Econ 717 Problem Set 3

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Questions 1-8

Table 1. Regression results for questions 3-8

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Q3	Q4a	Q4b	Q5	Q6	Q7	Q8
mlda21	-3.150	-9.293***	8.886***	5.755	5.755***	1.165	
	(1.975)	(1.323)	(2.328)	(4.764)	(1.669)	(2.990)	
placebo82							9.325**
							(4.015)
Constant	45.32***	62.77***	45.74***	57.52***	57.52***	56.98***	59.14***
	(1.845)	(1.833)	(4.539)	(4.779)	(3.514)	(3.369)	(2.464)
Observations	651	651	651	651	651	336	237
R-squared	0.004	0.500	0.238	0.691	0.691	0.769	0.808
Year FE	No	Yes	No	Yes	Yes	Yes	Yes
State FE	No	No	Yes	Yes	Yes	Yes	Yes
Cluster	No	No	No	Yes	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1 shows the regression output for the regressions estimated in question 3-8. In the Q3 column, we can see the output when the only regressor is the minimum drinking age with no state or year fixed effects. In the Q4a column, I have included year fixed effects, and in the Q4b column I have included state fixed effects. The Q5 column includes both state and year fixed effects as well as a state cluster, and the Q6 column also includes state and year fixed effects but no state cluster. Finally, the Q7 column only includes observations before 1990, and the Q8 column uses the 1982 placebo indicator in lieu of the minimum drinking age. All of the regressions used robust standard errors.

The first three columns illustrate how the estimated impact of the minimum drinking age on traffic fatalies changes dramatically once year and state fixed effects are introduced, indicating that

*I have discussed this problem set with Emily Case, Danny Edgel, and Alex von Hafften.

these provide meaningful detail to the specification. In the columns for Q5 and Q6, we can see the impact that adding state clusters has. The point estimates for Q5 and Q6 are very similar, but in Q5 the state clusters make the standard errors notably smaller, so much so that the estimated impact of the minimum drinking age on traffic fatalies is statistically significant with the state clusters and not statistically significant without them. In Q7 we only included observations from before 1990, where we can see that the estimated impact of the minimum drinking age on traffic fatalies becomes much smaller, and it is not statistically significant. This indicates that much of the estimated treatment effect in previous questions is caused by later years of data, well after the minimum legal drinking age changed. Finally, in Q8 we include a placebo for the pre-period. In this we can see that the placebo effect is large and positive, but it is not statistically significant at the 95% confidence level.

Questions 9-10

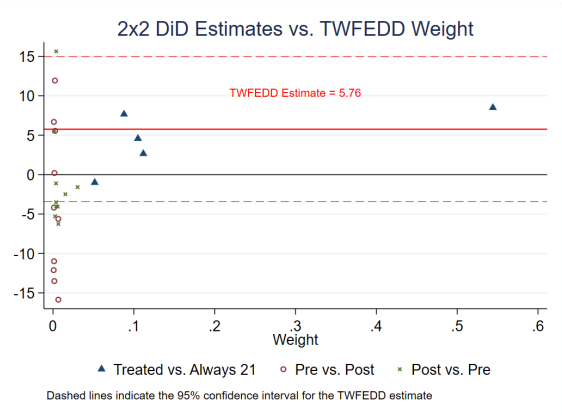
Table 2. Regression results for questions 9-10

	(1)	(2)	(3)	(4)
VARIABLES	MD Only	MI Only	MD Only	MI Only
mlda21	7.652*	-1.006		
	(3.915)	(3.746)		
mlda21_early			3.757	-10.10***
			(3.014)	(2.232)
mlda_later			8.472*	0.576
			(4.202)	(4.233)
Constant	56.87***	65.80***	64.52***	64.79***
	(1.306)	(1.083)	(3.587)	(3.624)
Observations	403	403	403	403
R-squared	0.719	0.716	0.719	0.720
Year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Cluster	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In questions 9 and 10, we estimated the impact of the "voluntary" treatment states, Maryland and Michigan, using states that were always treated as the control group. As we can see, Maryland has a large positive treatment effect, but it is not statistically significant at the 95% confidence level. Michigan has a relatively small and negative effect, which is also statistically insignificant. In question 10, we broke the the treatment dummy into two groups for early and late years of treatment. We can see that in Michigan, there was a large and statistically significant effect in the early years, however the treatment is small and insignificant in later years. This may indicate that the treatment effect wanes over time.

Bonus



The graph above summarizes the results of the Goodman-Bacon decomposition. This plots in the individual 2x2 DiD treatment effect estimates against the weight that the two-way fixed effects difference in differences (TWFEDD) specification assigns them in calculating the estimate. As we can see, the Pre vs. Post observations are have a large range of treatment effect estimates, but these have very low weight in the specification. The Post vs. Pre estimates have a narrower range of values closely concentrated around 0, but these also have a lower weight. The Treated vs. Always 21 group has more values around the point estimate of 5.76, and these observations have higher weights. As a result, the TWFEDD estimate is largely due to the Treated vs. Always 21 group, which indicates that changing the minimum drinking age to 21 had an inconclusive effect on traffic fatalities.