

```

1
2
3 *****
4 * Preliminaries
5 *****
6 clear all
7 set more off
8
9
10 *****
11 * Import data, create additional covariates
12 *****
13
14 * Import LaLonde data
15 import delimited using "C:\\Users\\Nmath_000\\Documents\\MI_school\\Second Year\\675 Applied
Econometrics\\hw\\hw4\\LaLonde_all.csv"
16
17
18 * set directory
19 cd "C:\\Users\\Nmath_000\\Documents\\Code\\courses\\econ 675\\PS_4_tex\\"
20 * Generate additional covariates
21 gen log_re74 = log(re74+1)
22 gen log_re75 = log(re75+1)
23 gen age_sq = age^2
24 gen age_cu = age^3
25 gen educ_sq = educ^2
26 gen black_u74 = black*u74
27 gen educ_log_re74 = educ*log_re74
28 gen treat2 = treat if treat==1|treat==2
29 replace treat2=0 if treat2==2
30
31 *****
32 * [1] Difference in means
33 *****
34
35 * Lalonde control
36 reg re78 treat if treat==1|treat==0 , hc2
37
38 * PSID control
39 reg re78 treat if treat==1|treat==2 , hc2
40
41 *****
42 * [2] OLS
43 *****
44
45 * Covariates A, Lalonde control
46 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 if treat==1|treat==0 ,
hc2
47
48 * Covariates B, Lalonde control
49 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74 u75
if treat==1|treat==0 , hc2
50
51 * Covariates C, Lalonde control
52 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74 u75
age_cu black_u74 educ_log_re74 if treat==1|treat==0 , hc2
53
54 * Covariates A, PSID
55 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 if treat==1|treat==2 ,
hc2
56
57 * Covariates B, PSID
58 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74 u75
if treat==1|treat==2 , hc2
59
60 * Covariates C, PSID
61 reg re78 treat age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74 u75
age cu black u74 educ log re74 if treat==1|treat==2 , hc2
62
63

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64 *****
65 * [3] Regression Imputation
66 *****
67
68 * Covariates A, Lalonde control
69 teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75) (treat) if treat==1|
treat==0 , ate
70 teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75) (treat) if treat==1|
treat==0 , atet
71
72 * Covariates B, Lalonde control
73 teffects ra (re78 age educ black hisp married nodegr log re74 log re75 age sq educ sq u74
u75) (treat) if treat==1|treat==0 , ate
74 teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74
u75) (treat) if treat==1|treat==0 , atet
75
76 * Covariates C, Lalonde control
77 teffects ra (re78 age educ black hisp married nodegr log re74 log re75 age sq educ sq u74
u75 age_cu black_u74 educ_log_re74) (treat) if treat==1|treat==0 , ate
78 teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74
u75 age_cu black_u74 educ_log_re74) (treat) if treat==1|treat==0 , atet
79
80
81 * Covariates A, PSID control
82 eststo ri1: teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75) (treat2)
if treat2==1|treat2==0 , ate
83 eststo ri2: teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75) (treat2)
if treat2==1|treat2==0 , atet
84
85 * Covariates B, PSID control
86 teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq educ_sq u74
u75) (treat2) if treat2==1|treat2==0 , ate
87 eststo ri3: teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75) (treat2) if treat2==1|treat2==0 , atet
88
89 * Covariates C, PSID control
90 eststo ri4: teffects ra (re78 age educ black hisp married nodegr log re74 log re75 age sq
educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat2) if treat2==1|treat2==0 , ate
91 eststo ri5: teffects ra (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat2) if treat2==1|treat2==0 , atet
92
93 esttab ri1 using Q2_atematch.csv, se nostar keep(r1vs0.treat2) wide noparentheses nonumber
noobs plain nomtitles replace
94 esttab ri2 ri3 ri4 using Q2_att.csv, se nostar keep(r1vs0.treat2) wide noparentheses
nonumber noobs plain nomtitles replace
95
96 *****
97 * [4] IPW
98 *****
99
100 * Covariates A, Lalonde control
101 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75, logit) if
treat==1|treat==0 , ate
102 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75, logit) if
treat==1|treat==0 , atet
103
104 * Covariates B, Lalonde control
105 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75, logit) if treat==1|treat==0 , ate
106 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75, logit) if treat==1|treat==0 , atet
107
108 * Covariates C, Lalonde control
109 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0 , ate
110 teffects ipw (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0 , atet
111
112 * Covariates A, PSID control [doesn't converge, so set maxiter = 50!!!!]
113 eststo il: teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75,

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    logit) if treat2==1|treat2==0 , ate iterate(25)
114  eststo i2: teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75,
    logit) if treat2==1|treat2==0 , atet iterate(25)
115
116  * Covariates B, PSID control [first need to drop obs with very low prop scores]
117  teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75, logit) if treat2==1|treat2==0 , ate osample(viol)
118  teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75, logit) if treat2==1|treat2==0 & viol==0 , ate iter(25)
119  eststo i3: teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75
    age_sq educ_sq u74 u75, logit) if treat2==1|treat2==0 & viol==0 , atet iter(25)
120
121  * Covariates C, PSID control [need to drop people]
122  teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==0 , ate osample(
    viol1)
123  teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==0 & viol1==0,
    ate iter(25)
124  eststo i4: teffects ipw (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75
    age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==0 , atet
    iter(25)
125
126  esttab i1 using Q2_atematch.csv, se nostar keep(rlvs0.treat2) wide noparentheses nonumber
    noobs plain nomtitles append
127  esttab i2 i3 i4 using Q2_att.csv, se nostar keep(rlvs0.treat2) wide noparentheses nonumber
    noobs plain nomtitles append
128
129  *****
130  * [5] Doubly Robust
131  *****
132
133  * Covariates A, Lalonde control
134  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75, logit) if
    treat==1|treat==0 , ate
135  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75, logit) if
    treat==1|treat==0 , atet
136
137  * Covariates B, Lalonde control
138  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75, logit) if treat==1|treat==0 , ate
139  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75, logit) if treat==1|treat==0 , atet
140
141  * Covariates C, Lalonde control
142  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0 , ate
143  teffects ipwra (re78) (treat age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0 , atet
144
145  * Covariates A, PSID control
146  eststo d1: teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74
    log_re75, logit) if treat2==1|treat2==0 , ate iter(25)
147  eststo d2: teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74
    log_re75, logit) if treat2==1|treat2==0 , atet iter(25)
148
149  * Covariates B, PSID control
150  teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75, logit) if treat2==1|treat2==0 , ate iter(25)
151  eststo d3: teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74
    log_re75 age_sq educ_sq u74 u75, logit) if treat2==1|treat2==0 , atet iter(25)
152
153  * Covariates C, PSID control
154  teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
    educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==0 , ate
155  eststo d4: teffects ipwra (re78) (treat2 age educ black hisp married nodegr log_re74
    log_re75 age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==
    0 , atet iter(25)
156
157  esttab d1 using Q2_atematch.csv, se nostar keep(rlvs0.treat2) wide noparentheses nonumber

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noobs plain nomtitles append
158 esttab d2 d3 d4 using Q2_att.csv, se nostar keep(r1vs0.treat2) wide noparentheses nonnumber
noobs plain nomtitles append
159
160 *****
161 * [6] Nearest Neighbour Matching
162 *****
163
164 * Covariates A, Lalonde control
165 eststo n1: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75) (
treat) if treat==1|treat==0 , ate nneighbor(1) metric(maha)
166 eststo n2: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75) (
treat) if treat==1|treat==0 , atet nneighbor(1) metric(maha)
167
168 * Covariates B, Lalonde control
169 eststo n3: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75) (treat) if treat==1|treat==0 , ate nneighbor(1) metric(maha)
170 eststo n4: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75) (treat) if treat==1|treat==0 , atet nneighbor(1) metric(maha)
171
172 * Covariates C, Lalonde control
173 eststo n5: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat) if treat==1|treat==0 , ate
nneighbor(1) metric(maha)
174 eststo n6: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat) if treat==1|treat==0 , atet
nneighbor(1) metric(maha)
175
176 * Covariates A, PSID control
177 eststo n7: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75) (
treat2) if treat2==1|treat2==0 , ate nneighbor(1) metric(maha)
178 eststo n8: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75) (
treat2) if treat2==1|treat2==0 , atet nneighbor(1) metric(maha)
179
180 * Covariates B, PSID control
181 eststo n9: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75) (treat2) if treat2==1|treat2==0 , ate nneighbor(1) metric(maha)
182 eststo n10: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75) (treat2) if treat2==1|treat2==0 , atet nneighbor(1) metric(maha)
183
184 * Covariates C, PSID control
185 eststo n11: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat2) if treat2==1|treat2==0 , ate
nneighbor(1) metric(maha)
186 eststo n12: teffects nnmatch (re78 age educ black hisp married nodegr log_re74 log_re75
age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74) (treat2) if treat2==1|treat2==0 ,
atet nneighbor(1) metric(maha)
187
188 esttab n7 using Q2_atematch.csv, se nostar keep(r1vs0.treat2) wide noparentheses nonnumber
noobs plain nomtitles append
189 esttab n8 n10 n12 using Q2_att.csv, se nostar keep(r1vs0.treat2) wide noparentheses nonnumber
noobs plain nomtitles append
190
191 *****
192 * [7] PS matching
193 *****
194
195 * Covariates A, Lalonde control
196 eststo p1: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75, logit) if treat==1|treat==0 , ate
197 eststo p2: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75, logit) if treat==1|treat==0 , atet
198
199 * Covariates B, Lalonde control
200 eststo p3: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75, logit) if treat==1|treat==0 , ate
201 eststo p4: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75, logit) if treat==1|treat==0 , atet
202
203 * Covariates C, Lalonde control

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204 eststo p5: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0
, ate
205 eststo p6: teffects psmatch (re78) (treat age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat==1|treat==0
, atet
206
207 * Covariates A, PSID control
208 eststo p7:teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log_re75, logit) if treat2==1|treat2==0 , ate
209 eststo p8:teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log re75, logit) if treat2==1|treat2==0 , atet
210
211 * For the PSID samples below there are some prop scores too close to 1.
212 * First I need to run the treat2ment models, identify the respondents w/ problematic prop
scores -- this will cause the code to break
213 * Then I drop the violators and estimate the treat2ment effects
214 teffects psmatch (re78) (treat2 age educ black hisp married nodegr log re74 log re75 age sq
educ_sq u74 u75, logit) if treat2==1|treat2==0 , ate osample(viol2)
215 teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74 log_re75 age_sq
educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==0, ate osample(
viol3)
216
217
218 * Covariates B, PSID control
219 eststo p9:teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75, logit) if treat2==1|treat2==0 & viol2==0 , ate
220 eststo p10:teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75, logit) if treat2==1|treat2==0 & viol2==0, atet
221
222 * Covariates C, PSID control
223 eststo p11: teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==
0 & viol3==0 , ate
224 eststo p12: teffects psmatch (re78) (treat2 age educ black hisp married nodegr log_re74
log_re75 age_sq educ_sq u74 u75 age_cu black_u74 educ_log_re74, logit) if treat2==1|treat2==
0 & viol3==0 , atet
225
226 esttab p1 p3 p5 p7 p9 n11 using Q2_atematch.csv, se nostar keep(r1vs0.treat r1vs0.treat2)
wide noparentheses nonumber noobs plain nomtitles append
227 esttab p8 p10 p12 using Q2_att.csv, se nostar keep(r1vs0.treat2) wide noparentheses nonumber
noobs plain nomtitles append
228
229
230
231
232
233 *****
234 * Preliminaries
235 *****
236 clear all
237 set more off
238
239 * Set working directory
240 global dir "/Users/Anirudh/Desktop/GitHub"
241
242
243 set seed 22
244 set obs 50
245
246 *****
247 * [1] Summary stats and density plots
248 *****
249
250 * number of replications
251 local M = 1000
252 set matsize 11000
253
254 * empty matrices to store estimates and indicator of coverage
255 matrix est = J(`M',3,.)

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256 matrix cov = J(`M',3,.)
257
258 * initial values we will replace during replication
259 gen x = rnormal(0,1)
260 gen z = .85*x + sqrt(1-.85)*rnormal(0,1)
261 gen eps = rnormal(0,1)
262 gen y = 1 + .5*x + z + eps
263
264 * loop for M replications
265 forvalues i = 1/`M'{
266     qui replace x = rnormal(0,1)
267     qui replace z = .85*x + sqrt(1-.85)*rnormal(0,1)
268     qui replace eps = rnormal(0,1)
269     qui replace y = 1 + .5*x + z + eps
270
271     * long regression
272     qui reg y x z, r
273
274     * extract first estimate
275     local beta_hat = _b["x"]
276     matrix est[`i',1] = `beta_hat'
277
278     * get SE and calculate coverage of true beta_0 = .5
279     local se_hat = _se["x"]
280     local lb_hat = `beta_hat' - 1.96 * `se_hat'
281     local ub_hat = `beta_hat' + 1.96 * `se_hat'
282     local cov_hat = (.5 >= `lb_hat') & (.5 <= `ub_hat')
283     matrix cov[`i',1] = `cov_hat'
284
285     * save gamma over se gamma
286     local gamma_hat = _b["z"]
287     local gamma_se = _se["z"]
288     local tstat = `gamma_hat'/`gamma_se'
289
290     * short regression
291     qui reg y x, r
292     local beta_tilde = _b["x"]
293     matrix est[`i',2] = `beta_tilde'
294
295     * get SE and calculate coverage of true beta_0 = .5
296     local se_tilde = _se["x"]
297     local lb_tilde = `beta_tilde' - 1.96 * `se_tilde'
298     local ub_tilde = `beta_tilde' + 1.96 * `se_tilde'
299     local cov_tilde = (.5 >= `lb_tilde') & (.5 <= `ub_tilde')
300     matrix cov[`i',2] = `cov_tilde'
301
302     * third estimate
303     local beta_check = cond(`tstat' >= 1.96, `beta_hat', `beta_tilde')
304     matrix est[`i',3] = cond(`tstat' >= 1.96, `beta_hat', `beta_tilde')
305     matrix cov[`i',3] = cond(`tstat' >= 1.96, `cov_hat', `cov_tilde')
306 }
307
308 * turn results into variables
309 svmat est
310 svmat cov
311
312 * drop old data
313 drop x
314 drop z
315 drop eps
316 drop y
317
318 * rename variables
319 rename est1 beta_hat
320 rename est2 beta_tilde
321 rename est3 beta_check
322 rename cov1 cov_hat
323 rename cov2 cov_tilde
324 rename cov3 cov_check
325

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```

326 * write summary statistics to latex
327 outreg2 using q3.tex, replace sum(log) ///
328     keep(beta_hat beta_tilde beta_check) ///
329     eqkeep(min mean median max) ///
330     dec(2)
331
332 * kernel densities
333 twoway kdensity beta_hat, k(epanechnikov) || ///
334     kdensity beta_tilde, k(epanechnikov) || ///
335     kdensity beta_check, k(epanechnikov) ///
336     leg(lab(1 "beta_hat") lab(2 "beta_tilde") lab(3 "beta_check")) ///
337     ytitle("Density") xtitle("")
338
339
340 *****
341 * [2] Coverage rates
342 *****
343
344 * calculate these here, report them in LaTeX
345 sum(cov_hat)
346 sum(cov_tilde)
347 sum(cov_check)
348

```