Quasi-Experimental Designs
Part 1: Regression Discontinuity Design
Technical Track

Impact Evaluation Workshop
Gdansk, February 2017
IE Methods Toolbox

- Randomized Assignment
- Difference-in-Differences
- Regression Discontinuity Design
- Matching

Quasi-experimental methods (require more assumptions)
Recap: need the right proxy for the counter-factual

With large sample, random program assignment ensures two groups have very similar characteristics ON AVERAGE

A lottery ensures the two groups are the same
But what if you **cannot** randomize?

TREATMENT GROUP

CONTROL GROUP

not the same
IE Methods Toolbox

- Randomized Assignment
- Discontinuity Design
- Difference-in-Differences
- Matching
DISCONTINUITY DESIGN
Discontinuity Design

Many programs select participants using an index or score:

- **Anti-poverty Programs**
  - Targeted to households below a given poverty index/income

- **Pensions**
  - Targeted to population above a certain age

- **Education**
  - Scholarships for students with high scores on standardized text

- **Labor**
  - Programs for certain age groups (youth, elderly)
  - Programs targeted on the duration of unemployment
Discontinuity Design

Compare outcomes $Y$ for units just **above and below** the cut-off point

Units just above the cut-off point are very **similar** to units just below it – **good comparison**.
Regression Discontinuity Design-Baseline

Outcome (e.g. probability of being employed)

Score (e.g. age)
Regression Discontinuity Design-Post Intervention

Outcome (e.g. probability of being employed)

Score (e.g. age)
For a Discontinuity Design you need...

1) Continuous eligibility index
   • e.g. income
   • e.g. age
   • e.g. unemployment spell (months)

2) Clearly defined cut-off.

Participants with a score ≤ cutoff are eligible
Participants with a score > cutoff are not-eligible
Or vice-versa
Example: Progresa CCT

Eligibility for Progresa is based on national poverty index (equivalent of a household’s income)

Household is considered poor if score $\leq 750$

Eligibility for Progresa:
- Eligible if score $\leq 750$
- Not eligible if score $> 750$
Example of Progresa

Score vs. consumption at Baseline-No treatment

Poverty Index

Consumption Fitted values

Fitted values

puntaje estimado en focalizacion

276 1294

153.578

379.224
Example of Progresa

Score vs. consumption post-intervention period-treatment

Consumption vs. Poverty Index

30.58**

Estimated impact on consumption (Y)

(**) Significant at 1%
## Progresa Policy Recommendation?

### Impact of Progresa on Consumption (Y)

<table>
<thead>
<tr>
<th>Case 1: Before &amp; After</th>
<th>34.28**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 2: Enrolled &amp; Not Enrolled</td>
<td>-4.15</td>
</tr>
<tr>
<td>Case 3: Randomized Assignment</td>
<td>29.75**</td>
</tr>
<tr>
<td><strong>Case 4: Discontinuity Design</strong></td>
<td><strong>30.58</strong>**</td>
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</tbody>
</table>

**Note:** If the effect is statistically significant at the 1% significance level, we label the estimated impact with 2 stars (**). If significant at 10% level, we label impact with +
Example with 2 thresholds: Cambodia CCT

- **Eligibility** is based on an *index* of the probability of dropping out of school.

- **2 cutoff points** within each school:
  - Applicants with the highest dropout risk offered US$60 per year scholarship
  - Applicants with intermediate dropout risk offered US$45 per year scholarship
  - Applicants with low dropout risk were not offered scholarship by the program
Example with 2 thresholds: Large impact on $45 scholarship

• No scholarship versus $45
• $60 versus $45 scholarship

Advantages of RDD for evaluation

Yields an **unbiased** estimate of treatment effect at the discontinuity

Can take advantage of a known rule for assigning the benefit

- This is common in the design of social interventions
- No need to “exclude” a group of eligible households/individuals from treatment
Warning

• Need a large enough sample of people around the cut-off. Because only compare who around the cut-off.
• Majority of eligible subjects must participate.
• Not always generalizable: it tells us the impact of the program for the people around the cut-off.
  – Youth program: would the program have the same impact for very young (16-20 y.o.) and not so young (20-24 y.o.) participants?
  – Progresa: would the impact have the same impact for very poor and not so poor households?
Example: Effect of Youth Job Guarantee on employment [Sweden]

Program

WHAT? Youth employment program (<25) with in-depth activation once the jobseeker has been registered for more than 90 days at the PES
WHERE? Started in 2007, Sweden

Open unemployment and registration at the PES (3 months) → *The Youth Job Guarantee*: - In-depth assessment and counseling - Job seeking activities with coaching (at least 3 months, normally) → *The Youth Job Guarantee*: - Work experience or training - Job seeking activities at least 4h/week (12 months, max 15 months in total)

WHY? Increase employment among long-term unemployed youth

Method/Eligibility

- Registered jobseekers who are unemployed for more than 90 days, and who are <25 years old are **eligible**
- Registered jobseekers who are unemployed for more than 90 days, but who are >=25 years old are **not eligible**

Data

Look at two cohorts: **2008** and **2009**
Combine data from PES and Health registries
Example: Effect of Youth Job Guarantee on employment [Sweden]

Results

- Participants in the YJG program increases the probability of finding employment during the first 90 days of the unemployment spell by around **2 percentage points**
- Taking into account that about 28 percent of the 25-year-olds find employment within 90 days, this would correspond to an increase of about **7 percent**
Poland:
When can you use RDD?
Examples/discussion

• Family 500+
• Money to start self-employment. (Środki na podjęcie działalności gospodarczej)

Are the above-mentioned programs good candidates to be evaluated using RDD.

• Why? Why not?
• What the eligibility rule should be?
• What the goal of the evaluation should be?
Poland: When can you use RDD?

Family 500+

- Eligibility rule:
  - Disposable income below 800 PLN per person.
  - Below the cutoff the family receives the support for every child.

- Treatment group: Families with one child and income below 800 PLN per person.
- Control group: Families with one child and income above 800 PLN per person.

- Goal of the evaluation:
  - Fertility rate
  - Consumption
  - Results in school of children
  - Effects on labor market

- Problems:
  - Self-selectoin. Families around the cutoff have control of their income.
Poland: When can you use RDD? Money to start self employment.

- Eligibility rule:
  - People younger than 30 years old.

- Treatment group: Unemployed younger than 30.
- Control group: Unemployed older than 30.

- Goal of the evaluation:
  - Effect of long run employment.

- Problems:
  - Most of the unemployed that are eligible do not receive the support.
  - People register as unemployed only to be able to apply for the funds. If not for the program they would not register as unemployed and there is a good Chance that they would start the self-employment anyway.
Keep in Mind

Discontinuity Design

- Requires **continuous eligibility criteria with clear cut-off.**
- Gives unbiased estimate of the treatment effect: *Observations just across the cut-off are good comparisons.*
- No need to **exclude** a group of eligible households/individuals from treatment.
- Can sometimes use it for programs that already ongoing.
Test
When is it possible to do regression discontinuity design?

A. When there is a continuous eligibility criteria with a clear cut-off.

B. When there is a comparison group of people who do not receive the program.

C. When government randomly assigns some to receive the program and some not.
Assessment

Please rate this session
Please rate the pace of this presentation

A. Just right
B. Too slow
C. Too Fast
D. No opinion
Please rate the relevance of the selected technical material

A. Very relevant
B. Just relevant
C. Irrelevant
D. No opinion
Please rate the clarity and effectiveness of the delivery

A. Excellent!
B. Good
C. Fair
D. Poor
E. No opinion
Thank you!