Homework4

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personal comment: (Dylan, I know the results are really strange in my homework, even though I tried hard. Some questions were brought up while I was doing this homework, and I would like to ask those later. Thank you!)

1 Python

1.

In the figure below, the parallel trends seem to hold before the treatment. After the treatment, we see a significant drop in bycatch for the treatment group. Interestingly, the slopes of both groups look similar even after the treatment.
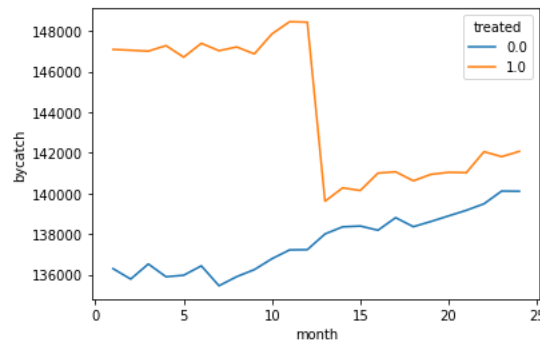

Figure 1: Trends before and treatment of treatment and control groups.

2.

The estimated treatment effect using samples in December 2017 and January 2018 is -8956.78. In other words, the average bycatch of the treated firm declined by almost 9000 pounds compared to firms in the control group.

3.

(a)

When we estimate the treatment effect using a regression-based two-period DID estimator, it is counted as -9591.35, which is larger than the estimate in 2, and now statistically insignificant. In this estimate, the average bycatch of the treated firm declined by over 95000 pounds compared to firms in the control group in December 2017 - January 2018.

(b)

Interestingly, the results change so strangely when we include the full monthly sample. The estimated treatment effect is now about 23,000 pounds, which is out of the sample range.

(c)

When we include control variables, the results become more similar to what we estimated in 2. and (a). Now the estimated treatment effect is -8085, which indicates that treated firms declined the amount of bycatch by 8085 when they received treatment, compared to the non-treated firms during 2017 and 2018.

(d)

	(a)	(b)	(c)
treated group	11202.04	68633.21	2631.98
	(23065.41)	(51018.87)	(3772.85)
treatment	-9591.35	-23982.74	-8085.14
	(32619.42)	(10922.16)	(2620.38)
firmsize			13307.74
			(16394.07)
salmon			-0.68
			(1.13)
shrimp			1.55
			(0.18)
Observation	100	1200	1200.00

Table 1: Results of estimated treatment effect with different methods. Constant or indicators are not presented in the table

Table 1 shows the results of the estimated treatment effect without presenting any constant or firm/month indicators. Columns (b) and (c) include firm and month indicators. The estimated treatment effects in (a) and (c) are similar to the estimate in 2, though the estimate in (a) is not statistically significant. Comparing (b) and (c), we can see control variables play an important role. Also, the standard errors are the smallest in (c).

2   Stata

1.

(a)

I generated a firm indicator by 'i.firm.' Table 2 shows that the treatment effect is the same as what we estimated in 3. (c), but we have positive coefficient. Also, we have absurdly high R-square and I think that is because we have about more than 70 variables in the analysis, including firm and month indicators.

(b)

The results of the within-transformation estimate are in column (2) of Table 2. Here, variables $'dem_bycatch'$, $'dem_salmon'$, and $'dem_shrimp'$ are demeaned variables, and time-invariant individual variables are omitted. In this analysis, we can see the treatment effect is estimated as 3,910 pounds, and I think this is because the treatment variable (binary) is not demeaned.

(c)

Table 2 shows the difference in estimates in (a) and (b). Comparing shrimp and salmon, we can see that both methods' estimated coefficients are similar, though standard errors are different. However, the coefficients of treatment are quite different, almost by half, and strangely both positive.

VARIABLES	(1) bycatch	(2) dem_bycatch
treatment	8,085***	3,910***
	(2,619)	(1,225)
firmsize	13,308	
	(16,387)	
salmon	-0.680	
	(1.125)	
shrimp	1.552***	
	(0.178)	
dem_salmon		-0.620
		(0.961)
dem_shrimp		1.579***
		(0.191)
Observations	1,200	1,200
R-squared	0.999	0.383

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

Table 2: Results of estimated treatment effect with and without "within-transformation". Constant or indicators are not presented in the table