

```

1 *****
2 ****HSR Appendix*****
3 *****
4
5 ***Set path***
6
7 cd "D:\DID checklist"
8
9 *****
10 ***Define variables***
11 *****
12
13 *id: unique hospital id
14 *year: year of observation (2003-2009)
15 *composite: dependent variable, measure of hospital quality
16 *mean_composite_q_all: quartiles of hospital quality in pre-intervention period
17 *tag_hosp: equal to 1 for a single observation for each hospital, otherwise equal to 0
18 *program: equal to 1 for hospitals assigned to treatment, otherwise equal to 0
19 *post: equal to 1 if year >=2007
20
21
22 ****Testing assumptions of DID*****
23
24 use "DID analytic file 11-20-13.dta", clear
25
26 set seed 47589
27
28 *****
29 ****Let probability of selection depend on level of performance****
30 *****
31
32 gen duce=.
33 forvalues i=1/4 {
34 local j=.25 + (`i' * .1)
35 replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
36 }
37 by id: egen program=max(duce)
38 drop duce
39
40 *****
41 **Alternative program effects**
42 *****
43
44 sum composite
45 local e_n =0
46 local e_s = `r(sd)' * .2
47 local e_l = `r(sd)' * .5
48
49 foreach y in e_n e_s e_l {
50 gen composite_`y' = composite + (program * post * ``y'')
51 }
52
53 *****
54 **Setting panel**
55 *****
56
57 tsset id year
58
59 *****
60 ****Element 1. Data exists on study outcomes for at least one observation period among
61 groups exposed and not exposed to an intervention, both before and after the intervention
62 was implemented***
63 *****
64 *****
65
66 *Directly observable*
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99

```

```

65 *****
66 ***Element 2. Trends in outcome performance prior to an intervention are "parallel"
between treatment and comparison groups***
67 *****
68
69 char year[omit] 2006
70
71 ***Continuous trend***
72 reg composite c.year c.year#i.program if post==0 & obs_all==1, cluster(id)
73 test _b[1.program#c.year]=0
74
75 ***Conclusion: Evidence of non-parallel trends prior to program start***
76
77 *****
78 ***Element 3. Baseline outcome levels are unrelated to expectations for changes in
outcomes***
79 *****
80
81 sort id
82 by id: egen mean_composite_a=mean(composite) if post==0
83 by id: egen mean_composite_pre = max(mean_composite_a)
84
85 xtset id year
86
87 reg D1.composite c.year c.mean_composite_pre#c.year if program==0 & post==1, cluster(id)
88 reg D1.composite c.year c.mean_composite_pre#c.year if program==1 & post==1, cluster(id)
89
90 ***Conclusion: For both treatment and comparison groups, higher pre-intervention
performnace is associated with lower improvement in the post-intervention period***
91
92 *****
93 ***Element 4. Violations to standard statistical assumptions are appropriately
addressed*****
94 *****
95 ssc install whitetst
96
97 foreach y in e_n e_s e_l {
98 reg composite_`y' i.program##i.post
99 estat hettest
100 whitetst
101 }
102
103 ***Conclusion: standard errors are not i.i.d
104
105 *****
106 ***Element 5. Events or factors other than treatment, occurring at the time of treatment,
should not differentially affect outcomes for treatment and comparison groups*****
107 *****
108
109 *Not testable*
110
111 *****
112 ***Element 6. The composition of treatment and comparison groups does not change over the
course of the study*****
113 *****
114
115 *Not testable in these data which include observatation from only those hospitals with data
in every year*
116
117 *****

```

```

118  *
119  ***Element 7. Treatment does not "spill-over" from treatment group to comparison
120  group*****
121  *****
122  *
123  reg composite c.year i.post if program==0, cluster(id)
124
125  *Some evidence of spillover to comparison group
126
127  *****
128  *****SIMULATION EXPERIMENT*****
129  *****
130  *****
131  *****
132
133  *****
134  *****
135  ****Scenario 1: Random selection****
136  *****
137  *****
138
139  program drop _all
140  program define did, rclass
141  version 12.0
142  drop _all
143
144  use "DID analytic file 11-20-13.dta", clear
145
146  *****
147  ***Probability of treatment is unrelated to levels or trends*****
148  *****
149
150  gen duce=.
151  forvalues i=1/4 {
152  local j=.5
153  replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
154  }
155  by id: egen program=max(duce)
156  drop duce
157
158  *****
159  **Alternative program effects**
160  *****
161
162  sum composite
163  local e_n =0
164  local e_s = `r(sd)' * .2
165  local e_l = `r(sd)' * .5
166
167  foreach y in e_n e_s e_l {
168  gen composite_`y' = composite + (program * post * ``y'')
169  }
170
171  *****
172  **Setting panel**
173  *****
174
175  tsset id year
176
177  *****
178  ***Creating matched sample*****
179  *****
180
181  psmatch2 program L1_composite L2_composite L3_composite if year==2007, out(wanker) common
182  caliper(.01) n(1)
183  egen group_id = group(_n1)

```

```

184 local idlist
185 sum group_id
186 forvalues i=1/\`r(max)\' {
187 sum _n1 if group_id==`i'
188 local idlist `idlist' `r(mean)'
189 }
190
191 gen fweight=.
192 foreach i in `idlist' {
193 display "_n1 = `i'"
194 sum _n1 if _n1==`i'
195 replace fweight=`r(N)' if _id==`r(max)'
196 list program fweight if _id==`i'
197 }
198
199 replace fweight=1 if program==1 & _nn==1
200
201 sort id
202 by id: egen weight=max(fweight)
203
204 *****
205 ****Analysis*****
206 *****
207
208 ***Characteristics of simulation run***
209
210 xtreg composite c.year##i.program if post==0, fe i(id)
211 local dif_trend = _b[1.program#c.year]
212 return scalar dif_trend = `dif_trend'
213 test 1.program#c.year
214 local reject_trend = cond(`r(p)' <=.05 , 1,0)
215 return scalar reject_trend = `reject_trend'
216
217 ***Estimation, not accounting for trends***
218
219 foreach y in e_n e_s e_l {
220 foreach x in obs_all obs_adjacent obs_post {
221 xtreg composite_`y' i.program##i.post if `x'==1, cluster(id) fe i(id)
222 local b_`x'`_y'_n = _b[1.program#1.post]
223 return scalar b_`x'`_y'_n = `b_`x'`_y'_n'
224 test 1.program#1.post=0
225 local reject_`x'`_y'_n = cond(`r(p)' <=.05 , 1,0)
226 return scalar reject_`x'`_y'_n = `reject_`x'`_y'_n'
227
228 ***I.I.D.***
229
230 xtreg composite_`y' i.program##i.post if `x'==1, fe i(id)
231 test 1.program#1.post=0
232 display "r(p)="`r(p)'"
233 local reject_`x'`_y'_q = cond(`r(p)' <=.05 , 1,0)
234 return scalar reject_`x'`_y'_q = `reject_`x'`_y'_q'
235
236 }
237 }
238
239 ***propensity score matches***
240
241 foreach y in e_n e_s e_l {
242 foreach x in obs_match {
243 xtreg composite_`y' i.program##i.post [fweight=weight], cluster(id) fe i(id)
244 local b_`x'`_y'_n = _b[1.program#1.post]
245 return scalar b_`x'`_y'_n = `b_`x'`_y'_n'
246 test 1.program#1.post=0
247 local reject_`x'`_y'_n = cond(`r(p)' <=.05 , 1,0)
248 return scalar reject_`x'`_y'_n = `reject_`x'`_y'_n'
249
250 ***I.I.D.***
251
252 xtreg composite_`y' i.program##i.post [fweight=weight], fe i(id)
253 test 1.program#1.post=0

```

```

254 local reject_`x'`_y'_q = cond(`r(p)' <=.05 , 1,0)
255 return scalar reject_`x'`_y'_q = `reject_`x'`_y'_q'
256
257 }
258 }
259
260 ****Estimation, accounting for trends****
261
262 foreach y in e_n e_s e_l {
263   foreach x in obs_all {
264     xtreg composite_`y' i.program##i.year2 if `x'==1, cluster(id) fe i(id)
265     local b_`x'`_y'_t = _b[1.program#2007.year2]
266     return scalar b_`x'`_y'_t = `b_`x'`_y'_t'
267     test 1.program#2007.year2=0
268     local reject_`x'`_y'_t = cond(`r(p)' <=.05 , 1,0)
269     return scalar reject_`x'`_y'_t = `reject_`x'`_y'_t'
270
271     ***I.I.D.***
272
273     xtreg composite_`y' i.program##i.year2 if `x'==1, fe i(id)
274     test 1.program#2007.year2=0
275     local reject_`x'`_y'_z = cond(`r(p)' <=.05 , 1,0)
276     return scalar reject_`x'`_y'_z = `reject_`x'`_y'_z'
277
278   }
279 }
280
281 ***propensity score matches***
282
283 foreach y in e_n e_s e_l {
284   foreach x in obs_match {
285     xtreg composite_`y' i.program##i.year2 [fweight=weight], cluster(id) fe i(id)
286     local b_`x'`_y'_t = _b[1.program#2007.year2]
287     return scalar b_`x'`_y'_t = `b_`x'`_y'_t'
288     test 1.program#2007.year2=0
289     local reject_`x'`_y'_t = cond(`r(p)' <=.05 , 1,0)
290     return scalar reject_`x'`_y'_t = `reject_`x'`_y'_t'
291
292     ***I.I.D.***
293
294     xtreg composite_`y' i.program##i.year2 [fweight=weight], fe i(id)
295     test 1.program#2007.year2=0
296     local reject_`x'`_y'_z = cond(`r(p)' <=.05 , 1,0)
297     return scalar reject_`x'`_y'_z = `reject_`x'`_y'_z'
298
299   }
300 }
301
302 *****
303 *****
304 ****Permutation tests: two-sided test****
305 *****
306 *****
307
308 forvalues p=2/50 {
309   gen duce=.
310   forvalues i=1/4 {
311     local j=.25 + (`i' * .1)
312     replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
313   }
314   by id: egen program`p'=max(duce)
315   drop duce
316   sum program`p'
317
318   *****
319   ****Creating matched sample****
320   *****
321   *****
322
323 psmatch2 program`p' L1_composite L2_composite L3_composite if year==2007, out(wanker)

```

```

common caliper(.01) n(1)
324
325 egen group_id`p' = group(_n1)
326 local idlist
327 sum group_id`p'
328 forvalues i=1/`r(max)' {
329 sum _n1 if group_id`p'==`i'
330 local idlist `idlist' `r(mean)'
331 }
332
333 gen fweight`p'=.
334 foreach i in `idlist' {
335 display "_n1 = `i'"
336 sum _n1 if _n1==`i'
337 replace fweight`p'=`r(N)' if _id==`r(max)'
338 list program`p' fweight`p' if _id==`i'
339 }
340
341 replace fweight`p'=1 if program`p'==1 & _nn==1
342
343 sort id
344 by id: egen weight`p'=max(fweight`p')
345
346
347
348
349 ****Estimation, not accounting for trends****
350
351 foreach y in e_n e_s e_l {
352 foreach x in obs_all obs_adjacent obs_post {
353 reg composite_`y' i.program`p'##i.post if `x'==1
354 local b_`x'_`y'_n`p' = _b[1.program`p'#1.post]
355 }
356 }
357
358 ***propensity score matches***
359
360 foreach y in e_n e_s e_l {
361 foreach x in obs_match {
362 reg composite_`y' i.program`p'##i.post [fweight=weight`p']
363 local b_`x'_`y'_n`p' = _b[1.program`p'#1.post]
364 }
365 }
366
367 ****Estimation, accounting for trends****
368
369 foreach y in e_n e_s e_l {
370 foreach x in obs_all {
371 reg composite_`y' i.program`p'##i.year2 if `x'==1
372 local b_`x'_`y'_t`p' = _b[1.program`p'#2007.year2]
373 }
374 }
375
376 ***propensity score matches***
377
378 foreach y in e_n e_s e_l {
379 foreach x in obs_match {
380 reg composite_`y' i.program`p'##i.year2 [fweight=weight`p']
381 local b_`x'_`y'_t`p' = _b[1.program`p'#2007.year2]
382 }
383 }
384 drop program`p' group_id`p' fweight`p' weight`p'
385 }
386
387
388 foreach y in e_n e_s e_l {
389 foreach x in obs_all obs_adjacent obs_post obs_match {
390 foreach j in n {
391 gen est_`x'_`y'_`j' = `b_`x'_`y'_`j'' in 1
392 forvalues p=2/50 {

```

```

393  replace est_`x'`_`y'`_`j' = `b_`x'`_`y'`_`j'`p' in `p'
394  }
395
396  *egen rank_`x'`_`y'`_`j' = rank(est_`x'`_`y'`_`j')
397  egen rank_`x'`_`y'`_`j' = rank(abs(est_`x'`_`y'`_`j'))
398  sum est_`x'`_`y'`_`j'
399  local o = `r(N)' * .95
400  local rank = rank_`x'`_`y'`_`j' in 1
401  local reject_`x'`_`y'`_`j'p = cond(`rank' >=`o' , 1,0)
402  return scalar reject_`x'`_`y'`_`j'p = `reject_`x'`_`y'`_`j'p'
403
404  }
405  }
406  }
407
408  foreach y in e_n e_s e_l {
409  foreach x in obs_all obs_match {
410  foreach j in t {
411  gen est_`x'`_`y'`_`j' = `b_`x'`_`y'`_`j' in 1
412  forvalues p=2/50 {
413  replace est_`x'`_`y'`_`j' = `b_`x'`_`y'`_`j'`p' in `p'
414  }
415
416
417  *egen rank_`x'`_`y'`_`j' = rank(est_`x'`_`y'`_`j')
418  egen rank_`x'`_`y'`_`j' = rank(abs(est_`x'`_`y'`_`j'))
419  sum est_`x'`_`y'`_`j'
420  local o = `r(N)' * .95
421  local rank = rank_`x'`_`y'`_`j' in 1
422  local reject_`x'`_`y'`_`j'p = cond(`rank' >=`o' , 1,0)
423  return scalar reject_`x'`_`y'`_`j'p = `reject_`x'`_`y'`_`j'p'
424  }
425  }
426  }
427
428  *****
429  *****
430  ****Permutation tests over****
431  *****
432  *****
433
434
435  end
436
437  local term dif_trend = r(dif_trend) reject_trend = r(reject_trend)
438  foreach y in e_n e_s e_l {
439  foreach x in obs_all obs_adjacent obs_post obs_match {
440  foreach j in n {
441  local term `term' b_`x'`_`y'`_`j' =r(b_`x'`_`y'`_`j')
442  }
443  foreach j in n q np {
444  local term `term' reject_`x'`_`y'`_`j' = r(reject_`x'`_`y'`_`j')
445  }
446  }
447  }
448  }
449
450
451  foreach y in e_n e_s e_l {
452  foreach x in obs_all obs_match {
453  foreach j in t {
454  local term `term' b_`x'`_`y'`_`j' =r(b_`x'`_`y'`_`j')
455  }
456  foreach j in t z tp {
457  local term `term' reject_`x'`_`y'`_`j' = r(reject_`x'`_`y'`_`j')
458  }
459  }
460  }
461  }
462

```

```

463
464 display "`term'"
465
466 simulate `term', reps(200): did
467
468 save "sim data alternative match random 12-2-13.dta", replace
469
470
471 local reject_none
472 foreach y in e_n {
473   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
474     local reject_none `reject_none' `x'
475   }
476 }
477
478 sum `reject_none'
479 foreach x in `reject_none' {
480   quietly sum `x'
481   display round(100*`r(mean)', .1) "%"
482 }
483
484
485
486 ***rejection rate with small effect***
487 local reject_small
488 foreach y in e_s {
489   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
490     local reject_small `reject_small' `x'
491   }
492 }
493
494 sum `reject_small'
495 foreach x in `reject_small' {
496   quietly sum `x'
497   display round(100*`r(mean)', .1) "%"
498 }
499
500 ***rejection rate with large effect***
501 local reject_large
502 foreach y in e_l {
503   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
504     local reject_large `reject_large' `x'
505   }
506 }
507
508 sum `reject_large'
509 foreach x in `reject_large' {
510   quietly sum `x'
511   display round(100*`r(mean)', .1) "%"
512 }
513
514
515 ***bias when no effect***
516 local bias
517 foreach y in e_n {
518   foreach x in b_obs_all_`y'_n b_obs_all_`y'_t b_obs_match_`y'_n b_obs_match_`y'_t
b_obs_adjacent_`y'_n b_obs_post_`y'_n {
519     gen `x'_`y'_abs = abs(`x')

```



```

520 local bias `bias' `x' `y'_abs
521 }
522 }
523
524 sum `bias'
525 foreach x in `bias' {
526 quietly sum `x'
527 display round(`r(mean)', .0001)
528 display ""
529 display ""
530 }
531
532 *****
533 *****
534 ****Scenario 2: selection on levels****
535 *****
536 *****
537
538 program drop _all
539 program define did, rclass
540 version 12.0
541 drop _all
542
543 use "DID analytic file 11-20-13.dta", clear
544
545 *****
546 ****Let probability of selection depend on level of performance****
547 *****
548
549 gen duce=.
550 forvalues i=1/4 {
551 local j=.25 + (`i' * .1)
552 replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
553 }
554 by id: egen program=max(duce)
555 drop duce
556
557
558
559 *****
560 **Alternative program effects**
561 *****
562
563 sum composite
564 local e_n =0
565 local e_s = `r(sd)' * .2
566 local e_l = `r(sd)' * .5
567
568 foreach y in e_n e_s e_l {
569 gen composite_`y' = composite + (program * post * ``y'')
570 }
571
572 *****
573 **Setting panel**
574 *****
575
576 tsset id year
577
578 *****
579 ****Creating matched sample****
580 *****
581
582
583 psmatch2 program L1_composite L2_composite L3_composite if year==2007, out(wanker) common
caliper(.01) n(1)
584
585 egen group_id = group(_n1)
586 local idlist
587 sum group_id
588 forvalues i=1/`r(max)' {

```

```

589   sum _nl if group_id==`i'
590   local idlist `idlist' `r(mean)'
591   }
592
593   gen fweight=.
594   foreach i in `idlist' {
595     display "_nl = `i'"
596     sum _nl if _nl==`i'
597     replace fweight=`r(N)' if _id==`r(max)'
598     list program fweight if _id==`i'
599   }
600
601   replace fweight=1 if program==1 & _nn==1
602
603   sort id
604   by id: egen weight=max(fweight)
605
606   *****
607   ****Analysis*****
608   *****
609
610   ***Characteristics of simulation run***
611
612   xtreg composite c.year##i.program if post==0, fe i(id)
613   local dif_trend = _b[1.program#c.year]
614   return scalar dif_trend = `dif_trend'
615   test 1.program#c.year
616   local reject_trend = cond(`r(p)' <=.05 , 1,0)
617   return scalar reject_trend = `reject_trend'
618
619   ****Estimation, not accounting for trends****
620
621   foreach y in e_n e_s e_l {
622     foreach x in obs_all obs_adjacent obs_post {
623       xtreg composite_`y' i.program##i.post if `x'==1, cluster(id) fe i(id)
624       local b_`x'_`y'_n = _b[1.program#1.post]
625       return scalar b_`x'_`y'_n = `b_`x'_`y'_n'
626       test 1.program#1.post=0
627       local reject_`x'_`y'_n = cond(`r(p)' <=.05 , 1,0)
628       return scalar reject_`x'_`y'_n = `reject_`x'_`y'_n'
629
630       ***I.I.D.***
631
632       xtreg composite_`y' i.program##i.post if `x'==1, fe i(id)
633       test 1.program#1.post=0
634       display "r(p)=" `r(p)'
635       local reject_`x'_`y'_q = cond(`r(p)' <=.05 , 1,0)
636       return scalar reject_`x'_`y'_q = `reject_`x'_`y'_q'
637     }
638   }
639
640
641   ***propensity score matches***
642
643   foreach y in e_n e_s e_l {
644     foreach x in obs_match {
645       xtreg composite_`y' i.program##i.post [fweight=weight], cluster(id) fe i(id)
646       local b_`x'_`y'_n = _b[1.program#1.post]
647       return scalar b_`x'_`y'_n = `b_`x'_`y'_n'
648       test 1.program#1.post=0
649       local reject_`x'_`y'_n = cond(`r(p)' <=.05 , 1,0)
650       return scalar reject_`x'_`y'_n = `reject_`x'_`y'_n'
651
652       ***I.I.D.***
653
654       xtreg composite_`y' i.program##i.post [fweight=weight], fe i(id)
655       test 1.program#1.post=0
656       local reject_`x'_`y'_q = cond(`r(p)' <=.05 , 1,0)
657       return scalar reject_`x'_`y'_q = `reject_`x'_`y'_q'
658

```

```

659 }
660 }
661
662 ****Estimation, accounting for trends****
663
664 foreach y in e_n e_s e_l {
665   foreach x in obs_all {
666     xtreg composite_`y' i.program##i.year2 if `x'==1, cluster(id) fe i(id)
667     local b_`x'_'y'_t = _b[1.program#2007.year2]
668     return scalar b_`x'_'y'_t = `b_`x'_'y'_t'
669     test 1.program#2007.year2=0
670     local reject_`x'_'y'_t = cond(`r(p)' <=.05 , 1,0)
671     return scalar reject_`x'_'y'_t = `reject_`x'_'y'_t'
672
673     ****I.I.D.***
674
675     xtreg composite_`y' i.program##i.year2 if `x'==1, fe i(id)
676     test 1.program#2007.year2=0
677     local reject_`x'_'y'_z = cond(`r(p)' <=.05 , 1,0)
678     return scalar reject_`x'_'y'_z = `reject_`x'_'y'_z'
679   }
680 }
681
682
683 ****propensity score matches****
684
685 foreach y in e_n e_s e_l {
686   foreach x in obs_match {
687     xtreg composite_`y' i.program##i.year2 [fweight=weight], cluster(id) fe i(id)
688     local b_`x'_'y'_t = _b[1.program#2007.year2]
689     return scalar b_`x'_'y'_t = `b_`x'_'y'_t'
690     test 1.program#2007.year2=0
691     local reject_`x'_'y'_t = cond(`r(p)' <=.05 , 1,0)
692     return scalar reject_`x'_'y'_t = `reject_`x'_'y'_t'
693
694     ****I.I.D.***
695
696     xtreg composite_`y' i.program##i.year2 [fweight=weight], fe i(id)
697     test 1.program#2007.year2=0
698     local reject_`x'_'y'_z = cond(`r(p)' <=.05 , 1,0)
699     return scalar reject_`x'_'y'_z = `reject_`x'_'y'_z'
700
701   }
702 }
703
704 *****
705 *****
706 ****Permutation tests: two-sided test****
707 *****
708 *****
709
710 forvalues p=2/50 {
711   gen duce=.
712   forvalues i=1/4 {
713     local j=.25 + (`i' * .1)
714     replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
715   }
716   by id: egen program`p'=max(duce)
717   drop duce
718   sum program`p'
719
720
721 *****
722 ****Creating matched sample****
723 *****
724
725 psmatch2 program`p' L1_composite L2_composite L3_composite if year==2007, out(wanker)
726 common caliper(.01) n(1)
727 egen group_id`p' = group(_n1)

```

```

728 local idlist
729 sum group_id`p'
730 forvalues i=1/`r(max)' {
731 sum _n1 if group_id`p'==`i'
732 local idlist `idlist' `r(mean)'
733 }
734
735 gen fweight`p'=.
736 foreach i in `idlist' {
737 display "_n1 = `i'"
738 sum _n1 if _n1==`i'
739 replace fweight`p'=`r(N)' if _id==`r(max)'
740 list program`p' fweight`p' if _id==`i'
741 }
742
743 replace fweight`p'=1 if program`p'==1 & _nn==1
744
745 sort id
746 by id: egen weight`p'=max(fweight`p')
747
748
749
750
751 ****Estimation, not accounting for trends****
752
753 foreach y in e_n e_s e_l {
754 foreach x in obs_all obs_adjacent obs_post {
755 reg composite_`y' i.program`p'##i.post if `x'==1
756 local b_`x'_'`y'_'n`p' = _b[1.program`p'#1.post]
757 }
758 }
759
760 ****propensity score matches****
761
762 foreach y in e_n e_s e_l {
763 foreach x in obs_match {
764 reg composite_`y' i.program`p'##i.post [fweight=weight`p']
765 local b_`x'_'`y'_'n`p' = _b[1.program`p'#1.post]
766 }
767 }
768
769 ****Estimation, accounting for trends****
770
771 foreach y in e_n e_s e_l {
772 foreach x in obs_all {
773 reg composite_`y' i.program`p'##i.year2 if `x'==1
774 local b_`x'_'`y'_'t`p' = _b[1.program`p'#2007.year2]
775 }
776 }
777
778 ****propensity score matches****
779
780 foreach y in e_n e_s e_l {
781 foreach x in obs_match {
782 reg composite_`y' i.program`p'##i.year2 [fweight=weight`p']
783 local b_`x'_'`y'_'t`p' = _b[1.program`p'#2007.year2]
784 }
785 }
786 drop program`p' group_id`p' fweight`p' weight`p'
787 }
788
789
790 foreach y in e_n e_s e_l {
791 foreach x in obs_all obs_adjacent obs_post obs_match {
792 foreach j in n {
793 gen est_`x'_'`y'_'`j' = `b_`x'_'`y'_'`j'' in 1
794 forvalues p=2/50 {
795 replace est_`x'_'`y'_'`j' = `b_`x'_'`y'_'`j''`p'' in `p'
796 }
797 }

```

```

798 *egen rank_`x'`y'`j' = rank(est_`x'`y'`j')
799 egen rank_`x'`y'`j' = rank(abs(est_`x'`y'`j'))
800 sum est_`x'`y'`j'
801 local o = `r(N)' * .95
802 local rank = rank_`x'`y'`j' in 1
803 local reject_`x'`y'`j'p = cond(`rank' >=`o' , 1,0)
804 return scalar reject_`x'`y'`j'p = `reject_`x'`y'`j'p'
805
806 }
807 }
808 }
809
810 foreach y in e_n e_s e_l {
811   foreach x in obs_all obs_match {
812     foreach j in t {
813       gen est_`x'`y'`j' = `b_`x'`y'`j'' in 1
814       forvalues p=2/50 {
815         replace est_`x'`y'`j' = `b_`x'`y'`j'`p'' in `p'
816       }
817
818       *egen rank_`x'`y'`j' = rank(est_`x'`y'`j')
819       egen rank_`x'`y'`j' = rank(abs(est_`x'`y'`j'))
820       sum est_`x'`y'`j'
821       local o = `r(N)' * .95
822       local rank = rank_`x'`y'`j' in 1
823       local reject_`x'`y'`j'p = cond(`rank' >=`o' , 1,0)
824       return scalar reject_`x'`y'`j'p = `reject_`x'`y'`j'p'
825     }
826   }
827 }
828 }
829
830 *****
831 *****
832 ****Permutation tests over****
833 *****
834 *****
835
836
837 end
838
839 local term dif_trend = r(dif_trend) reject_trend = r(reject_trend)
840 foreach y in e_n e_s e_l {
841   foreach x in obs_all obs_adjacent obs_post obs_match {
842     foreach j in n {
843       local term `term' b_`x'`y'`j' =r(b_`x'`y'`j')
844     }
845     foreach j in n q np {
846       local term `term' reject_`x'`y'`j' = r(reject_`x'`y'`j')
847     }
848   }
849 }
850 }
851
852
853 foreach y in e_n e_s e_l {
854   foreach x in obs_all obs_match {
855     foreach j in t {
856       local term `term' b_`x'`y'`j' =r(b_`x'`y'`j')
857     }
858     foreach j in t z tp {
859       local term `term' reject_`x'`y'`j' = r(reject_`x'`y'`j')
860     }
861   }
862 }
863 }
864
865
866 display "`term'"
867

```

```

868 simulate `term', reps(200): did
869
870 save "sim data selection on levels 12-3-13.dta", replace
871
872
873 local reject_none
874 foreach y in e_n {
875   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
876     local reject_none `reject_none' `x'
877   }
878 }
879
880 sum `reject_none'
881 foreach x in `reject_none' {
882   quietly sum `x'
883   display round(100*`r(mean)', .1) "% "
884 }
885
886
887
888 ***rejection rate with small effect***
889 local reject_small
890 foreach y in e_s {
891   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
892     local reject_small `reject_small' `x'
893   }
894 }
895
896 sum `reject_small'
897 foreach x in `reject_small' {
898   quietly sum `x'
899   display round(100*`r(mean)', .1) "% "
900 }
901
902 ***rejection rate with large effect***
903 local reject_large
904 foreach y in e_l {
905   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
`y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'
_n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
`y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
906     local reject_large `reject_large' `x'
907   }
908 }
909
910 sum `reject_large'
911 foreach x in `reject_large' {
912   quietly sum `x'
913   display round(100*`r(mean)', .1) "% "
914 }
915
916
917 ***bias when no effect***
918 local bias
919 foreach y in e_n {
920   foreach x in b_obs_all_`y'_n b_obs_all_`y'_t b_obs_match_`y'_n b_obs_match_`y'_t
b_obs_adjacent_`y'_n b_obs_post_`y'_n {
921     gen `x'_'y'_abs = abs(`x')
922     local bias `bias' `x'_'y'_abs
923   }
924 }

```

```

925
926   sum `bias'
927   foreach x in `bias' {
928     quietly sum `x'
929     display round(`r(mean)', .0001)
930     display ""
931     display ""
932   }
933
934   *****
935   *****
936   ****Scenario 3: Selection on trends****
937   *****
938   *****
939
940   program drop _all
941   program define did, rclass
942   version 12.0
943   drop _all
944
945   use "DID analytic file 11-20-13.dta", clear
946
947
948   *****
949   ****Let probability of selection depend on trends in performance****
950   *****
951   *****
952
953   gen duce=.
954   forvalues i=1/4 {
955     local j=.25 + (`i' * .1)
956     replace duce =uniform()<=`j' if tag_hosp==1 & trend_q==`i'
957   }
958   by id: egen program=max(duce)
959   drop duce
960
961   *****
962   **Alternative program effects**
963   *****
964
965   sum composite
966   local e_n =0
967   local e_s = `r(sd)' * .2
968   local e_l = `r(sd)' * .5
969
970   foreach y in e_n e_s e_l {
971     gen composite_`y' = composite + (program * post * ``y'')
972   }
973
974   *****
975   **Setting panel**
976   *****
977
978   tsset id year
979
980   *****
981   ***Creating matched sample****
982   *****
983
984   psmatch2 program L1_composite L2_composite L3_composite if year==2007, out(wanker) common
    caliber(.01) n(1)
985
986   egen group_id = group(_n1)
987   local idlist
988   sum group_id
989   forvalues i=1/`r(max)' {
990     sum _n1 if group_id==`i'
991     local idlist `idlist' `r(mean)'
992   }
993

```

```

994 gen fweight=.
995 foreach i in `idlist' {
996 display "_n1 = `i'"
997 sum _n1 if _n1==`i'
998 replace fweight=`r(N)' if _id==`r(max)'
999 list program fweight if _id==`i'
1000 }
1001
1002 replace fweight=1 if program==1 & _nn==1
1003
1004 sort id
1005 by id: egen weight=max(fweight)
1006
1007 *****
1008 ****Analysis*****
1009 *****
1010
1011 ***Characteristics of simulation run***
1012
1013 xtreg composite c.year##i.program if post==0, fe i(id)
1014 local dif_trend = _b[1.program#c.year]
1015 return scalar dif_trend = `dif_trend'
1016 test 1.program#c.year
1017 local reject_trend = cond(`r(p)' <=.05 , 1,0)
1018 return scalar reject_trend = `reject_trend'
1019
1020 ****Estimation, not accounting for trends****
1021
1022 foreach y in e_n e_s e_l {
1023 foreach x in obs_all obs_adjacent obs_post {
1024 xtreg composite `y' i.program##i.post if `x'==1, cluster(id) fe i(id)
1025 local b_`x'`_y'_n = _b[1.program#1.post]
1026 return scalar b_`x'`_y'_n = `b_`x'`_y'_n'
1027 test 1.program#1.post=0
1028 local reject_`x'`_y'_n = cond(`r(p)' <=.05 , 1,0)
1029 return scalar reject_`x'`_y'_n = `reject_`x'`_y'_n'
1030
1031 ***I.I.D.***
1032
1033 xtreg composite_`y' i.program##i.post if `x'==1, fe i(id)
1034 test 1.program#1.post=0
1035 display "r(p)="`r(p)'"
1036 local reject_`x'`_y'_q = cond(`r(p)' <=.05 , 1,0)
1037 return scalar reject_`x'`_y'_q = `reject_`x'`_y'_q'
1038
1039 }
1040 }
1041
1042 ***propensity score matches***
1043
1044 foreach y in e_n e_s e_l {
1045 foreach x in obs_match {
1046 xtreg composite_`y' i.program##i.post [fweight=weight], cluster(id) fe i(id)
1047 local b_`x'`_y'_n = _b[1.program#1.post]
1048 return scalar b_`x'`_y'_n = `b_`x'`_y'_n'
1049 test 1.program#1.post=0
1050 local reject_`x'`_y'_n = cond(`r(p)' <=.05 , 1,0)
1051 return scalar reject_`x'`_y'_n = `reject_`x'`_y'_n'
1052
1053 ***I.I.D.***
1054
1055 xtreg composite_`y' i.program##i.post [fweight=weight], fe i(id)
1056 test 1.program#1.post=0
1057 local reject_`x'`_y'_q = cond(`r(p)' <=.05 , 1,0)
1058 return scalar reject_`x'`_y'_q = `reject_`x'`_y'_q'
1059
1060 }
1061 }
1062
1063 ****Estimation, accounting for trends****

```



```

1064
1065   foreach y in e_n e_s e_l {
1066   foreach x in obs_all {
1067   xtreg composite_`y' i.program##i.year2 if `x'==1, cluster(id) fe i(id)
1068   local b_`x'_`y'_t = _b[1.program#2007.year2]
1069   return scalar b_`x'_`y'_t = `b_`x'_`y'_t'
1070   test 1.program#2007.year2=0
1071   local reject_`x'_`y'_t = cond(`r(p)' <=.05 , 1,0)
1072   return scalar reject_`x'_`y'_t = `reject_`x'_`y'_t'
1073
1074   ***I.I.D.***
1075
1076   xtreg composite_`y' i.program##i.year2 if `x'==1, fe i(id)
1077   test 1.program#2007.year2=0
1078   local reject_`x'_`y'_z = cond(`r(p)' <=.05 , 1,0)
1079   return scalar reject_`x'_`y'_z = `reject_`x'_`y'_z'
1080
1081   }
1082   }
1083
1084   ***propensity score matches***
1085
1086   foreach y in e_n e_s e_l {
1087   foreach x in obs_match {
1088   xtreg composite_`y' i.program##i.year2 [fweight=weight], cluster(id) fe i(id)
1089   local b_`x'_`y'_t = _b[1.program#2007.year2]
1090   return scalar b_`x'_`y'_t = `b_`x'_`y'_t'
1091   test 1.program#2007.year2=0
1092   local reject_`x'_`y'_t = cond(`r(p)' <=.05 , 1,0)
1093   return scalar reject_`x'_`y'_t = `reject_`x'_`y'_t'
1094
1095   ***I.I.D.***
1096
1097   xtreg composite_`y' i.program##i.year2 [fweight=weight], fe i(id)
1098   test 1.program#2007.year2=0
1099   local reject_`x'_`y'_z = cond(`r(p)' <=.05 , 1,0)
1100   return scalar reject_`x'_`y'_z = `reject_`x'_`y'_z'
1101
1102   }
1103   }
1104
1105   *****
1106   *****
1107   ***Permutation tests: two-sided test***
1108   *****
1109   *****
1110
1111   forvalues p=2/50 {
1112   gen duce=.
1113   forvalues i=1/4 {
1114   local j=.25 + (`i' * .1)
1115   replace duce =uniform()<=`j' if tag_hosp==1 & mean_composite_q_all==`i'
1116   }
1117   by id: egen program`p'=max(duce)
1118   drop duce
1119   sum program`p'
1120
1121   *****
1122   ***Creating matched sample*****
1123   *****
1124
1125
1126   psmatch2 program`p' L1_composite L2_composite L3_composite if year==2007, out(wanker)
common caliper(.01) n(1)
1127
1128   egen group_id`p' = group(_n1)
1129   local idlist
1130   sum group_id`p'
1131   forvalues i=1/`r(max)' {
1132   sum _n1 if group_id`p'==`i'

```

```

1133 local idlist `idlist' `r(mean)'
1134 }
1135
1136 gen fweight`p'=.
1137 foreach i in `idlist' {
1138 display "_n1 = `i'"
1139 sum _n1 if _n1==`i'
1140 replace fweight`p'=`r(N)' if _id==`r(max)'
1141 list program`p' fweight`p' if _id==`i'
1142 }
1143
1144 replace fweight`p'=1 if program`p'==1 & _nn==1
1145
1146 sort id
1147 by id: egen weight`p'=max(fweight`p')
1148
1149
1150
1151
1152 ****Estimation, not accounting for trends****
1153
1154 foreach y in e_n e_s e_l {
1155 foreach x in obs_all obs_adjacent obs_post {
1156 reg composite_`y' i.program`p'##i.post if `x'==1
1157 local b_`x'_`y'_n`p' = _b[1.program`p'#1.post]
1158 }
1159 }
1160
1161 ***propensity score matches***
1162
1163 foreach y in e_n e_s e_l {
1164 foreach x in obs_match {
1165 reg composite_`y' i.program`p'##i.post [fweight=weight`p']
1166 local b_`x'_`y'_n`p' = _b[1.program`p'#1.post]
1167 }
1168 }
1169
1170 ****Estimation, accounting for trends****
1171
1172 foreach y in e_n e_s e_l {
1173 foreach x in obs_all {
1174 reg composite_`y' i.program`p'##i.year2 if `x'==1
1175 local b_`x'_`y'_t`p' = _b[1.program`p'#2007.year2]
1176 }
1177 }
1178
1179 ***propensity score matches***
1180
1181 foreach y in e_n e_s e_l {
1182 foreach x in obs_match {
1183 reg composite_`y' i.program`p'##i.year2 [fweight=weight`p']
1184 local b_`x'_`y'_t`p' = _b[1.program`p'#2007.year2]
1185 }
1186 }
1187 drop program`p' group_id`p' fweight`p' weight`p'
1188 }
1189
1190
1191 foreach y in e_n e_s e_l {
1192 foreach x in obs_all obs_adjacent obs_post obs_match {
1193 foreach j in n {
1194 gen est_`x'_`y'_`j' = `b_`x'_`y'_`j'' in 1
1195 forvalues p=2/50 {
1196 replace est_`x'_`y'_`j' = `b_`x'_`y'_`j''`p'' in `p'
1197 }
1198
1199 *egen rank_`x'_`y'_`j' = rank(est_`x'_`y'_`j')
1200 egen rank_`x'_`y'_`j' = rank(abs(est_`x'_`y'_`j'))
1201 sum est_`x'_`y'_`j'
1202 local o = `r(N)' * .95

```

```

1203 local rank = rank_`x'`y'`j' in 1
1204 local reject_`x'`y'`j'p = cond(`rank' >=`o' , 1,0)
1205 return scalar reject_`x'`y'`j'p = `reject_`x'`y'`j'p'
1206
1207 }
1208 }
1209 }
1210
1211 foreach y in e_n e_s e_l {
1212   foreach x in obs_all obs_match {
1213     foreach j in t {
1214       gen est_`x'`y'`j' = `b_`x'`y'`j'' in 1
1215       forvalues p=2/50 {
1216         replace est_`x'`y'`j' = `b_`x'`y'`j'`p'' in `p'
1217       }
1218     }
1219   }
1220   *egen rank_`x'`y'`j' = rank(est_`x'`y'`j')
1221   egen rank_`x'`y'`j' = rank(abs(est_`x'`y'`j'))
1222   sum est_`x'`y'`j'
1223   local o = `r(N)' * .95
1224   local rank = rank_`x'`y'`j' in 1
1225   local reject_`x'`y'`j'p = cond(`rank' >=`o' , 1,0)
1226   return scalar reject_`x'`y'`j'p = `reject_`x'`y'`j'p'
1227 }
1228 }
1229 }
1230
1231 *****
1232 *****
1233 ****Permutation tests over****
1234 *****
1235 *****
1236
1237
1238 end
1239
1240 local term dif_trend = r(dif_trend) reject_trend = r(reject_trend)
1241 foreach y in e_n e_s e_l {
1242   foreach x in obs_all obs_adjacent obs_post obs_match {
1243     foreach j in n {
1244       local term `term' b_`x'`y'`j' =r(b_`x'`y'`j')
1245     }
1246     foreach j in n q np {
1247       local term `term' reject_`x'`y'`j' = r(reject_`x'`y'`j')
1248     }
1249   }
1250 }
1251 }
1252
1253
1254 foreach y in e_n e_s e_l {
1255   foreach x in obs_all obs_match {
1256     foreach j in t {
1257       local term `term' b_`x'`y'`j' =r(b_`x'`y'`j')
1258     }
1259     foreach j in t z tp {
1260       local term `term' reject_`x'`y'`j' = r(reject_`x'`y'`j')
1261     }
1262   }
1263 }
1264 }
1265
1266
1267 display "`term'"
1268
1269 simulate `term', reps(200): did
1270
1271 save "sim data selection on trends 12-3-13.dta", replace
1272

```

```

1273 local reject_none
1274 foreach y in e_n {
1275   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
1276   `y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'_
   _n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
   `y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
   reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
1277     local reject_none `reject_none' `x'
1278   }
1279 }
1280
1281 sum `reject_none'
1282 foreach x in `reject_none' {
1283   quietly sum `x'
1284   display round(100*`r(mean)', .1) "%"
1285 }
1286
1287
1288
1289 ***rejection rate with small effect***
1290 local reject_small
1291 foreach y in e_s {
1292   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
   `y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'_
   _n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
   `y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
   reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
1293     local reject_small `reject_small' `x'
1294   }
1295 }
1296
1297 sum `reject_small'
1298 foreach x in `reject_small' {
1299   quietly sum `x'
1300   display round(100*`r(mean)', .1) "%"
1301 }
1302
1303 ***rejection rate with large effect***
1304 local reject_large
1305 foreach y in e_l {
1306   foreach x in reject_obs_all_`y'_q reject_obs_all_`y'_n reject_obs_all_`y'_np reject_obs_all_
   `y'_z reject_obs_all_`y'_t reject_obs_all_`y'_tp reject_obs_match_`y'_q reject_obs_match_`y'_
   _n reject_obs_match_`y'_np reject_obs_match_`y'_z reject_obs_match_`y'_t reject_obs_match_
   `y'_tp reject_obs_adjacent_`y'_q reject_obs_adjacent_`y'_n reject_obs_adjacent_`y'_np
   reject_obs_post_`y'_q reject_obs_post_`y'_n reject_obs_post_`y'_np {
1307     local reject_large `reject_large' `x'
1308   }
1309 }
1310
1311 sum `reject_large'
1312 foreach x in `reject_large' {
1313   quietly sum `x'
1314   display round(100*`r(mean)', .1) "%"
1315 }
1316
1317
1318 ***bias when no effect***
1319 local bias
1320 foreach y in e_n {
1321   foreach x in b_obs_all_`y'_n b_obs_all_`y'_t b_obs_match_`y'_n b_obs_match_`y'_t
   b_obs_adjacent_`y'_n b_obs_post_`y'_n {
1322     gen `x'_`y'_abs = abs(`x')
1323     local bias `bias' `x'_`y'_abs
1324   }
1325 }
1326
1327 sum `bias'
1328 foreach x in `bias' {
1329   quietly sum `x'

```

```
1330   display round(`r(mean)', .0001)
1331   display ""
1332   display ""
1333   }
1334
```