Study Overview

The study will investigate the impact of class size on students' academic performance. The key assumption is that when the number of students reaches the threshold (40 students), an additional class is opened, which significantly reduces the student-teacher ratio.

Key Variables and Data Overview

- Dependent Variable: Academic Performance - measured by standardized test scores.
- Running (Independent) Variable: Class Size - the number of students in a class.
- Cutoff Variable: Maimonides' Rule - a threshold of 40 students.

Reproduction Task

Create a graph illustrating the relationship between Class Size and Academic Performance, with a discontinuity at the threshold of 40 students, which is where we expect to see a jump in academic performance due to the reduction in class size.

Estimation Tasks

RDD Estimation: Estimate the impact of Class Size on Academic Performance using a sharp RDD approach. This involves comparing the academic performance of students in classes just below and just above the threshold. 2SLS Estimation with RDD: Although 2SLS is typically associated with IV methods, it can be adapted for RDD if we treat the assignment to a smaller class as an "instrument" that is determined by the class size being just below or above the threshold.

Empirical Results

To replicate the empirical results, we would follow these steps:

1. **Sharp RDD Analysis:**

   $AcademicPerformance_i = \alpha + \beta \cdot (ClassSize_i - 40) + \gamma \cdot 1(ClassSize_i \geq 40) + \epsilon_i$

   Here, $1(ClassSize_i \geq 40)$ is an indicator function that takes a value of 1 if the class size is at or above the threshold and 0 otherwise. γ captures the discontinuous jump at the threshold.

2. **2SLS Estimation Using RDD:**

   $AcademicPerformance_i = \pi_0 + \pi_1 \cdot SmallClass_i + \nu_i$

   $SmallClass_i = \delta_0 + \delta_1 \cdot 1(ClassSize_i \geq 40) + \mu_i$

   In this framework, $SmallClass_i$ is a binary variable that is 1 if the student is in a smaller class due to the Maimonides' rule.

Interpreting Regression Results

1. The coefficient γ from the RDD analysis will provide the causal impact of class size on academic performance at the threshold.
2. The coefficient π_1 from the 2SLS estimation will give us the estimated impact of being in a smaller class on academic performance, accounting for the non-random assignment around the cutoff.

This exercise will reveal the causal impact of class size on academic performance using a natural experiment setting provided by the Maimonides' rule, similar to how settler mortality rates were used to infer the causal impact of institutions on economic performance.