

WSS Short Course

Guidelines for Using State-of-the-Art Methods to Estimate Propensity Score and Inverse Probability of Treatment Weights When Drawing Causal Inferences

Date: Wednesday, November 16, 2016

Time: 9:00 am – 4:30 pm

Instructor: Dr. Beth Ann Griffin

Place: Bureau of Labor Statistics

Conference rooms 1-3, 2 Massachusetts Avenue NE, Washington, DC

Course Content:

Estimation of causal effects is a primary activity of many studies. Examples include testing whether a substance abuse treatment program is effective, whether an intervention improves the quality of mental health care, or whether incentives improve retention of military service members. Controlled, random-assignment experiments are the gold standard for estimating such effects. However, experiments are often infeasible, forcing analysts to rely on observational data in which treatment assignments are out of the control of the investigators. This short course will provide an introduction to causal modeling using the potential outcomes framework and the use of propensity scores and weighting (i.e., propensity score or inverse probability of treatment weights) to estimate causal effects from observational data. It will also present step-by-step guidelines on how to estimate and perform diagnostic checks of the estimated weights for testing the relative effectiveness of two or more interventions. Attendees will gain hands-on experience estimating propensity score weights using boosted models in R, SAS and Stata; evaluating the quality of those weights; and using them to estimate intervention effects. Additional topics (if time allows) can also include methods for conducting sensitivity analyses for unobserved confounding and estimation of the effects of time-varying treatments. Attendees should be familiar with linear and logistic regression; no knowledge of propensity scores is expected.

About the Instructor: Beth Ann Griffin is a senior statistician at the RAND Corporation, where she codirects the RAND Center for Causal Inference and is a member of the Pardee RAND Graduate School faculty. Her statistical research focuses on causal effects estimation when using observational data. Her substantive research has primarily fallen into three areas: (1) substance abuse treatment for adolescents, (2) military health, and (3) neighborhood level predictors of health. She is currently the principal investigator of two projects sponsored by the National Institute of Drug Abuse (NIDA), one which is focused on improving a promising health services research tool (the TWANG package) for estimating causal effects of treatment using propensity score weights (www.rand.org/statistics/twang) and the other which aims to develop well-operationalized, empirically-supported sequences of decision rules—known as “Adaptive Interventions” (AIs)—to provide guidance about substance-use services decisions for adolescent clients. Griffin also serves on the editorial board the *Annals of Applied*

Statistics, Statistics in Medicine and Observational Studies. She received her Ph.D. in biostatistics from Harvard University.

Course Schedule:

- 8:15 - 9:00 Coffee, breakfast, and check in
- 9:00 - 10:00 Introduction to potential outcomes framework for causal modeling and the role of the propensity score in causal effect estimation
- 10:00-10:30 Propensity score estimation via logistic regression and GBM
- What is GBM and how does it compare with logistic regression
 - The role of balance in propensity score estimation
 - Metrics for assessing balance
- 10:30 - 10:45 Break
- 10:45 – 11:45 Propensity score weighting example with two treatment conditions
- Use the TWANG package to fit a GBM model
 - Use of TWANG in R, SAS, and Stata
 - Use of TWANG to assess balance
 - Estimation of treatment effects using estimated weights
- 11:45 – 12:15 Alternatives to GBM and logistic regression for propensity score estimation (CBPS or MDIA)
- 12:15 - 1:15 Lunch (provided)
- 1:15 - 1:45 Causal effects with 3+ treatments, definitions and estimators
- 1:45 – 2:45 Propensity score weighting example with four treatment conditions
- Use the TWANG package to fit a GBM model
 - Use of TWANG in R, SAS, and Stata
 - Use of TWANG to assess balance
 - Estimation of treatment effects using estimated weights
- 2:45 - 3:00 Break
- 3:00 – 3:30 Doubly robust approaches
- 3:30 – 4:30 Marginal structural models & inverse probability of treatment weighting

Advance registration: In addition to your RSVP here, please go to <http://wss-shortcourse.eventbrite.com> to register and pay for the class. Online registration will close on November 14, 2016; earlier if the course fills up.

Registration Fee:

- Full-time students (at most 8): \$50 advance, \$70 at the door
- WSS members: \$160 advance, \$180 at the door
- All others: \$210 advance, \$240 at the door
- WSS membership information: <http://washstat.org/joinus.html>

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