# Research Methods in Political Science III
# Statistical Causal Inference

## School of Law, Kobe University, Spring 2016

Wed. 8:50–10:20pm
Room 102, Building II
（第二学舎 102 教室）
Office Hours: Mon 12:00–1:30pm
(or by appointment)

Instructor：Yuki Yanai（矢内 勇生）
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### Overview and Class Goals

This course introduces students to causal inference based on the potential outcomes approach. The students will learn some statistical methods to find out causal effects in political phenomena so that they will be able to make causal claims in their own research.

### Prerequisites

Students are expected to have some experience of data analysis using R. If you would like to review how to use R, the following books might help you.

- Gandrud, Christopher. 2015. *Reproducible Research with R and RStudio, Second Edition.* Boca Raton, FL: CRC Press.
- Grolemund, Garret. 2014. *Hands-On Programming with R.* Sebastopol, CA: O'Reilly.
- Lander, Jared P. 2014. *R for Everyone: Advanced Analytics and Graphics.* Upper Saddle River, NJ: Addison-Wesley.
- Leek, Jeff. 2014. *The Elements of Data Analytic Style.* Leanpub.
- Peng, Roger D. 2014–2016 *R Programming for Data Science.* Leanpub.
- Peng, Roger D. 2015–2016. *Report Writing for Data Science in R.* Leanpub.

### Class Format

Class meets in a seminar room without computers. You are encouraged to bring your own laptop to class, though it is not required. Up to Week 5, a lecture is given, and class discussion follows.

From Week 6, we spend two weeks for each topic. In the fist week for a topic, I give you a lecture. In the second week, a team of students gives a lecture on how to apply the method to political-science problems. More detailed explanation will be given in class.

### Requirements and Grading

Grades will be based on

- class participation (20% of final grade),
- homework assignments (30%), and
- performance in the assigned topic(s) (50%)

Students must complete the assigned readings before class every week.

### Course Website

The course materials can be found at the following URL:

http://www2.kobe-u.ac.jp/~yyanai/classes/rm3/contents/

You are expected to check the webpage on regular basis (please refresh your web browser to view the latest content). However, the weekly assignment will be posted *not* on the website but on *Slack*.

### Slack

To facilitate communication outside class, we use Slack. The Slack group of this class is https://kobe-rmps3.slack.com/. Visit Getting Started | Slack to learn the basic usage of Slack.

You are expected to post questions regarding class to *an appropriate channel* in Slack. You should not only ask questions but also answer other students' questions if possible. Your answers do not have to be complete or perfect. If you found an answer to your own question, please post the answer to share it with your colleagues. If nobody posts an answer to a question, the instructor will provide an answer or discuss the problem in the following class.

Weekly homework assignments are also posted on Slack, so you should watch Slack activity even if you are not willing to participate in discussions.

**Please send me an email with the subject "Slack for Research Methods 3" by Tuesday April 19qyth**, and I will send you an invitation to our Slack group. Unfortunately, Kobe University's email system seems to treat Slack emails as spams, so please let me know your email address that is *not* Kobe University's (e.g., gmail, yahoo mail, etc.).

### Computing

We use R for our data analysis projects. You can use other software when you do your homework, but we use only R in class.

### Required Book

Please purchase the following book.

- Angrist, Joshua D., and Jörn-Steffen Pischke. 2015. *Mastering 'Metrics: The Path from Cause to Effect.* Princeton, NJ: Princeton UP. (henceforth **AP15**)

### Optional Books

The following books are optional. Many of you should find them useful.

1. Angrist, Joshua D., and Jörn-Steffen Pischke. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton, NJ: Princeton UP.
2. Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models.* New York: Cambridge UP.
3. Hernán, Miguel A., and James A. Robins. 2016. *Causal Inference.* Boca Raton: Chapman & Hall/CRC Press, forthcoming.
4. Imbens, Guido W., and Donald B. Rubin. 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction.* New York: Cambridge UP.
5. Manski, Charles F. 1995. *Identification Problems in Social Sciences.* Cambridge, MA: Harvard UP.

6. Morgan, Stephen L., and Christoper Winship. 2015. *Counterfactuals and Causal Inference: Methods and Principles for Social Research, Second Edition.* New York: Cambridge UP.
7. Rosenbaum, Paul R. 2010. *Design of Observational Studies.* New York: Springer.

## Schedule

The readings with **M** (Mandatory) should be completed prior to the lecture for which they are listed. Graduate students should at least skim readings with **R** (Recommended) as well either before or after the lecture. Readings with **O** (Optional) should enrich your understanding of the topics. *This schedule is subject to change.*

*No class on Apr. 6.* Instructor is out of town.

### 1. Introduction (Apr. 13)

**M** Brady, Henry E. 2008. "Causation and Explanation in Social Science." In Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier, eds. *The Oxford Handbook of Political Methodology.* New York: Oxford University Press, Ch.10.

**R** Marini, Margaret Mooney, and Burton Singer. 1988. "Causality in the Social Sciences." *Sociological Methodology* 18:347–409.

**R** Keele, Luke. 2015. "The Statistics of Causal Inference: A View from Political Methodology." *Political Analysis* 23: 313–335.

**O** Heckman, James J. 2005. "The Scientific Model of Causality." *Sociological Methodology* 35(1):1–98.

### 2. Potential Outcomes Approach (Apr. 20)

**M** Hernán and Robins (2016), Ch.1.

**M** Rubin, Donald B. 2005. "Causal Inference Using Potential Outcomes: Design, Modeling, Decisions." *Journal of the American Statistical Association* 100:322–331.

**R** Holland, Paul W. 1986. "Statistics and Causal Inference." *Journal of the American Statistical Association* 81:945–960.

**O** Imbens and Rubin (2015), Ch.1.

**O** Morgan and Winship (2015), Ch.2.

### 3. Assignment Mechanism (Apr. 27)

**M** Imbens and Rubin (2015), Ch.3.

**M** Hernán and Robins (2016), Chs.7–8.

**M** Sekhon, Jasjeet S. 2004. "Quality Meets Quantity: Case Studies, Conditional Probability, and Counterfactuals." *Perspectives on Politics* 2(2): 281-293.

**R** Angrist and Pischke (2008), Ch.1.

**R** Little, Roderick J., and Donald B. Rubin. 2000. "Causal Effects in Clinical and Epidemiological Studies via Potential Outcomes: Concepts and Analytical Approaches." *Annual Review of Public Health* 21:121–145.

**O** Manski (1995), Ch.2.

## 4. Randomized Experiments (1) (May 11)

**M** AP15, Ch.1.

**M** Hernán and Robins (2016), Ch.2.

**M** Olken, Benjamin A. 2007. "Monitoring Corruption: Evidence from a Field Experiment in Indonesia." *Journal of Political Economy* 115(2):200–249.

**R** Imbens and Rubin (2015), Ch.4.

**O** Angrist and Pischke (2008), Ch.2.

**O** Rosenbaum (2010), Ch.2.

## 5. Randomized Experiments (2) (May 18)

**M** Imai, Kosuke, Gary King, and Elizabeth A. Stuart. 2008. "Misunderstandings between Experimentalists and Observationalists about Causal Inference." *Journal of the Royal Statistical Society. Series A* 171(2): 481–502.

**M** Druckman, James N., Donald P. Green, James H. Kuklinski, and Arthur Lupia. 2006. "The Growth and Development of Experimental Research in Political Science." *American Political Science Review* 100(4): 627–635.

**R** Palfrey, Thomas R. 2009. "Laboratory Experiments in Political Economy." *Annual Review of Political Science* 12: 379–388. (working paper version)

**R** de Rooji, Eline A., Donald P. Green, and Alan S. Gerber. 2009. "Field Experiments on Political Behavior and Collective Action." *Annual Review of Political Science* 12: 389–395.

**R** Humphreys, Macartan, and Jeremy M. Weinstein. 2009. "Field Experiments and the Political Economy of Development." *Annual Review of Political Science* 12: 367–368.

**O** Dunning, Thad. 2012. *Natural Experiments in the Social Sciences: A Design-Based Approach.* New York: Cambridge University Press.

**O** Morton, Rebecca B., and Kenneth Williams. 2010. *Experimental Political Science and the Study of Causality: From Nature to the Lab.* New York: Cambridge UP.

## 6. Matching: Theory (May 25)

**M** Stuart, Elizabeth A. 2010. "Matching Methods for Causal Inference: A Review and a Look Forward." *Statistical Science* 25(1): 1–21.

**M** Sekhon, Jasjeet S. 2009. "Opiates for the Matches: Matching Methods for Causal Inference." *Annual Review of Political Science* 12: 487–508.

**M** Lyall, Jason. 2010. "Are Coethnics More Effective Counterinsurgents? Evidence from the Second Chechen War." *American Political Science Review* 104(1):1–20.

**R** Morgan, Stephen L., and David J. Harding. 2006. "Matching Estimators of Causal Effects: Prospects and Pitfalls in Theory and Practice." *Sociological Methods & Research* 35(1): 3–60.

**R** Stuart, Elizabeth A., and Donald B. Rubin. 2008. "Best Practice in Quasi-Experimental Designs: Matching Methods for Causal Inference." In Jason W. Osborne, ed. *Best Practices in Quantitative Methods.* Thousand Oaks: Sage, Ch.11.

**O** Abadie, Alberto, and Guido W. Imbens. 2011. "Bias-Corrected Matching Estimators for Average Treatment Effects." *Journal of Business & Economic Statistics* 29(1):1–11.

**O** Ho, Daniel E., Kosuke Imai, Gary King, and Elizabeth A. Stuart. 2007. "Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference." *Political Analysis* 15: 199-236.

**O** Iacus, Stefano M., Gary King, and Giuseppe Porro. 2012. "Causal Inference without Balance Checking: Coarsened Exact Matching." *Political Analysis* 20: 1–24.

**O** McKinlay, Sonja M. 1977. "Pair-Matching: A Reappraisal of a Popular Technique." *Biometrics* 33(4): 725–735.

**O** Morgan and Winship (2015), Ch.5.

**O** Rosenbaum (2010), Part II.

**O** Sekhon, Jasjeet S. 2008. "The Neyman-Rubin Model of Causal Inference and Estimation via Matching Methods." In Janet M. Box-Steffensmeier, Henry E. Brady, and David Collier, eds. *The Oxford Handbook of Political Methodology.* New York: Oxford University Press, Ch.11.

## 7. Matching: Practice (June 1)

A reading list will be provided by students in charge by May 25.

## 8. Regression: Theory (June 8)

**M** AP15, Ch.2.

**M** Gelman and Hill (2009), Ch.9.

**O** Angrist and Pischke (2008), Ch.3.

**O** Morgan and Winship (2015), Ch.6.

## 9. Regression: Practice (June 15)

A reading list will be provided by students in charge by June 8.

## 10. Instrumental Variables: Theory (June 22)

**M** AP15, Ch.3.

**M** Sovey, Allison J., and Donald P. Green. 2011. "Instrumental Variables Estimation in Political Science: A Readers' Guide." *American Journal of Political Science* 55(1): 188–200.

**M** Kern, Holger Lutz, and Jens Hainmueller. 2009. "Opium for the Masses: How Foreign Media Can Stabilize Authoritarian Regimes." *Political Analysis* 17(4):377–399.

**R** Imbens, Guido W. 2014. "Instrumental Variables: An Econometrician's Perspective." *Statistical Science* 29(3): 323–358.

**R** Martens, Edwin P., Wiebe R. Pestman, Anthonius de Boer, Svetlana V. Belister, and Olaf H. Klungel. 2006. "Instrumental Variables: Application and Limitations." *Epidemiology* 17(3): 260–267.

**O** Abadie, Alberto. 2003. "Semiparametric Instrumental Variable Estimation of Treatment Response Models." *Journal of Econometrics* 113:231–263.

**O** Angrist and Pischke (2008), Ch.4.

**O** Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. 1996. "Identification of Causal Effects Using Instrumental Variables." *Journal of the American Statistical Association* 91: 444–455.

**O** Morgan and Winship (2015), Ch.9.

### 11. Instrumental Variables: Practice (June 29)

A reading list will be provided by students in charge by June 22.

### 12. Regression Discontinuity Design: Theory (July 6)

**M** AP15, Ch.4.

**M** Imbens, Guido W., and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142: 615–635.

**M** Eggers, Andrew C., Anthony Fowler, Jens Hainmueller, Andrew B. Hall, and James M. Snyder, Jr. 2015. "On the Validity of the Regression Discontinuity Design for Estimating Electoral Effects: New Evidence from Over 40,000 Close Races." *American Journal of Political Science* 59(1):259–274.

**R** Imbens, Guido W., and Karthik Kalyanaraman. 2012. "Optimal Bandwidth Choice for the Regression Discontinuity Estimator" *Review of Economic Studies* 79(3):933–959.

**O** Angrist and Pischke (2008), Ch.6.

**O** Hahn, Jinyong, Petra Todd, and Wilbert Van der Klaauw. 2001. "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design." *Econometrica* 69(1):201–209.

**O** Lee, David S., and Thomas Lemieux. 2010. "Regression Discontinuity Designs in Economics." *Journal of Economic Literature* 48(2): 281–355.

### 13. Regression Discontinuity Design: Practice (July 13)

A reading list will be provided by students in charge by July 6.

### 14. Differences-in-Differences: Theory (July 20)

**M** AP15, Ch.5.

**M** Lyall, Jason. 2009. "Does Indiscriminate Violence Incite Insurgent Attacks? Evidence from Chechnya." *Journal of Conflict Resolution* 53(3):31–362.

**R** Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics* 119(1):249–275.

**R** Abadie, Alberto. 2005. "Semiparametric Difference-in-Differences Estimators." *Review of Economic Studies* 72:1–19.

**O** Angrist and Pischke (2009), ch.5.

### 15. Differences-in-Differences: Practice (July 27)

A reading list will be provided by students in charge by July 20.