Assignment 1: Hansen AER 2013

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Summary of Hansen's Project

Replication

Density of the Running Variable

If people were capable of manipulating their blood alcohol content (BAC) with the precision required to full the breathalyzer, the histogram of BAC would swell to the left of the legal threshold and drop to the right of it. That distortion of the distribution would occur because of the negative legal consequences for being charged with driving while intoxicated.

In the recreation of Hansen's BAC histogram below we do not see any evidence for sorting on the running variable. The characteristic density discontinuity is not present at BAC = 0.08, the black vertical line.
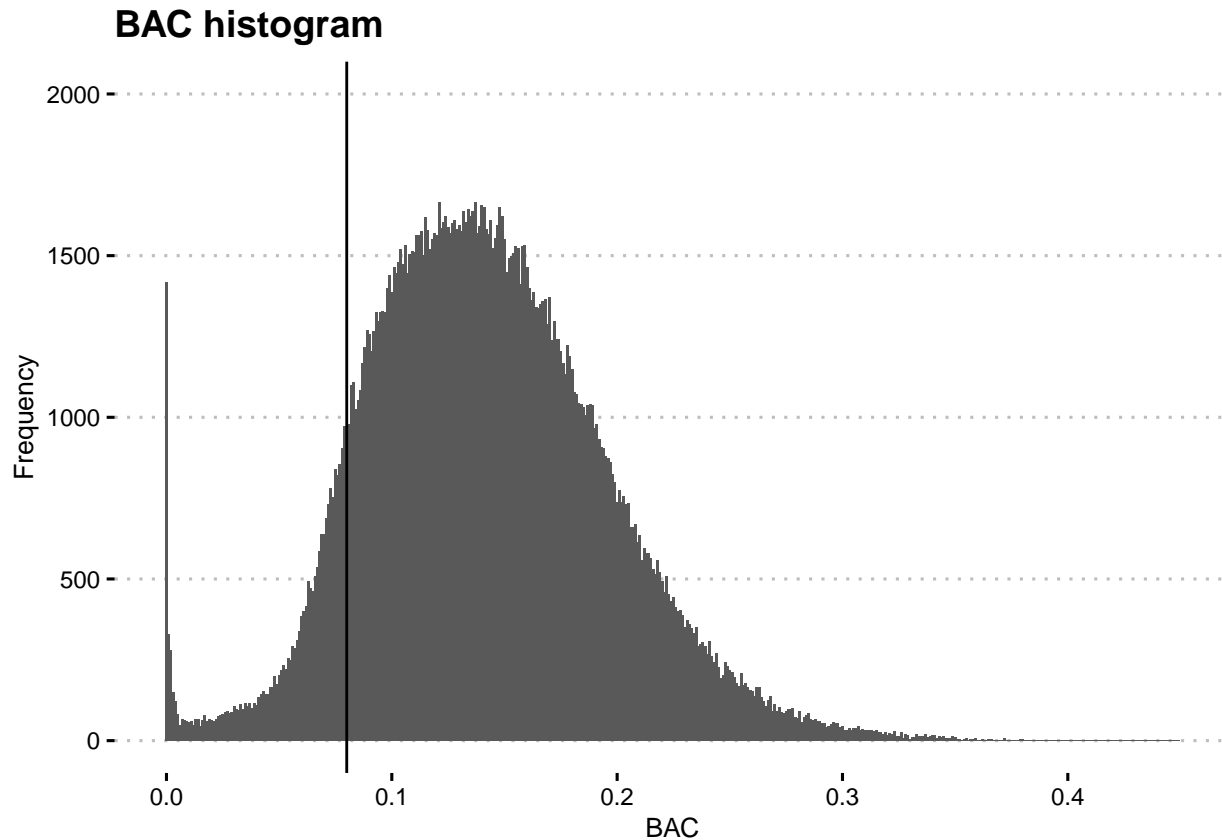
Covariates by the Running Variable

Table 1: Regression Discontinuity Estimates for Covariates

	Male	White	Age	Accident
	(1)	(2)	(3)	(4)
DUI	0.006	0.004	−1.115***	−0.007**
	(0.004)	(0.004)	(0.121)	(0.003)
Observations	214,558	214,558	214,558	214,558
R^2	0.000	0.001	0.013	0.021
Adjusted R^2	0.000	0.001	0.013	0.021
Residual Std. Error (df = 214554)	0.408	0.345	11.431	0.351
F Statistic (df = 3; 214554)	9.428***	58.401***	907.467***	1,566.761***

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

As shown in the table above, only age shows a significant discontinuity at the BAC threshold.

The figure below shows linear model fits. Panel C in the linear model plots illuminates the significant imbalance found for the linear regression of age on BAC presented in the table above. It seems to be an artifact of including high values of BAC, which biases the model; all the average BAC levels (represented by empty dots) within .02 percentage points of the legal BAC threshold lie above the linear fit.

There are several differences between these plots and the corresponding plots presented in Hansen's paper. Obviously, the replication plots use only one threshold BAC level, rather than the two shown in the original. These influence our regression results by including data from farther away from the threshold than Hansen uses.

Additionally, Panel B in the replication plot shows a positive slope below the 0.08 BAC threshold, unlike the negative slope in the original. Also, Panel C in the original has an age axis that ranges from 0.34 to 0.38, three orders of magnitude smaller than the ranges in the replication.

Panel A. Accident at scene

Panel B. Male

Panel C. Age

Panel D. White
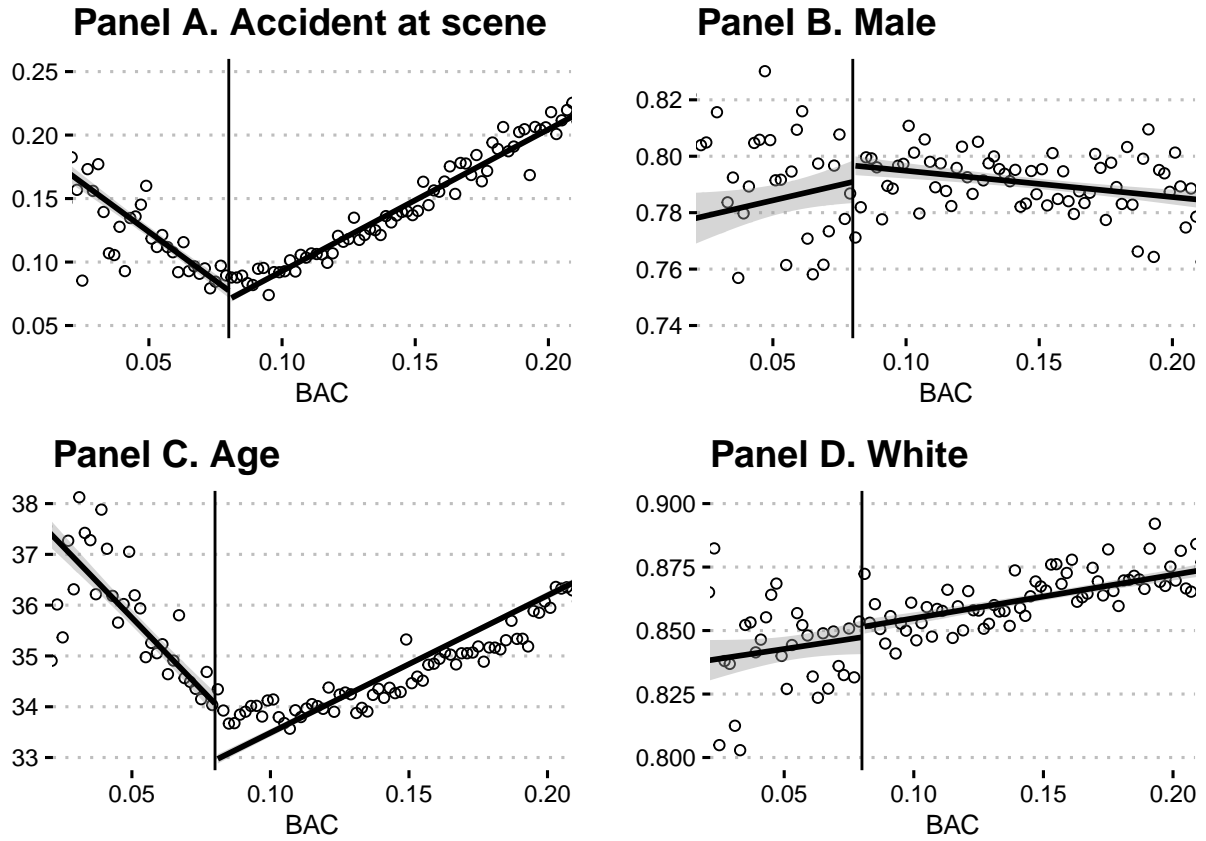
The bias introduced by the linear model for age above is fixed by using a quadratic model, presented in Panel C of the figure below. However, the quadratic model also introduces a potentially disqualifying amount of variance. For example, Panel B shows a questionable fit below the legal BAC threshold.

Panel A. Accident at scene

BAC

Panel B. Male

BAC

Panel C. Age

BAC

Panel D. White

BAC
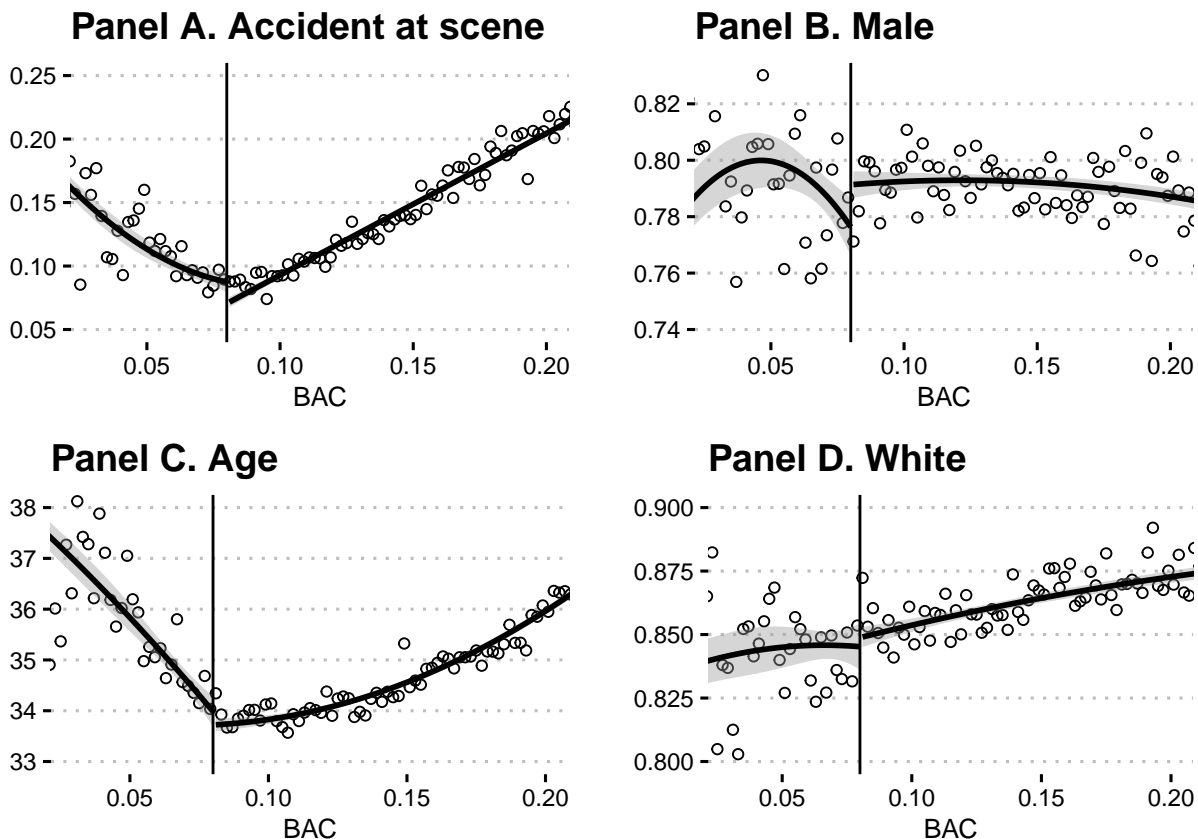
Regression Discontinuity

Table 2: Regression Discontinuity Estimates for the Effect of DUI on Recidivism, BAC in [0.03, 0.13]

|	Linear Control	With Interaction	With Quadratic Interaction
	(1)	(2)	(3)
DUI	−0.027***	−0.059***	0.113
	(0.004)	(0.015)	(0.084)
Observations	89,967	89,967	89,967
R^2	0.004	0.004	0.004
Adjusted R^2	0.004	0.004	0.004
Residual Std. Error	0.308 (df = 89960)	0.308 (df = 89959)	0.308 (df = 89957)
F Statistic	54.029*** (df = 6; 89960)	46.995*** (df = 7; 89959)	37.092*** (df = 9; 89957)

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 3: Regression Discontinuity Estimates for the Effect of DUI on Recidivism, BAC in [0.055, 0.105]

	Linear Control	With Interaction	With Quadratic Interaction
	(1)	(2)	(3)
DUI	-0.022^{***}	-0.069^{**}	0.270
	(0.006)	(0.034)	(0.409)
Observations	47,205	47,205	47,205
R^2	0.004	0.004	0.004
Adjusted R^2	0.004	0.004	0.004
Residual Std. Error	0.306 (df = 47198)	0.306 (df = 47197)	0.306 (df = 47195)
F Statistic	31.384*** (df = 6; 47198)	27.198*** (df = 7; 47197)	21.232*** (df = 9; 47195)

Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.

Regression Discontinuity for All Offenders, Linear
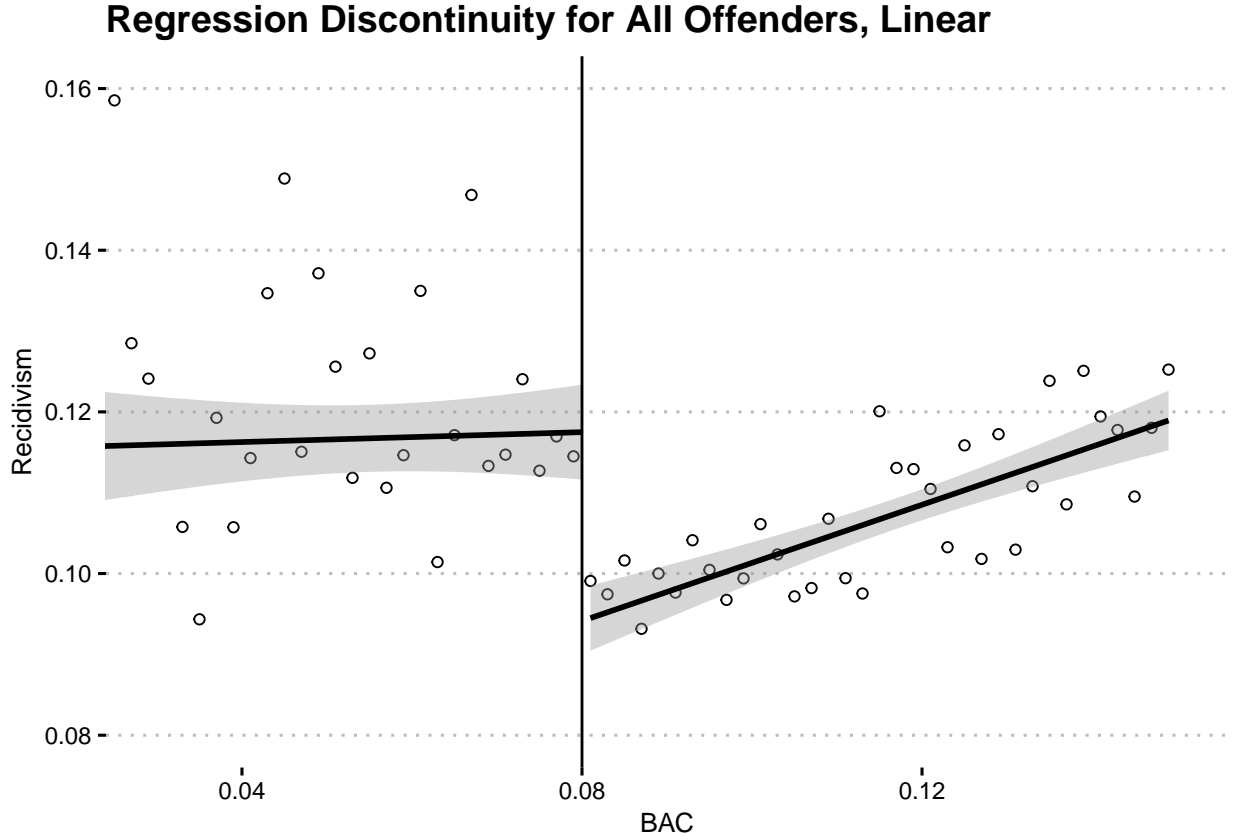
Regression Discontinuity for All Offenders, Quadratic