

# Audrey Mirasola

## Replication 1 Causal Inference Class

### Hansen study about DWI and BAC

```
. use "/Users/audreymirasola/Downloads/hansen_dwi.dta"
```

#### Question 3

```
. gen baccutoff = bac1 >= .08
. gen cutbac1 = baccutoff*bac1
```

#### Question 4

We use the McCrary density test to inspect the data and analyze whether there is evidence of manipulation. If smoothness is violated there, BAC at the cutoff may not be an ideal treatment to base a study on.

```
. net install rddensity, from(https://raw.githubusercontent.com/
checking rddensity consistency and verifying not already installed
all files already exist and are up to date.
```

```
. net install lpdensity, from(https://raw.githubusercontent.com/
checking lpdensity consistency and verifying not already installed
all files already exist and are up to date.
```

```
. rddensity bac1, c(.08) plot
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 =	0.080	Left of c	Right of c	Number of obs
Number of obs		23010	191548	Model
Eff. Number of obs		14727	28946	BW method
Order est. (p)		2	2	Kernel
Order bias (q)		3	3	VCE method
BW est. (h)		0.023	0.023	

Running variable: bac1.

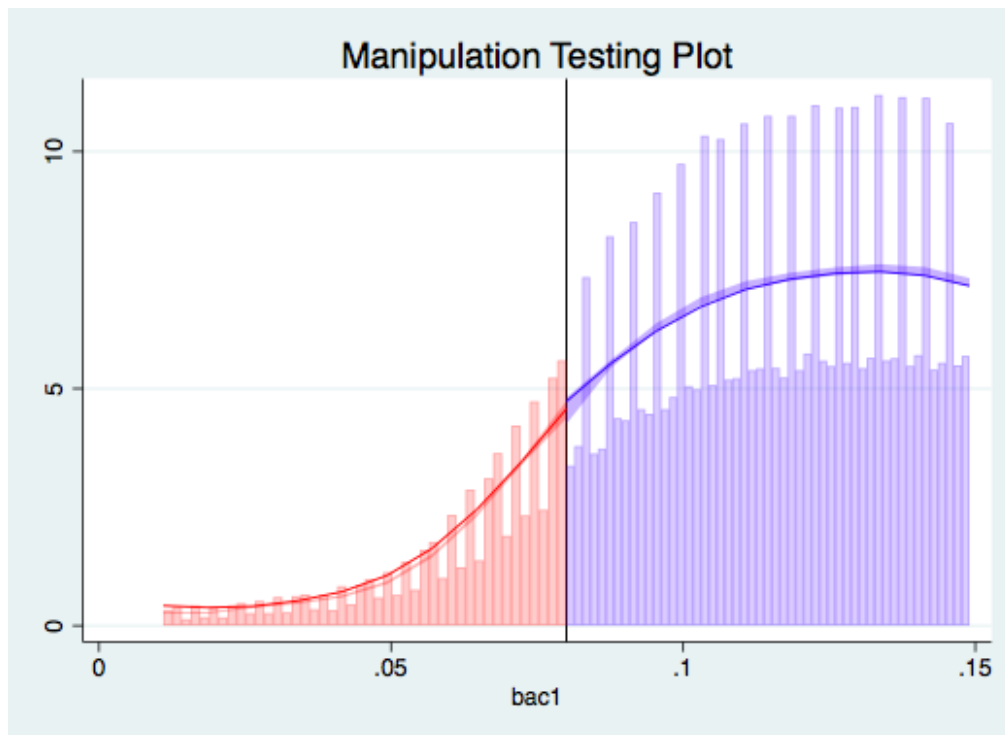
Method	T	P> T
Robust	-0.1387	0.8897

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

Window Length / 2	<c	>=c	P> T
0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000

0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000
0.000	909	0	0.0000

```
. graph export density.png , replace
(file /Users/audreymirasola/Downloads/density.png written in PNG)
```



While there is a bit of a jump, it is within standard error and there is no evidence that smoothness is violated. There is no evidence of sorting along the running variable. This agrees with Hansen's findings in the paper.

### Question 5

```
. replace bac1 = bac1-.08
(214,558 real changes made)
```

```
. quietly eststo: reg white i.baccutoff bac1 cutbac1 i.male age
. estimates store white, title(White)
```

```
. quietly eststo: reg male i.baccutoff bac1 cutbac1 i.white age
. estimates store male, title(Male)
```

```
. quietly eststo: reg aged i.baccutoff bac1 cutbac1 i.white i.male
. estimates store age, title(Age)
```

```
. quietly eststo: reg acc i.baccutoff bac1 cutbac1 i.white i.male
```

```
. estimates store accident, title(Accident)
. estout white male age accident, cells((b(star fmt(%9.3f))) (se
```

Panel A: Regressions with .05 Bandwidth

	white b/se	male b/se	age b/se
0.baccuttoff	0.000 (.)	0.000 (.)	0.000 (.)
1.baccuttoff	0.016 (0.017)	-0.016 (0.020)	-5.969*** (0.585)
bacl	0.202 (0.214)	-0.178 (0.240)	-67.407*** (7.204)
cutbacl	-0.120 (0.234)	0.280 (0.263)	72.751*** (7.828)
0.male	0.000 (.)		0.000 (.)
1.male	-0.036*** (0.003)		0.406*** (0.091)
aged	0.002*** (0.000)	0.001*** (0.000)	
0.acc	0.000 (.)	0.000 (.)	0.000 (.)
1.acc	0.004 (0.004)	-0.006 (0.005)	1.664*** (0.143)
0.white		0.000 (.)	0.000 (.)
1.white		-0.047*** (0.004)	1.939*** (0.098)
_cons	0.812*** (0.006)	0.808*** (0.007)	31.821*** (0.172)

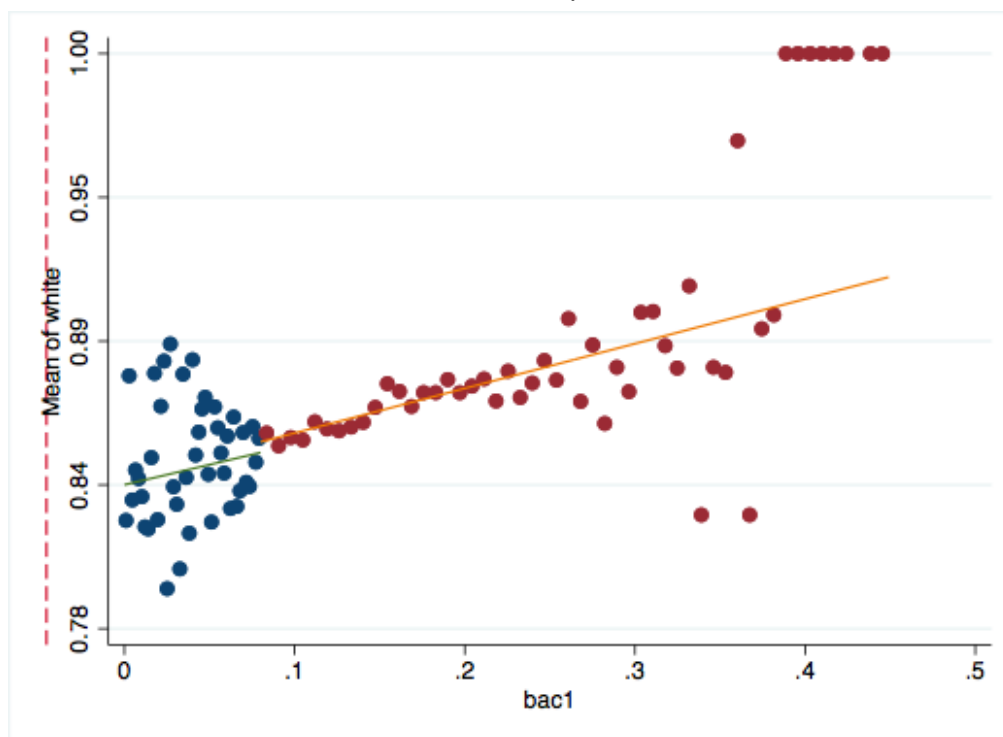
```
. eststo clear
```

### Question 6

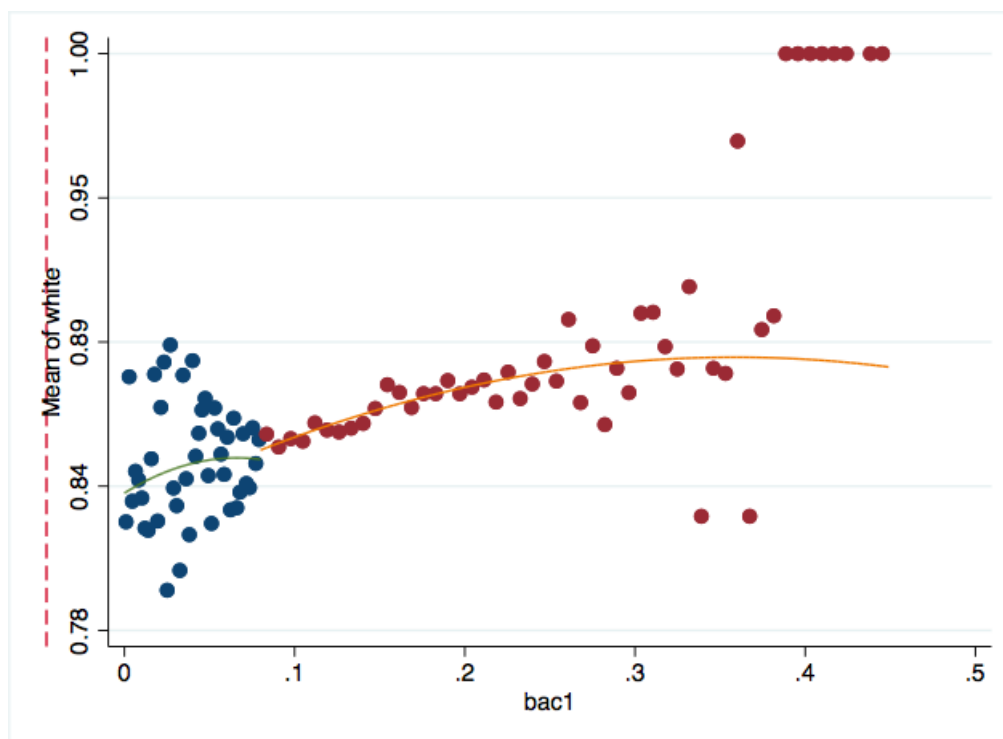
```
. replace bac1 = bac1+.08
(214,558 real changes made)
```

Plot the covariates

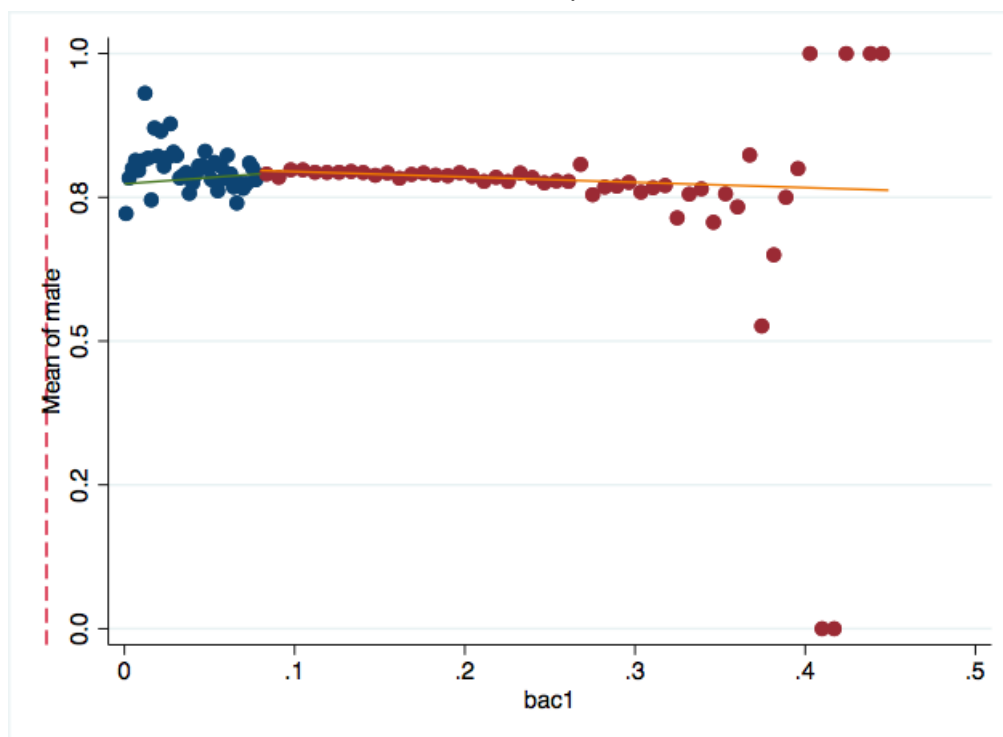
```
. quietly cmogram white bac1, cut(.08) scatter line(40)
. graph export Whitebac1.png , replace
(file /Users/audreymirasola/Downloads/Whitebac1.png written in 1
```



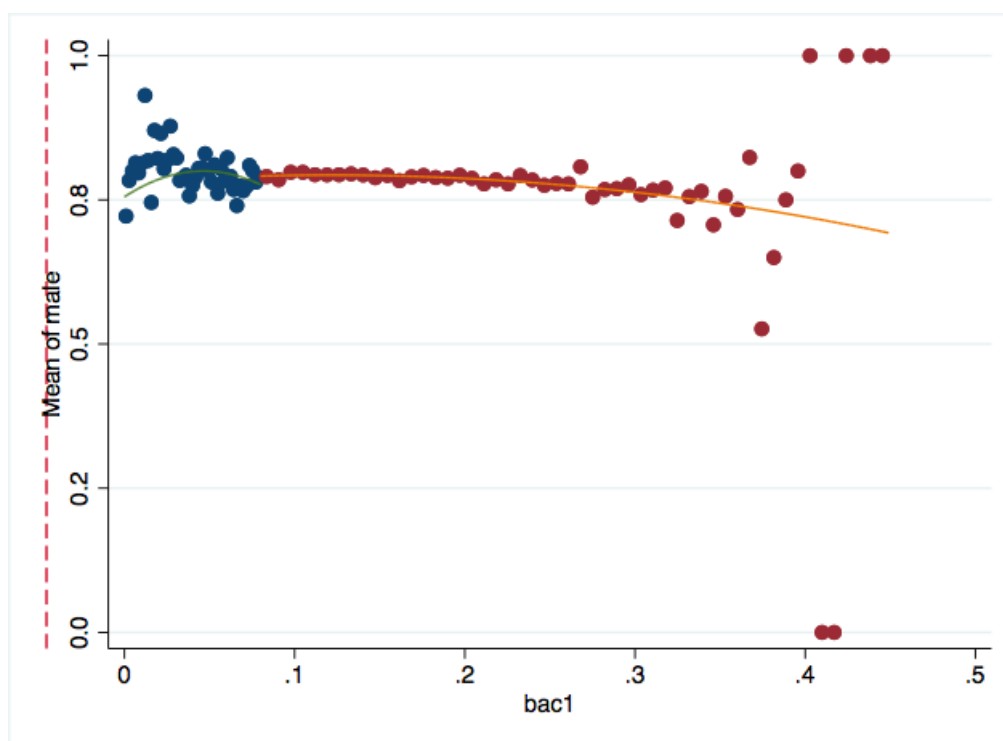
```
. quietly      cmogram    white bac1,      cut(.08) scatter line(40)
. graph export Whitebac2.png , replace
(file /Users/audreymirasola/Downloads/Whitebac2.png written in 1
```



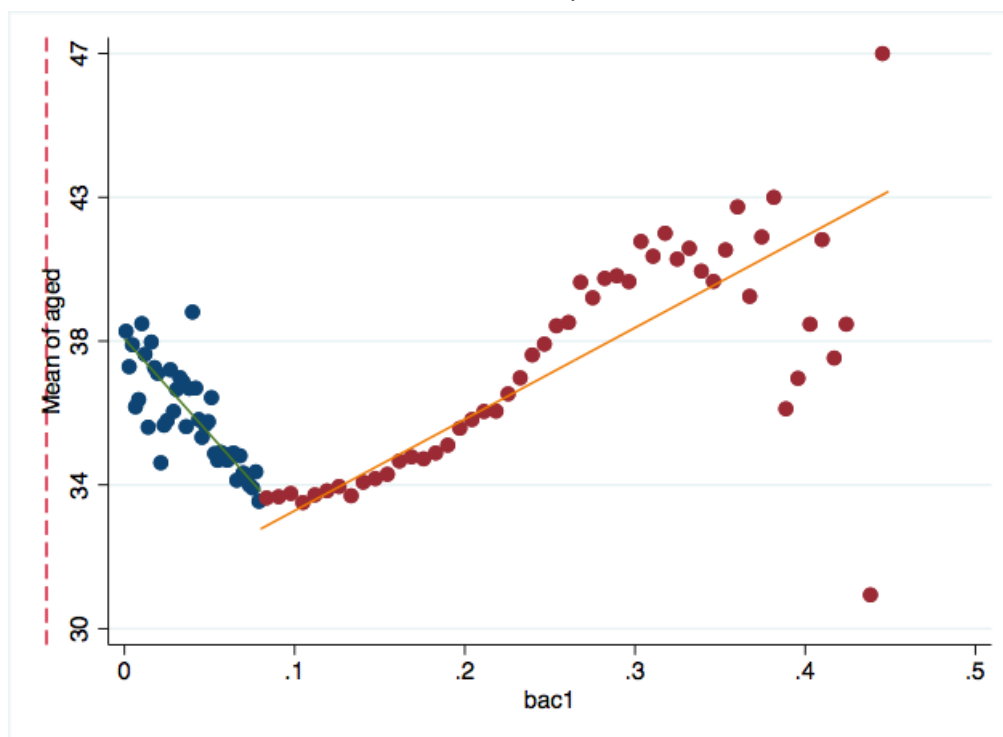
```
. quietly      cmogram    male bac1,      cut(.08) scatter line(40)
. graph export malebac1.png , replace
(file /Users/audreymirasola/Downloads/malebac1.png written in P
```



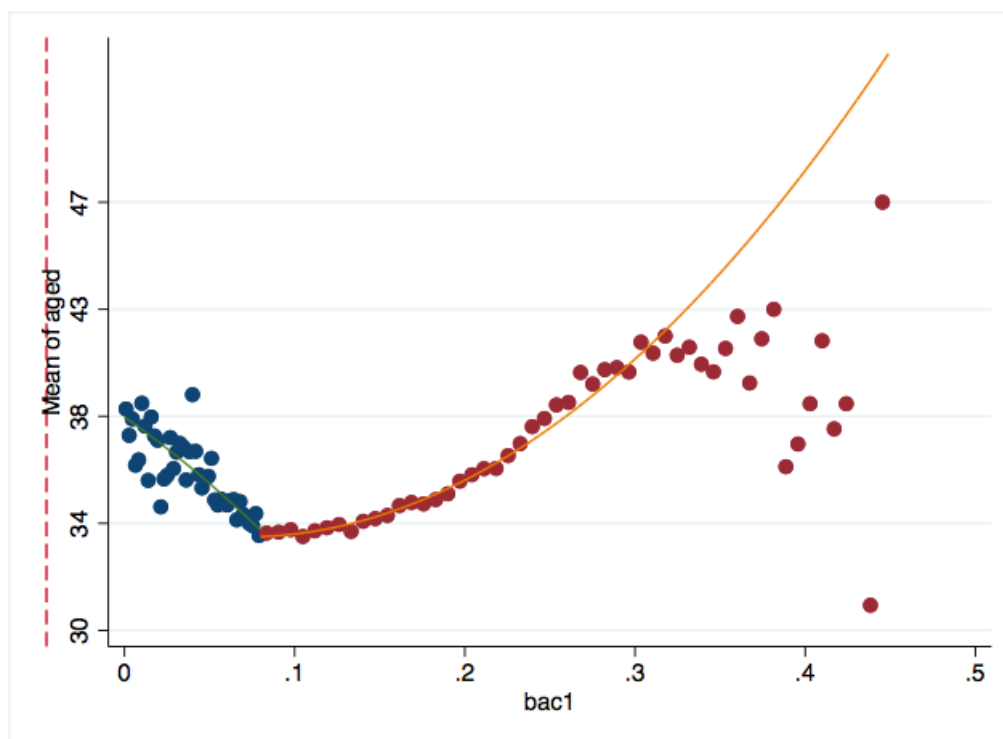
```
. quietly      cmogram      male bac1,      cut(.08) scatter line(40)
. graph export malebac2.png , replace
(file /Users/audreymirasola/Downloads/malebac2.png written in PNG format)
```



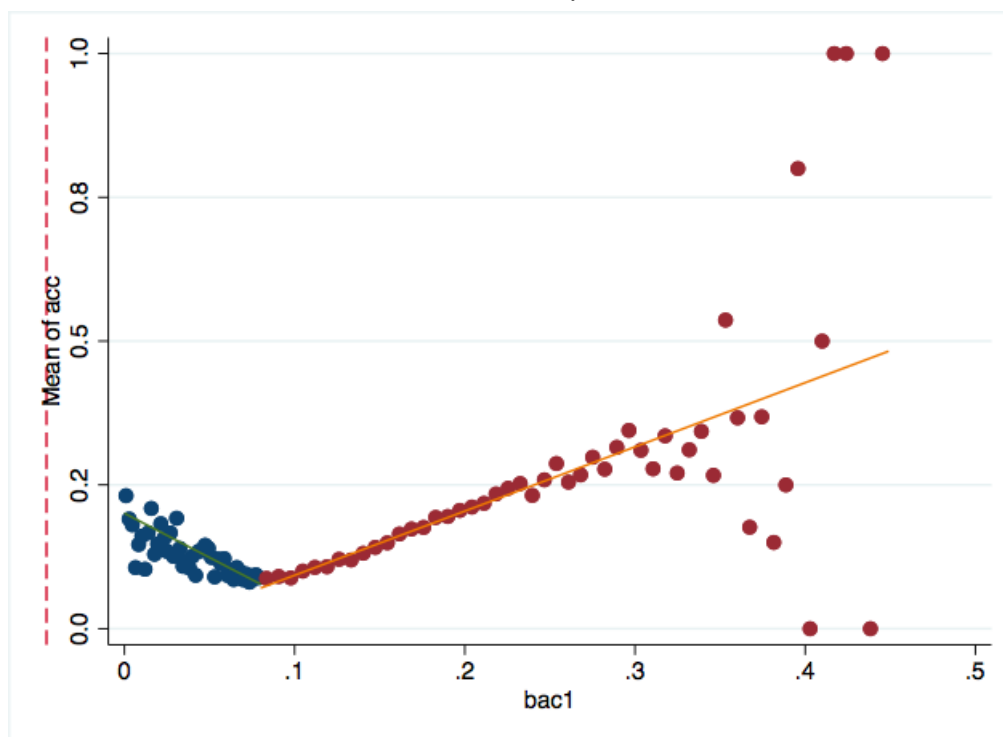
```
. quietly      cmogram      age bac1,      cut(.08) scatter line(40)
. graph export Agebac1.png , replace
(file /Users/audreymirasola/Downloads/Agebac1.png written in PNG format)
```



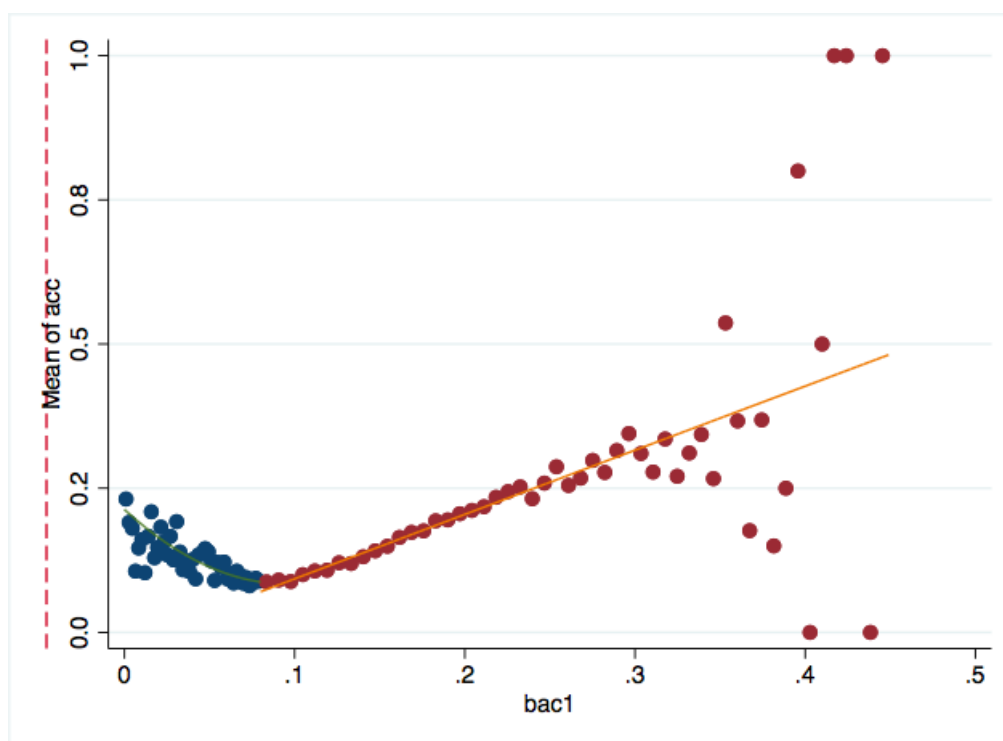
```
. quietly      cmogram      age bac1,      cut(.08) scatter line(40) c
. graph export Agebac2.png , replace
(file /Users/audreymirasola/Downloads/Agebac2.png written in PNG
```



```
. quietly      cmogram      acc bac1,      cut(.08) scatter line(40) c
. graph export Accbac1.png , replace
(file /Users/audreymirasola/Downloads/Accbac1.png written in PNG
```



```
. quietly      cmogram      acc bac1,      cut(.08) scatter line(40) c
. graph export Accbac2.png , replace
(file /Users/audreymirasola/Downloads/Accbac2.png written in PNG)
```



The graphs are fairly similar to those in Hansen's paper. Plotting each covariate quadratically shows that the null hypothesis of smoothness cannot be rejected.

### Question 7

## Panel A

```
. replace bac1 = bac1-.08
(214,558 real changes made)
```

## Column 1 (controlling for bac1 linearly)

```
. quietly eststo: reg recidivism i.baccutoff bac1 cutbac1 i.white
. estimates store ControlLinearly, title(Model 1)
```

## Column 2 (interact cutoff and bac 1 linearly)

```
. quietly eststo: xi: reg recidivism i.baccutoff*bac1 cutbac1 i.white
. estimates store LinearInteraction, title(Model 2)
```

## Column 3 (interact cutoff and bac1 linearly and as a quadratic)

```
. gen bacsq =(bac1)^2
. quietly eststo: xi: reg recidivism baccutoff##c.(bac1 bacsq)
. estimates store QuadraticInteraction, title(Model 3)
. estout ControlLinearly LinearInteraction QuadraticInteraction
> ons with .05 Bandwidth)
```

## Panel A: Regressions with .05 Bandwidth

	ControlLin~y b/se	LinearInte~n b/se	QuadraticI~n b/se
0.baccutoff	0.000 (.)		0.000 (.)
1.baccutoff	-0.059*** (0.015)		-0.096 (0.054)
bac1	-0.043 (0.187)	-0.035 (0.187)	-1.053 (0.601)
cutbac1	0.438* (0.204)	0.000 (.)	1.027 (0.689)
0.white	0.000 (.)		
1.white	0.016*** (0.003)		
0.male	0.000 (.)		
1.male	0.033*** (0.002)		
aged	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
0.acc	0.000 (.)		
1.acc	0.004 (0.003)		
_Ibaccutto~1		-0.024*** (0.004)	
_IbacXbac1_1		0.416* (0.204)	
_Iyear_2000		0.005 (0.005)	
_Iyear_2001		0.009 (0.005)	
_Iyear_2002		-0.003 (0.005)	
_Iyear_2003		-0.004 (0.004)	



```

_Iyear_2004          -0.006
                    (0.004)
_Iyear_2005          -0.009*
                    (0.005)
_Iyear_2006          -0.002
                    (0.005)
_Iyear_2007          -0.023***
                    (0.004)
_Iwhite_1            0.014***
                    (0.003)
_Imale_1             0.032***
                    (0.002)
_Iacc_1             0.004
                    (0.003)
bacsq               -24.717
                    (13.739)
0.baccutoff~1        0.000
                    (.)
1.baccutoff~1        0.000
                    (.)
0.baccutoff~q        0.000
                    (.)
1.baccutoff~q       32.731*
                    (15.105)
_cons               0.106***
                    (0.005)
                   0.113***
                   (0.006)
                   0.100***
                   (0.006)

. eststo clear

```

## Panel B

## Column 1 (controlling for bac1 linearly)

```

. quietly eststo: reg recidivism i.baccutoff bac1 cutbac1 i.white
. estimates store ControlLinearlyB, title(Model 4)

```

## Column 2 (interact cutoff and bac1 linearly )

```

. quietly eststo: xi: reg recidivism i.baccutoff*bac1 cutbac1 i.white
. estimates store LinearInteractionB, title(Model 5)

```

## Column 3 (interact cutoff and bac1 linearly and as a quadratic)

```

. quietly eststo: xi: reg recidivism baccutoff##c.(bac1 bacsq)
. estimates store QuadraticInteractionB, title(Model 6)
. estout ControlLinearlyB LinearInteractionB QuadraticInteractionB
> ssions with .025 Bandwidth)

```

## Panel B: Regressions with .025 Bandwidth

	ControlLin~B b/se	LinearInte~B b/se	QuadraticI~B b/se
0.baccutoff	0.000 (.)		0.000 (.)
1.baccutoff	-0.064 (0.035)		-0.085 (0.133)
bac1	-0.196 (0.383)	-0.202 (0.382)	-1.203 (1.344)
cutbac1	0.547 (0.449)	0.537 (0.449)	0.882 (1.675)
0.white	0.000 (.)		

```

      _*_*_
1.white      0.018***
              (0.004)
0.male      0.000
              (.)
1.male      0.036***
              (0.003)
aged        -0.001***      -0.001***      -0.001***
              (0.000)      (0.000)      (0.000)
0.acc      0.000
              (.)
1.acc      0.004
              (0.005)
_Ibaccutto~1      -0.063
                  (0.035)
_IbacXbac1_1      0.000
                  (.)
_Iyear_2000      0.010
                  (0.007)
_Iyear_2001      0.003
                  (0.007)
_Iyear_2002      -0.004
                  (0.006)
_Iyear_2003      -0.005
                  (0.006)
_Iyear_2004      -0.009
                  (0.006)
_Iyear_2005      -0.009
                  (0.006)
_Iyear_2006      -0.007
                  (0.006)
_Iyear_2007      -0.025***
                  (0.006)
_Iwhite_1      0.016***      0.018***
                  (0.004)      (0.004)
_Imale_1      0.035***      0.036***
                  (0.003)      (0.003)
_Iacc_1      0.004
                  (0.005)
bacsq      -46.065
              (58.747)
0.baccutto~1      0.000
                  (.)
1.baccutto~1      0.000
                  (.)
0.baccutto~q      0.000
                  (.)
1.baccutto~q      71.268
                  (69.207)
_cons      0.098***      0.106***      0.094***
              (0.007)      (0.008)      (0.008)
-----
. eststo clear

```

## Question 8

```

. replace bac1 = bac1+.08
(214,558 real changes made)

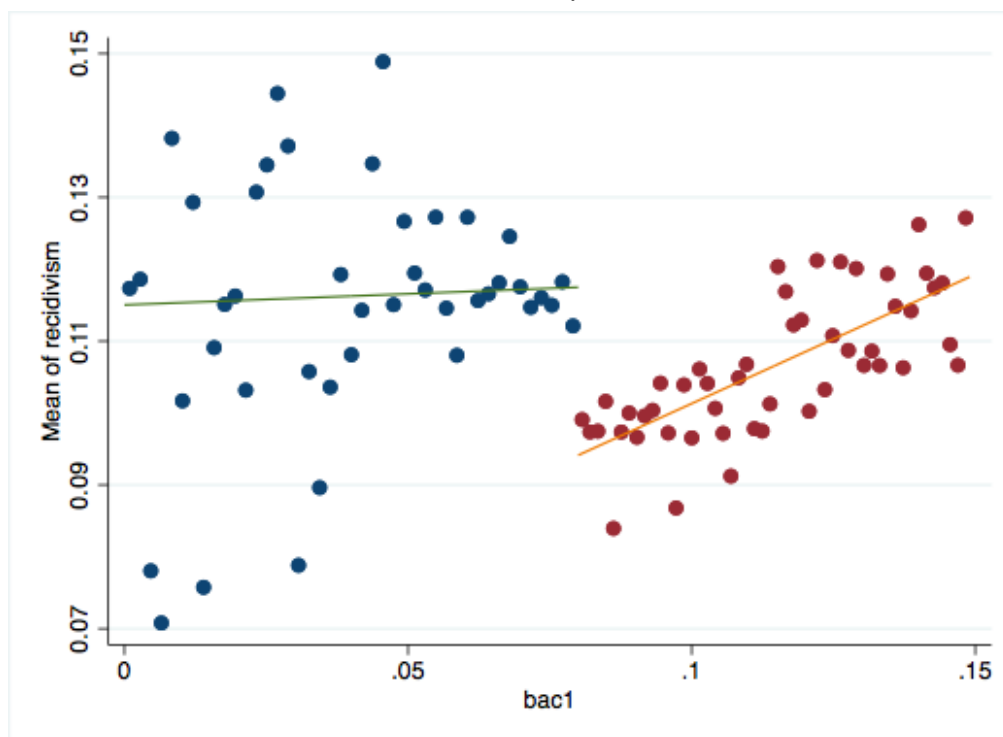
```

## Linear Fit

```

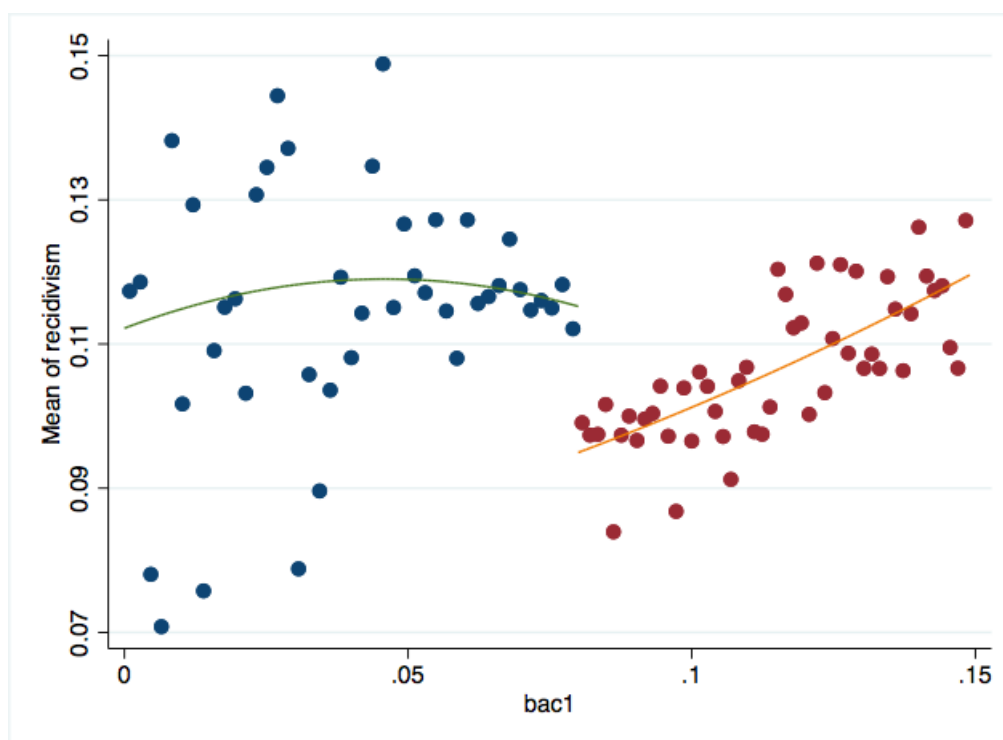
. quietly cmogram recidivism bac1 if bac1<.15, cut(.08) scatter
. graph export recid.png , replace
(file /Users/audreymirasola/Downloads/recid.png written in PNG)

```



### Quadratic Fit

```
. quietly cmogram recidivism bac1 if bac1<.15, cut(.08) scatter
. graph export recidq.png , replace
(file /Users/audreymirasola/Downloads/recidq.png written in PNG)
```



### Question 9

This project tested the hypothesis of whether or not receiving punishment for drunk driving has an impact on recidivism. I am confident in Hansen's conclusion that punishment has an impact because this replication shows that there is a significant decrease in recidivism at the cusp of the threshold while the other variables remain smooth at that .08 treatment point.