Homework 4

Economics 7103

February 12, 2024

1 Python

1.1

Visually inspect the bycatch by month before and after treatment for treated and control groups by creating a line plot for months in 2017 and 2018. Does it appear that there are parallel trends before treatment?

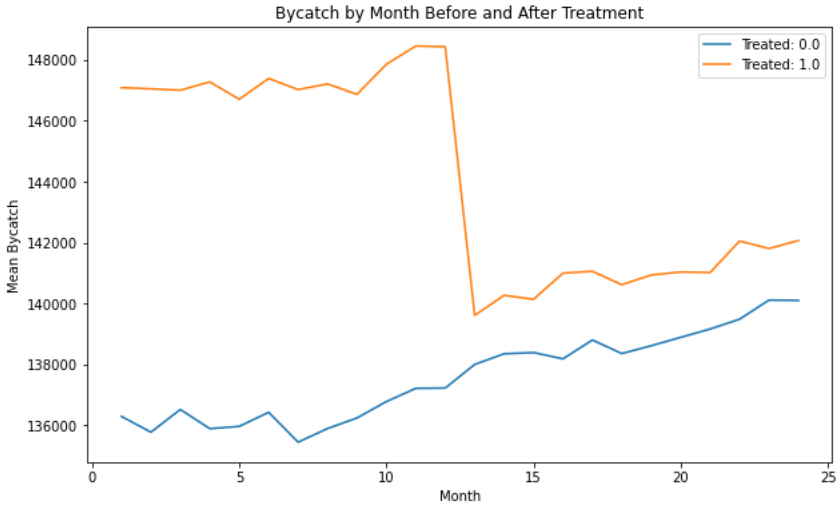

Figure 1: Line plot of treatment and control group for years 2017 and 2018.

The trends appear relatively parallel before treatment.

1.2

Estimate the treatment effect of the program on bycatch using the sample analog of the population difference-in-differences for treatment and control groups in December 2017 and

January 2018. Simply report the estimate without a standard error. What is the intuition of the estimator?
Difference-in-Differences Estimate: -9591.349503863748. The intuition of this estimator is that the treatment led to a 9591 pound/ month decrease in bycatch for the treatment group relative to the control group after controlling for the otherwise expected trend for the treatment group.

1.3

Estimate the treatment effect using the following regression specifications and report all coefficients, standard errors (or confidence intervals), and observations in a single table.
a Estimate the treatment effect of the program on bycatch using a regression-based two-period difference-in-differences estimator.
I think I specified this incorrectly.
b Suppose you would like to use the full monthly sample to improve on what you did in the previous question. Using the full monthly sample, estimate the treatment effect of the program on bycatch using a regression-based difference-in-differences estimator. How did your results change?
This is closer to the estimate from 1.2, but notably a smaller effect.
c Suppose now that you want to control for firm size and other covariates that change over time such as pounds of shrimp and salmon harvested. Estimate the difference-in-differences regression with added controls.
These estimates are even smaller but still sizeable and significant.
d Report the results from (a), (b), and (c) in a table with standard errors or confidence intervals calculated using clustered standard errors at the firm level. Omit the estimates of the coefficients on the month indicators in your table. How do these results compare to your previous calculation?

	Model 1	Model 2	Model 3
Firm Size			-2024.3135
			(3252.7476)
Group Indicator	-236.6952	-8956.7837***	-8652.7024***
	(14737.6755)	(3166.9212)	(2791.9692)
Salmon			0.5963***
			(0.2004)
Shrimp			1.0545***
			(0.0514)
Treated		11052.4496	85.2895
		(23162.9725)	(328.9368)
N	1200	1200	1200

Table 1: Coefficients from Python

Overall, I am concerned with the specification. Model 1 should obviously have less observations and group indicator and treated have a direct relationship.

2 Stata

2.1

You now would like to allow and control for firm-specific fixed-effects. In particular, you would like to allow for an unobserved effect c_i that varies at the firm level but not over time
a Generate indicator variables for each firm. Include these indicator variables in your OLS regression to control for fixed effects directly and estimate equation (6)
see code

b Perform the "within-transformation" on all of the dependent and independent variables by de- meaning each variable and estimate (6).
see code
c Display the results of your estimates from (a) and (b) in the same table, reporting the same clus- tered standard errors or confidence intervals as previously. Omit the estimates of the coefficients on the month and firm indicators in your table. How do the results from (b) compare to (a)? How do these estimates compare to the previous estimates of the treatment effect and how does the interpretation change? (Note for the future that standard errors from (a) are typically "wrong", but do not worry about that for this homework. In addition, (a) is computationally costly when the panel size is large—in general you should use the within transformation to control for fixed effects.)

	(1)	(2)
	(a)	(b)
treatment	-8085.1**	-8149.1***
	(-3.09)	(-14.40)
salmon	-0.680	-0.428
	(-0.60)	(-1.81)
shrimp	1.552***	1.537***
	(8.70)	(19.67)
firmsize	12972.4	0
	(0.78)	(.)
_cons	5029.1	-0.000222
	(1.10)	(-0.00)
N	1200	1200

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Coefficients from Stata

The results are fairly similar between the two models. The estimates are close to the ones estimated in section 1, but it a bit smaller. We are not taking out the constant firm effects in addition to time effects.