Topics in Applied Econometrics

Regression discontinuity

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How to tackle an empirical project

1. What causal effects are we interested in?
2. What ideal experiment would capture this effect?
3. What is our identification strategy?
4. What is our mode of statistical inference?

Empirical setting into research design

- So far, we have considered the two extremes of randomization
  - Perfect randomization: RCT
  - No randomization: matching
- Sometimes the truth lies in between
- *Example:* unemployment insurance
  - Some baseline level of UI benefits
  - For some unemployed in certain regions, additional UI
  - What can we learn from comparing them to those in neighboring regions?

Treatment thresholds

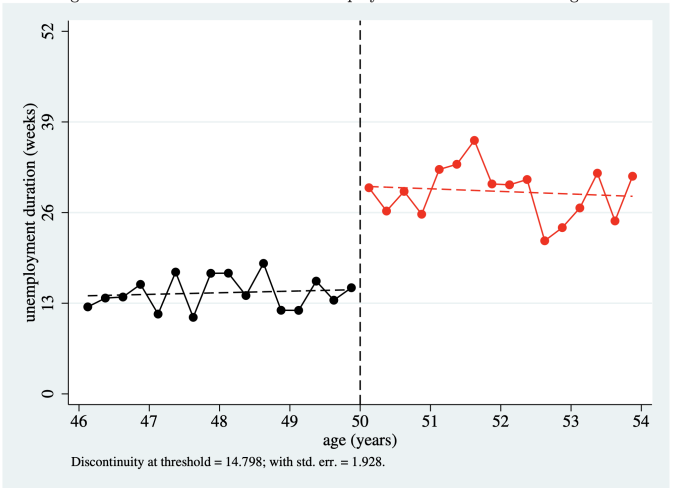
- Treatment status depends on some eligibility threshold
- “Just treated” units are comparable to “just untreated” units
- Assignment to treatment at the threshold is as good as random
- How reasonable is this assumption?
  - Age cutoff: born on June 30 vs. July 1
  - Area border: east vs. west side of a street
- How strict is the cutoff?
  - Sharp RD: no one is treated on one side, everyone is treated on the other
  - Fuzzy RD: some may be treated on both sides, but the fraction of treated units jumps at the threshold

Treatment effects with sharp RD

- Does a sharp RD identify ATE?
- Yes. . . right around the threshold, if compliance is perfect
- Hard to argue that the effect can be extrapolated to further away from the threshold
- *Example:* UI benefits in Austria (Lalive, 2008, JOE)
  - Under 50: up to 39 weeks of UI
  - 50+: 52 weeks $\rightsquigarrow$ 209 weeks in certain regions

Treatment effects with sharp RD (cont'd)

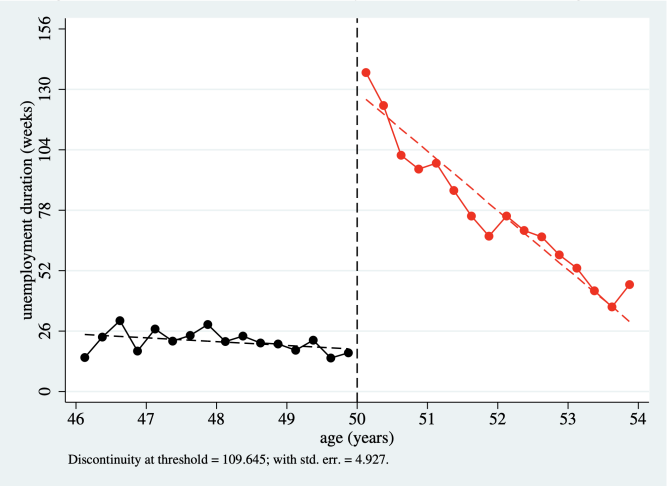
Figure 2: The effect of REBP on unemployment duration for men: age threshold



Source: Lalive (2008)

Treatment effects with sharp RD (cont'd)

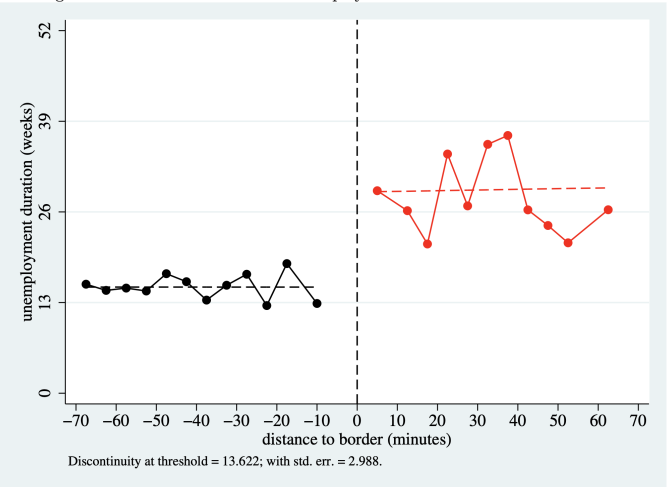
Figure 7: The effect of REBP on unemployment duration for women: age threshold



Source: Lalive (2008)

Treatment effects with sharp RD (cont'd)

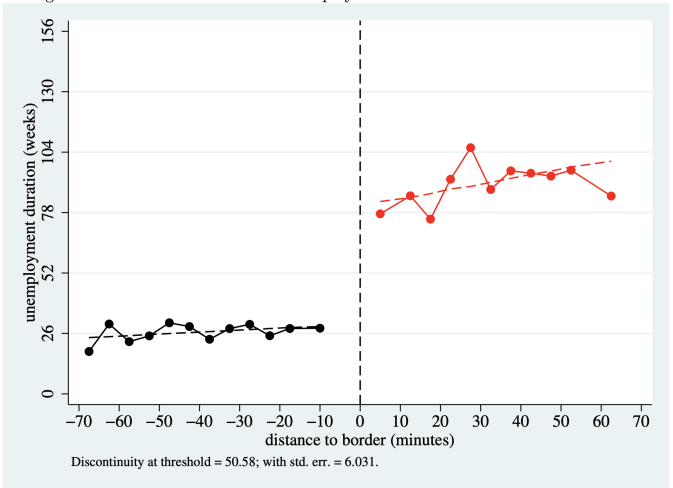
Figure 3: The effect of REBP on unemployment duration for men: border threshold



Source: Lalive (2008)

Treatment effects with sharp RD (cont'd)

Figure 8: The effect of REBP on unemployment duration for women: border threshold

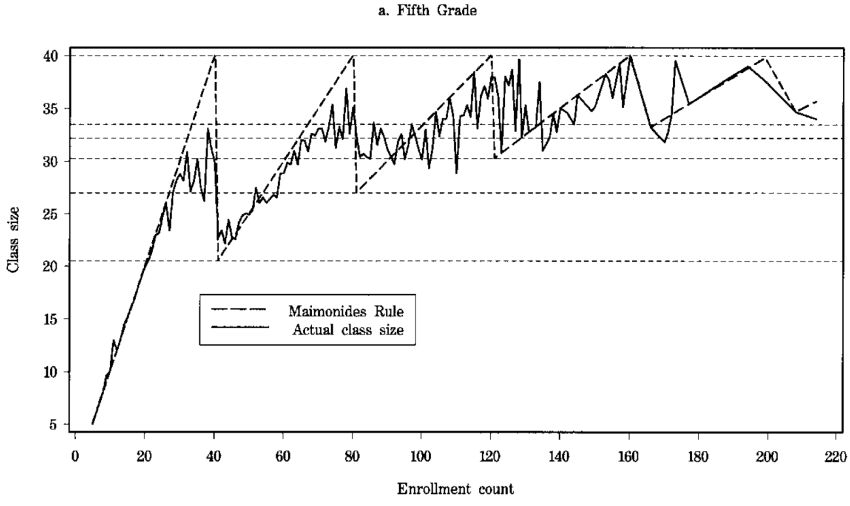


Source: Lalive (2008)

Treatment effects with fuzzy RD

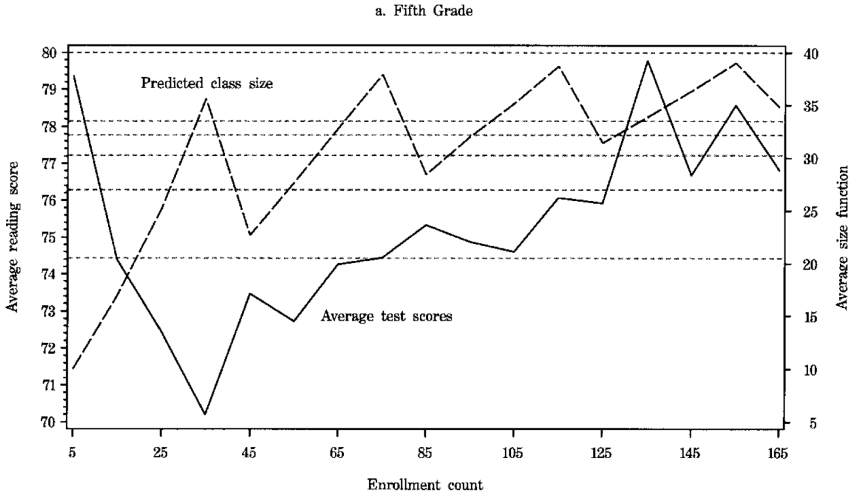
- Does a fuzzy RD identify ATE?
- No, not even under perfect compliance
- But it identifies. . . LATE!
- Zoom in on the treated units on the treated side of the threshold
- Even harder to extrapolate results, but arguably valid at the threshold
- *Example:* class size and test scores (Angrist and Lavy, 1999, QJE)

Treatment effects with fuzzy RD



Source: Angrist and Lavy (1999)

Treatment effects with fuzzy RD



Source: Angrist and Lavy (1999)

Additional Slides

References I

Angrist, J. D. and V. Lavy (1999). Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement. *Quarterly Journal of Economics 114*(2), 533–575.

Lalive, R. (2008). How Do Extended Benefits Affect Unemployment Duration? A Regression Discontinuity Approach. *Journal of Econometrics 142*(2), 785–806.