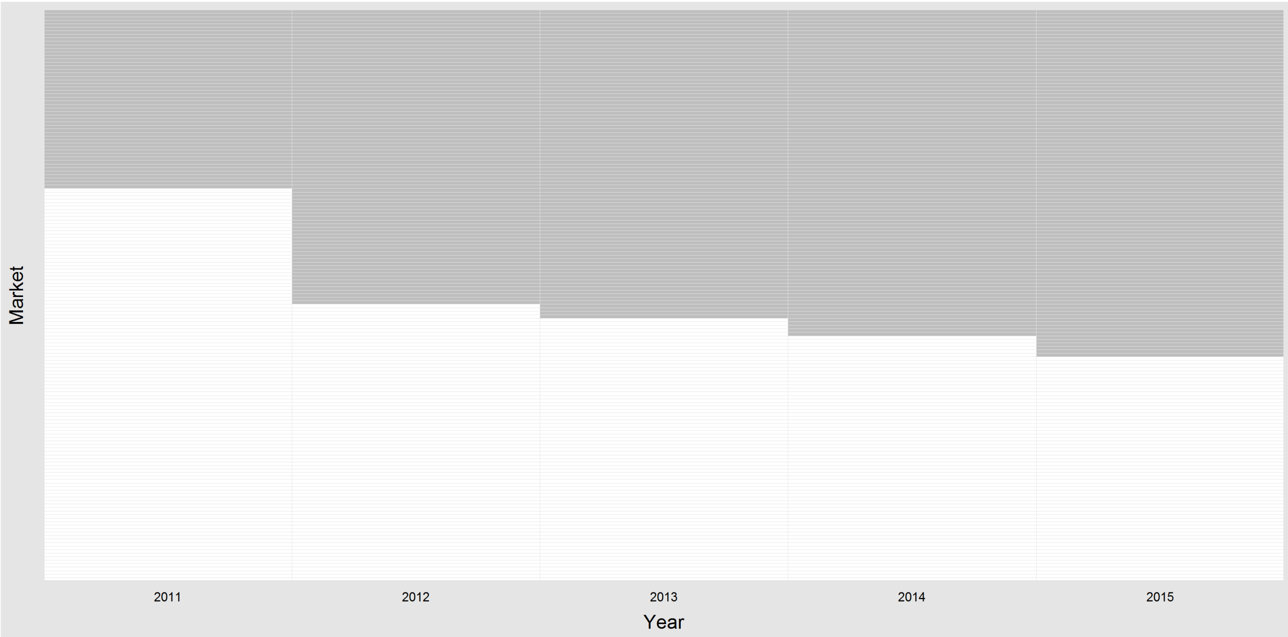
[a]Estimated treatment effects on price from entry of non-children's hospitals using a 5-claim threshold for identifying entry events. Dynamic treatment effects estimated using Callaway & Sant'Anna (2021), with our residualized price outcome as described in the main text.

Figure 15: **CH Entry Events with Minimum 10-claim Threshold**[a]



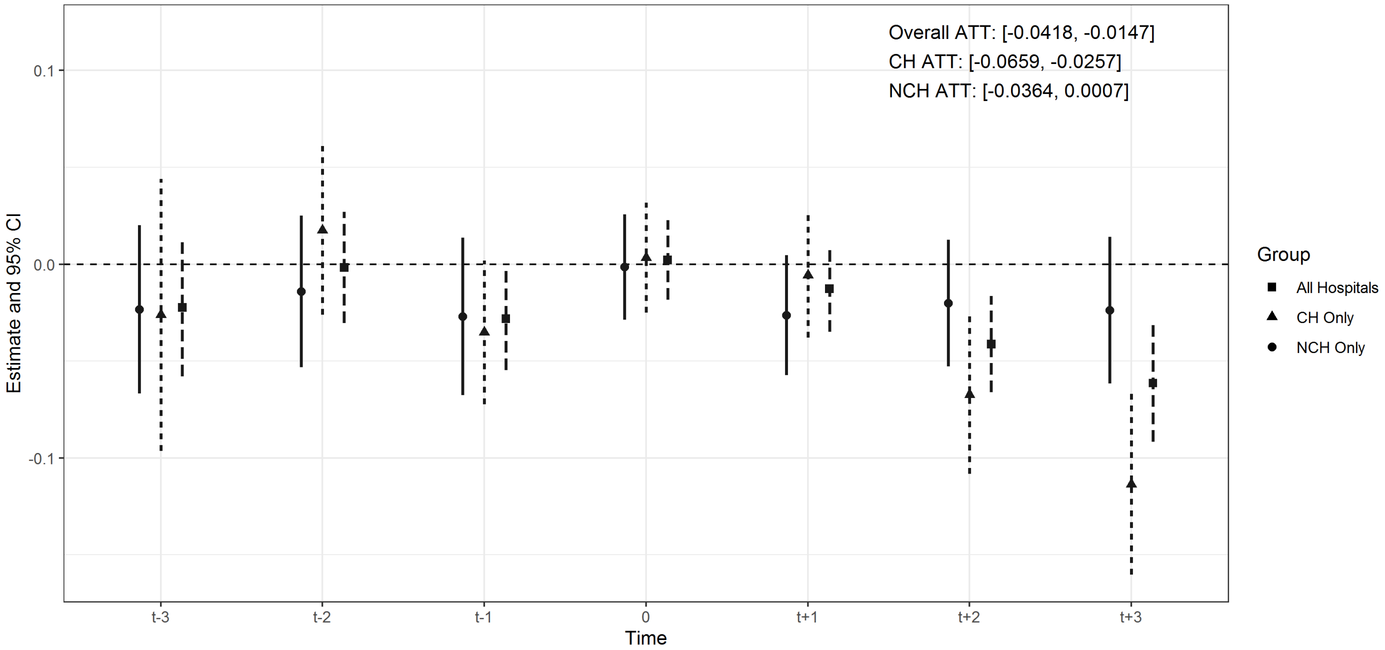
[a]Depiction of markets experiencing an entry of a children's hospital over time, where "entry" requires a hospital to have had at least 10 routine pediatric claims following a year in which we observed 0 such claims. Shaded markets reflect those experiencing entry.

Figure 16: **NCH Entry Events with Minimum 10-claim Threshold**[a]



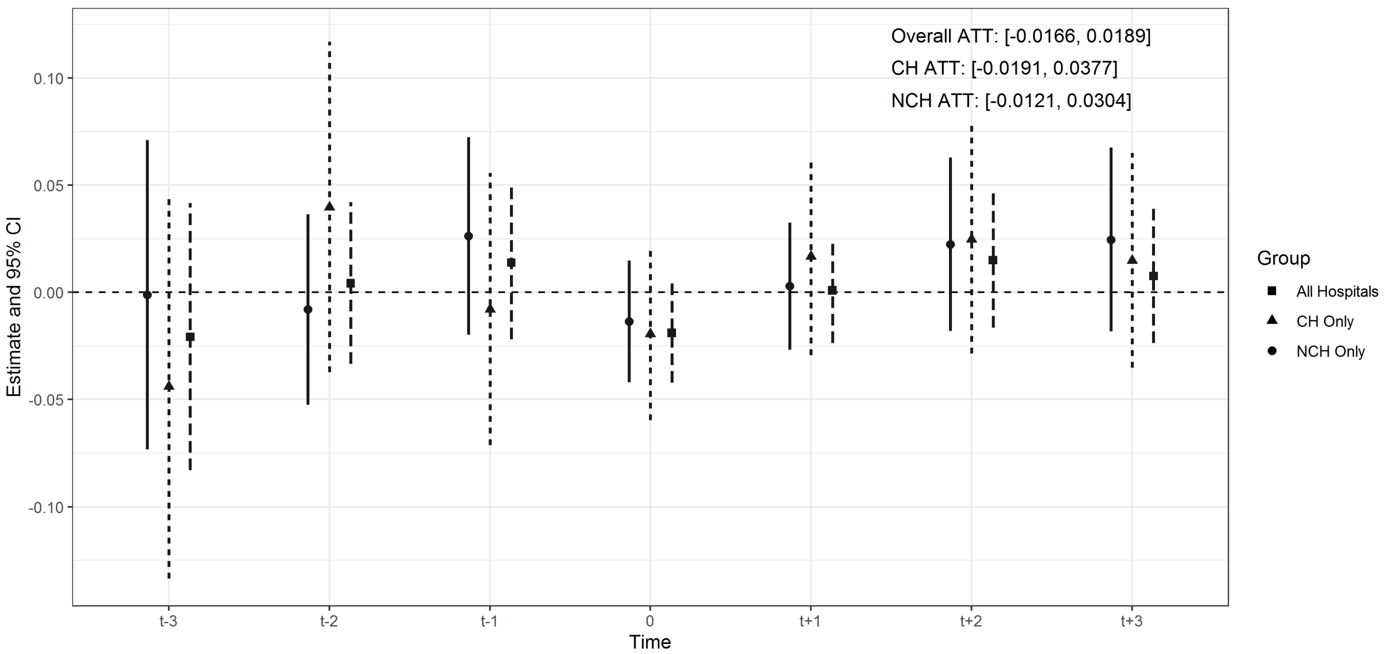
[a]Depiction of markets experiencing an entry of a non-children's hospital over time, where "entry" requires a hospital to have had at least 10 routine pediatric claims following a year in which we observed 0 such claims. Shaded markets reflect those experiencing entry.

Figure 17: **CH Entry Effects with Minimum 10-claim Threshold**[a]



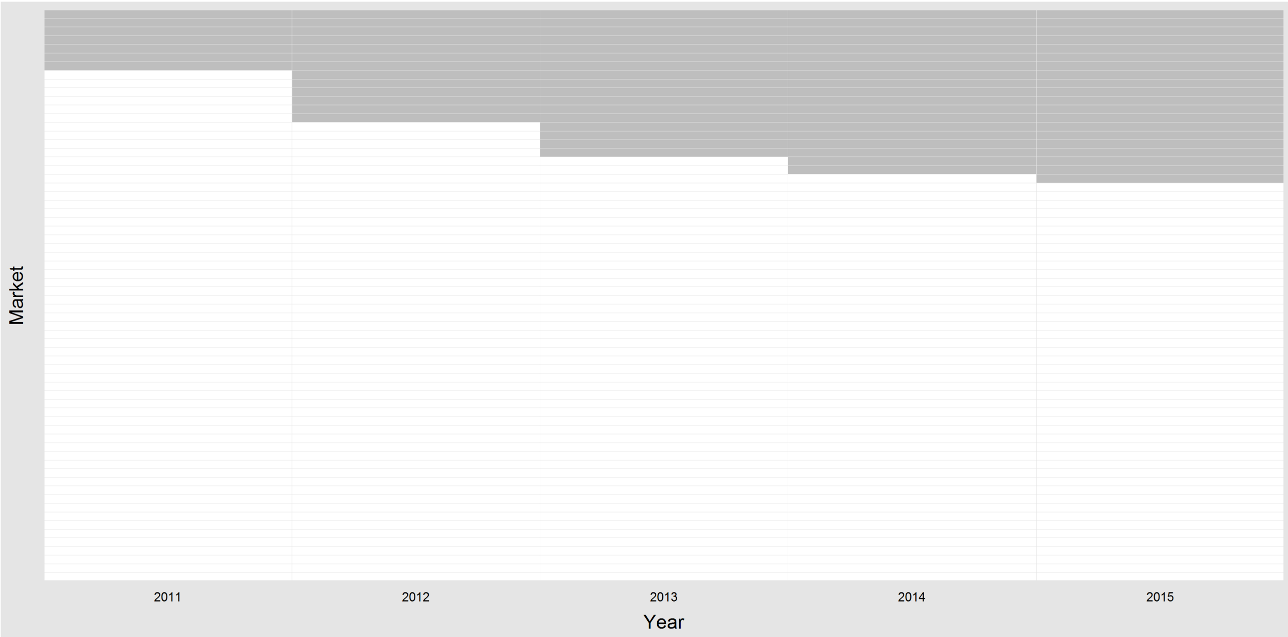
[a]Estimated treatment effects on price from entry of children's hospitals using a 10-claim threshold for identifying entry events. Dynamic treatment effects estimated using Callaway & Sant'Anna (2021), with our residualized price outcome as described in the main text.

Figure 18: **NCH Entry Effects with Minimum 10-claim Threshold**[a]



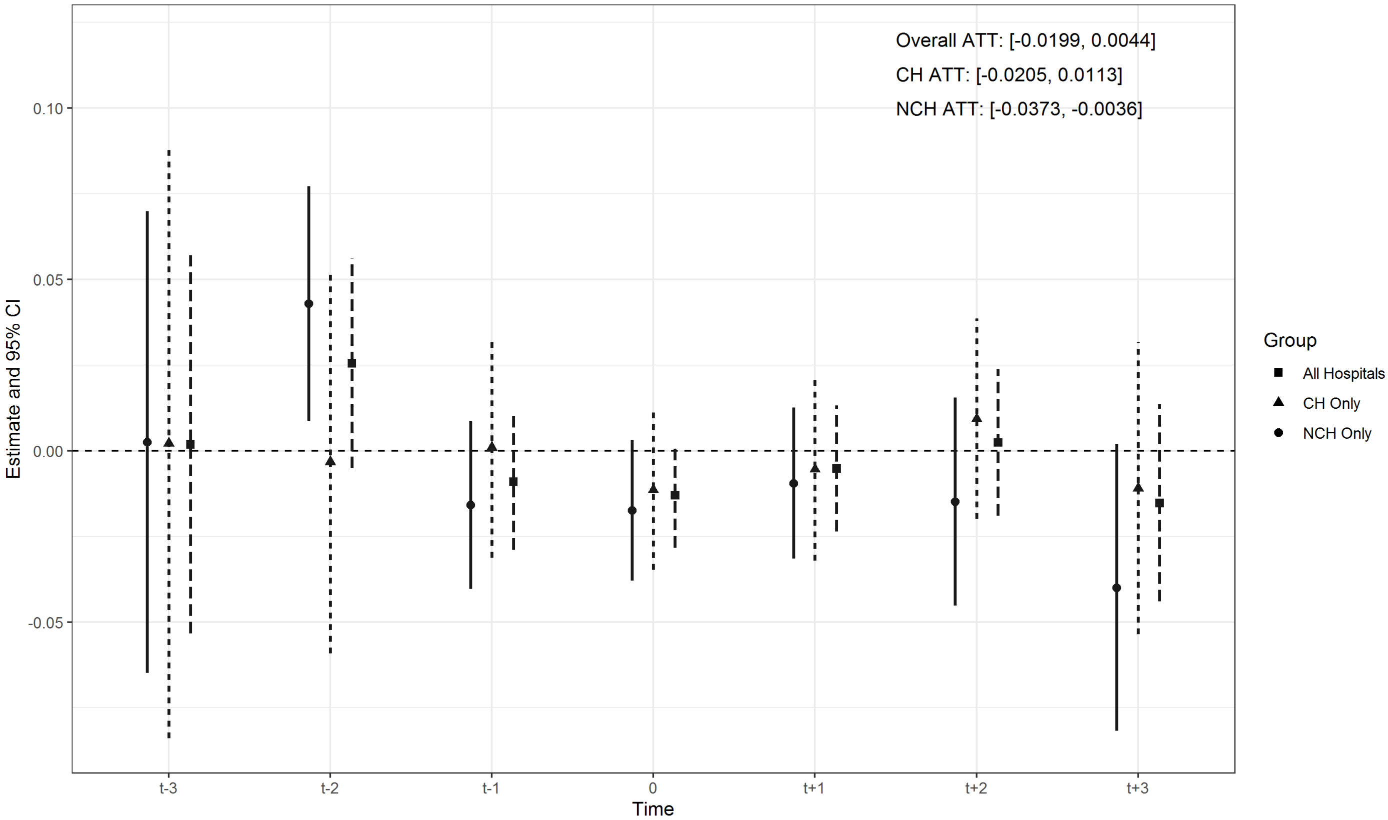
[a]Estimated treatment effects on price from entry of non-children's hospitals using a 10-claim threshold for identifying entry events. Dynamic treatment effects estimated using Callaway & Sant'Anna (2021), with our residualized price outcome as described in the main text.

Figure 19: **Expansion into Specialized Procedures** [a]



[a]Shaded markets reflect those experiencing expansion of a new hospital into a highly specialized procedure as defined and discussed in the main text.

Figure 20: **Effect of Expansion into Highly Specialized Procedures**[a]



[a]Dynamic treatment effects estimated based on Callaway & Sant'Anna (2021), as described in the main text.