

Michael J. Higgins

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POSITIONS *Assistant Professor* 2015-
Department of Statistics
Kansas State University, Manhattan, KS

Postdoctoral Research Associate 2013-2015
Program for Quantitative and Analytical Political Science
Department of Politics
Princeton University, Princeton, NJ

EDUCATION *Ph.D.*, Statistics. 2013
University of California at Berkeley, Berkeley, CA
Applications of Integer Programming Methods to Solve Statistical Problems
Dissertation Co-chairs: Jasjeet Sekhon and Deborah Nolan

B.S., Mathematics and Statistics. 2006
Kansas State University, Manhattan, KS
Summa cum laude.

ACTIVE RESEARCH AREAS

Causal Inference:

- Experimental design: Blocking of experiments, design and analysis of cluster-randomized experiments, design of experiments with sampling and experimental components.
- Post-stratification, matching, and related problems, and their relationship to optimal partitioning problems in graph theory.
- Estimation of treatment effects under Neyman-Rubin Causal Model.

Quantitative Social Science:

- Applying statistical techniques to solve problems in automated redistricting and election auditing.

Applied Integer Programming:

- Using integer programming techniques to solve problems in statistics and social science, including those in experimental design, nonparametric statistics, and optimal selection of teams in NCAA Basketball Tournament brackets.

PEER REVIEWED PUBLICATIONS

1. Higgins, M.J., F. Sävje, J. S. Sekhon “Improving Massive Experiments with Threshold Blocking.” *Proc. Natl. Acad. Sci.* Accepted.
2. Higgins, M.J., R.L. Rivest, and P.B. Stark “Sharper p -values for stratified post-election audits,” *Statistics, Politics, and Policy*, Vol. 2: Iss. 1, Article 7. 2011.

SUBMITTED MANUSCRIPTS “A New Automatic Redistricting Simulator using Markov Chain Monte Carlo” (with Ben Fifield, Kosuke Imai, and Alexander Tarr)

SELECTED WORKS IN PROGRESS “Blocking Estimators and Inference Under the Neyman-Rubin Model.” (with Fredrik Sävje and Jasjeet Sekhon)
“The Benefits of Probability Proportional to Size Sampling in Cluster-Randomized Experiments”

SOFTWARE PACKAGES `elec.strat`
- R package that calculates exact p -values and obtains optimal sampling sizes for stratified election audits.
- Available on CRAN.

SELECTED TALKS

- “Improving Massive Experiments using Threshold Blocking: Minimizing the Within-Block Distance.” Kansas State University Applied Mathematics Seminar. 2015.
- “The Large Problem of Big Data: Finding solutions to practical problems by combining Mathematics, Statistics, and Computer Science.” Kansas State University Undergraduate Mathematics Seminar. 2015.
- “Improving Massive Experiments using Threshold Blocking.” Columbia University Department of Political Science. 2015.
- “A new automated redistricting algorithm using MCMC.” Annual Meeting of the Society for Political Methodology. With Ben Fifield and Kosuke Imai. 2014.
- “Improving Experiments by Optimal Blocking: Minimizing the Maximum Within-block Distance.” Kansas State University Statistics Seminar. 2013.
- “Improving Experiments by Optimal Blocking: Minimizing the Maximum Within-block Distance.” Annual Meeting of the Society for Political Methodology. With Jasjeet Sekhon. 2013.

SELECTED CONTRIBUTED TALKS AND POSTERS

- “The Benefits of Probability Proportional to Size Sampling in Cluster Randomized Experiments.” Annual Meeting of the American Political Science Association. 2014.
- “The Benefits of Probability Proportional to Size Sampling in Cluster Randomized Experiments.” Poster presentation. Annual Meeting of the Society for Political Methodology. 2014.
- “Improving Experiments by Optimal Blocking: Minimizing the Maximum Within-block Distance.” Joint Statistical Meetings. 2013.
- “Sharper p -values for Stratified Election Audits.” Annual Meeting of the Society for Political Methodology. Poster presentation. 2013.
- “Optimal Blocking by Minimizing the Maximum Intra-block Dissimilarity.” U.S. Census Bureau, Center for Statistical Research & Methodology. 2013.
- “Exact Inference using Stratified Random Samples and the 0-1 Knapsack Problem.” Joint Statistical Meetings. 2011.

**STATISTICAL
CONSULTING**

Online teaching evaluation analysis: 2013-2014
• Helped design experiment and analyzed data to determine effects in response rates and scores when teaching evaluations switch to an online format.

São Paulo tax experiment: 2012-2013
• Cleaned data and helped design experiment and sampling procedure.

U.S. Congress roll call analysis: 2011-2013
• Wrote R code to simulate U.S. Congress roll call votes and analyze performance of ideal point estimation methods.

TEACHING

Kansas State University:

STAT 706: Basic Elements of Statistical Theory, Fall 2015.

Princeton University:

WWS 404: Quantitative/Qualitative Research Methods Lab, Spring 2014.
Quantitative lab instructor.

SERVICE

Reviewer for *Annals of Applied Statistics* and *Political Analysis*.