Statistics/Data analysis

```
      name:  <unnamed>
       log:  C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/pset4_logfil
> e.smcl
  log type:  smcl
 opened on:   4 Dec 2023, 11:50:56

1 .
2 .
3 . // install programs
4 . // do "$do_loc/Code/01_programs.do"
5 .
6 . // analyze
7 . do "$do_loc/02_q1a.do"

8 . /*
  > Title:          02_q1a.do
  > Purpose:        Question 1.a, PSet 4
  >
  > */
9 .
10.
11.
12. use "$dta_loc/pset4_data.dta", clear

13. foreach v of varlist *vote* election* {
    2.          char `v'[_de_col_width_] 14
    3. }

14.
15.
16. /* -----------------------------------------------------------------------------
  > 1a Define running var, X*/
17. gen votes_tot = votes_for + votes_against

18. gen x = votes_for/votes_tot

19. assert win == 1 if x > 0.5

20. gen w = eligible_voters

21. gen margin = x-0.5

22.
23.
24. save "$dta_loc/pset4_clean.dta", replace
  file C:/Users/yfkas/Dropbox (Personal)/ARE213/Pset4/pset4_clean.dta saved

25.
  end of do-file

26. do "$do_loc/02_q1b.do"

27. /*
  > Title:          02_q1b.do
  > Purpose:        Question 1.b, PSet 4
  >
  > */
28.
29.
```

```
30. /* ---------------------------------------------------------------------------
  > 1b Check RDD assumption, E[W|X]*/
31. 
32. 
33. use "$dta_loc/pset4_clean.dta", clear

34. 
35. 
36. // hist x
37. sort votes_for votes_against eligible_voters

38. 
39. /*
  > // Testing scatter and binscatter
  > scatter w x
  > xtile pctx = x, nq(100)
  > preserve
  >         collapse (mean) w, by(pctx)
  >         scatter w pctx
  > restore
  > */
40. 
41. /*
  > rdrobust w x, ///
  >         p(2) ///
  >         c(0.5) ///
  >         h(0.5) ///
  >         masspoints(adjust) ///
  >         bwselect(mserd) ///
  >         kernel(tri)
  > 
  > local h_l = e(h_l)
  > local h_r = e(h_r)
  > */
42. 
43. // Local linear regression
44. reg w i.win##c.margin

      Source |       SS           df       MS      Number of obs   =    76,740
-------------+----------------------------------   F(3, 76736)     =    136.32
       Model |  44643727.3         3  14881242.4   Prob > F        =    0.0000
    Residual |  8.3770e+09    76,736  109167.039   R-squared       =    0.0053
-------------+----------------------------------   Adj R-squared   =    0.0053
       Total |  8.4217e+09    76,739  109744.532   Root MSE        =     330.4

------------------------------------------------------------------------------
           w | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
       1.win |   -69.0819   4.187571   -16.50   0.000    -77.28952   -60.87428
      margin |   106.8179   13.95248     7.66   0.000     79.47107    134.1646
             |
win#c.margin |
          1  |   103.1523   17.93967     5.75   0.000     67.99067     138.314
             |
       _cons |   151.7831   2.846744    53.32   0.000     146.2035    157.3627
------------------------------------------------------------------------------

45. rdrobust w x, p(1) c(0.5) h(0.5) kernel(uniform)

  Sharp RD estimates using local polynomial regression.

      Cutoff c = .5 | Left of c  Right of c            Number of obs =      76740
--------------------+----------------------            BW type       =     Manual
      Number of obs |      41656       35084           Kernel        =    Uniform
 Eff. Number of obs |      41656       35084           VCE method    =         NN
     Order est. (p) |          1           1
     Order bias (q) |          2           2
        BW est. (h) |      0.500       0.500
       BW bias (b) |      0.500       0.500
          rho (h/b) |      1.000       1.000
```

```
  Outcome: w. Running variable: x.
  ─────────────────────────────────────────────────────────────────────────────────────
                  Method │   Coef.    Std. Err.      z      P>|z|      [95% Conf. Interval]
  ─────────────────────────────────────────────────────────────────────────────────────
            Conventional │  -77.577     3.5019    -22.1532  0.000    -84.4406      -70.7136
                  Robust │     -          -        3.5594   0.000     6.68396       23.0655
  ─────────────────────────────────────────────────────────────────────────────────────

46. // close
47. 
48. // Visual test
49. rdplot w x, ///
  >         p(2) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6)) ///
  >                                  xtitle("Running variable") ///
  >                                  ytitle("Eligible voters")) ///
  >         ci(95) ///
  >         shade
  Mass points detected in the running variable.

  RD Plot with evenly spaced number of bins using polynomial regression.

           Cutoff c = .5 │ Left of c  Right of c        Number of obs  =       76740
  ───────────────────────┼──────────────────────        Kernel         =  Triangular
           Number of obs │     41656       35084
      Eff. Number of obs │     41656       35084
     Order poly. fit (p) │         2           2
        BW poly. fit (h) │     0.500       0.500
    Number of bins scale │     1.000       1.000

  Outcome: w. Running variable: x.
  ──────────────────────────────────────────────
                         │ Left of c  Right of c
  ───────────────────────┼──────────────────────
           Bins selected │        11          18
      Average bin length │     0.045       0.028
       Median bin length │     0.045       0.028
  ───────────────────────┼──────────────────────
       IMSE-optimal bins │        11          18
     Mimicking Var. bins │       786         600
  ───────────────────────┼──────────────────────
  Rel. to IMSE-optimal:  │
           Implied scale │     1.000       1.000
       WIMSE var. weight │     0.500       0.500
      WIMSE bias weight  │     0.500       0.500
  ──────────────────────────────────────────────


50. graph export "$do_loc/graphs/q1b_rdplot.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet
      4/Stata/graphs/q1b_rdplot.png saved as PNG format

51. 
```

```
52. // Statistical test
53. rdperm x w, c(0.5) perm(500) // rejects equality
  RD Distribution Test using permutations.
  Cutoff c =         .5 |   Left of c   Right of c     Number of obs    =      76740
  ----------------------+--------------------------    Fixed q          =        462
         Number of obs  |       41656        35084     Number of perms  =        500
     Eff. number of obs |         462          462     Test statistic   =        CvM
     Eff. neighbourhood |   -.0090909            0
  Running variable :     x
  Covariates       :    w
  -------------------------------------------------
                        |         P.value
  ----------------------+--------------------------
                 Result |               0
  -------------------------------------------------

54. cdfplot w if w < 500, by(win) // visually apparent that CDFs diverge early on
  (0 observations deleted)

55. graph export "$do_loc/graphs/q1b_cdfs.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet
      4/Stata/graphs/q1b_cdfs.png saved as PNG format

56.
57. /*
  > Q: is checking whether E [Wi | Xi] is continuous at the cutoff
  > be a useful placebo check for the RDD assumptions
  >
  > Testing for the continuity of this expectation can be done visually using a
  > scatter plot. If a ruler can be placed across the entire graph, then
  > the continuity of E[Wi | Xi] is satisfied in a local linear model. The ruler
  > analogy can be extended to a polynomial of degree p, hence the result is
  > somewhat arbitrary. The bandwidth introduces more arbitrariness. Canay and Kamat
  > (2017) suggested comparing CDFs of W at either side of the cutoff. The
  > result of rdperm shows that the null of equality of distributions can be
  > rejected. Visually inspecting the CDFs confirms this.
  >
  > */
58.
59.
60.
  end of do-file

61. do "$do_loc/02_q1c.do"

62. /*
  > Title:          02_q1c.do
  > Purpose:        Question 1.c, PSet 4
  >
  > */
63.
64. /* -------------------------------------------------------------------------
  > 1c Check RDD assumption, density of Xi is continuous around c.
  > */
65.
66.
67. use "$dta_loc/pset4_clean.dta", clear
```

```
68.
69. hist x // histogram seems ok
  (bin=48, start=0, width=.02083333)

70.
71. // try rddensity
72. rddensity x, c(0.45) plot kernel(triangular) all
  Computing data-driven bandwidth selectors.

  Point estimates and standard errors have been adjusted for repeated observations.
  (Use option nomasspoints to suppress this adjustment.)

  RD Manipulation test using local polynomial density estimation.

       c =     0.450 | Left of c  Right of c          Number of obs =       76740
  -------------------+----------------------          Model         = unrestricted
       Number of obs |     35726       41014          BW method     =        comb
  Eff. Number of obs |      8397        7756          Kernel        =  triangular
      Order est. (p) |         2           2          VCE method    =   jackknife
      Order bias (q) |         3           3
         BW est. (h) |     0.059       0.064

  Running variable: x.
  ------------------------------------------
              Method |       T          P>|T|
  -------------------+----------------------
        Conventional |   -0.7890       0.4301
              Robust |   -0.9183       0.3584
  ------------------------------------------

  P-values of binomial tests. (H0: prob = .5)
  -----------------------------------------------------
   Window Length / 2 |      <c          >=c |     P>|T|
  -------------------+----------------------+----------
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
               0.000 |      89            0 |    0.0000
  -----------------------------------------------------

73. graph export "$do_loc/graphs/q1c_45.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1c_45.png
      saved as PNG format

74.
75. rddensity x, c(0.5) plot kernel(triangular) all
  Computing data-driven bandwidth selectors.

  Point estimates and standard errors have been adjusted for repeated observations.
  (Use option nomasspoints to suppress this adjustment.)

  RD Manipulation test using local polynomial density estimation.

       c =     0.500 | Left of c  Right of c          Number of obs =       76740
  -------------------+----------------------          Model         = unrestricted
       Number of obs |     41656       35084          BW method     =        comb
  Eff. Number of obs |      6592        4859          Kernel        =  triangular
      Order est. (p) |         2           2          VCE method    =   jackknife
      Order bias (q) |         3           3
         BW est. (h) |     0.055       0.041
```

Running variable: x.

Method	T	P>|T|
Conventional	-13.3528	0.0000
Robust	-10.9449	0.0000

P-values of binomial tests. (H0: prob = .5)

Window Length / 2	<c	>=c	P>|T|
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000
0.000	0	956	0.0000

```
76. graph export "$do_loc/graphs/q1c_50.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1c_50.png
      saved as PNG format

77.
78. rddensity x, c(0.55) plot kernel(triangular) all
```

Computing data-driven bandwidth selectors.

Point estimates and standard errors have been adjusted for repeated observations.
(Use option *nomasspoints* to suppress this adjustment.)

RD Manipulation test using local polynomial density estimation.

c = 0.550	Left of c	Right of c
Number of obs	47372	29368
Eff. Number of obs	6524	6763
Order est. (p)	2	2
Order bias (q)	3	3
BW est. (h)	0.062	0.065

Number of obs	=	76740
Model	=	unrestricted
BW method	=	comb
Kernel	=	triangular
VCE method	=	jackknife

Running variable: x.

Method	T	P>|T|
Conventional	-0.4940	0.6213
Robust	2.3461	0.0190

P-values of binomial tests. (H0: prob = .5)

Window Length / 2	<c	>=c	P>|T|
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000

```
79. graph export "$do_loc/graphs/q1c_55.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1c_55.png
     saved as PNG format

80. 
81. /*
  > This algorithm compares densities below and above the cutoff using
  > bandwidths calculated as follows:
  >         1) minimize the MSE of each density estimator to the L and R separately
  >         2) minimize the MSE of the difference of the two density estimators
  >         3) repeat (2) for the sum
  >         3) Take the median of the three bandwidths.
  > I have also set it to use a triangular kernel to emphasize observations
  > closer to the cutoff. One notices that shifting the cutoff slightly around
  > c=0.5 shows that indeed there appears to be manipulation at c = 0.5 but not
  > at those other points.
  > */
82. 
83. 
  end of do-file

84. do "$do_loc/02_q1d.do"

85. /*
  > Title:          02_q1d.do
  > Purpose:        Question 1.d, PSet 4
  > 
  > */
86. 
87. 
88. /* ---------------------------------------------------------------------------
  > 1d Drop inconclusive races and repeat q1b and c
  > */
89. 
90. use "$dta_loc/pset4_clean.dta", clear

91. 
92. drop if x == 0.5
  (956 observations deleted)

93. 
94. 
95. 
96. // repeat 1b ----------------------------------------------------------
97. // Visual test
98. rdplot w x, ///
  >         p(2) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
  >         shade
  Mass points detected in the running variable.

  RD Plot with evenly spaced number of bins using polynomial regression.
```

Cutoff c = .5	Left of c	Right of c
Number of obs	41656	34128
Eff. Number of obs	41656	34128
Order poly. fit (p)	2	2
BW poly. fit (h)	0.500	0.500
Number of bins scale	1.000	1.000

Number of obs =	75784
Kernel =	Triangular

Outcome: w. Running variable: x.

	Left of **c**	Right of **c**
Bins selected	**11**	**20**
Average bin length	**0.045**	**0.025**
Median bin length	**0.045**	**0.025**
IMSE-optimal bins	**11**	**20**
Mimicking Var. bins	**778**	**609**
Rel. to IMSE-optimal:		
Implied scale	**1.000**	**1.000**
WIMSE var. weight	**0.500**	**0.500**
WIMSE bias weight	**0.500**	**0.500**

```
.
// Statistical test
rdperm x w, c(0.5) perm(500) // fails to reject equality
```

RD Distribution Test using permutations.

Cutoff c = .5	**Left of c**	**Right of c**
Number of obs	**41656**	**34128**
Eff. number of obs	**383**	**383**
Eff. neighbourhood	**-.00819671**	**.00887573**

Number of obs	=	**75784**
Fixed q	=	**383**
Number of perms	=	**500**
Test statistic	=	**CvM**

Running variable : x
Covariates : w

	P.value
Result	**.186**

```
cdfplot w if w < 500, by(win)
  (0 observations deleted)

graph export "$do_loc/graphs/q1d_cdfs.png", ///
>         width(1200) height(900) ///
>         replace
file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet
     4/Stata/graphs/q1d_cdfs.png saved as PNG format

// although still visually apparent that CDFs diverge early on



// repeat 1c ---------------------------------------------------------
hist x // histogram seems ok
  (bin=48, start=0, width=.02083333)


// try rddensity
rddensity x, c(0.45) plot kernel(triangular) all
```

Computing data-driven bandwidth selectors.

Point estimates and standard errors have been adjusted for repeated observations.
(Use option *nomasspoints* to suppress this adjustment.)

RD Manipulation test using local polynomial density estimation.

c = **0.450**	Left of c	Right of c
Number of obs	**35726**	**40058**
Eff. Number of obs	**8399**	**8200**
Order est. (p)	**2**	**2**
Order bias (q)	**3**	**3**
BW est. (h)	**0.059**	**0.076**

Number of obs	=	**75784**
Model	=	**unrestricted**
BW method	=	**comb**
Kernel	=	**triangular**
VCE method	=	**jackknife**

Running variable: x.

Method	T	P>|T|
Conventional	4.5365	0.0000
Robust	0.3655	0.7148

P-values of binomial tests. (H0: prob = .5)

Window Length / 2	<c	>=c	P>|T|
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000
0.000	89	0	0.0000

```
113 graph export "$do_loc/graphs/q1d_45.png", ///
  >        width(1200) height(900) ///
  >        replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1d_45.png
      saved as PNG format

114
115 rddensity x, c(0.5) plot kernel(triangular) all
```

Computing data-driven bandwidth selectors.

Point estimates and standard errors have been adjusted for repeated observations.
(Use option *nomasspoints* to suppress this adjustment.)

RD Manipulation test using local polynomial density estimation.

c = 0.500	Left of c	Right of c
Number of obs	41656	34128
Eff. Number of obs	6591	5156
Order est. (p)	2	2
Order bias (q)	3	3
BW est. (h)	0.055	0.053

Number of obs	=	75784
Model	=	unrestricted
BW method	=	comb
Kernel	=	triangular
VCE method	=	jackknife

Running variable: x.

Method	T	P>|T|
Conventional	-3.8780	0.0001
Robust	-3.4202	0.0006

P-values of binomial tests. (H0: prob = .5)

Window Length / 2	<c	>=c	P>|T|
0.002	11	9	0.8238
0.003	62	45	0.1215
0.005	140	120	0.2386
0.007	269	237	0.1681
0.008	404	345	0.0340
0.010	575	484	0.0057
0.012	808	649	0.0000
0.013	1008	795	0.0000
0.015	1236	976	0.0000
0.017	1544	1200	0.0000

```
graph export "$do_loc/graphs/q1d_50.png", ///
>         width(1200) height(900) ///
>         replace
file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1d_50.png
    saved as PNG format

rddensity x, c(0.55) plot kernel(triangular) all
Computing data-driven bandwidth selectors.

Point estimates and standard errors have been adjusted for repeated observations.
(Use option nomasspoints to suppress this adjustment.)

RD Manipulation test using local polynomial density estimation.
```

c = 0.550	Left of c	Right of c
Number of obs	46416	29368
Eff. Number of obs	5638	6763
Order est. (p)	2	2
Order bias (q)	3	3
BW est. (h)	0.062	0.065

Number of obs	=	75784
Model	=	unrestricted
BW method	=	comb
Kernel	=	triangular
VCE method	=	jackknife

Running variable: x.

Method	T	P>|T|
Conventional	-2.0580	0.0396
Robust	5.0569	0.0000

P-values of binomial tests. (H0: prob = .5)

Window Length / 2	<c	>=c	P>|T|
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000
0.000	0	66	0.0000

```
graph export "$do_loc/graphs/q1d_55.png", ///
>         width(1200) height(900) ///
>         replace
file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1d_55.png
    saved as PNG format

/*
> Ans: Explain.
> Dropping observations right at the cutoff leads us to fail to reject the
> null hypothesis that the densities are not continuous at the cutoff.
>
> What occurs is that there was no bunching over 0.5. Rather, many races end up
> tied. Dropping such inconclusive races shows that even though there are
> relatively fewer observations right before the cutoff, there also appear to be
> a relatively lower observations from conclusive races right above the cutoff.
> So even though there is a visual dip in the estimated density plot, there is
> no discontinuity.
>
> */
```

```
save "$dta_loc/pset4_trim.dta", replace
file C:/Users/yfkas/Dropbox (Personal)/ARE213/Pset4/pset4_trim.dta saved



end of do-file

do "$do_loc/02_q1e.do"

/*
> Title:          02_q1e.do
> Purpose:        Question 1.e, PSet 4
>
> */



/* ---------------------------------------------------------------------------
> 1d Redefine x and
> */
use "$dta_loc/pset4_trim.dta", clear

gen xp = votes_for - votes_against, after(x)

sort xp


// cdfplot xp

xtile xp_100 = xp, nq(100)

// scatter xp_100 xp
// drop if inlist(xp_100, 1,2,99,100)

// Test for continuity of mean firm size around the cutoff.
// Visual test
rdplot w xp if !inlist(xp_100, 1,2,99,100) , ///
>         p(2) ///
>         c(0) ///
>         masspoints(adjust) ///
>         bwselect(mserd) ///
>         h(`h_l' `h_r') ///
>         kernel(tri) ///
>         binselect(espr) ///
>         graph_options(legend(position(6))) ///
>         ci(95) ///
>         shade
Mass points detected in the running variable.

RD Plot with evenly spaced number of bins using polynomial regression.

         Cutoff c = 0 | Left of c  Right of c        Number of obs  =      72756
----------------------+----------------------        Kernel         = Triangular
        Number of obs |     40138       32618
   Eff. Number of obs |     40138       32618
  Order poly. fit (p) |         2           2
     BW poly. fit (h) |   159.000     148.000
 Number of bins scale |     1.000       1.000
```

Outcome: w. Running variable: xp.

	Left of **c**	Right of **c**
Bins selected	**30**	**16**
Average bin length	**5.300**	**9.250**
Median bin length	**5.300**	**9.250**
IMSE-optimal bins	**30**	**16**
Mimicking Var. bins	**346**	**137**
Rel. to IMSE-optimal:		
Implied scale	**1.000**	**1.000**
WIMSE var. weight	**0.500**	**0.500**
WIMSE bias weight	**0.500**	**0.500**

```
graph export "$do_loc/graphs/q1e.png", ///
>         width(1200) height(900) ///
>         replace
file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q1e.png
    saved as PNG format

/* 1e and 1f Ans:
>
> 1e: Redefining x as the difference shows that firms tend to be smaller if the race
> is close. That is, larger firms have larger majorities either for or against.
>
> 1f: From the exercise in q1d, it appears that there is indeed bunching
> that causes close races. Dropping inconclusive races results in balance tests
> that fail to reject the identifying assumption of the continuity of potential
> outcomes which we test using balance of w and x at the cutoff.
>
> */

save "$dta_loc/pset4_trim2.dta", replace
file C:/Users/yfkas/Dropbox (Personal)/ARE213/Pset4/pset4_trim2.dta saved

end of do-file

do "$do_loc/02_q2a.do"

/*
> Title:          02_q2a.do
> Purpose:        Question 2.a, PSet 4
>
> */

use "$dta_loc/pset4_trim2.dta", clear
```

```
164 gen y = logwage

165
166 scatter y x

167 graph export "$do_loc/graphs/q2a_yx.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q2a_yx.png
      saved as PNG format

168
169 // statistically inspect ATE at c
170 reg y i.win##c.margin // Local linear regression

        Source |       SS           df       MS      Number of obs   =    75,784
  -------------+----------------------------------   F(3, 75780)     =    435.10
         Model |  1098.54679         3  366.182262   Prob > F        =    0.0000
      Residual |  63776.1907    75,780  .841596605   R-squared       =    0.0169
  -------------+----------------------------------   Adj R-squared   =    0.0169
         Total |  64874.7375    75,783  .856059242   Root MSE        =    .91739

  ------------------------------------------------------------------------------
             y | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
  -------------+----------------------------------------------------------------
         1.win |   .1551971   .0118305    13.12   0.000     .1320094    .1783848
        margin |   .1714447   .0397388     4.31   0.000     .0935568    .2493326
               |
  win#c.margin |
            1  |   .0565245   .0505913     1.12   0.264    -.0426343    .1556833
               |
         _cons |   11.34204   .0082005  1383.09   0.000     11.32597    11.35812
  ------------------------------------------------------------------------------

171 rdrobust y x, p(1) c(0.5) h(0.5) kernel(uniform)

  Sharp RD estimates using local polynomial regression.

       Cutoff c = .5 | Left of c  Right of c            Number of obs =      75784
  -------------------+----------------------            BW type       =     Manual
       Number of obs |     41656       34128            Kernel        =    Uniform
  Eff. Number of obs |     41656       34128            VCE method    =         NN
      Order est. (p) |         1           1
      Order bias (q) |         2           2
         BW est. (h) |     0.500       0.500
        BW bias (b) |     0.500       0.500
          rho (h/b) |     1.000       1.000

  Outcome: y. Running variable: x.
  --------------------------------------------------------------------------------
              Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
  -------------------+------------------------------------------------------------
        Conventional |   .1552     .01161   13.3654  0.000    .132438      .177956
              Robust |     -          -      8.7974  0.000    .118795        .1869
  --------------------------------------------------------------------------------

172
173 // visually inspect ATE at c
174 rdplot y x, ///
  >         p(1) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
  >         shade
  Mass points detected in the running variable.

  RD Plot with evenly spaced number of bins using polynomial regression.
```

```
         Cutoff c = .5 | Left of c  Right of c        Number of obs  =      75784
-----------------------+----------------------        Kernel         = Triangular
         Number of obs |     41656       34128
    Eff. Number of obs |     41656       34128
    Order poly. fit (p)|         1           1
     BW poly. fit (h)  |     0.500       0.500
  Number of bins scale |     1.000       1.000

Outcome: y. Running variable: x.
----------------------------------------------
                       | Left of c  Right of c
-----------------------+----------------------
          Bins selected|         6           6
    Average bin length |     0.083       0.083
     Median bin length |     0.083       0.083
-----------------------+----------------------
     IMSE-optimal bins |         6           6
   Mimicking Var. bins |       604         599
-----------------------+----------------------
Rel. to IMSE-optimal:  |
         Implied scale |     1.000       1.000
     WIMSE var. weight |     0.500       0.500
     WIMSE bias weight |     0.500       0.500
----------------------------------------------


175 graph export "$do_loc/graphs/q2a_h50.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q2a_h50.png
      saved as PNG format

176
177 // setting h by minimizing MSE tightens the bandwidth and exagerates the ATE
178 rdrobust y x, p(1) c(0.5) kernel(uniform)
  Mass points detected in the running variable.

  Sharp RD estimates using local polynomial regression.

       Cutoff c = .5 | Left of c  Right of c            Number of obs =      75784
---------------------+----------------------            BW type       =      mserd
       Number of obs |     41656       34128            Kernel        =    Uniform
  Eff. Number of obs |     14499       11060            VCE method    =         NN
      Order est. (p) |         1           1
      Order bias (q) |         2           2
         BW est. (h) |     0.110       0.110
         BW bias (b) |     0.206       0.206
           rho (h/b) |     0.533       0.533
          Unique obs |      7352        5274

  Outcome: y. Running variable: x.
--------------------------------------------------------------------------------
              Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
---------------------+----------------------------------------------------------
        Conventional |  .17225     .02428   7.0948   0.000    .124668     .219839
              Robust |     -          -     6.0272   0.000    .117361     .230472
--------------------------------------------------------------------------------
  Estimates adjusted for mass points in the running variable.

179 local h_l `e(h_l)'
```

```
local h_r `e(h_r)'

rdplot y x, ///
  >         p(1) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         h(`h_l' `h_r') ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
  >         shade
  Mass points detected in the running variable.

  RD Plot with evenly spaced number of bins using polynomial regression.

          Cutoff c = .5 | Left of c  Right of c        Number of obs  =      75784
  ----------------------+----------------------        Kernel         = Triangular
          Number of obs |     41656       34128
     Eff. Number of obs |     14499       11060
    Order poly. fit (p) |         1           1
       BW poly. fit (h) |     0.110       0.110
   Number of bins scale |     1.000       1.000

  Outcome: y. Running variable: x.
  ---------------------------------------------
                        | Left of c  Right of c
  ----------------------+----------------------
           Bins selected|         6           6
     Average bin length |     0.083       0.083
      Median bin length |     0.083       0.083
  ----------------------+----------------------
      IMSE-optimal bins |         6           6
    Mimicking Var. bins |       604         599
  ----------------------+----------------------
  Rel. to IMSE-optimal: |
          Implied scale |     1.000       1.000
      WIMSE var. weight |     0.500       0.500
     WIMSE bias weight  |     0.500       0.500
  ---------------------------------------------


graph export "$do_loc/graphs/q2a_hopt.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet
      4/Stata/graphs/q2a_hopt.png saved as PNG format


/*
  > // plotting xp against y is very different and sensitive to outliers
  > rdplot y xp if !inlist(xp_100, 1,2,99,100), ///
  >         p(2) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
  >         shade
  >
  > rdplot y xp, ///
  >         p(2) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
```

```
>         shade
> */


/* 2a Discuss:
>
> Upon visual inspection, the outcome appears to follow a local linear trend
> on both sides of the cutoff. I therefore implement a local linear regression
> using the full range of the running variable as a bandwidth. I also use a
> uniform kernel but a triangular one does not change the results by much. My
> approach is thus equivalent to a specification where the treatment and the
> margin (running variable less cutoff) are fully interacted. A local linear
> specification is not always the most informative because the conditional
> expectation of Y given X can have some curvature. In our case, it apparently
> does not.
>
> The effect is a statistically significant positive number.
>
> 2c: see discussion above.
>
> */



end of do-file

do "$do_loc/02_q2b.do"

/*
> Title:          02_q2b.do
> Purpose:        Question 2.b, PSet 4
>
> */

/*
> What's the estimand? The estimand is \hat{tau}, the same one as in slide 15.
> Larger or smaller firms? As we showed in q 1
>
> */

use "$dta_loc/pset4_trim2.dta", clear


gen y = logwage


rdrobust y x, p(1) c(0.5) kernel(uniform)
```

Mass points detected in the running variable.

Sharp RD estimates using local polynomial regression.

Cutoff c = .5	Left of **c**	Right of **c**
Number of obs	**41656**	**34128**
Eff. Number of obs	**14499**	**11060**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.110**	**0.110**
BW bias (b)	**0.206**	**0.206**
rho (h/b)	**0.533**	**0.533**
Unique obs	**7352**	**5274**

Number of obs	=	**75784**
BW type	=	**mserd**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.17225**	**.02428**	**7.0948**	**0.000**	**.124668**	**.219839**
Robust	**-**	**-**	**6.0272**	**0.000**	**.117361**	**.230472**

Estimates adjusted for mass points in the running variable.

```
201 local h_l `e(h_l)'

202 local h_r `e(h_r)'

203 rdplot y x, ///
  >         p(1) ///
  >         c(0.5) ///
  >         masspoints(adjust) ///
  >         /// bwselect(mserd) ///
  >         h(`h_l' `h_r') ///
  >         kernel(tri) ///
  >         binselect(espr) ///
  >         graph_options(legend(position(6))) ///
  >         ci(95) ///
  >         shade
  Mass points detected in the running variable.

  RD Plot with evenly spaced number of bins using polynomial regression.

          Cutoff c = .5 | Left of c  Right of c        Number of obs  =      75784
  ----------------------+----------------------        Kernel         = Triangular
          Number of obs |     41656       34128
     Eff. Number of obs |     14499       11060
    Order poly. fit (p) |         1           1
       BW poly. fit (h) |     0.110       0.110
   Number of bins scale |     1.000       1.000

  Outcome: y. Running variable: x.
  ---------------------------------------------
                        | Left of c  Right of c
  ----------------------+----------------------
          Bins selected |         6           6
     Average bin length |     0.083       0.083
      Median bin length |     0.083       0.083
  ----------------------+----------------------
      IMSE-optimal bins |         6           6
    Mimicking Var. bins |       604         599
  ----------------------+----------------------
  Rel. to IMSE-optimal: |
          Implied scale |     1.000       1.000
      WIMSE var. weight |     0.500       0.500
      WIMSE bias weight |     0.500       0.500
  ---------------------------------------------


204
205 // around the cutoff, firms are not larger
206 gen localtobw = inrange(x, 0.5-`h_l', 0.5+`h_r')

207 ttest w, by(localtobw)

  Two-sample t test with equal variances
  ------------------------------------------------------------------------------
     Group |     Obs        Mean    Std. err.   Std. dev.   [95% conf. interval]
  ---------+--------------------------------------------------------------------
         0 |  50,225    131.7441    1.663188     372.736    128.4842     135.004
         1 |  25,559    134.3151    1.482614    237.0283    131.4091    137.2211
  ---------+--------------------------------------------------------------------
  Combined |  75,784    132.6112    1.210376     333.203    130.2389    134.9835
  ---------+--------------------------------------------------------------------
      diff |           -2.571003    2.560152               -7.588889    2.446883
  ------------------------------------------------------------------------------
      diff = mean(0) - mean(1)                                      t =  -1.0042
  H0: diff = 0                                     Degrees of freedom =    75782

      Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
   Pr(T < t) = 0.1576         Pr(|T| > |t|) = 0.3153          Pr(T > t) = 0.8424
```

```
208
  end of do-file

209 do "$do_loc/02_q2d.do"

210 /*
  > Title:          02_q2d.do
  > Purpose:        Question 2.d, PSet 4
  >
  > */
211
212
213
214 use "$dta_loc/pset4_trim2.dta", clear

215
216 gen y = logwage

217
218 local h_max = 50

219 local step = 50

220 forval i = 1(`=`h_max'/`step'')`h_max' {
    2.         dis "rdrobust with h(`i'/100)"
    3.         qui rdrobust y x, p(1) c(0.5) h(`i'/100) kernel(uniform)
    4.
221         // get stats
222         local tau_`i' = `e(tau_cl)'
    5.         local z_bc = e(tau_bc) / e(se_tau_rb)
    6.         local bc_lb_`i' = e(tau_bc) - invnormal(0.975)*e(se_tau_rb)
    7.         local bc_ub_`i' = e(tau_bc) + invnormal(0.975)*e(se_tau_rb)
    8. }
  rdrobust with h(1/100)
  rdrobust with h(2/100)
  rdrobust with h(3/100)
  rdrobust with h(4/100)
  rdrobust with h(5/100)
  rdrobust with h(6/100)
  rdrobust with h(7/100)
  rdrobust with h(8/100)
  rdrobust with h(9/100)
  rdrobust with h(10/100)
  rdrobust with h(11/100)
  rdrobust with h(12/100)
  rdrobust with h(13/100)
  rdrobust with h(14/100)
  rdrobust with h(15/100)
  rdrobust with h(16/100)
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  rdrobust with h(36/100)
  rdrobust with h(37/100)
  rdrobust with h(38/100)
  rdrobust with h(39/100)
```

```
  rdrobust with h(40/100)
  rdrobust with h(41/100)
  rdrobust with h(42/100)
  rdrobust with h(43/100)
  rdrobust with h(44/100)
  rdrobust with h(45/100)
  rdrobust with h(46/100)
  rdrobust with h(47/100)
  rdrobust with h(48/100)
  rdrobust with h(49/100)
  rdrobust with h(50/100)

223
224
225 // plot estimates and SEs against bandwidth
226 clear

227 set obs `step'
  Number of observations (_N) was 0, now 50.

228 gen h = .
  (50 missing values generated)

229 gen tau = .
  (50 missing values generated)

230 gen rb_lb = .
  (50 missing values generated)

231 gen rb_ub = .
  (50 missing values generated)

232
233 forval i = 1/`=_N' {
    2.         replace h     = `i'/`h_max' in `i'
    3.         replace tau   = `tau_`i''   in `i'
    4.         replace rb_lb = `bc_lb_`i'' in `i'
    5.         replace rb_ub = `bc_ub_`i'' in `i'
    6. }
  (1 real change made)
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 label var rb_ub "Bias-corrected upper bound (95% CI)"

 label var tau   "Conventional local-polynomial RD estimate"

 label var rb_lb "Bias-corrected lower bound (95% CI)"

 label var h "Bandwidth"

 twoway (line rb_ub h, lpattern(dash) lcolor(grey)) ///
  >                 (line tau h, lcolor(black)) ///
  >                 (line rb_lb h, lpattern(dash) lcolor(grey)), ///
  >                 legend(position(6)) ytitle("Estimate") ///
  >                 yline(0, lcolor(red) lpattern(solid))
  (note:  named style grey not found in class color, default attributes used)
  (note:  named style grey not found in class color, default attributes used)
  (note:  named style grey not found in class color, default attributes used)
  (note:  named style grey not found in class color, default attributes used)


 graph export "$do_loc/graphs/q2d.png", ///
  >         width(1200) height(900) ///
  >         replace
  file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q2d.png
      saved as PNG format



 /* As the bandwidth increases, the estimates become less biased in this
  > local linear setting.
  > */


  end of do-file

 do "$do_loc/02_q2e.do"
```

```
248 /*
  > Title:          02_q2e.do
  > Purpose:        Question 2.e, PSet 4
  >
  > */
249 /*
  > 2.E Alter the cutoff.
  >
  > */
250
251 use "$dta_loc/pset4_trim2.dta", clear

252
253 gen y = logwage

254
255 local c_range 30(10)70

256
257 forval i = 1/41 {
    2.         local c = 29+`i' // c= 30(1)70
    3.
258         gen margin_`c' = x - `c'/100
    4.         gen win_`c'    = x > `c'/100
    5. }

259
260 // Local linear regression
261 /*
  > forval i = 1/41 {
  >         local c = 29+`i' // c= 30(1)70
  >         if      `c' <  50 reg y i.win_`c'##c.margin_`c' if x < 0.5
  >         else if `c' == 50 reg y i.win_`c'##c.margin_`c'
  >         else if `c' >  50 reg y i.win_`c'##c.margin_`c' if x > 0.5
  > }
  > */
262
263 local rdopts ""

264 forval i = 1/41 {
    2.
265         // get c
266         local c = 29+`i' // c= 30(1)70
    3.         local c_reg = `c'/100
    4.
267         if      `c' <  50 rdrobust y x if x < 0.5, c(`c_reg') p(1) h(50/100) kernel(
  > uniform)
    5.         else if `c' == 50 rdrobust y x,                     c(`c_reg') p(1) h(50/
  > 100) kernel(uniform)
    6.         else if `c' >  50 rdrobust y x if x > 0.5, c(`c_reg') p(1) h(50/100) kern
  > el(uniform)
    7.
268         // get stats
269         local tau_`c' = `e(tau_cl)'
    8.         dis "tau_`c' = `tau_`c''"
    9.         local z_bc = e(tau_bc) / e(se_tau_rb)
   10.         local bc_lb_`c' = e(tau_bc) - invnormal(0.975)*e(se_tau_rb)
   11.         local bc_ub_`c' = e(tau_bc) + invnormal(0.975)*e(se_tau_rb)
   12. }
```

Sharp RD estimates using local polynomial regression.

Cutoff c = .3	Left of **c**	Right of **c**
Number of obs	**15195**	**26461**
Eff. Number of obs	**15195**	**26461**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	.01502	.01845	0.8140	0.416	-.021149	.051192
Robust	-	-	-0.1407	0.888	-.056689	.049096

tau_30 = .015021428558839

Sharp RD estimates using local polynomial regression.

Cutoff c = .31	Left of **c**	Right of **c**
Number of obs	16406	25250
Eff. Number of obs	16406	25250
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	41656
BW type	=	Manual
Kernel	=	Uniform
VCE method	=	NN

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	.00878	.01824	0.4810	0.631	-.026983	.044535
Robust	-	-	-0.5599	0.576	-.067179	.037325

tau_31 = .0087761259873247

Sharp RD estimates using local polynomial regression.

Cutoff c = .32	Left of **c**	Right of **c**
Number of obs	17674	23982
Eff. Number of obs	17674	23982
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	41656
BW type	=	Manual
Kernel	=	Uniform
VCE method	=	NN

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	.01224	.0181	0.6764	0.499	-.023234	.047722
Robust	-	-	-0.1910	0.849	-.056797	.046711

tau_32 = .0122437935695849

Sharp RD estimates using local polynomial regression.

Cutoff c = .33	Left of **c**	Right of **c**
Number of obs	18859	22797
Eff. Number of obs	18859	22797
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	41656
BW type	=	Manual
Kernel	=	Uniform
VCE method	=	NN

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	.02172	.01802	1.2052	0.228	-.013602	.057044
Robust	-	-	0.6917	0.489	-.0333	.069627

tau_33 = .0217211098977259

Sharp RD estimates using local polynomial regression.

Cutoff c = .34	Left of **c**	Right of **c**
Number of obs	**20061**	**21595**
Eff. Number of obs	**20061**	**21595**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01245**	**.018**	**0.6914**	**0.489**	**-.022836**	**.047727**
Robust	**-**	**-**	**0.1006**	**0.920**	**-.048578**	**.053833**

tau_34 = .0124454009049089

Sharp RD estimates using local polynomial regression.

Cutoff c = .35	Left of **c**	Right of **c**
Number of obs	**21507**	**20149**
Eff. Number of obs	**21507**	**20149**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01003**	**.01816**	**0.5525**	**0.581**	**-.025558**	**.045622**
Robust	**-**	**-**	**0.1085**	**0.914**	**-.049084**	**.054836**

tau_35 = .0100319166975602

Sharp RD estimates using local polynomial regression.

Cutoff c = .36	Left of **c**	Right of **c**
Number of obs	**22802**	**18854**
Eff. Number of obs	**22802**	**18854**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01462**	**.01828**	**0.8000**	**0.424**	**-.0212**	**.050444**
Robust	**-**	**-**	**0.6753**	**0.499**	**-.03406**	**.069868**

tau_36 = .0146219233892815

Sharp RD estimates using local polynomial regression.

Cutoff c = .37	Left of **c**	Right of **c**
Number of obs	24211	17445
Eff. Number of obs	24211	17445
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	-.00777	.01851	-0.4198	0.675	-.04406	.028515
Robust	-	-	-0.9555	0.339	-.078265	.026964

tau_37 = -.0077726241658844

Sharp RD estimates using local polynomial regression.

Cutoff c = .38	Left of **c**	Right of **c**
Number of obs	25775	15881
Eff. Number of obs	25775	15881
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	-.01689	.01906	-0.8863	0.375	-.054254	.020466
Robust	-	-	-1.6830	0.092	-.102506	.007793

tau_38 = -.0168941355655257

Sharp RD estimates using local polynomial regression.

Cutoff c = .39	Left of **c**	Right of **c**
Number of obs	27154	14502
Eff. Number of obs	27154	14502
Order est. (p)	1	1
Order bias (q)	2	2
BW est. (h)	0.500	0.500
BW bias (b)	0.500	0.500
rho (h/b)	1.000	1.000

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	.00011	.01954	0.0058	0.995	-.038175	.038403
Robust	-	-	-0.3402	0.734	-.066784	.047028

tau_39 = .0001140979514993

Sharp RD estimates using local polynomial regression.

Cutoff c = .4	Left of **c**	Right of **c**
Number of obs	**28253**	**13403**
Eff. Number of obs	**28253**	**13403**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**-.01523**	**.0195**	**-0.7812**	**0.435**	**-.053441**	**.022982**
Robust	**-**	**-**	**-1.4866**	**0.137**	**-.095815**	**.013159**

tau_40 = -.0152294819179382

Sharp RD estimates using local polynomial regression.

Cutoff c = .41	Left of **c**	Right of **c**
Number of obs	**29990**	**11666**
Eff. Number of obs	**29990**	**11666**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**-.01446**	**.02069**	**-0.6986**	**0.485**	**-.055012**	**.026099**
Robust	**-**	**-**	**-1.6120**	**0.107**	**-.108443**	**.010563**

tau_41 = -.0144561424662797

Sharp RD estimates using local polynomial regression.

Cutoff c = .42	Left of **c**	Right of **c**
Number of obs	**31455**	**10201**
Eff. Number of obs	**31455**	**10201**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**-.00157**	**.0219**	**-0.0715**	**0.943**	**-.04449**	**.041358**
Robust	**-**	**-**	**-0.8279**	**0.408**	**-.089807**	**.036469**

tau_42 = -.0015662699972339

Sharp RD estimates using local polynomial regression.

Cutoff c = .43	Left of **c**	Right of **c**
Number of obs	**32904**	**8752**
Eff. Number of obs	**32904**	**8752**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00041**	**.0236**	**0.0176**	**0.986**	**-.045843**	**.046671**
Robust	**-**	**-**	**-0.6693**	**0.503**	**-.094178**	**.04623**

tau_43 = .0004143517504502

Sharp RD estimates using local polynomial regression.

Cutoff c = .44	Left of **c**	Right of **c**
Number of obs	**34314**	**7342**
Eff. Number of obs	**34314**	**7342**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00958**	**.0252**	**0.3801**	**0.704**	**-.03982**	**.058982**
Robust	**-**	**-**	**0.1102**	**0.912**	**-.0696**	**.077894**

tau_44 = .0095809283334063

Sharp RD estimates using local polynomial regression.

Cutoff c = .45	Left of **c**	Right of **c**
Number of obs	**35726**	**5930**
Eff. Number of obs	**35726**	**5930**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.02032**	**.0279**	**0.7283**	**0.466**	**-.034359**	**.074992**
Robust	**-**	**-**	**1.2153**	**0.224**	**-.031722**	**.135257**

tau_45 = .0203162987549561

Sharp RD estimates using local polynomial regression.

Cutoff c = .46	Left of **c**	Right of **c**
Number of obs	**36962**	**4694**
Eff. Number of obs	**36962**	**4694**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**-.03429**	**.03026**	**-1.1333**	**0.257**	**-.093603**	**.025016**
Robust	**-**	**-**	**-1.3311**	**0.183**	**-.141402**	**.02702**

tau_46 = -.0342936662187014

Sharp RD estimates using local polynomial regression.

Cutoff c = .47	Left of **c**	Right of **c**
Number of obs	**38420**	**3236**
Eff. Number of obs	**38420**	**3236**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01087**	**.0372**	**0.2923**	**0.770**	**-.062032**	**.083775**
Robust	**-**	**-**	**1.3783**	**0.168**	**-.031512**	**.180843**

tau_47 = .0108714762746409

Sharp RD estimates using local polynomial regression.

Cutoff c = .48	Left of **c**	Right of **c**
Number of obs	**39677**	**1979**
Eff. Number of obs	**39677**	**1979**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**-.08226**	**.04421**	**-1.8606**	**0.063**	**-.168909**	**.004393**
Robust	**-**	**-**	**-1.4809**	**0.139**	**-.239282**	**.033311**

tau_48 = -.0822580530512731

Sharp RD estimates using local polynomial regression.

Cutoff c = .49	Left of **c**	Right of **c**
Number of obs	**41088**	**568**
Eff. Number of obs	**41088**	**568**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**41656**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**.03427**	**.08067**	**0.4248**	**0.671**	**-.123841**	**.192383**
Robust	**-**	**-**	**0.8097**	**0.418**	**-.141107**	**.33976**

tau_49 = .0342712501831883

Sharp RD estimates using local polynomial regression.

Cutoff c = .5	Left of **c**	Right of **c**
Number of obs	**41656**	**34128**
Eff. Number of obs	**41656**	**34128**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**75784**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**.1552**	**.01161**	**13.3654**	**0.000**	**.132438**	**.177956**
Robust	**-**	**-**	**8.7974**	**0.000**	**.118795**	**.1869**

tau_50 = .155197106007666

Sharp RD estimates using local polynomial regression.

Cutoff c = .51	Left of **c**	Right of **c**
Number of obs	**482**	**33646**
Eff. Number of obs	**482**	**33646**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**-.01941**	**.06182**	**-0.3141**	**0.753**	**-.140574**	**.101744**
Robust	**-**	**-**	**-0.5866**	**0.557**	**-.215795**	**.116378**

tau_51 = -.0194146579748917

Sharp RD estimates using local polynomial regression.

Cutoff c = .52	Left of **c**	Right of **c**
Number of obs	**1666**	**32462**
Eff. Number of obs	**1666**	**32462**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**-.04578**	**.03491**	**-1.3116**	**0.190**	**-.114198**	**.022631**
Robust	**-**	**-**	**-0.8126**	**0.416**	**-.131196**	**.054293**

tau_52 = -.0457833334740378

Sharp RD estimates using local polynomial regression.

Cutoff c = .53	Left of **c**	Right of **c**
Number of obs	**2632**	**31496**
Eff. Number of obs	**2632**	**31496**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**-.01349**	**.03108**	**-0.4340**	**0.664**	**-.074413**	**.047435**
Robust	**-**	**-**	**-0.3319**	**0.740**	**-.103083**	**.073228**

tau_53 = -.0134892261037152

Sharp RD estimates using local polynomial regression.

Cutoff c = .54	Left of **c**	Right of **c**
Number of obs	**3769**	**30359**
Eff. Number of obs	**3769**	**30359**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01915**	**.02587**	**0.7401**	**0.459**	**-.031555**	**.069846**
Robust	**-**	**-**	**1.0729**	**0.283**	**-.033464**	**.114405**

tau_54 = .0191453971836175

Sharp RD estimates using local polynomial regression.

Cutoff c = .55	Left of **c**	Right of **c**
Number of obs	**4760**	**29368**
Eff. Number of obs	**4760**	**29368**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01545**	**.02415**	**0.6395**	**0.522**	**-.031895**	**.062789**
Robust	**-**	**-**	**0.5433**	**0.587**	**-.051888**	**.091689**

tau_55 = .0154470996587825

Sharp RD estimates using local polynomial regression.

Cutoff c = .5600000000000001	Left of **c**	Right of **c**
Number of obs	**5868**	**28260**
Eff. Number of obs	**5868**	**28260**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00461**	**.02197**	**0.2097**	**0.834**	**-.038451**	**.047664**
Robust	**-**	**-**	**-0.5253**	**0.599**	**-.082074**	**.047381**

tau_56 = .0046067195915391

Sharp RD estimates using local polynomial regression.

Cutoff c = .57	Left of **c**	Right of **c**
Number of obs	**6972**	**27156**
Eff. Number of obs	**6972**	**27156**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**-.00931**	**.02072**	**-0.4492**	**0.653**	**-.049921**	**.031305**
Robust	**-**	**-**	**-1.4678**	**0.142**	**-.106717**	**.015322**

tau_57 = -.0093076136005159

Sharp RD estimates using local polynomial regression.

Cutoff c = .58	Left of **c**	Right of **c**
Number of obs	**8095**	**26033**
Eff. Number of obs	**8095**	**26033**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.02369**	**.01955**	**1.2121**	**0.225**	**-.014619**	**.062006**
Robust	**-**	**-**	**1.0032**	**0.316**	**-.027958**	**.086587**

tau_58 = .0236935265799367

Sharp RD estimates using local polynomial regression.

Cutoff c = .59	Left of **c**	Right of **c**
Number of obs	**9067**	**25061**
Eff. Number of obs	**9067**	**25061**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.03116**	**.01912**	**1.6299**	**0.103**	**-.006312**	**.068641**
Robust	**-**	**-**	**1.4291**	**0.153**	**-.015403**	**.098337**

tau_59 = .0311646223006825

Sharp RD estimates using local polynomial regression.

Cutoff c = .6	Left of **c**	Right of **c**
Number of obs	**9868**	**24260**
Eff. Number of obs	**9868**	**24260**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.03126**	**.01894**	**1.6509**	**0.099**	**-.005854**	**.068377**
Robust	**-**	**-**	**1.1919**	**0.233**	**-.022494**	**.092316**

tau_60 = .0312615341529892

Sharp RD estimates using local polynomial regression.

Cutoff c = .61	Left of **c**	Right of **c**
Number of obs	**11060**	**23068**
Eff. Number of obs	**11060**	**23068**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs = **34128**
BW type = **Manual**
Kernel = **Uniform**
VCE method = **NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**.02702**	**.01788**	**1.5115**	**0.131**	**-.008017**	**.062065**
Robust	**-**	**-**	**1.0029**	**0.316**	**-.025451**	**.078789**

tau_61 = .0270239747992704

Sharp RD estimates using local polynomial regression.

Cutoff c = .62	Left of **c**	Right of **c**
Number of obs	**12020**	**22108**
Eff. Number of obs	**12020**	**22108**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs = **34128**
BW type = **Manual**
Kernel = **Uniform**
VCE method = **NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**.01711**	**.01757**	**0.9742**	**0.330**	**-.017316**	**.05154**
Robust	**-**	**-**	**0.2231**	**0.823**	**-.045703**	**.057442**

tau_62 = .0171116405654494

Sharp RD estimates using local polynomial regression.

Cutoff c = .63	Left of **c**	Right of **c**
Number of obs	**12981**	**21147**
Eff. Number of obs	**12981**	**21147**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs = **34128**
BW type = **Manual**
Kernel = **Uniform**
VCE method = **NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Conventional	**.01478**	**.01718**	**0.8607**	**0.389**	**-.018882**	**.048451**
Robust	**-**	**-**	**0.2014**	**0.840**	**-.04477**	**.055024**

tau_63 = .0147847834244317

Sharp RD estimates using local polynomial regression.

Cutoff c = .64	Left of **c**	Right of **c**
Number of obs	**13819**	**20309**
Eff. Number of obs	**13819**	**20309**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01531**	**.01712**	**0.8946**	**0.371**	**-.018238**	**.048865**
Robust	**-**	**-**	**0.3826**	**0.702**	**-.04043**	**.060045**

tau_64 = .0153138155797485

Sharp RD estimates using local polynomial regression.

Cutoff c = .65	Left of **c**	Right of **c**
Number of obs	**14679**	**19449**
Eff. Number of obs	**14679**	**19449**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.02027**	**.01713**	**1.1833**	**0.237**	**-.013306**	**.053847**
Robust	**-**	**-**	**0.8962**	**0.370**	**-.027532**	**.073919**

tau_65 = .0202708768525568

Sharp RD estimates using local polynomial regression.

Cutoff c = .66	Left of **c**	Right of **c**
Number of obs	**15489**	**18639**
Eff. Number of obs	**15489**	**18639**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00671**	**.01717**	**0.3907**	**0.696**	**-.026948**	**.040366**
Robust	**-**	**-**	**-0.1697**	**0.865**	**-.055517**	**.04667**

tau_66 = .0067088055904883

Sharp RD estimates using local polynomial regression.

Cutoff c = .67	Left of **c**	Right of **c**
Number of obs	**16212**	**17916**
Eff. Number of obs	**16212**	**17916**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00166**	**.01732**	**0.0957**	**0.924**	**-.032289**	**.035605**
Robust	**-**	**-**	**-0.4357**	**0.663**	**-.063507**	**.040408**

tau_67 = .001657936994885

Sharp RD estimates using local polynomial regression.

Cutoff c = .68	Left of **c**	Right of **c**
Number of obs	**16905**	**17223**
Eff. Number of obs	**16905**	**17223**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.01096**	**.01746**	**0.6278**	**0.530**	**-.023262**	**.045187**
Robust	**-**	**-**	**0.5266**	**0.598**	**-.038432**	**.066672**

tau_68 = .0109626271500858

Sharp RD estimates using local polynomial regression.

Cutoff c = .6899999999999999	Left of **c**	Right of **c**
Number of obs	**17638**	**16490**
Eff. Number of obs	**17638**	**16490**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00599**	**.01755**	**0.3411**	**0.733**	**-.028415**	**.040391**
Robust	**-**	**-**	**0.2943**	**0.769**	**-.044674**	**.060463**

tau_69 = .0059880332223443

Sharp RD estimates using local polynomial regression.

Cutoff c = .7	Left of **c**	Right of **c**
Number of obs	**18315**	**15813**
Eff. Number of obs	**18315**	**15813**
Order est. (p)	**1**	**1**
Order bias (q)	**2**	**2**
BW est. (h)	**0.500**	**0.500**
BW bias (b)	**0.500**	**0.500**
rho (h/b)	**1.000**	**1.000**

Number of obs	=	**34128**
BW type	=	**Manual**
Kernel	=	**Uniform**
VCE method	=	**NN**

Outcome: y. Running variable: x.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Conventional	**.00137**	**.01773**	**0.0773**	**0.938**	**-.033371**	**.036112**
Robust	**-**	**-**	**0.0731**	**0.942**	**-.051141**	**.055102**

```
  tau_70 = .0013703275602168

270
271
272 clear

273 set obs 41
  Number of observations (_N) was 0, now 41.

274 gen c = .
  (41 missing values generated)

275 gen tau = .
  (41 missing values generated)

276 gen rb_lb = .
  (41 missing values generated)

277 gen rb_ub = .
  (41 missing values generated)

278
279 forval i = 1/`=_N' {
  2.         local c = 29+`i' // c= 30(1)70
  3.         replace c     = `c' in `i'
  4.         replace tau   = `tau_`c''   in `i'
  5.         replace rb_lb = `bc_lb_`c'' in `i'
  6.         replace rb_ub = `bc_ub_`c'' in `i'
  7. }
  (1 real change made)
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```
label var rb_ub "Bias-corrected upper bound (95% CI)"

label var tau   "Conventional local-polynomial RD estimate"

label var rb_lb "Bias-corrected lower bound (95% CI)"

label var c "Cutoff"

twoway (line rb_ub c, lpattern(dash) lcolor(grey)) ///
>                (line tau c, lcolor(black)) ///
>                (line rb_lb c, lpattern(dash) lcolor(grey)), ///
>                legend(position(6)) ytitle("Estimate") ///
>                yline(0, lcolor(red) lpattern(solid))
(note:  named style grey not found in class color, default attributes used)
(note:  named style grey not found in class color, default attributes used)
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graph export "$do_loc/graphs/q2e.png", ///
>        width(1200) height(900) ///
>        replace
file C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/graphs/q2e.png
    saved as PNG format

end of do-file

log close
      name:  <unnamed>
       log:  C:/Users/yfkas/Documents/GitHub/ARE213_Fall2023/PSet 4/Stata/pset4_logfil
> e.smcl
  log type:  smcl
 closed on:   4 Dec 2023, 11:53:26
```