ECON 771 Module 1 Empirical Exercise

Due: September 23, 2022

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Question 1.

	Total Revenue				Uncompensated Care			
Year	Mean	SD	Min	Max	Mean	SD	Min	Max
2003	198.00	340.81	-1.76	4722.76	13.76	32.55	-0.13	777.99
2004	219.25	381.22	0.15	5525.73	15.39	36.68	0.00	820.25
2005	239.99	421.45	0.00	6398.55	17.47	37.80	0.00	939.13
2006	264.90	466.57	-0.10	7784.09	21.22	47.69	-2.67	1074.62
2007	289.09	510.77	0.06	8577.05	23.90	51.78	0.00	1203.37
2008	314.72	558.89	0.00	9293.79	26.92	57.15	0.00	1361.81
2009	345.55	616.57	0.12	9846.46	28.20	48.06	0.00	583.98
2010	370.20	663.48	0.31	10185.42	30.11	71.87	0.00	2793.92
2011	397.74	715.84	-27.58	10572.29	33.99	74.82	-54.94	2057.88
2012	422.21	769.73	-11.80	11865.32	37.46	86.32	-1.24	1881.08
2013	448.63	837.37	0.09	12751.71	39.40	80.72	-0.34	1812.49
2014	482.58	909.25	0.01	13376.35	36.72	88.40	-26.45	1989.89
2015	522.71	972.47	0.01	14143.53	33.28	86.55	-0.53	2037.43
2016	567.08	1065.74	0.08	15618.75	45.05	401.43	-0.04	20404.45
2017	608.39	1170.04	0.12	16863.43	40.98	102.33	-0.03	2746.88
2018	659.04	1290.58	0.28	18677.25	38.83	99.63	0.01	2596.87
2019	714.29	1426.95	0.00	22000.93	48.87	120.65	-97.79	2639.15

Table 1: Total hospital revenue and uncompensated care from 2003-2019 (millions of USD).

We can see from Table 1 that total hospital revenue grew steadily from 2003-2019, while uncompensated care grew steadily from 2003-2013 before fluctuated with no clear pattern. The data also seems to contain several outliers, such as the maximum of $20 trillion in uncompensated care in 2016 and negative minimum values throughout.

Question 2.

From Figure 1, we can see that for-profit and nonprofit uncompensated care grew at close to the same rate until 2013, then experienced declines from 2013-2015 before increasing from 2015-2019. Prior to the trend break, nonprofit uncompensated care was consistently around $2 million above for-profit uncompensated care, but for-profit uncompensated care grew much faster much faster after 2015 and is over $30 million higher than nonprofit uncompensated care in 2019.

Question 3.

We see from Table 2 that uncompensated care declined after expansion in all model specifications, but the magnitude of the effect differs depending on the group of adopters that we examine. We get the strongest negative result when examining the 2014 adopters against the never-treated

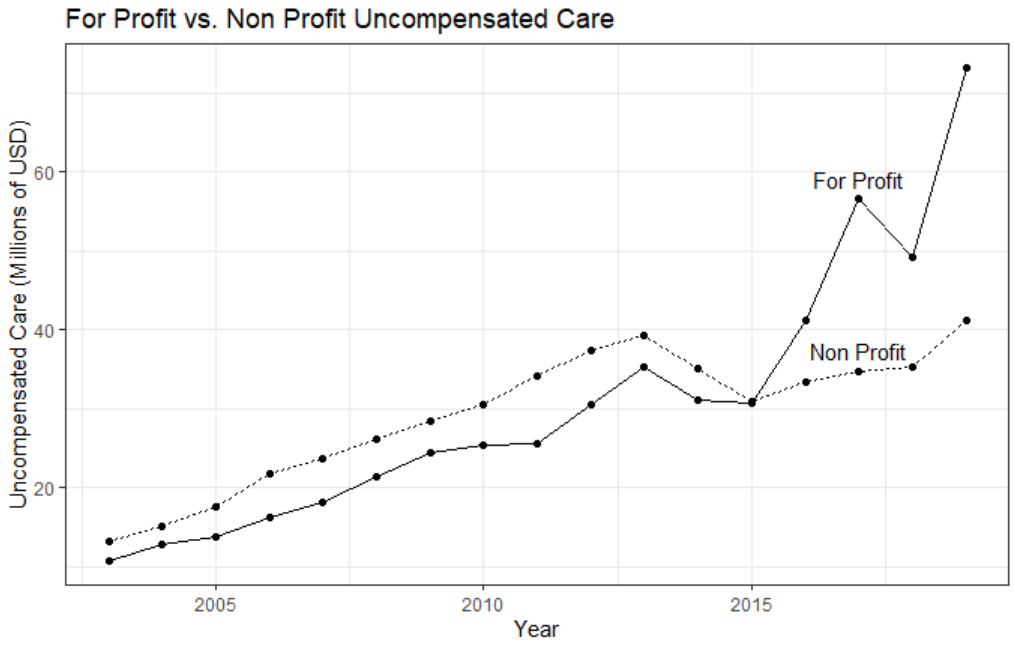

Figure 1: For-profit and not-for-profit uncompensated care over time.

	All	2014	2015	2016
Dependent:	Uncompensated Care (millions of USD)			
Treat	-32.47***	-34.42***	-30.48***	-25.37***
SE	(3.101)	(3.090)	(4.181)	(4.058)
Provider FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
SE Clustered	by provider			
Observations	42,755	37,405	20,701	19,125
R^2	0.37606	0.69578	0.34490	0.68612
Within R^2	0.00467	0.02783	0.00103	0.00207

Table 2: Two-way Fixed Effects Estimates

group, followed by the full sample of adopters against the never-treated group, the 2015 adopters against the never-treated group, and finally the 2016 adopters against the never-treated group.

Question 4.

Table 3 shows the traditional event study results for the full sample and a subsample of 2014 adopters with a never-treated control group. Both models show a positive trend three years before treatment and negative trends the year of treatment and two to five years after treatment. The 2014 adopters also experienced uncompensated care declines one year after treatment.

Question 5.

Table 4 shows the results of Sun and Abraham event studies for four samples: (1) Those who

Time to Treatment	Full Sample	2014 Adopters
-3 Years	8.810***	9.479***
	(2.499)	(2.821)
-2 Years	1.411	1.128
	(1.156)	(1.704)
Treatment	-14.201***	-11.434***
	(3.988)	(1.851)
+1 Year	-1.884	-17.471***
	(17.501)	(1.794)
+2 Years	-40.826***	-28.423***
	(12.273)	(2.255)
+3 Years	-38.834***	-35.541***
	(4.365)	(2.593)
+4 Years	-42.772***	-37.774***
	(5.354)	(3.201)
+5 Years	-42.314***	-48.320***
	(5.332)	(4.298)
n	42755	37405
AIC	513122.4	386610.3
BIC	513200.3	386687.1
RMSE	97.67	42.47
SE Clustered by	provider	provider
Provider FE	X	X
Year FE	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Traditional event study results for the effect of Medicaid expansion on uncompensated care (millions of USD).

adopted in 2014, 2015, or 2016 and the never-treated group, (2) the 2014 adopters and the never-treated group, (3) the 2015 adopters and the never-treated group, and (4) the 2016 adopters and the never-treated group. The results for the aggregated and 2014 samples are very similar to those from the traditional event studies. The 2016 adopters seem to respond similarly to the 2014 adopters, and the lack of significance one year after treatment in the aggregated sample seems to be driven by the 2015 adopters (Alaska, Indiana, and Pennsylvania).

Question 6.

Figure 2 shows the results of the Sun & Abraham event study for the aggregated 2014, 2015, and 2016 adopters. Separate plots for each adoption year are located at the end of the document, and once again show that the 2015 adopters are driving the null result one year after treatment in the aggregated sample.

Question 7.

Time to treatment	Aggregated	2014	2015	2016
-3 Years	8.986***	9.478***	14.086***	4.939
	(2.573)	(2.821)	(3.682)	(4.792)
-2 Years	1.898	1.128	2.904	-2.594
	(1.245)	(1.704)	(2.401)	(2.527)
Treatment	-13.646***	-11.434***	-26.584	-11.657***
	(3.161)	(1.851)	(25.430)	(2.569)
+1 Year	-7.470	-17.470***	79.730	-34.893***
	(11.303)	(1.794)	(95.234)	(4.546)
+2 Years	-32.074***	-28.422***	-51.870*	-37.564***
	(3.575)	(2.255)	(25.052)	(4.771)
+3 Years	-39.724***	-35.540***	-63.037*	-52.407***
	(4.260)	(2.593)	(31.819)	(5.484)
+4 Years	-43.322***	-37.773***	-80.466*	
	(5.514)	(3.201)	(38.449)	
+5 Years	-48.976***	-48.320***		
	(4.349)	(4.298)		
n	41512	37404	20700	19124
AIC	499147.9	386600.9	262634.3	206664.9
BIC	499225.6	386677.7	262697.8	206719.9
RMSE	98.78	42.47	137.62	53.73
SE Clustered by	provider	provider	provider	provider
Provider FE	X	X	X	X
Year FE	X	X	X	X

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Sun & Abraham event study results for the effect of Medicaid expansion on uncompensated care (millions of USD)

Figure 3 shows the Callaway & Santa'Anna results for the full sample (any adoption year vs. the never-treated group). In this model specification we did not cut off the pre-treatment period at -3 years, but instead included each year in the pre-treatment period separately. This resulted in a much cleaner (i.e., close to zero) pre-trend. The results are largely the same as those for the other model specifications, with declining uncompensated care each year after treatment except the first year. Examining Figure 3 at the end of the document, we can see that the first year after treatment shows a significant negative effect in a subsample with only the 2014 adopters and the never-treated group, once again suggesting that the null result in the full sample is driven by the 2015 adopters.

Question 8.

I look forward to seeing the answer to this question!

Question 9.

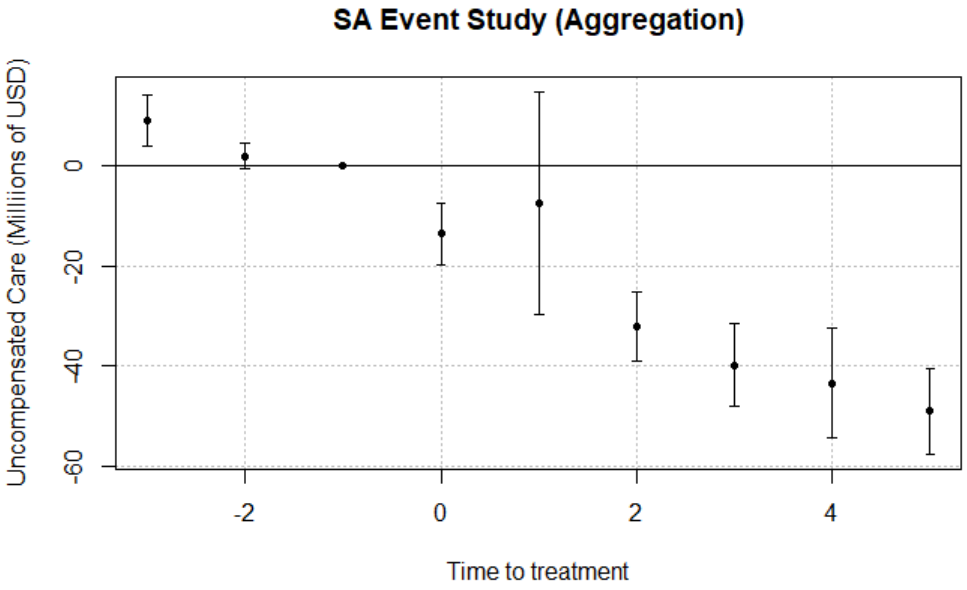

Figure 2: Sun & Abraham Event Study for 2014, 2015, and 2016 adopters

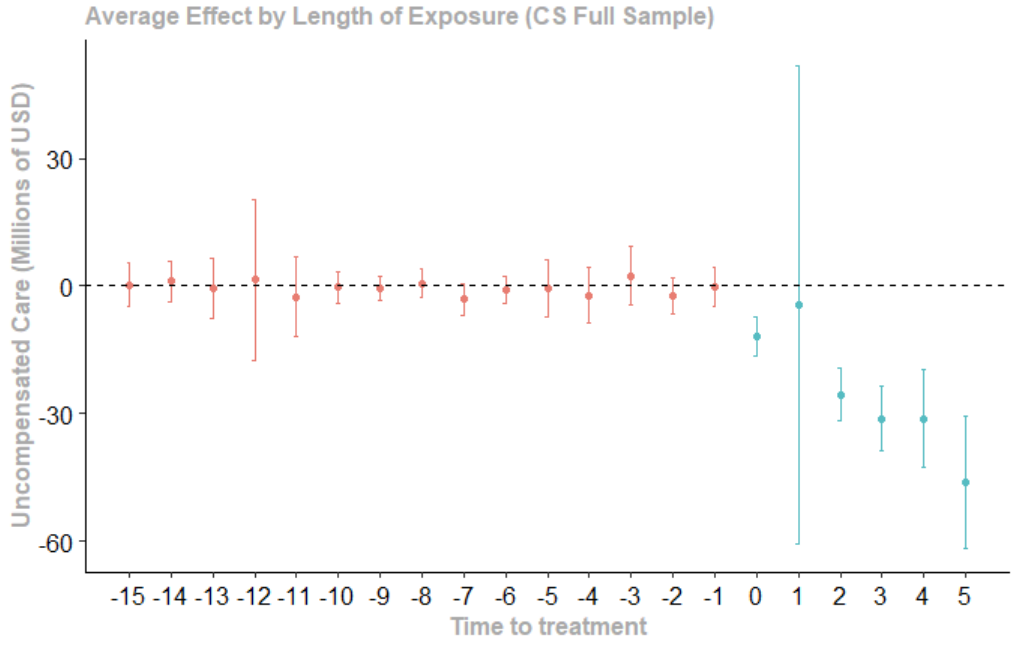

Figure 3: Callaway & Sant'Anna estimates of the effect of Medicaid expansion on uncompensated care (full sample).

The results were quite robust across the different specifications and estimators, but did vary depending on the year of adoption, especially among the 2015 adopters. Medicaid expansion seems to have a significant negative effect on uncompensated care for all years during and after expan-

sion except among the 2015 adopters, who experience a delay of two years after adoption before experiencing uncompensated care decreases. All specifications except Callaway & Sant'Anna seem to show a plausible continuous decline throughout the pre- and post-treatment periods, but I believe this is due to cutting off the pre-treatment period at three years before treatment for those specifications, not a true underlying trend. The plot from Callaway & Sant'Anna contains more pre-treatment periods and visually seems far less likely to have a continuous trend throughout the observation period.

Question 10.

I enjoyed this assignment! I use Stata far more frequently than I use R, so it's been interesting, albeit somewhat challenging, to figure out best practices, especially for creating/exporting tables and figures. I certainly still have room to improve before having a consistent, easily replicable workflow in R, but I'm sure the remaining empirical exercises will get me closer to that goal. The most difficult portion of the assignment was the sensitivity analysis in Question 8, largely due to my unfamiliarity with that depth of coding (non-CRAN packages, user-written functions, etc.). Importing and cleaning the data was more straightforward than I expected thanks to your GitHub repositories, which was a pleasant surprise. Looking back I wish I extended the pre-treatment period in most of my analyses, which I believe would ease most of the doubts about a continuous downward trend throughout the observation period. I also wish I started a bit earlier so I wouldn't get this 10% late penalty, but you live and you learn. Thanks!

Additional Figures

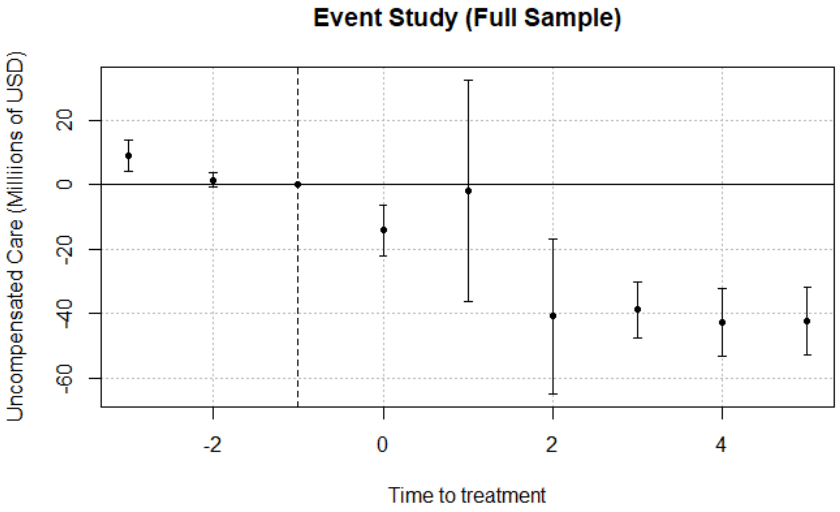

Figure 4: Traditional event study with full sample.

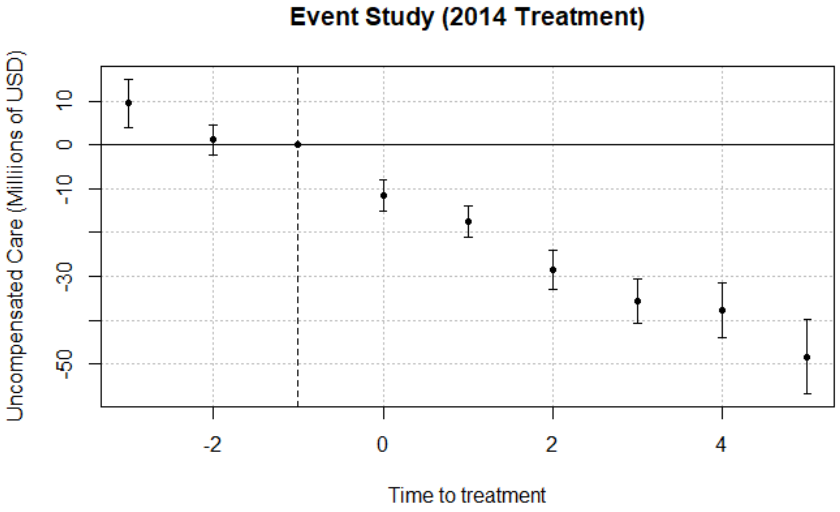

Figure 5: Traditional event study with subsample of 2014 adopters.

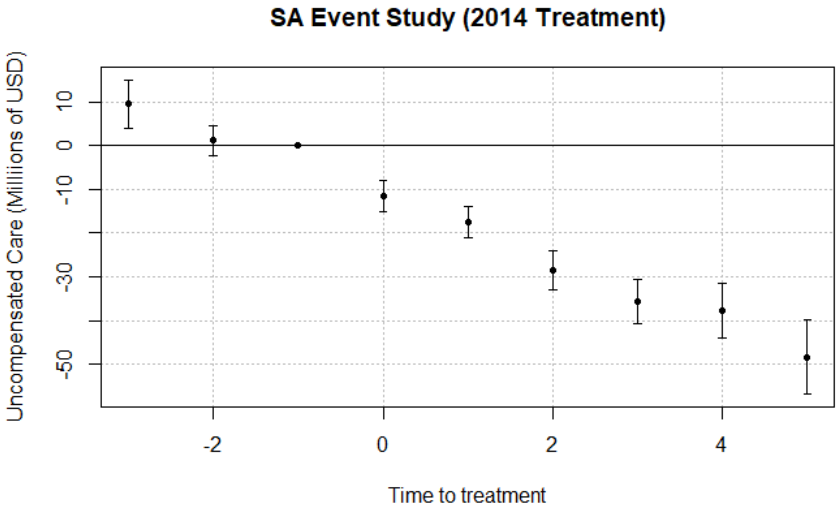

Figure 6: Sun & Abraham event study for subsample of 2014 adopters.

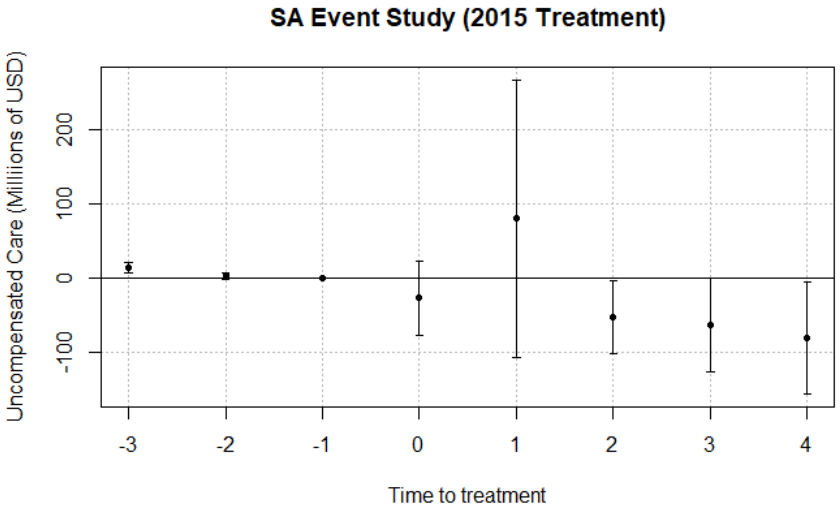

Figure 7: Sun & Abraham event study for subsample of 2014 adopters.

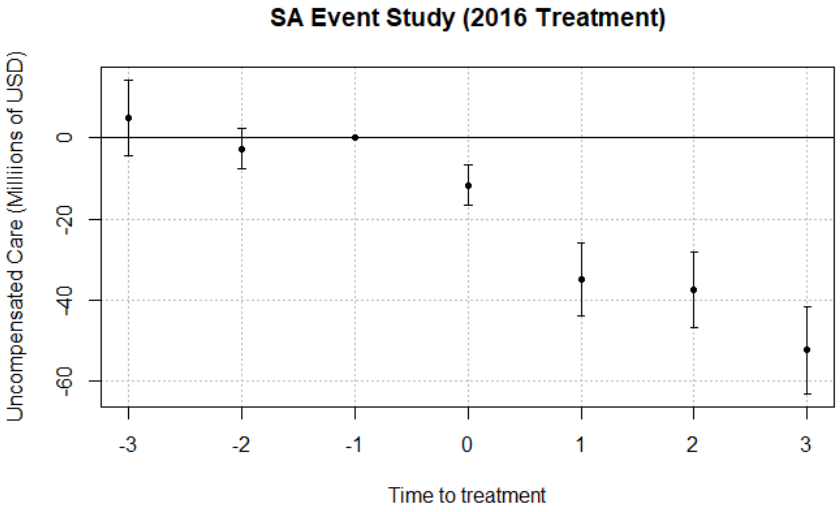

Figure 8: Sun & Abraham event study for subsample of 2014 adopters.

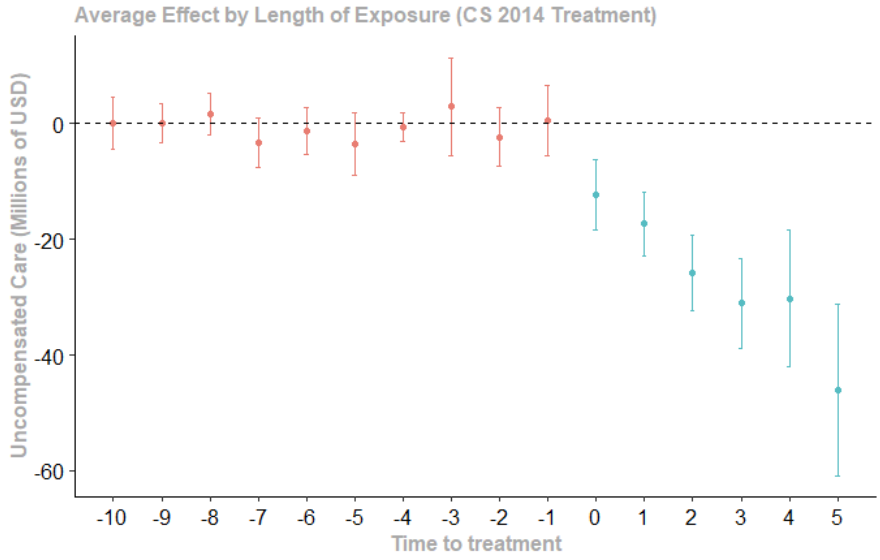

Figure 9: Callaway & Sant'Anna estimates for subsample of 2014 adopters.