Improving Balance in Regression Discontinuity by Matching: Estimating the Effect on Academic Probation After the First Year of College

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In the study Ability, Gender, and Performance Standards: Evidence from Academic Probation, Lindo, Sanders, and Oreopoulos (2010) use regression discontinuity design to examine students’ responses to being placed on academic probation after their first year of college. However, Lindo et al. (2010) do not account for imbalance in their regression discontinuity design, in which dissimilarity exists between the pre-treatment characteristics of the treatment and control groups.

OBJECTIVE
To improve balance and better approximate a randomized experiment, we preprocess Lindo et al.’s (2010) data set by performing exact matching on pre-treatment covariates. We then re-estimate the impact of academic probation on student outcomes.


INTRODUCTION

In the study Ability, Gender, and Performance Standards: Evidence from Academic Probation, Lindo, Sanders, and Oreopoulos (2010) use regression discontinuity design to examine students’ responses to being placed on academic probation after their first year of college.

METHODOLOGY

The matching process prunes observations from the dataset such that the remaining observations have improved balance between treatment and control groups (i.e., the distributions of pre-treatment covariates in the groups are more similar).

We use matching to reduce the relationship between the treatment indicator $T_i$ and pre-treatment covariates $X_i$ while inducing little bias and inefficiency.2

Pre-matching: Imbalance in High School Grade Percentile

Post-matching: Balance in High School Grade Percentile

RESULTS

Estimated Effect on the Decision to Leave After the First Evaluation

By utilizing the matching method of preprocessing data prior to estimation and analysis, we reduce imbalance between treatment and control groups in a regression discontinuity design. By improving balance, we are able to reduce bias in the estimates of the effects of being placed on academic probation on student outcomes.
