*————————————begin RDD_Replication_Evelyn.do————————————

RDD Replication

Github repo and summary

1. https://github.com/EvelynCheng-Github/RDD

2. What is his research question? His research question is that the effect of harsher punishments and sanctions on driving under the influence.

   What data does he use? He utilizes the administrative records of 512,964 drunk driving parking spots in Washington State. What's more, blood alcohol content thresholds are important value to control drinking and driving.

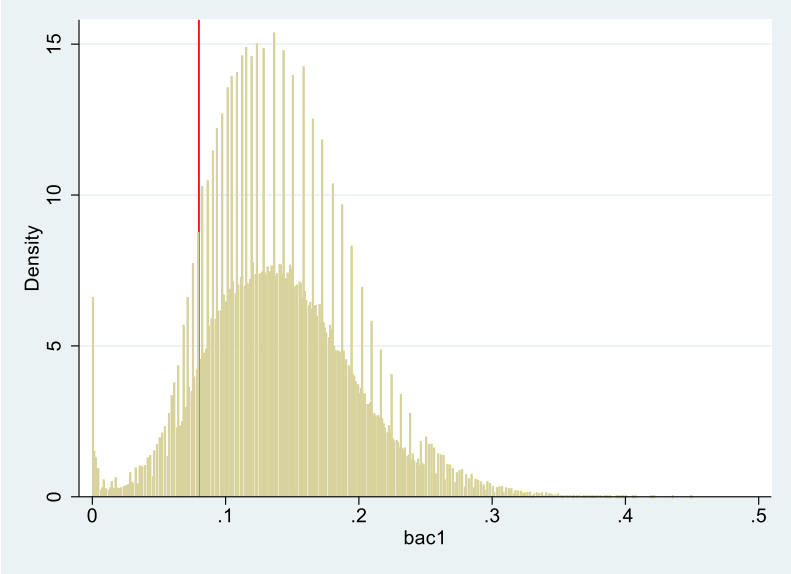
   What is his research design, or "identification strategy"? This article provides quasi-experimental evidence on the impact of severity of punishment on future crimes. In order to provide evidence for these alternative mechanisms, this article examines the degree of change in sanctions and punishments in terms of thresholds, multiple time windows for recidivism, and alcohol-related alternative crimes.

   What are his conclusions? Conclusion is that the additional sanctions experienced by drunk drivers at BAC thresholds are effective in reducing repeat drunk driving.

Reproducing somewhat Hansen's results

3. Create a dummy

4. Any evidence for manipulation



BAC histogram I draw presented that there are no obvious changes around 0.08. I didn't see manipulations in these data. I find same results with Hansen and there are no evidence for sorting on the running variable.

5. Recreate Table 2 Panel A

```
. rdrobust white bac1, c(0.08) h(0.03 0.13) kernel(uniform)

Sharp RD estimates using local polynomial regression.

   Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558
------------------+----------------------           BW type       =     Manual
    Number of obs |     23010      191548           Kernel        =     Uniform
Eff. Number of obs |     16399      169805           VCE method    =     NN
   Order est. (p) |         1           1
   Order bias (q) |         2           2
       BW est. (h) |     0.030       0.130
       BW bias (b) |     0.030       0.130
        rho (h/b) |     1.000       1.000

Outcome: white. Running variable: bac1.

------------------------------------------------------------------------------
        Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
-------------------+----------------------------------------------------------
  Conventional |   .0018     .00501   0.3592   0.719    -.00802      .011619
        Robust |     -          -     -0.1135  0.910   -.014432      .012852
------------------------------------------------------------------------------

. est store model1

. rdrobust aged bac1, c(0.08) h(0.03 0.13) kernel(uniform)

Sharp RD estimates using local polynomial regression.
```

```
   Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558
------------------+----------------------           BW type       =     Manual
    Number of obs |     23010      191548           Kernel        =     Uniform
Eff. Number of obs |     16399      169805           VCE method    =     NN
   Order est. (p) |         1           1
   Order bias (q) |         2           2
       BW est. (h) |     0.030       0.130
       BW bias (b) |     0.030       0.130
        rho (h/b) |     1.000       1.000
Outcome: aged. Running variable: bac1.
--------------------------------------------------------------------------------
          Method |   Coef.    Std. Err.    z     P>|z|    [95% Conf. Interval]
------------------+-------------------------------------------------------------
     Conventional | -.60951       .164   -3.7165  0.000   -.930952     -.288077
          Robust |     -         -     -0.5166  0.605   -.562484      .327809
--------------------------------------------------------------------------------
. est store model2
. rdrobust acc bac1, c(0.08) h(0.03 0.13) kernel(uniform)
Sharp RD estimates using local polynomial regression.
   Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558
------------------+----------------------           BW type       =     Manual
    Number of obs |     23010      191548           Kernel        =     Uniform
Eff. Number of obs |     16399      169805           VCE method    =     NN
   Order est. (p) |         1           1
   Order bias (q) |         2           2
```

BW est. (h) | 0.030 0.130

BW bias (b) | 0.030 0.130

rho (h/b) | 1.000 1.000

Outcome: acc. Running variable: bac1.

Method | Coef. Std. Err. z P>|z| [95% Conf. Interval]

---+---

Conventional | -.01301 .00408 -3.1921 0.001 -.020996 -.005021

Robust | - - -1.4959 0.135 -.019453 .002612

. est store model3

. esttab model1 model2 model3

---

(1) (2) (3)

white aged acc

RD_Estimate 0.00180 -0.610*** -0.0130**

(0.36) (-3.72) (-3.19)

N 214558 214558 214558

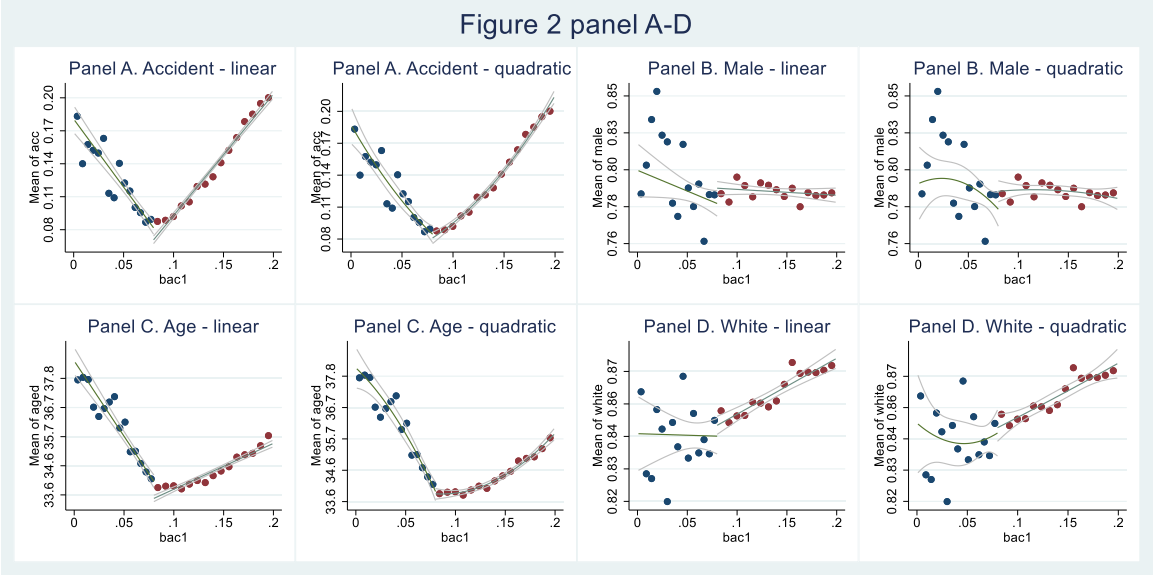
---

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

When we consider white male as dependent variables, p-value is 0.719 which means we can't reject null hypothsis. The covariates aren balanced at the cutoff. But if we take age and accident into account, p-value is near 0 which presents these two covariates aren't balanced at the cutoff. Hansen's result is that age and acc are exogenous. And balance test on table 2 shows that the results of age and acc isn't statistically significant. There are no cutoff about all variables which is different than my results.

6. Recreate Figure 2 panel A-D



In Hansen's paper, demographic factors such as age, race, and gender are stable across the DUI punishment thresholds.

7. Replicate Table 3

. reg recidivism bac1 male white acc aged if bac1 > 0.03 & bac1 < 0.13

Source	SS	df	MS	Number of obs =	89,967
Model	26.4808257	5	5.29616514	Prob > F =	0.0000
Residual	8565.65702	89,961	.095215227	R-squared =	0.0031
Total	8592.13785	89,966	.095504278	Adj R-squared =	0.0030
				Root MSE =	.30857

recidivism	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]

```
-------------+----------------------------------------------------------------

        bac1 |  -.0754879    .047039    -1.60   0.109    -.1676838     .016708

        male |   .0331526   .0025364    13.07   0.000     .0281813    .0381239

       white |   .0161118   .0029094     5.54   0.000     .0104093    .0218142

         acc |   .0047692   .0034149     1.40   0.163    -.0019241    .0114624

        aged |  -.0008381   .0000891    -9.41   0.000    -.0010127   -.0006635

       _cons |   .1025354   .0064622    15.87   0.000     .0898696    .1152012

------------------------------------------------------------------------------
```

. est store model4

. rdrobust recidivism bac1, c(0.08) h(0.03 0.13) kernel(uniform) covs(male white acc aged)

Covariate-adjusted sharp RD estimates using local polynomial regression.

```
   Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558

------------------+----------------------           BW type       =     Manual

    Number of obs |     23010      191548           Kernel        =     Uniform

Eff. Number of obs |     16399      169805           VCE method    =         NN

   Order est. (p) |         1           1

   Order bias (q) |         2           2

      BW est. (h) |     0.030       0.130

      BW bias (b) |     0.030       0.130

       rho (h/b) |     1.000       1.000
```

Outcome: recidivism. Running variable: bac1.

```
------------------------------------------------------------------------------

          Method |   Coef.    Std. Err.     z     P>|z|    [95% Conf. Interval]

-----------------+------------------------------------------------------------

    Conventional | -.02015     .00444   -4.5420  0.000   -.028852     -.011458
```

```
          Robust |     -         -     -2.9039  0.004   -.029956     -.005814
--------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 4

. est store model5

. rdrobust recidivism bac1, c(0.08) h(0.03 0.13) kernel(uniform) p(2) covs(male white acc
aged)

Covariate-adjusted sharp RD estimates using local polynomial regression.

   Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558
------------------+----------------------           BW type       =     Manual
    Number of obs |     23010      191548           Kernel        =     Uniform
Eff. Number of obs |    16399      169805           VCE method    =     NN
   Order est. (p) |        2           2
   Order bias (q) |        3           3
       BW est. (h) |    0.030       0.130
       BW bias (b) |    0.030       0.130
        rho (h/b) |     1.000       1.000
Outcome: recidivism. Running variable: bac1.

--------------------------------------------------------------------------------
          Method |   Coef.    Std. Err.     z     P>|z|    [95% Conf. Interval]
------------------+-------------------------------------------------------------
     Conventional | -.01788     .00616   -2.9039  0.004   -.029956     -.005814
          Robust |     -         -     -2.6092  0.009   -.035159     -.004996
--------------------------------------------------------------------------------
Covariate-adjusted estimates. Additional covariates included: 4

. est store model6
```

. esttab model4 model5 model6

	(1)	(2)	(3)
	recidivism	recidivism	recidivism
bac1	-0.0755		
	(-1.60)		
male	0.0332***		
	(13.07)		
white	0.0161***		
	(5.54)		
acc	0.00477		
	(1.40)		
aged	-0.000838***		
	(-9.41)		
RD_Estimate		-0.0202***	-0.0179**
		(-4.54)	(-2.90)
_cons	0.103***		
	(15.87)		
N	89967	214558	214558

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

```
. reg recidivism bac1 male white acc aged if bac1 > 0.055 & bac1 < 0.105

      Source |       SS           df       MS      Number of obs   =    46,957
-------------+----------------------------------   F(5, 46951)     =     34.24
       Model |  16.0618538         5  3.21237077   Prob > F        =    0.0000
    Residual |  4405.02672    46,951  .093821787   R-squared       =    0.0036
-------------+----------------------------------   Adj R-squared   =    0.0035
       Total |  4421.08857    46,956  .094153858   Root MSE        =     .3063

------------------------------------------------------------------------------
  recidivism |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        bac1 |  -.4758923   .1091708    -4.36   0.000    -.6898687   -.2619159
        male |   .0357643   .0034757    10.29   0.000     .0289519    .0425767
       white |   .0174948   .0039742     4.40   0.000     .0097052    .0252843
         acc |   .0043439   .0049114     0.88   0.376    -.0052825    .0139703
        aged |  -.0007526   .0001216    -6.19   0.000    -.0009909   -.0005142
       _cons |   .1284739   .0112569    11.41   0.000     .1064103    .1505375
------------------------------------------------------------------------------

. est store model7

. rdrobust recidivism bac1, c(0.08) h(0.055 0.105) kernel(uniform) covs(male white acc
aged)

Covariate-adjusted sharp RD estimates using local polynomial regression.

    Cutoff c = .08 | Left of c  Right of c           Number of obs =     214558
-------------------+----------------------           BW type       =     Manual
     Number of obs |     23010      191548           Kernel        =    Uniform
Eff. Number of obs |     19435      148004           VCE method    =         NN
    Order est. (p) |         1           1
```

Order bias (q) | 2 2

BW est. (h) | 0.055 0.105

BW bias (b) | 0.055 0.105

rho (h/b) | 1.000 1.000

Outcome: recidivism. Running variable: bac1.

Method | Coef. Std. Err. z P>|z| [95% Conf. Interval]

---+---

Conventional | -.02046 .00388 -5.2784 0.000 -.028053 -.012861

Robust | - - -3.7153 0.000 -.030628 -.009473

Covariate-adjusted estimates. Additional covariates included: 4

. est store model8

. rdrobust recidivism bac1, c(0.08) h(0.055 0.105) kernel(uniform) p(2) covs(male white acc aged)

Covariate-adjusted sharp RD estimates using local polynomial regression.

Cutoff c = .08 | Left of c Right of c Number of obs = 214558

---+--- BW type = Manual

Number of obs | 23010 191548 Kernel = Uniform

Eff. Number of obs | 19435 148004 VCE method = NN

Order est. (p) | 2 2

Order bias (q) | 3 3

BW est. (h) | 0.055 0.105

BW bias (b) | 0.055 0.105

rho (h/b) | 1.000 1.000

Outcome: recidivism. Running variable: bac1.

Method	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
Conventional	-.02005	.0054	-3.7153	0.000	-.030628 -.009473
Robust	-	-	-2.7437	0.006	-.032208 -.005367

Covariate-adjusted estimates. Additional covariates included: 4

. est store model9

. esttab model7 model8 model9

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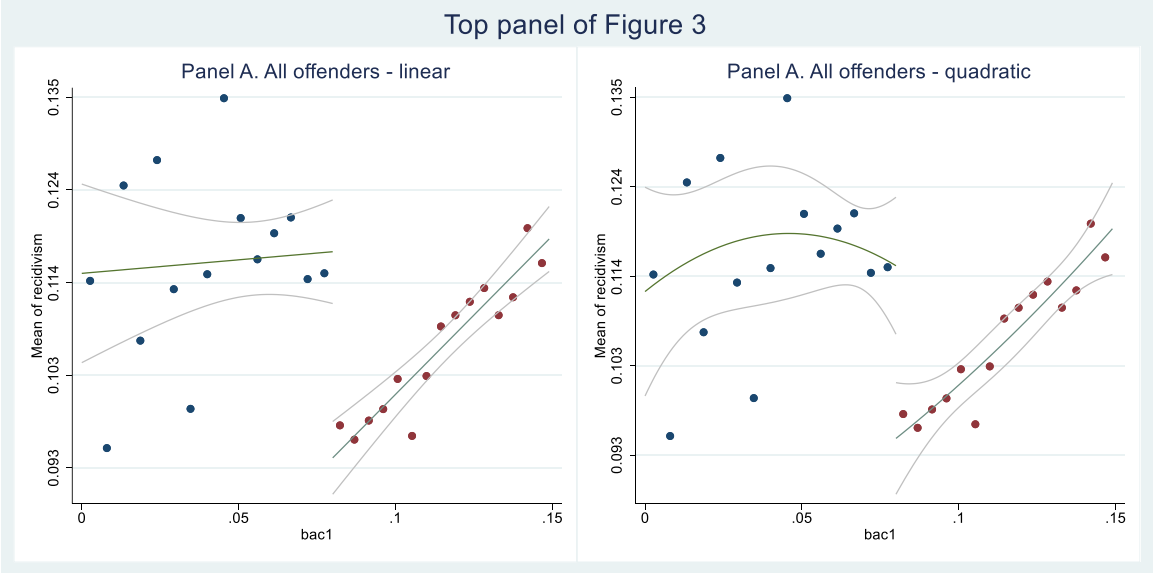
	(1)	(2)	(3)
	recidivism	recidivism	recidivism
bac1	-0.476***		
	(-4.36)		
male	0.0358***		
	(10.29)		
white	0.0175***		
	(4.40)		
acc	0.00434		
	(0.88)		
aged	-0.000753***		
	(-6.19)		
RD_Estimate		-0.0205***	-0.0201***

		(-5.28)	(-3.72)
_cons	0.128***		
	(11.41)		
N	46957	214558	214558

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

8. Recreate the top panel of Figure 3



9. The hypothesis I tested is that raw data hasn't be manipulated. And I find that there are no evidence for manipulations. Then, we check for covariate balance which I discover different results with author about age and acc. But the white variable is smooth around 0.08 that author and I get the same result. What's more, I tested regression discontinuity of having BAC above the threshold.