

Bergen Course
Problem Set #3

1. (60 points) Using the JTPA dataset available on the webpage, implement the following estimators (see the attached page describing the dataset)

- Cross-section Estimator (in quarters 4,5,6)
- Before-After Estimator (symmetric differences, using quarters (4,-4),(5,-5) and (6,-6))
- Difference-in-Differences Estimator (again, take differences symmetrically)
- Nearest Neighbor (one nearest neighbor matching estimator) without imposing common support condition
- Nearest Neighbor estimator imposing the common support condition

What is the bias associated with each of the estimators? Summarize your results for each estimator. What difference does imposing common support make? (Note: for a,b, and c you can try experimenting with different sets of regressor control variables.)

2. (20 points) The Rosenbaum and Rubin (1983) Theorem discussed in class shows that if

$$Y_0 \perp\!\!\!\perp D \mid X \tag{RR}$$

Then,

$$Y_0 \perp\!\!\!\perp D \mid P(X)$$

where $P(X) = \Pr(D = 1 \mid X)$ is the “propensity score”. Following the argument of the proof given in class, show that (RR) implies

$$Y_0 \perp\!\!\!\perp D \mid Z(X),$$

where $Z(X) = \ln\left(\frac{P(X)}{1-P(X)}\right)$. Thus, matching could proceed on the log-odds ratio instead of on the propensity score.

Information on Accessing the JTPA dataset

The dataset is available from the web page located at
<http://athena.sas.upenn.edu/~petra/class222/jtpa.asc>.

1. download the file called jtpa.asc
2. It contains the following variables

id - person id number

qtr - quarter relative to random assignment. The data cover 18 months (6 quarters) prior to and 18 months (6 quarters) after the date of random assignment. For example, quarter = -1 refers to earnings in the quarter prior to random assignment. Quarter = 6 refers to earnings 18 months after the date of random assignment. (The date of random assignment would be = 0, but the dataset does not contain earnings for the month of random assignment.)

d - indicator for whether in the experimental group (1=in experimental group, 0 =in nonexperimental group)

earn - monthly earnings (in dollars)

aged - age category indicator

edlt10 - education less than 10 years

ed1011 - education 10 to 11 years

ed12 - education 12 years

ed1315 - education 13-15 years

edgt15 - education 15 or more years

totexp - total labor market experience

p - propensity score ($=\Pr(D=1|X)$)