Applied Microeconometrics, Assignment 3: Matching and Weighting

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Q1: Compute separately for New Jersey and Pennsylvania the average number of employees in both waves, and compute the difference-in-difference estimate. Next repeat this, but only considering the restaurants that responded in both waves of the survey.

We created the new variables:

$$\text{emp\_before} = EMPFT + \frac{EMPPT}{2} + NMGRS \quad \text{and} \quad \text{emp\_after} = EMPFT + \frac{EMPPT}{2} + NMGRS.$$

We then calculated the following averages for the number of employees in both waves in NJ and PA:

	STATE	emp_before	emp_after
1	NJ	20.44	21.03
2	PA	23.33	21.17

This gives us a difference-in-difference estimator of:

$$NJ_1 - PA_1 - (NJ_0 - PA_0) = 2.7536.$$

So the average number of employees per restaurant in New Jersey increased by 2.7536 employees compared to in Pennsylvania after the increase in minimum wage.

We then repeated the same calculations, but only including those restaurants which responded in both waves of the survey. For this, we included only those restaurants with $STATUS = 1$, as the variable STATUS indicated whether or not a restaurant responded in the second wave. This dropped 11 observations, leaving us with 399 restaurants for which we found the following results:

	STATE	emp_before	emp_after
1	NJ	20.60	21.36
2	PA	23.39	21.44

This time we find an DiD estimate of:

$$NJ_1 - PA_1 - (NJ_0 - PA_0) = 2.7179.$$

We see that this leads to a slightly smaller increase in the average number of employees per restaurant in New Jersey compared to in Pennsylvania, or an increase of 2.7179.

Q2: Estimate this model and next subsequently add characteristics of the restaurants observed in the first wave. But think carefully which characteristics can be included. How does the latter affect the estimate for the coefficient δ?

Second model with locations. In our main regression we dont include: location variables, the ones that are needed for difference, PCTAFF (intermediate variable)

Q3: Provide a balancing table, i.e. show the sample mean of characteristics observed in the first survey separately for the restaurants in New Jersey and Pennsylvania. What is your opinion about the balancing table?

	n_0	mean_0	sd_0	n_1	mean_1	sd_1	Diff
NCALLS	79	0.78	0.97	331	1.23	1.46	0.442**
EMPFT	78	10.21	10.78	326	7.72	7.96	-2.481**
EMPPT	78	19.49	9.58	328	18.68	10.21	-0.812
NMGRS	78	3.54	1.10	326	3.39	1.00	-0.146
WAGE_ST	76	4.63	0.35	314	4.61	0.35	-0.018
INCTIME	74	18.87	13.10	305	18.17	10.71	-0.698
FIRSTINC	69	0.21	0.10	298	0.23	0.11	0.022
BONUS	79	0.29	0.46	331	0.24	0.43	-0.055
PCTAFF	74	45.91	36.09	292	49.62	34.89	3.715
MEALS	79	2.03	0.39	331	1.88	0.56	-0.146**
OPEN	79	7.82	2.16	331	8.10	2.16	0.279
HRSOPEN	79	14.53	2.95	331	14.42	2.78	-0.107
PSODA	77	0.97	0.07	325	1.06	0.08	0.087***
PFRY	77	0.84	0.09	316	0.94	0.10	0.100***
PENTREE	77	1.22	0.62	321	1.35	0.65	0.133
NREGS	78	3.33	1.10	326	3.66	1.29	0.323**
NREGS11	77	2.79	0.75	321	2.70	0.92	-0.094

Add number of employees. Focus on full time employees.

Q4: Check for the different characteristics if there is a common support for restaurants in New Jersey and Pennsylvania. And estimate a propensity score for being a restaurant in New Jersey.

All variables have values that are not existent in both states (use tab to show), except for BONUS. For example, NCALLS never takes on the value 4 in Pensylvania, but it does in NJ. There are no variables without common values for both states.
Estimate the propensity score with a logit model (glm()).
Variables that we can make into common support: WAGEST, MEALS, BONUS, OPEN, PSODA, PFRY, PENTREE, NREGS11, NREGS
do a model with interaction terms and higher orders

Q5: Use propensity score matching to estimate the average treatment effect on the treated for the employment before and after the minimum wage increase in New Jersey, so on E_{0i} and E_{1i} separately.

Q6: Now use propensity score matching to estimate the average treatment effect on the treated on the change in employment in the restaurants, so $E_{1i} - E_{0i}$.

Q7: Now check the sensitivity of the propensity score matching estimate by also computing the weighting estimators for the average treatment effect on the treated.