

Module 1 Empirical Exercise

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In Module 1 Empirical Exercise, I aimed to examine if Medicaid expansion reduced hospital uncompensated care. Data on hospital uncompensated care were obtained from the Hospital Cost Report Information System. Hospital level characteristics were based on Provider of Services files. We linked these two data by provider id and year. Medicaid expansion information was obtained from Kaiser Family Foundation website. There were less than 0.1% of providers with typos in state code and I excluded them from the analysis. Several difference-in-differences approaches were used to assess how Medicaid expansion affected hospital uncompensated care. Overall, we found net decrease in hospital uncompensated care among hospitals in states that adopted Medicaid expansion. My findings were consistent with evidence from earlier studies.

Please refer to the 'readme' file and R codes for more information on the codes and analysis. The following Tables and Figures present results for several different approaches for difference-in-differences

Question 1

Table 1. Summary statistics for hospital total revenues and uncompensated care over time, 2003-2019.

Year	Mean	Standard error	Max	Min
Uncompensated care				
2003	13690686	32477090	777987403	-128490
2004	15348665	36636185	820253000	1
2005	17450120	37779732	939134000	1
2006	21191175	47661714	1074625000	-2667140
2007	23871966	51758532	1203374820	1
2008	26897133	57129777	1361805561	1
2009	28183155	48044025	583975318	1
2010	30113108	71871654	2793923000	1
2011	33993542	74815724	2057877941	-54937691
2012	37425483	86279858	1881083319	-1238052
2013	39397101	80720290	1812491128	-340144
2014	36688557	88356841	1989885799	-26451356
2015	33280795	86547353	2037430287	-529475
2016	45021881	401287334	20404447666	-36365
2017	40949195	102298386	2746877223	-27988
2018	38791523	99588006	2596866716	9091
2019	48866957	120646176	2639150267	-97789186
Hospital total revenues				
2003	196326538	339256311	4722758791	-1757898
2004	217080321	379301539	5525730727	154394
2005	237504259	419255621	6398553843	1
2006	262156614	464191949	7784094716	-104189
2007	285967931	508039610	8577046126	63650
2008	311419620	555982989	9293788259	4
2009	341731391	613291586	9846464732	119236
2010	366800221	660468141	10185415748	306861
2011	394095337	712561058	10572291195	-27582223
2012	417921710	765936313	11865320139	-11799711
2013	444045034	833240757	12751708196	94880
2014	477721391	904717771	13376352387	6624
2015	516938345	967475023	14143533186	9368
2016	560688971	1060093043	15618749067	84952
2017	602198589	1164505609	16863431079	124513
2018	651942046	1284264382	18677245214	282914
2019	706457120	1419791246	22000932119	3

Table 1 shows the summary statistics for hospital total revenues and uncompensated care over time. Overall, both numbers increased over time.

Question 2

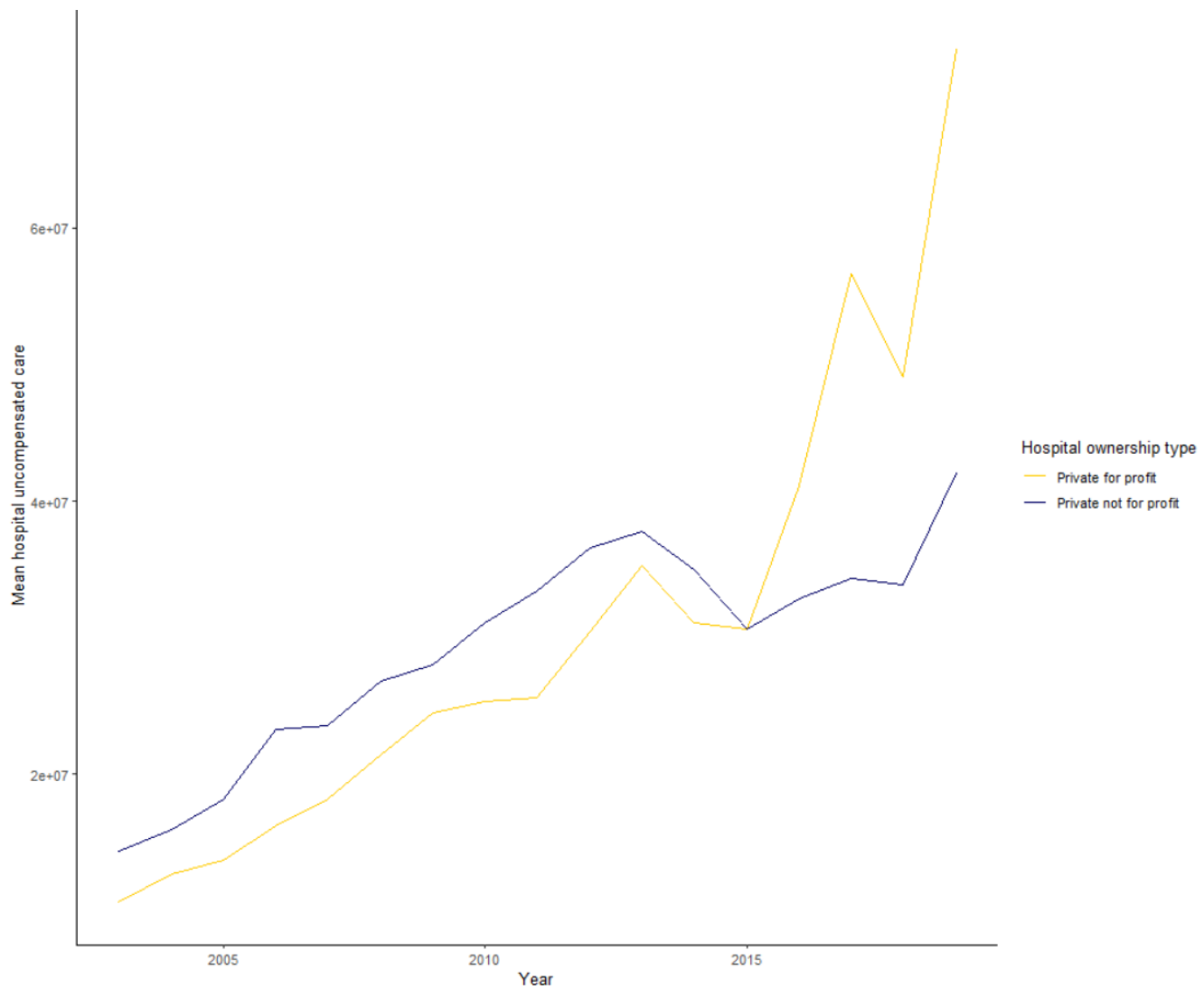


Figure 1. Mean hospital uncompensated care, by hospital ownership type, 2000-2018

Mean hospital uncompensated care increased over time for both for profit and not for profit hospitals, with greater increase observed for for-profit hospitals from Figure 1.

Question 3

For this question and all the following questions, states expanded Medicaid after 2019 was included as never treated group.

Table 2. The effect of Medicaid expansion on hospital uncompensated care, using a traditional two-way fixed effects (TWFE) estimation

Models	Estimates (SE)
Full sample	-31660943 (6282483)***
2014 expanded	-34520904 (6330346)***
2014 and 2015 expanded	-33025176 (6720678)***
2014-2016 expanded	-32475886 (6661130)***

*** indicates $p < 0.001$

The results indicated that there was a net decrease in hospital uncompensated care in Medicaid expansion states. The conclusion was the same in all these 4 models. Models with states that expanded Medicaid in 2014 as the treatment group and those that had never adopted Medicaid expansion as the control group had the largest effect estimate, indicating the greatest decrease among states expanded in 2014.

Question 4

Table 3a. The effect of Medicaid expansion on hospital uncompensated care, using event study, full sample.

Year	Estimates (SE)
Prior 16	20221821 (3727184)***
Prior 15	17471760 (3369313)***
Prior 14	17227890 (3590454)***
Prior 13	23481211 (4558595)***
Prior 12	19786302 (4775064)***
Prior 11	14081935 (2863789)***
Prior 10	12563180 (2182706)***
Prior 9	11813690 (1915603)***
Prior 8	12854692 (1888362)***
Prior 7	10629335 (2175712)***
Prior 6	9543853 (1856078)***
Prior 5	9322720 (3238610)*
Prior 4	5031341 (1722633)*
Prior 3	3985287 (2389728)
Prior 2	1212416 (1237947)
Enactment	-14106169 (4850184)*
Post 1	-1961889 (17004796)
Post 2	-40875220 (2940636)***
Post 3	-38781595 (6832951)***
Post 4	-42597115 (11106607)**
Post 5	-42245401 (4344947)***

*** indicates $p < 0.001$; ** indicates p in (0.001, 0.01]; * indicates p in (0.01, 0.05]

Table 3b. The effect of Medicaid expansion on hospital uncompensated care, using event study, including states expanded in 2014 and non-expansion states.

Year	Estimates (SE)
Prior 11	11356456 (1299165.3)***
Prior 10	11669416 (1336110.2)***
Prior 9	11886804 (1341875.5)***
Prior 8	13935062 (1473860)***
Prior 7	12317494 (1491042.1)***
Prior 6	10044837 (1408049.4)***
Prior 5	6899168 (1358628.6)***
Prior 4	5813359 (1158512.9)***
Prior 3	6054841 (437244.5)***
Prior 2	1171416 (237164.9)***
Enactment	-11426447 (255158.5)***
Post 1	-17439144 (366373.5)***
Post 2	-28442085 (482503.7)***
Post 3	-35578108 (775673.5)***
Post 4	-37676196 (1203392)***
Post 5	-48278785 (1479252.3)***

*** indicates $p < 0.001$; ** indicates p in (0.001, 0.01]; * indicates p in (0.01, 0.05]

From Table 3a, I found greater decrease in hospital uncompensated care in Medicaid expansion compared to non-expansion states except for the first year post Medicaid expansion. From Table 3b, I found greater decrease in hospital uncompensated care in Medicaid expansion compared to non-expansion states. Overall, Results from the event study suggested net decrease in uncompensated care in Medicaid expansion states.

Question 5

Table 4. The effect of Medicaid expansion on hospital uncompensated care, using Sun and Abraham approach, including states expanded in 2014-2016 and non-expansion states.

Year	Estimates (SE)
Prior 11-13	13912063 (3257061)***
Prior 10	12348300 (2962105)***
Prior 9	12586533 (3042671)***
Prior 8	13848848 (3633717)***
Prior 7	11932029 (3718852)**
Prior 6	10072691 (3622684)**
Prior 5	8966601 (3668705)*
Prior 4	5144834 (2825487).
Prior 3	5413387 (1951812)**
Prior 2	1144964 (1397632)
Enactment	-13090231 (3148765)***
Post 1	-6918949 (11255418)
Post 2	-31465814 (3541336)***
Post 3	-39158178 (4220759)***
Post 4	-42618879 (5474008)***
Post 5	-48279763 (4284818)***

From Table 4, I found greater decrease in hospital uncompensated care in Medicaid expansion compared to non-expansion states except for the first year post Medicaid expansion. Overall, Results from Sun and Abraham approach suggested net decrease in uncompensated care in Medicaid expansion states.

Question 6

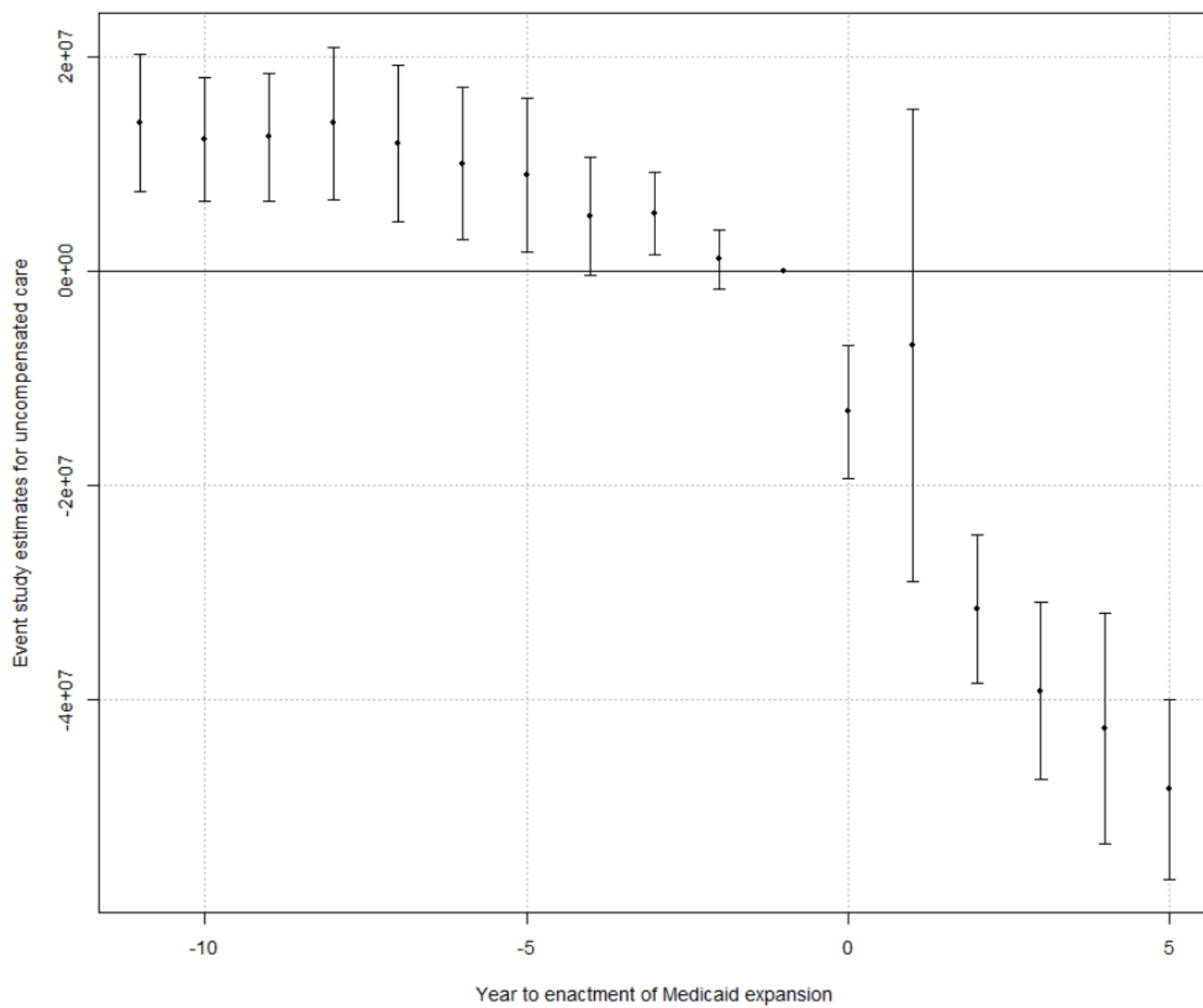


Figure 2. Event study of Medicaid expansion on hospital uncompensated care, using Sun and Abraham approach

Question 7

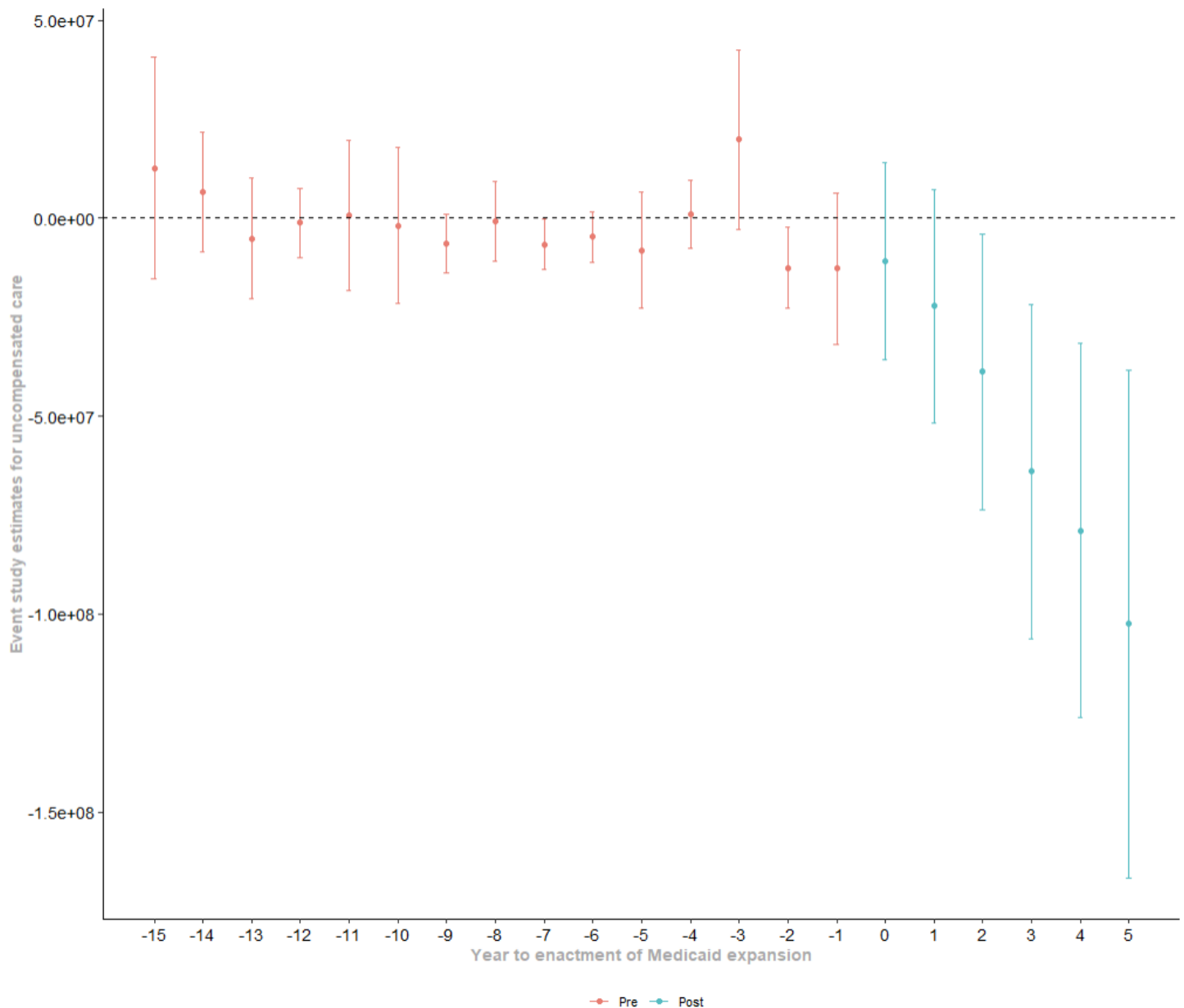


Figure 3. Event study of Medicaid expansion on hospital uncompensated care, using Callaway and Sant’Anna approach

From Figure 3, I found greater decrease in hospital uncompensated care in Medicaid expansion compared to non-expansion states except for the year when Medicaid expansion was implemented and the first year post Medicaid expansion. Overall, Results from Callaway and Sant’Anna approach suggested net decrease in uncompensated care in Medicaid expansion states.

Question 8

I kept on getting error for this question in R.

For type="smoothness", I got an error message: Error in { : task 1 failed - "attempt to apply non-function"

For type="relative_magnitude", I got an error message: Error in { : task 1 failed - "a dimension is zero"

Question 9

Overall, results from all the analysis showed greater decrease in hospital uncompensated care in Medicaid expansion compared to non-expansion states. The estimates differed when using different approaches.

The parallel trends assumptions may be violated when using the event study approach and Sun and Abraham approach (Tables 3a, 3b, and 4 and Figure 2) as the pre-Medicaid expansion estimates did not cover 0. There was no evidence on violation of parallel trends assumptions when using Callaway and Sant'Anna approach (Figure 3) as 0 was covered by the confidence intervals of pre-Medicaid expansion estimates.

Question 10

In general, I feel doing data cleaning for POS data is a little bit time consuming. Understanding these variables also took a while. More data cleaning will be needed for a real project. I also got an R error for question 8 and didn't know how to figure it out. I updated R to the most recent version but it still didn't work out. I think the sample codes from class slides are super helpful. Putting all these approaches together is also an interesting exercise.

I compare my results with previous studies and found that the findings were consistent and Medicaid expansion reduced hospital uncompensated care.

Young, Gary J., et al. "Impact of ACA Medicaid expansion on hospitals' financial status." *Journal of Healthcare Management* 64.2 (2019): 91-102.

Dranove, David, Craig Garthwaite, and Christopher Ody. "Uncompensated care decreased at hospitals in Medicaid expansion states but not at hospitals in nonexpansion states." *Health Affairs* 35.8 (2016): 1471-1479.