PS200C: Quantitative Methods

In-class Activity 9: Regression Discontinuity Designs

Name: _____

Setup for Q1-Q3. In the United States, Medicare provides nearly universal health insurance to people aged 65 and older. At age 65 a person becomes eligible for Medicare regardless of their previous insurance status. A researcher wants to estimate the effect of Medicare on hospital utilization, using age as the running variable.

Question 1: Identify the pieces. Write down what the running variable X_i, the cutoff c, the treatment D_i, and a candidate outcome Y_i are in this design. Then state, in one sentence, what the continuity assumption requires here.

Question 2: What else changes at the cutoff? The biggest threat to RD is another treatment at the same threshold ("bundled treatments"). Name *at least one* other thing that changes at age 65 that could plausibly affect hospital utilization, and explain in a sentence why it is a problem for the RD interpretation.

Question 3: A fuzzy twist on Medicare-at-65. In practice the age-65 cutoff doesn't *determine* Medicare enrollment perfectly — a few people are already on Medicare before 65 (via disability), and a few don't enroll right at 65. Suppose the researcher finds:

- Just *above* age 65, hospital days per person per year are **0.45 days** higher than just below (the reduced-form / ITT effect of crossing the cutoff).
- At the same cutoff, Medicare enrollment jumps from **5%** (just below) to **95%** (just above).

(a) Compute the fuzzy-RD estimate of the effect of *being enrolled in Medicare* on hospital days per person per year.

(b) For whom is this the treatment effect? Describe the compliers in one sentence.

Question 4: Reading a balance plot. Suppose you run an RD on Brazilian municipalities at the e-voting threshold (40,500 registered voters) and produce balance plots like the one we saw in lecture. For each finding below, say in one sentence whether it *supports* the design, *threatens* the design, or is *ambiguous*, and why.

(a) Pre-1998 municipal income shows no jump at the cutoff.

(b) Pre-1998 literacy rate shows a small but statistically significant jump at the cutoff.

(c) *Post-1998* federal social spending shows a jump at the cutoff.