RD Robustness Project

Exercise: dropping data away from cutoff

Maor Milgrom

2020-03-22

Introduction

The goal of this project is to test the robustness of the Regression-Discontinuity analysis to different extreme cases, via simulations, using the 'rdrobust' package.

This Document: Excercise #3

Testing whether the RD coefficient becomes biased when we gradually drop observations in different intervals around the cutoff.

Set Parameters

Here we set the main parameters for the excercise:

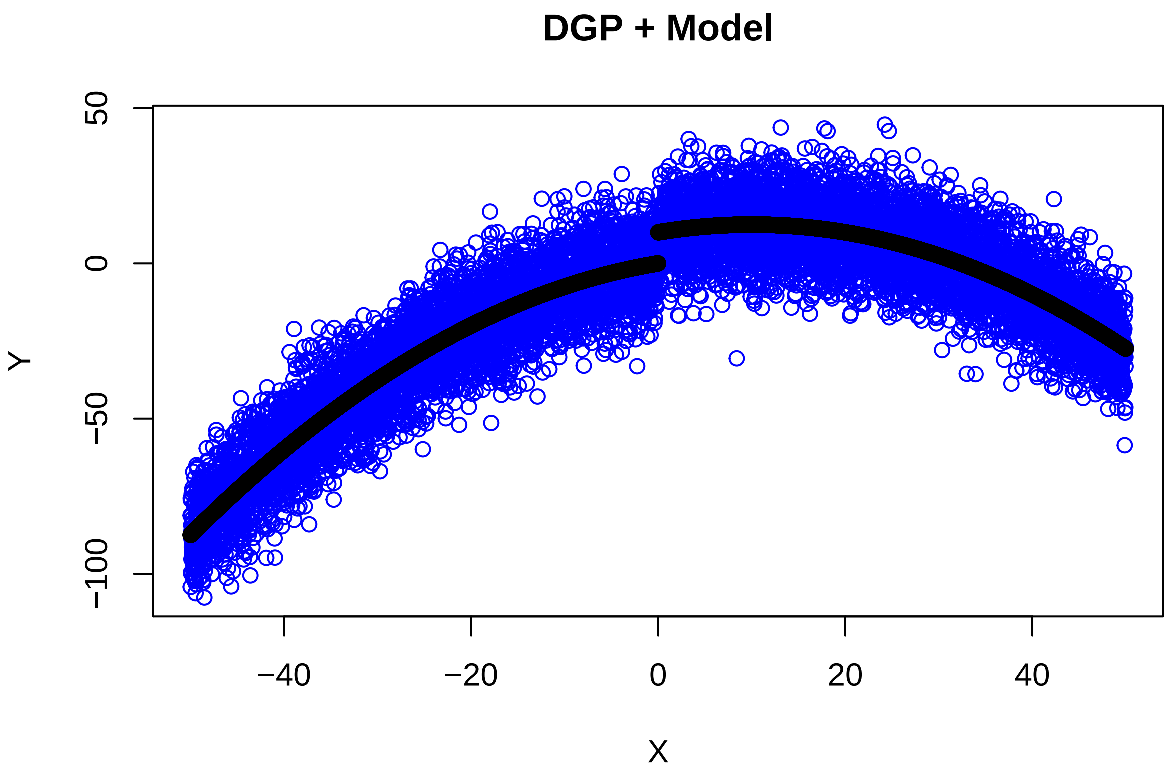
```
jump=10             # Size of jump at cutoff
loop=1000
figs.iter.save=5
quadratic=T         # T - quadratic DGP, F - linear
symm_obw="mserd"    # mserd - symmetric OBW, msetwo - asymmetric OBW
normal.x=T          # T - normal draws of x around cutoff, F - uniform draws
dgp.sd=10           # sd of normal noise added to DGP
bc=F                # bias-corrected (bc) estimates or conventional (c)
intervals=c(5,10,20,40)
var.list=c("coef.c","coef.bc","obw.c","obw.bc")
```

Simulate DGP and plot

```
df <- as.data.frame(matrix(0, ncol = 0, nrow = length(seq(-100,100,0.01))))
df$x=round(seq(-100,100,0.01), digits=2)
df=subset(df,df$x!=0)
df$treated <- ifelse(df$x>0, 1, 0)

df$y.model<- 0.5*df$x  - 0.025*df$x^2*quadratic + jump*df$treated
df$y=df$y.model+rnorm(length(df$x),0,dgp.sd)

## dataframe for draws (samples)
sample.x <- as.data.frame(matrix(0, ncol = 0, nrow = nrow(df)/10))
```



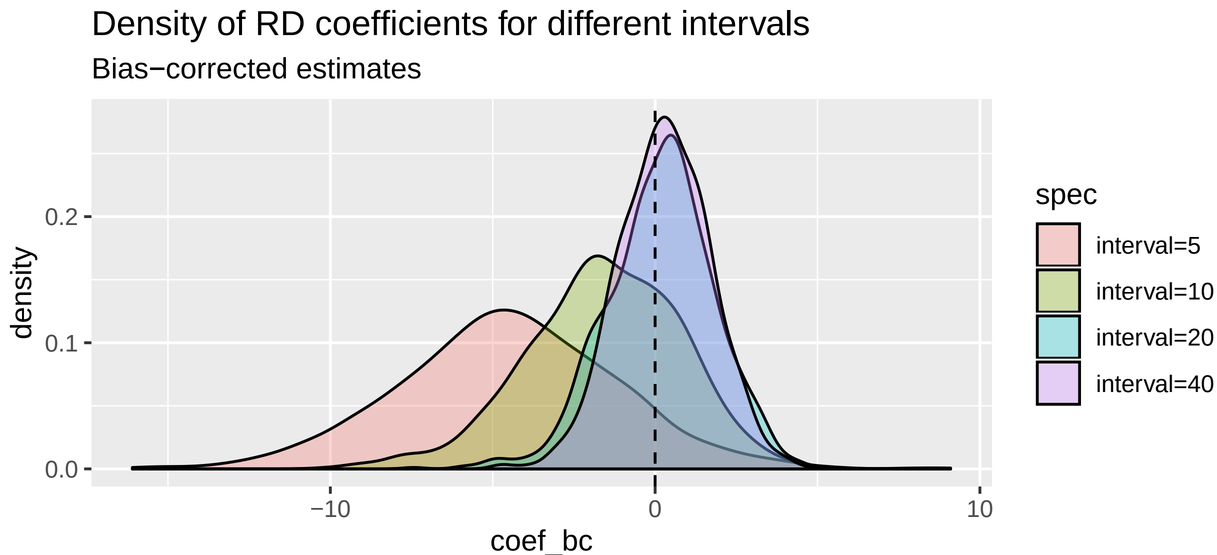
Iterations

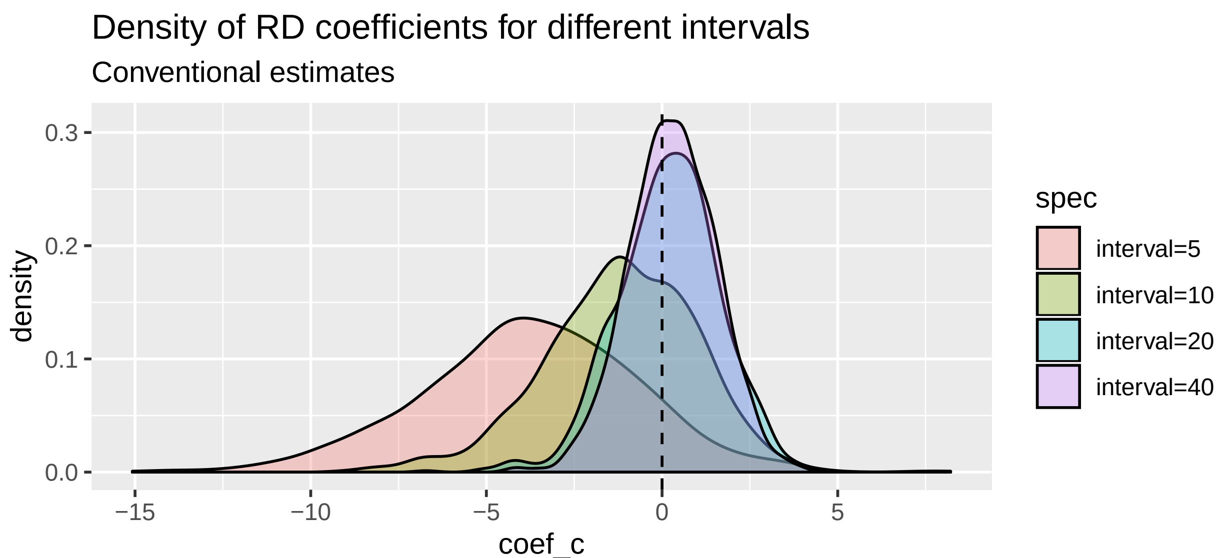
Running 1000 iterations, and presenting figures from last iteration for illustration In each iteration, and for each of the 4 intervals, , we:

1. Draw randomly 2000 observations around the cutoff.
2. Keep data in that interval around cutoff
3. compute OBW and RD coefficient

Results

Figures summarizing iterations





Summary results - Table

Note: coefficients (treatment effects) are normalized to zero, by subtracting from each estimate the size of the jump at the cutoff.

Table 1: Summary Table

	int_5	int_10	int_20	int_40
coef.c	-3.7542	-1.1896	0.1735	0.2895
coef.bc	-4.5201	-1.5871	0.1482	0.2839
obw.c	1.1001	2.4561	4.9060	6.5447
obw.bc	1.9387	4.2615	8.1923	11.1069

Interpreting results

We find that as we restrict the analysis to smaller intervals around the cutoff, not only the optimal OBW chosen is smaller, but the coefficients become biased downwards.