Experimental Methods in Development Research

Overview

This course covers the applied practice of rigorous randomized controlled trials. In other words, we will cover the design principles of field experiments, as well as common challenges you might face when implementing and analyzing field experiment. The course will provide a mix of statistical theory, practical tips for implementing field experiments, and computer practice.

The course will connect the broader set of non-experimental tools (e.g., differences-in-differences, instrumental variables, regression discontinuity) to random assignment, to understand similarities and differences.

We will discuss issues in research design (how different types of treatment effects can be measured in field experiments) and in survey design (how different outcomes can be measured).

Recommended texts

The course will draw on articles from academic journals, as well as three texts on the conduct of impact evaluation.

- "Field Experiments: Design, Analysis, and Interpretation" by Alan Gerber and Don Green
- "Running Randomized Evaluations" by Rachael Glennerster and Kudzai Takavarasha
- "Handbook of Economic Field Experiments (Vol. 1)" By Abhijeet Banerjee and Esther Duflo

Assignments and Grading

For PhD students:

- Paper presentation (10%)
- Quantitative computer project (45%)
- Exam (45%)

For Masters students:

- Quantitative computer project (50%)
- Exam (50%)

Each PhD student will be assigned a paper. The goals are for the student to: i) place the issue addressed in the paper within the context of the course themes; ii) explain the empirical strategy used in the paper; and iii) provide a brief critique of the paper. The presentation is worth 10% of your grade.

The quantitative homework will force you to apply all of the statistical tools you will learn during the course. Students are requested to use either Stata or R for the course assignments. You must submit a report (a pdf written as a memo describing broadly what you did and what you found), the raw data, and all code and scripts used to produce the results. Your work should be completely replicable using the code and raw data you submit.

Lecture 1: Basics of random assignment

- Counterfactual/potential outcomes notation
- Average treatment effects, Intention to treat effects, Treatment on the treated
- One-sided non-compliance
- Two-sided non-compliance
- Power calculations & budget efficiency
- Clustered + stratification/blocks
- Re-randomization (or big stick)
- Relationship between research design and analysis

Readings:

- Duflo, Esther, Rachel Glennerster, and Michael Kremer (2007). "Using randomization in development economics research: A toolkit." Handbook of development economics
- Bruhn, M., & McKenzie, D. (2009). In pursuit of balance: Randomization in practice in development field experiments. American Economic Journal: Applied Economics
- Miratrix, L. W., Sekhon, J. S., & Yu, B. (2013). Adjusting treatment effect estimates by post-stratification in randomized experiments. Journal of the Royal Statistical Society: Series B (Statistical Methodology)
- Gerber & Green, Chs 1-4
- Handbook of Economic Field Experiments, Ch. 3, Sections 1-4 (Athey & Imbens)

Lecture 2: Beyond the basics

- Randomization Inference
- Extensive margin versus Intensive Margin impacts
- Attrition
- Bounding approaches
- Observing Unobservables (Identifying Moral Hazard and Adverse Selection)
- Factorial designs

Readings:

- Angrist, J. D., Imbens, G. W., & Rubin, D. B. (1996). Identification of causal effects using instrumental variables. Journal of the American Statistical Association
- Karlan, D., & Zinman, J. (2009). Observing unobservables: Identifying information asymmetries with a consumer credit field experiment. Econometrica
- Lee, D. S. (2009). Training, wages, and sample selection: Estimating sharp bounds on treatment effects. The Review of Economic Studies
- Small, D. S., Ten Have, T. R., & Rosenbaum, P. R. (2008). Randomization inference in a group–randomized trial of treatments for depression: covariate adjustment, noncompliance, and quantile effects. Journal of the American Statistical Association
- Muralidhara, Romero, Wüthrich (2009) Factorial designs, model selection, and (incorrect) inference in randomized experiments.
- Gerber & Green, Ch 5-8
- Handbook of Economic Field Experiments, Ch. 3, Section 9 (Athey & Imbens)

Lecture 3: Topics: Heterogeneous Treatment Effects, LATE Estimation, mediation, and Spillover Effects

- Treatment Effect Heterogeneity (Essential Heterogeneity)
- Spillovers/Interference
- Designing experiments to measure spillovers (Randomized Saturation designs)

Readings:

- Heckman, J. J., & Vytlacil, E. (2005). Structural equations, treatment effects, and econometric policy evaluation 1. Econometrica
- Imbens, G. W. (2010). Better LATE than nothing: Some comments on Deaton (2009) and Heckman and Urzua (2009). Journal of Economic literature
- Imai, K., Keele, L., Tingley, D., & Yamamoto, T. (2011). Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies. American Political Science Review
- Crépon, B., Duflo, E., Gurgand, M., Rathelot, R., & Zamora, P. (2013). Do labor market policies have displacement effects? Evidence from a clustered randomized experiment. The quarterly journal of economics
- Miguel, E., & Kremer, M. (2004). Worms: identifying impacts on education and health in the presence of treatment externalities. Econometrica
- Baird, S., Bohren, J. A., McIntosh, C., & Özler, B. (2018). Optimal design of experiments in the presence of interference. Review of Economics and Statistics

- Gerber & Green: Chapters 9-10

Lecture 4: Running field experiments: Practical, theoretical, and ethical considerations

- Biases that come from Study Effects
- Survey effects, Hawthorne and John Henry Effects
- Critique of RCTs (e.g., external validity and GE effects) and how to avoid/overcome them
- Lab Experiments in the Field
- Randomized promotion
- Information campaigns
- Connection to non-experimental literature
- Connection to IVs

Readings:

- Olken, B. A. (2015). Promises and perils of pre-analysis plans. The Journal of Economic Perspectives
- Thornton, R. L. (2008). The demand for, and impact of, learning HIV status. American Economic Review
- Zwane, A. P., Zinman, J., Van Dusen, E., Pariente, W., Null, C., Miguel, E., ... & Duflo, E. (2011). Being surveyed can change later behavior and related parameter estimates. Proceedings of the National Academy of Sciences
- Chuang, E., Dupas, P., Huillery, E., & Seban, J. (2019). Sex, Lies, and Measurement: Do Indirect Response survey methods work?
- Gerber & Green: Chapter 5-9
- Handbook of Economic Field Experiments, Ch. 5 (Glennerster)
- Handbook of Economic Field Experiments, Ch. 6 (Paluck & Shafir, construal and design of experiments)
- Handbook of Economic Field Experiments, Ch. 10 (Gneezy & Imas, lab-in-field methods)

Lecture 5: Education RCTs

- Measuring learning outcomes
- Other outcomes of interest (e.g., teacher's time-on-task, classroom observations)
- Cost effectiveness (and problems with it)

Readings:

- Angrist, J., Bettinger, E., Bloom, E., King, E., & Kremer, M. (2002). Vouchers for private schooling in Colombia: Evidence from a randomized natural experiment. American economic review

- Angrist, J., Bettinger, E., & Kremer, M. (2006). Long-term educational consequences of secondary school vouchers: Evidence from administrative records in Colombia. American economic review
- Banerjee, A. V., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. The Quarterly Journal of Economics
- Das, J., Dercon, S., Habyarimana, J., Krishnan, P., Muralidharan, K., & Sundararaman, V. (2013). School Inputs, Household Substitution, and Test Scores. American Economic Journal: Applied Economics
- Duflo, E., Dupas, P., & Kremer, M. (2015). School governance, teacher incentives, and pupil–teacher ratios: Experimental evidence from Kenyan primary schools. Journal of Public Economics
- Duflo, E., Dupas, P., & Kremer, M. (2011). Peer effects, teacher incentives, and the impact of tracking: Evidence from a randomized evaluation in Kenya. American Economic Review
- Kremer, M., Miguel, E., & Thornton, R. (2009). Incentives to learn. The Review of Economics and Statistics
- Krueger, A. B. (1999). Experimental estimates of education production functions. The quarterly journal of economics
- Mbiti, I., Muralidharan, K., Romero, M., Schipper, Y., Manda, C., & Rajani, R. (2019). Inputs, incentives, and complementarities in education: Experimental evidence from tanzania. The Quarterly Journal of Economics
- McEwan, P. J. (2015). Improving learning in primary schools of developing countries: A meta-analysis of randomized experiments. Review of Educational Research
- Muralidharan, K. (2017). Field experiments in education in developing countries. In Handbook of economic field experiments
- Muralidharan, K. (2012). Long-term effects of teacher performance pay: Experimental evidence from India
- Muralidharan, K., & Sundararaman, V. (2011). Teacher performance pay: Experimental evidence from India. Journal of political Economy
- Muralidharan, K., & Sundararaman, V. (2015). The aggregate effect of school choice: Evidence from a two-stage experiment in India. The Quarterly Journal of Economics
- Muralidharan, K., & Sundararaman, V. (2013). Contract teachers: Experimental evidence from India
- Romero, M., Sandefur, J., & Sandholtz, W. A. (2019). Outsourcing Education: Experimental Evidence from Liberia. American Economic Review
- Todd, P. E., & Wolpin, K. I. (2003). On the specification and estimation of the production function for cognitive achievement. The Economic Journal