**Assignment 4**

**Name: Diana Carolina Hernández Ríos**

**ID: 1020.729.394**

**E-mail:** [**dianacaroli.hernan05@urosario.edu.co**](mailto:dianacaroli.hernan05@urosario.edu.co)

1. **Github repositoy “RDD”**

<https://github.com/DCHRios/RDD>

1. **Summary of Hansen’s paper**

The research’s main goal is to analyze how punishments and sanctions are effective in reducing drink driving; This is relevant since drunk driving is considered as a serious public health issue, and given that this type of crime differs from other like homicide, authorities and policymakers need combined strategies to enforce people to avoid it and to have control tools, like Blood Alcohol Content -BAC- tests, to verify and punish if required.

Hansen used a Regression Discontinuity design to do so. First, he takes administrative records on 512,964 DUI stops from the state of Washington from 1995 to 2011, and BAC thresholds to determines potential punishments: 0.08 considered a DUI and 0.15 as aggravated DUI (based on data from the 1999–2007). He also checked prior offenses.

Specifications RDD design:

* Y: Reducing drink driving and recidivism
* D: Punishments and sanctions based on Blood Alcohol Content -BAC test to find DUI
* Running Variable: Blood Alcohol Content -BAC
* Cutoffs: BAC thresholds 0.08 and 0.15

Relevant assumptions and decisions:

* To establish identification in this case, it must be assumed that it is locally random for a driver to have a BAC either just below or just above the BAC thresholds (driver’s luck).
* The main results are based on a local-linear regression discontinuity design with a rectangular kernel.

Finally, the paper suggest that “additional sanctions experienced by drunk drivers at BAC thresholds are effective in reducing repeat drunk driving”, hence, according to Hansen, this paper provide policy evidence for the effectiveness of current BAC and if wanted, valuation to low it to 0.05.

1. **Generate a dummy variable to stablish 0.08 BAC cutoff**

Table 1 - Dummy variable of BAC1

|  |  |  |  |
| --- | --- | --- | --- |
| Dummy variable | Frequency | Percent | Cum. |
| 0 | **23,010** | **10.72** | **10.72** |
| 1 (bac1>=0,08) | **191,548** | **89.28** | **100.00** |
| Total | **214,558** | **100.00** |  |

1. **Evidence of Manipulation**

According to Hansen, “the inability of either drivers or police to manipulate BAC allows for a unique quasi-experiment to test whether the punishments and sanctions offenders experience at the BAC thresholds are effective in reducing drunk driving”. To verify that, McCrary introduced the idea that it is possible, by sorting on the running variable, to check whether there is evidence of a discontinuity in the density of units at the cutoff.

Based on the available data, the density test shows an evidence of manipulation, given a P-value of 0,0276, but is hard to see any bunching at 0.08 cutoff in the Figure1. However, in the original paper, and with the complete data, the McCrary test implies p-values of 0.59 and 0.38 respectively at the 0.08 and 0.15 thresholds. Therefore, Hansen used an alternative density test based on a local approximation to a binomial distribution. That test estimates a p-value of 0.795 at 0.08, and 0.886 at 0.15, again revealing no evidence of manipulation (Hansen, 2017, P.7).

Figure 1 - BAC Histogram

Imagen que contiene texto, mapa

Descripción generada automáticamente

Figure 2 - Rdensity test - bac1

Captura de pantalla de un celular

Descripción generada automáticamente

1. **Check for covariate balance**

I have estimated the effect of having a BAC over the DUI thresholds on predetermined characteristics which should be unaffected by BAC thresholds, employing the same regression model as equation (1), with 3 control variables utilized as the dependent variable. As shown in the table 2, the covariates are balanced at the cutoff. In contrast, Hansen failed to reject the null hypothesis that the predetermined characteristics are unrelated to the BAC cutoffs for DUI (Hansen, 2015, P.8).



Table 2 - Regression Discontinuity Estimates for the Effect of Exceeding BAC

Thresholds on Predetermined Characteristics

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Driver demographic characteristics** | | |
|  | (1) | (2) | (3) |
| Characteristics | white | aged | accident |
| BAC1 | 0.0202\*\*\* | -0.564\*\*\* | 0.0353\*\*\* |
|  | (0.00241) | (0.0802) | (0.00247) |
|  |  |  |  |
| \_cons | 0.844\*\*\* | 35.46\*\*\* | 0.116\*\*\* |
| Mean at 0.79 | (0.00228) | (0.0758) | (0.00234) |
| *Observations* | 214558 | 214558 | 214558 |

**Standard errors in parentheses**

**Significant \* *p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001**

1. **Recreate Figure 2 panel A-D.**

**Una captura de pantalla de un celular

Descripción generada automáticamenteCaptura de pantalla de un celular con letras

Descripción generada automáticamente**

**Imagen que contiene texto, mapa

Descripción generada automáticamenteCaptura de pantalla de un celular

Descripción generada automáticamente**

1. **Recidivism (recid) as the outcome**

Hansen’s table 3 shows the estimated effect of having BAC over the DUI threshold for all drivers, those with no prior tests, as well as those with at least one prior test. We are only focused on colum1 and add interactions as required for the assignment.

Table 3- Regression Discontinuity Estimates for the Effect

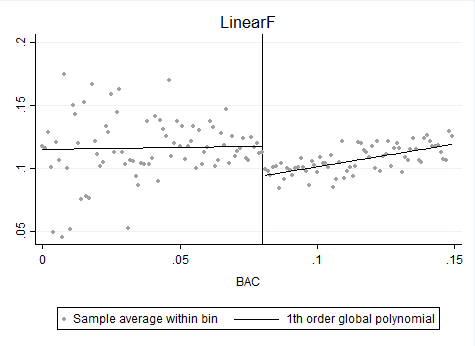
of Exceeding the 0.08 BAC Threshold on Recidivism

|  |  |  |  |
| --- | --- | --- | --- |
|  | (1) | (2) | (3) |
|  | **Recidivism**  **Control for the bac1 linearly** | **Recidivism**  **interact bac1 with cutoff linearly** | **Recidivism**  **interact bac1 with cutoff linearly and as a quadratic** |
| BAC1 | 0.00101 |  |  |
| **bac1 linearly** | (0.00224) |  |  |
|  |  |  |  |
| intbac1BAC1 |  | 0.155\*\*\* |  |
| **bac1 with cutoff linearly** |  | (0.0112) |  |
|  |  |  |  |
| inter2bac1BAC2 |  |  | 0.155\*\*\* |
| **bac1 with cutoff linearly and as a quadratic** |  |  | (0.0112) |
|  |  |  |  |
| \_cons | 0.117\*\*\* | 0.0966\*\*\* | 0.0966\*\*\* |
|  | (0.00212) | (0.00163) | (0.00163) |
| *N* | 214558 | 214558 | 214558 |

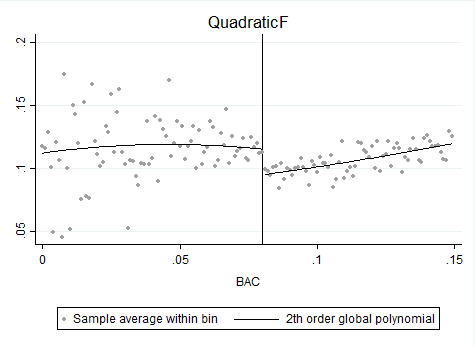
Standard errors in parentheses

significant \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

1. **Recreate the top panel of Figure 3**
   1. Fit linear fit using only observations with less than 0.15 bac on the bac1



* 1. Fit quadratic fit using only observations with less than 0.15 bac on the bac1

****