

Session 12: Regression discontinuity

MGT 581 | Introduction to econometrics

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Last time...

- Difference-in-differences
- Panel data
- Two-way fixed effects models

Today:

- Regression discontinuity design

Readings:

Regression discontinuity design

- Another form of quasi-experiment
- Idea: can find settings in which receiving treatment or control is **as if random**?
- Maybe: when being in T or C is almost a coin toss
- Discontinuity: frontier at which units either end up T or C
- Assumption: very close to the discontinuity, whether you end up T or C is near-random and thus like an experiment

Illustration

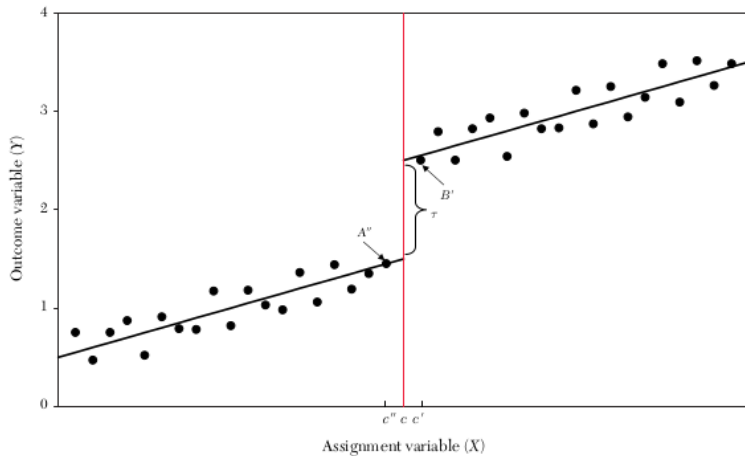


Figure 1. Simple Linear RD Setup

Figure 1: Source: OSE data science.

Some plausible RDDs:

- Effect of being elected: those just below and those just above 50% (Eggers and Hainmueller 2009)
- Effect of classroom size: those just below and just above number needed to split class in two
- Distance from a border
- Above vs. below drinking age

FIGURE 4. Regression Discontinuity Design: Effect of Serving in House of Commons on Wealth at Death

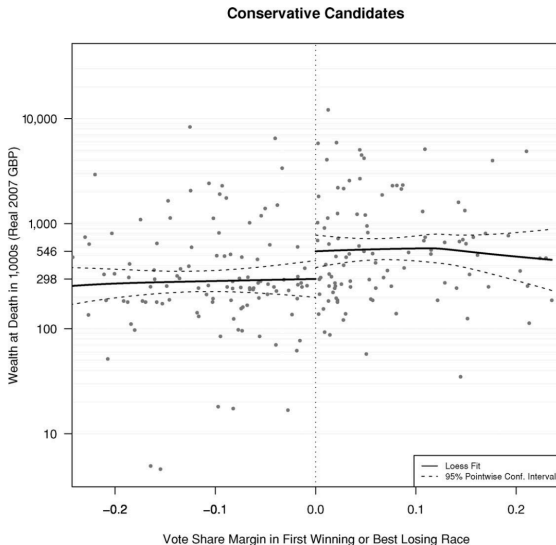


Figure 2: Source: Eggers and Hainmueller (2009)

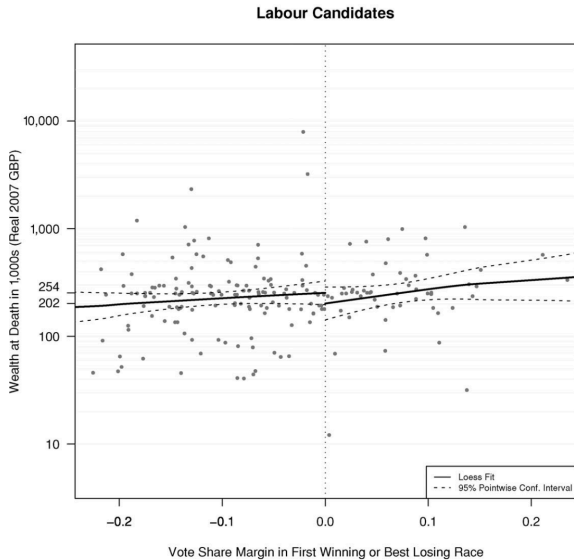


Figure 3: Source: Eggers and Hainmueller (2009)

In practice:

- Identify an exogenous discontinuity
- Start with a plausible bandwidth/sphere around the discontinuity
- Collect data within these boundaries
- Estimate with OLS

$$Y_i = \alpha + \delta \text{Distance}_i + \gamma D_i + \lambda D_i \text{Distance}_i$$

- Note: interaction needed to let slope differ at discontinuity

- Underlying assumption: no self-selection on either side of the discontinuity
- Check control variables: should not differ at the threshold (McCrary 2008)
- Don't use crazy functional forms for distance metrics. Linear should do. (Gelman and Imbens 2019)

References

- Eggers, Andrew C, and Jens Hainmueller. 2009. "MPs for Sale? Returns to Office in Postwar British Politics." *American Political Science Review* 103 (4): 513–33.
- Gelman, Andrew, and Guido Imbens. 2019. "Why High-Order Polynomials Should Not Be Used in Regression Discontinuity Designs." *Journal of Business & Economic Statistics* 37 (3): 447–56.
- McCrary, Justin. 2008. "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics* 142 (2): 698–714.