Impact Evaluation Design: Other Options

Regression Discontinuity

- General RD relies on thresholds for program participation
  - Units near threshold likely to be similar (other than which side of threshold)
  - Prior uses typically associated with cutoffs on scores, indices, baseline measures
  - Extensive literature on optimal bandwidth, dealing with fuzziness, etc.
- Recent growth in uses based on spatial cutoffs (aka boundaries)

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Program restricted to eligible areas (administrative units)

Baragwanath, Kathryn, and Ella Bayi. "Collective property rights reduce deforestation in the Brazilian Amazon." *Proceedings of the National Academy of Sciences* 117, no. 34 (2020): 20495-20502.

A — Indigenous Territory Baú, Parà

B — 12km Buffer

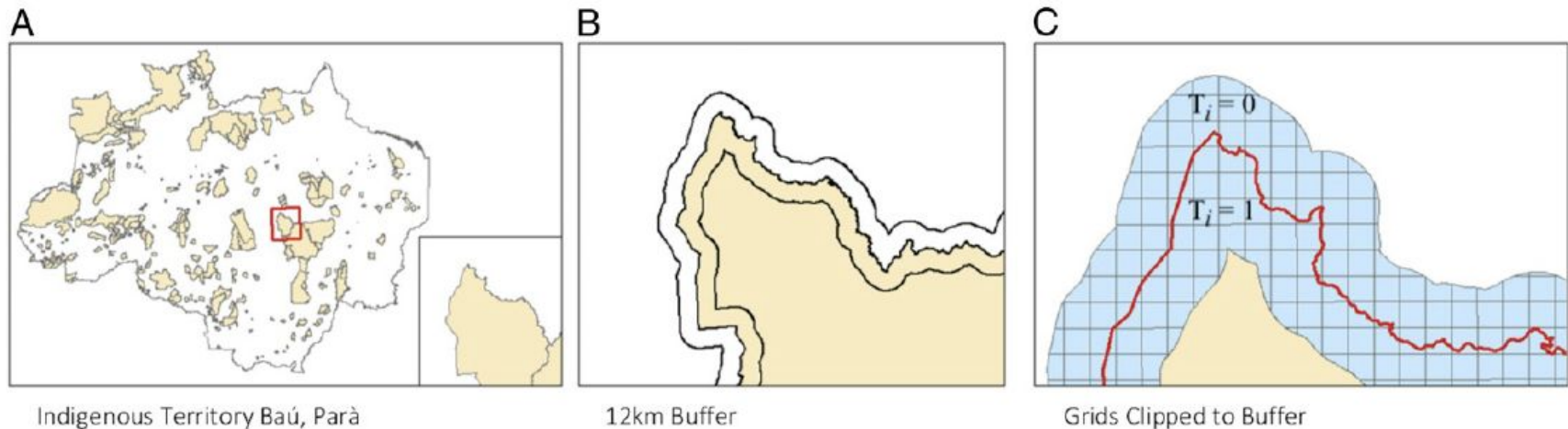C — Grids Clipped to Buffer

$T_i = 0$

$T_i = 1$

Fig. 2. (A) Indigenous territories in the Legal Amazon (the *Inset* shows the Baú territory in the state of Pará), (B) 12-km buffer inside and outside indigenous territory border, and (C) grids inside buffers. Grids inside are treated while grids outside are control.

Geophysical features cause diff. in treatment reach

Jones, Maria, Florence Kondylis, John Loeser, and Jeremy Magruder.

"Factor market failures and the adoption of irrigation in Rwanda."

American Economic Review 112, no. 7 (2022): 2316-52.

Panel A. Plots inside and outside command area

Command area

Outside command area

Panel B. Sharp increase in irrigation at boundary
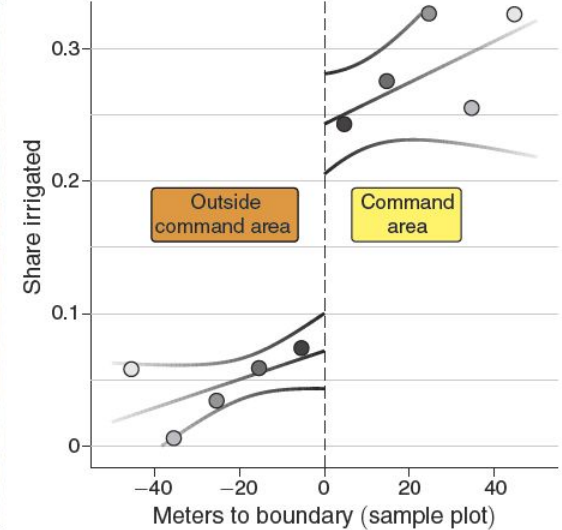
Outside command area

Command area

Figure 2. Estimating the Impact of Irrigation Exploiting Spatial Discontinuity in Access

Regression Discontinuity

- Relies on "non-interference" across boundaries, but many channels for this
  - Cornwall and Sauley (2021, Journal of Spatial Econometrics 2021) relax this assumption and account for network and peer effects…
  - … but not yet widely in use, so spillovers are definitely a concern
- Relies on dense spatial coverage of outcomes around boundaries
  - Major advantage of remotely sensed data over secondary sample surveys
- Many cases in which the boundaries "mattered" for outcomes even before the intervention, so back to relying on diff-in-diffs to account for non-comparability at baseline
  - Areas inside rehabilitated irrigation perimeters, for example

Matching

- Prior uses of matching attempted to account for baseline differences between samples of treated and untreated units
- More recently, not typically used on its own, but in combination with diff-in-diffs to prune samples
- The wide spatial coverage of remotely sensed data can be its own challenge
  - Narrowing comparison sites from among all untreated areas
- For multiple treatment times (roll-out) designs, most existing matching routines require reducing the time periods into binary windows (i.e. early vs. late treatment)

"Natural Experiments"

- Geophysical drivers of program placement that are not correlated with outcomes
    - Hydrological constraints shape hydropower dams and electrification access (Lipscomb, Mobarak and Barham 2013)
    - … as well as changing ag productivity and deforestation (Assuncao et al 2017)
    - Shortest routing for highways shapes development outcomes in India, including deforestation (Asher, Garg, and Novosad 2020)

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