



# THE UNIVERSITY OF CHICAGO

Department of Statistics

## STATISTICS COLLOQUIUM

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BIN YU

Department of Statistics  
University of California, Berkeley

### Lasso Adjustments of Treatment Effect Estimates in Randomized Experiments

**MONDAY, April 4, 2016, at 4:00 PM**

5734 S. University Ave., Eckhart 133, Chicago, IL

*Joint Seminar with Chicago Booth School of Business*

#### ABSTRACT

We provide a principled way for investigators to analyze randomized experiments when the number of covariates is large. Investigators often use linear multivariate regression to analyze randomized experiments instead of simply reporting the difference of means between treatment and control groups. Their aim is to reduce the variance of the estimated treatment effect by adjusting for covariates. If there are a large number of covariates relative to the number of observations, regression may perform poorly because of overfitting. In such cases, the Lasso may be helpful. We study the resulting Lasso-based treatment effect estimator under the Neyman-Rubin model of randomized experiments. We present theoretical conditions that guarantee that the estimator is more efficient than the simple difference-of-means estimator, and we provide a conservative estimator of the asymptotic variance, which can yield tighter confidence intervals than the difference-of-means estimator. Simulation and data examples show that Lasso-based adjustment can be advantageous even when the number of covariates is less than the number of observations. Specifically, a variant using Lasso for selection and OLS for estimation performs particularly well, and it chooses a smoothing parameter based on combined performance of Lasso and OLS.

(This talk is based on joint work with A. Bloniarz, H. Liu, C. Zhang and J. Sekhon.)

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