Impact Evaluation Methods (3)

4. Regression discontinuity: Local Average Treatment Effect (LATE)

When eligibility is given by a threshold in a continuous variable (poverty line, age, etc.).

- In South Africa, Government Pensions given to women who are at least 60, but not 59
- Grameen Bank requires less than 1/2 acre of land to be eligible
- In China, counties with less than a certain amount of income are eligible for rural development assistance (The 8-7 program)
- Government Transfers
- Chile: New credit line for "poor students" with grade above a given threshold that attend college.

The basic idea is to compare the observations just below and just above the threshold, on the basis that these observations would be almost identical if it were not for the program.
Or use a flexible form of regression, from above and from below, and measure the impact by the "jump" at the threshold.

Key assumption for the validity of the method: The outcome would be a continuous function of the indicator used for eligibility around the threshold, if it were not for the program. That is there is no other factor influencing the outcome that have a discontinuity at this threshold.

Method and result are best seen with a graph

Manacorda, Marco, Edward Miguel, and Andrea Vigorito. 2011. Government Transfers and Political Support. *American Economic Journal: Applied Economics* 3 (3): 1–28

In April 2005, a newly elected center-left government in Uruguay launched a cash-transfer program in response to a major economic crisis, and the program lasted until December 2007. Program eligibility was determined by a poverty index (a predicted income score based on a large number of pretreatment covariates) and only households with scores below a predetermined threshold were eligible. Households on each side of the threshold are essentially similar, but those just below received the transfer while those just above did not (Figure 2). In Figure 3, we observe that beneficiary households just below the threshold of eligibility are more likely to favor the current government relative to those just above. The impact of the program on government support is measured by the jump in support at the threshold, as we assume that since the households on both sides are essentially identical, they should have the same opinion were it not for the program. The estimate shows that beneficiaries are about 13 percentage points more likely to support the government compared to non-beneficiaries around the poverty threshold.

Figure 2: Proportion of sample households who benefited from the program, as a function of the baseline predicted income score.
Figure 3: Support for the government as a function of the normalized predicted income score.

Figure 2: *PANES* program eligibility and participation

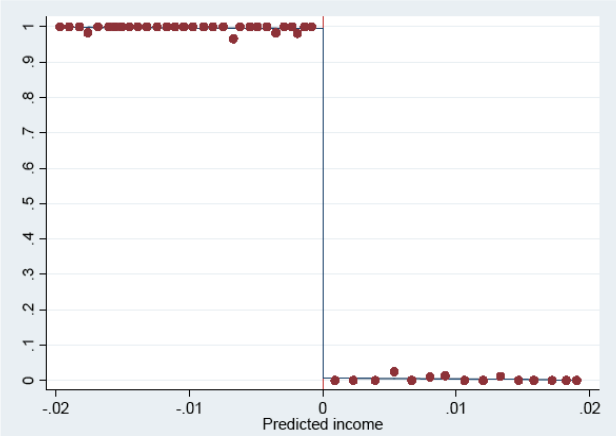
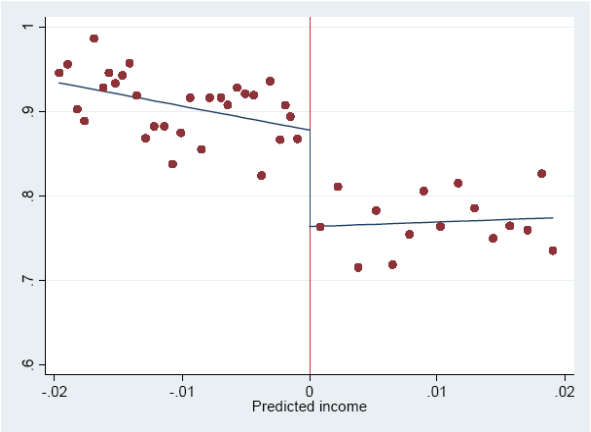


Figure 3: *PANES* Program eligibility and political support for the government, 2007 follow-up survey round



Estimating equation:

$$y_i = \beta_0 + \beta_1 T_i + \beta_2 \left(Inc_i - threshold\right) + \beta_3 T_i \left(Inc_i - threshold\right) + u_i$$
$$= \beta_0 + \beta_1 T_i + \beta_2 ZInc_i + \beta_3 T_i ZInc_i + u_i$$

Estimation gives $\hat{\beta}_1 = 0.129$ (0.013)

Tests in support of the validity of the method: Test for absence of discontinuity for any other variable

$$x_i = \beta_0 + \beta_1 T_i + \beta_2 ZInc_i + \beta_3 T_i ZInc_i + u_i$$

Dependent variable	Mean among non-eligibles	Coefficient eligibles (se)
Government support 2007	0.77	0.129 (0.013)
1. Log per capita income	6.34	−0.062 (0.059)
2. Household average years of education	4.05	–0.135 (0.198)
3. Household size	3.03	0.350 (0.242)
4. Household average age	31.68	1.195 (2.159)
5. Respondent is female	0.7	0.025 (0.057)
6. Respondent years of education	6.43	–0.228 (0.307)
7. Respondent age	43.63	0.929 (1.512)
8. Nonresponse/missing response on political support question (2007)	0.41	–0.037 (0.044)
9. Nonresponse/missing response on political support question (2008)	0.46	–0.049 (0.048)
10. Voted in 2004 elections	0.92	–0.013 (0.023)

Notes: The table reports results from regressions of various pretreatment (2005) characteristics on the program eligibility

5. Matching method to construct comparison groups: PSM

Based on selecting as a control group non-participants that are comparable to participants on a large number of *observable* essential characteristics.

1. Get representative and comparable data on participants and non-participants, possibly from two different surveys using identical questionnaires and collected roughly at the same time. The survey must include all variables *X* that are important determinants of both program participation and outcomes.
2. Estimate the probability *p* of program participation as a function of observable characteristics *X* (using a logit or other discrete choice model that we will see next week):

$$p(X) = \Pr(T|X).$$

3. Use the estimated coefficients to generate the predicted value $\hat{p}(X_i)$, called the propensity score, for each member *i* of the treatment and comparison groups.
4. Matching: For each participant *i*, find the non-participant *j* with closest value of the propensity score $\hat{p}(X_j) \approx \hat{p}(X_i)$ where ≈ means approximately equal.
5. Once matches have been made, the difference in outcome between each participant and its match is the estimated gain due to the program for that observation. Calculate the mean of these individual gains to obtain the average overall gain for participants. This is the Average Treatment Effect on the Treated (ToT) since it is measured on a representative sample of participants.

Advantages: Can be done ex-post, simply on the basis of observing participants and non-participants. However the underlying assumptions is **extremely strong. It is similar to the assumption $E(u|X) = 0$ in the regression analysis**

The key assumption for the validity of the method is that the *unobserved* characteristics are sufficiently similar across the treated (*T*) and control (*C*) groups that they do not create spurious correlations between treatment and outcome.

There is no test that can be done in support of the validity of the method.