Instrumental Variables Methods: A Two-Day Workshop

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Course Description

Instrumental variables (IV) is a powerful tool for leveraging external ("exogenous") variation to estimate the causal effects of otherwise confounded ("endogenous") variables. This two-day workshop will introduce the basics of IV through different practical examples, formalize the requirements of a valid and powerful IV, and discuss the mechanics of the two-stage least squares (2SLS) estimator. Special focus will be paid on interpreting linear IV under heterogeneous treatment effects and recent advances in leniency IV designs The course will include substantial group programming exercises, where different IV techniques will be illustrated in real-world applications.

About the Instructor

Peter Hull is the Groos Family Assistant Professor of Economics at Brown Univeristy and a Faculty Research Fellow at the National Bureau of Economic Research. He has published papers on topics in applied econometrics, education, healthcare, and criminal justice, in outlets such as the *American Economic Review*, the *Quarterly Journal of Economics*, the *Review of Economic Studies*, and the *New England Journal of Medicine.* His research is focused on developing and applying new instrumental variable methods to measure the quality of institutions, such as schools or hospitals, as well as discrimination and bias in human and algorithmic decision-making. Prior to Brown, Professor Hull taught at the Kenneth C. Griffin Department of Economics at the University of Chicago and worked at Microsoft Research and the Federal Reserve Bank of New York. He earned his PhD in economics from MIT in 2017, under 2021 Nobel Laureate Josh Angrist.

Course Objectives

This course is appropriate for students familiar with core causal inference tools (e.g. potential outcomes and/or causal graphs) and the basics of linear regression. The course will cover core topics on IV and 2SLS as well as more recent methodological advances; we will focus on applications and practical issues in the two coding labs. Students should be familiar with either Stata, R, or Python to complete these labs.

Course Structure

This is a two-day (6 hour) intensive workshop, with four hours of lectures and two 40-minute coding labs. The remaining time will be given to breaks. The coding labs will involve 20 minutes of self- or group-paced work and 20 minutes of solution live-coding.

Schedule

Tuesday 9/27	6:00-7:00pm	Lecture 1: Regression Review; Regression Endogeneity; Introduction to IV
	7:00-7:10pm	*Break*
	7:10-8:10pm	Lecture 2: Understanding Instrument Validity; 2SLS Mechanics; Applications
	8:10-8:20pm	*Break*
	8:20-9:00pm	Coding Lab 1: Angrist and Krueger (1991)
Wednesday 9/28	6:00-7:00pm	Lecture 3: Heterogeneous Treatment Effects; Characterizing Compliers; MTEs
	7:00-7:10pm	*Break*
	7:10-8:10pm	Lecture 4: Judge Leniency Designs; Shift-Share IV; New IV Frontiers
	8:10-8:20pm	*Break*
	8:20-9:00pm	Coding Lab 2: Stevenson (2018)
	9:00-9:15pm	Closing Remarks