COLLOQUIUM

Title: "Simple Approaches to Inference with Difference-in-Differences Estimators with Small Cross-Sectional Sample Sizes,"(joint work with Jeffrey M. Wooldridge)

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11-13-25

Neckers 156 - Time: 3:30-4:30 pm

Reception immediately following in the math library.

Abstract: We propose simple methods for valid inference in panel data difference-in-differences (DiD) settings with a small number of treated units or a small number of control units (including a small number of both). The approach uses a suitable transformation to collapse the panel data set into a cross-sectional data set. If the classical linear model assumptions hold in the cross-sectional regression, exact inference is available -- even in cases with only two control units and one treated unit. The approach likely works best with a large number of time periods before and after the intervention so that the central limit theorem across time makes normality a better approximation. Nevertheless, under joint normality and homoskedasticity of the time-varying errors, the exact approach can be applied with a few time periods -- both before and after the intervention -- as well as a few cross-sectional units. We also show how randomization inference can be implemented. In addition to standard DiD estimation, the approach permits the removal of unit-specific trends. With large enough sample sizes, control variables may be included. If the cross-sectional sample size is not too small, one can use a particular heteroskedasticity-robust standard error. We illustrate the approach using increased smoking restrictions in California, where there is only a single treated unit, as an alternative to the synthetic control approach. In the staggered intervention case, we reexamine the expansion of so-called ``castle'' laws in the United States.

Short Bio: Soo Jeong Lee is an Assistant Professor of Economics in the School of Analytics, Finance, and Economics at Southern Illinois University Carbondale. Her research interests span econometrics and the economics of education, with a focus on developing and advancing causal inference methods, particularly in panel data settings. In applied work, she studies teacher effectiveness and student–school matching effects.