RDD Replication

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Github repo and summary

Question 1

https://github.com/Reina-Huang/RDD.git

Question 2

The main question for this paper is that the authors would like to realize whether punishments and sanctions are effective in decreasing drunk driving. They claim this finding is important for improving social welfare, and could assist to formulate the related policy. In order to further construct the model, he utilize administrative records on 512,964 DUI BAC tests in the state of Washington from 1999 to 2007. The reason is that BAC thresholds are the same after 1999 which is 0.08 and 0.15 (aggravated).

Owing to the quantifiable characteristics of BAC, authors could apply local linear regression discontinuity design to do the estimates. In addition, the evidences also show that demographic indicators such as age, white/nonwhite and male/female keep constant in the DUI punishment thresholds. The identification strategy is that allowing the slopes change at the certain DUI (0.08) and severe DUI (0.15) threshold. To meet the expectation, they assumes recidivism may decrease at specific points if punishment and sanctions have effect.

Finally, authors point out recidivism will declining two percentages points which is statistically significant as BAC above the 0.08 threshold during a four year follow-up. Furthermore, conclusion also present people have lower possibilities to repeatedly drunk drive though people do not have previous tests. In other words, consequence means punishment and sanctions have advantages of reducing repeat drunk drivers for both 0.08 DUI threshold and 0.15 aggravated DUI in the short and long run.

Reproducing somewhat Hansen's results

Question 3

Please see the Appendix_RDD files with stata command and graph output.

Question 4

If people were capable of manipulating their blood alcohol content (bac1), we may use McCrary test or simply drawing a graph for runing variables to confirm the density weather meet our expectation.

According to **graph 1** in the Appendix_RDD, we could find our graph is similar with Hansen's Figure 1. A little difference between graph 1 and figure 1 is that the vertical axis of latter one is based on frequency of observations, comparing with former one is density. The graph 1 looks like normal distribution, though there are a lot of number at "zero" point. We may assume no human intervene inside this dataset.

Question 5

Equation(1)

$bacc = \beta_0 + \beta_1 white + \beta_2 male + \beta_3 aged + \beta_4 acc + u$

Equation(2)

$recidivism = \alpha_0 + \alpha_1 male + \alpha_2 white + \alpha_3 aged + \alpha_4 acc + \alpha_5 bac1 + \alpha_6 bacc + \alpha_7 bacc * bac1$

We could see the results in the Appendix_RDD, after we recreate Table 2 Panel A. Carefully comparing the results from equation (1) and equation (2), we may conclude that the covariates are balance at the cutoff. Particularly, that feature predetermined characteristics of the drivers seem to keep the same at the thresholds depends on above setting, equation (1).

Table 2	Male	White	Age	Accident
Panel A. DUI threshold	0.004	0.017	-0.0004	0.028
	(0.002)	(0.002)	(0.000)	(0.002)
Mean (at 0.892)	0.79	0.862	34.957	0.147
Controls	No	No	No	No
Observations	214,558	214,558	214,558	214,558

Question 6

Please see the Appendix_RDD files with stata command and graph output.

Comparing with Hansen's paper, we could find the results are similar, the difference come from our setting for only one threshold(0.08). Moreover, if we carefully focus our horizontal line (bac) between 0 to 0.2 and ignore sporadic points on the right side of 0.2, then the line (either linear or quadratic) have further similar with paper's.

Question 7

Table 3	Equation (1)	Equation (2)	Equation (3)
Panel A. BAC* ∈ [0.03, 0.13] *DUI	-0.075 (0.048)	-0.043 (0.187)	2.902** (0.092)
Controls	Yes	Yes	Yes
Observations	214,558	214,558	214,558
Panel B. BAC* ∈ [0.055, 0.105] *DUI	-0.476*** (0.111)	-0.196 (0.383)	6.167 (8.120)
Controls	Yes	Yes	Yes
Observations	214,558	214,558	214,558

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Question 8

Please see the Appendix_RDD files with stata command and graph output.

Question 9 For me, actually, it is hard for me to make the conclusion from this repository practice. The purpose and hypothesis is to research whether punishments and sanctions are effective in decreasing drunk driving in the certain threshold, which is 0.08 in this practice paper.

Although most results and graphs are similar with Hansen's paper, I am not confident with Hansen's original conclusion. One of reason is that the sample in Hansen's paper is not as much as in practice paper (n=214,558). That is, causal effect and the power of interpretation may be declined due to less data base.

The other questions for practice is that Regression Discontinuity Design still have some important assumptions we should notice and focus. If we can not guarantee our data meet those criteria, the conclusion will be ineffective and imprecise.

However, the threshold in the practice and Hansen paper is different, we ignore the aggravated DUI, which is 0.15 according to the setting. That may also change the evidences we found and cause diversities.

To sum up, depends on the consequence in question 7, punishments and sanctions are not effective in decreasing drunk driving under our model and examination, at least values are not statistically significant in the most situations. Perhaps, we need to reconsider our models and approaches in order to get better research results.