# Causal Inference and Public Policy in Europe

## MA Seminar, Summer 2023

## SM Applied Theories and Methods Political Science I / Specialization Module Political Science V

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**Classes: Mondays 14:00 – 17:30, from April 17 to June 12**
**∗ONLINE on April 17 and 25 with videos to be watched before the session!**

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## 1 Course Description

Social Sciences have undergone a "causal revolution" in the last few decades. The need to find reliable answers for important questions such as *"Do higher minimum wages increase unemployment?"* or *"Do violent protests reduce support for a social movement?"* has led researchers to develop a rigorous toolkit of methods and techniques to understand the causal relation between $X$ and $Y$. This course starts with the main contemporary theoretical framework behind current causal analysis in social sciences, the potential outcomes framework. We talk about how causal relations are understood in terms of counterfactuals, and the assumptions necessary to identify causal effects, as well as common challenges and pitfalls. The course focuses on

statistical inference for the analysis of public policy across a wide range of contexts, and covers issues related to the design, implementation, and evaluation of policy changes. Technical aspects will focus on computational approaches and real-world challenges.

### Goals

Students will learn to model cause-and-effect relationships and develop counterfactual scenarios. They will gain experience using computational methods to evaluate and predict the impacts of policies, interventions, and events, while learning to avoid common pitfalls. By the end, students will be able to: (1) think through which of the methods covered in class (if any) would be best suited to solve a given decision problem and what data would be required; (2) perform appropriate analysis and interpret results; (3) connect those results to strategic decision-making; (4) critically examine statistical causal claims put forward by others; and (5) present findings and recommendations effectively for audiences of varying sophistication.

### Prerequisites

Students are expected to be familiar with basic statistical methods for analysis and inference (i.e., run and interpret a linear regression). You should have taken Introduction to Quantitative Methods or a similar course before starting this. Students should also have a basic familiarity with R.

### Software

All students should have R installed in their computers before the first class. Students are also strongly encouraged to install RStudio. This is a more user-friendly interface for R with integration to other packages we will use throughout the course. RStudio is available for free at https://www.rstudio.com/.

## 2 Course Requirements

Students will be assessed based on the following exercises (all are mandatory to pass the course):

- **One of two take-home assignments (30 points).** Two take-home exercises will be posted during the semester, on **May 15** and **June 5** with two weeks to

complete each of them – deadlines on **May 29, at 23:55 CET**, and **June 19, 23:55 CET**. Students will be given a dataset and asked to perform analyses in accordance to methods covered in the class thus far. The length of assignments should not exceed **five pages**. **Each student should do only one of the two.**

- **Final course project (70 points).** For the final project, students should find data *that was not used in class* and use one of the methods discussed in the course to analyze it, in order to evaluate a given policy – i.e., what was the causal effect of a policy or event on an outcome? Results should be presented as an **infographic**, targeted at a lay audience (and not academic), with an accompanying 2-page technical memo on the data and analyses performed. The final infographics should be uploaded by **July 10**.

Points are converted to final grades as follows:

| Points | Grade |
|---|---|
| 100–95 | 1,0 |
| 94.5–90 | 1,3 |
| 89.5–85 | 1,7 |
| 84.5–80 | 2,0 |
| 79.5–75 | 2,3 |
| 74.5–70 | 2,7 |
| 69.5–65 | 3,0 |
| 64.5–60 | 3,3 |
| 59.5–55 | 3,7 |
| 54.5–50 | 4,0 |
| 49–0 | 5,0 |

## 2.1 A Note on Professional Presentation

For the one take-home assignment, I recommend you use RMarkdown. RStudio comes with a powerful authoring format called R Markdown. R Markdown documents look like a mix of a text document and R code. They enable easy creation of data analysis reports directly from R. Rather than copying and pasting into Word, your report is created automatically. R Markdown combines the core syntax of markdown (an easy-to-write plain text format) with embedded R code chunks that are

run so their output can be included in the final document. R Markdown documents are fully reproducible (they can be automatically regenerated whenever underlying R code or data changes). Markdown is simple to use as it enables the use of a syntax like plain-text.

1. You need to install LaTeX on your machine. This is a free typesetting software which R Markdown uses. Mac users should install TeXLive, freely available at https://www.tug.org/texlive/; Windows users should install `tinytex`, which can be done directly within RStudio, with the following three commands:
    - install.packages('tinytex')
    - library(tinytex)
    - install_tinytex()
2. To use R Markdown, simply create a new R Markdown document in RStudio. This will load a sample document. Select "Knit PDF" to produce a PDF output file with the write up and the code output.
3. More information on the R Markdown syntax is available here: http://rmarkdown.rstudio.com/.

**NB! Installing and running R and RMarkdown can be tricky. If you are having trouble, please contact the instructor in advance.**

# 3 Schedule

### Week 1 (Apr 17): Causality and the Experimental Gold Standard

**NB! This Session is online. You are expected to watch a preparatory video lecture before we meet on Zoom on April 17, 14:00**

Mandatory readings:

Imbens, Guido W., and Donald B. Rubin. 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences: an Introduction.* Cambridge: Cambridge University Press, Chapter 1.

Duflo, Esther (2020). Field Experiments and the Practice of Policy. *American Economic Review*, 110(7), 1952–1973.

### Week 2 (April 24): What to do when we can't experiment? Introduction to matching

**NB! This Session is online. You are expected to watch a preparatory video lecture before we meet on Zoom on April 24, 14:00**

Mandatory readings:

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(3): 199–236.

Guill, Karin, Oliver Lüdtke, and Olaf Köller. 2017. "Academic tracking is related to gains in students' intelligence over four years: Evidence from a propensity score matching study" *Learning and Instruction* 47: 43–52.

### Week 3 (May 8): How to find better matches

Mandatory readings:

Cunningham, Scott. 2021. *Causal Inference: the Mixtape.* Yale University Press, Chapter 5, sections 5.3 and 5.4. The book is available online for free here: https://mixtape.scunning.com/matching-and-subclassification.html

Kelley, Judith. 2011. "Do International Election Monitors Increase or Decrease Opposition Boycotts?" *Comparative Political Studies* 44: 1527-1556.

### Week 4 (May 15): Regression Discontinuity

Mandatory readings:

Cunningham, Scott. 2021. *Causal Inference: the Mixtape.* Yale University Press, Chapter 6. The book is available online for free here: https://mixtape.scunning.com/regression-discontinuity.html

Jankowski, Michael, Kamil Marcinkiewicz, and Anna Gwiazda. 2019. "The Effect of Electing Women on Future Female Candidate Selection Patterns: Findings from a Regression Discontinuity Design". *Politics & Gender* 15: 182-210.

Cavaille, Charlotte, and John Marshall. 2018. "Education and Anti-Immigration Attitudes: Evidence from Compulsory Schooling Reforms across Western Europe." *American Political Science Review*, 1–10.

### Week 5 (May 22): Differences-in-Differences and Introduction to Synthetic Controls

Mandatory readings:

Cunningham, Scott. 2021. *Causal Inference: the Mixtape*. Yale University Press, Chapter 9. The book is available online for free here: https://mixtape.scunning.com/difference-in-differences.html

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2015. "Comparative Politics and the Synthetic Control Method." *American Journal of Political Science* 59(2): 495–510.

### Week 6 (May June 5): Synthetic Controls II – Multiple treated units at many points in time

Mandatory readings:

Kreif, Noémi, Richard Grieve, Dominik Hangartner, Alex James Turner, Silviya Nikolova, and Matt Sutton. 2016. "Examination of the Synthetic Control Method for Evaluating Health Policies with Multiple Treated Units." *Health Economics* 25(12): 1514–1528.

Born, Benjamin, Alexander M. Dietrich, and Gernot J. Müller. 2021. "The lockdown effect: A counterfactual for Sweden." *Plos one* 16, no. 4.

### Week 7 (June 12): Instrumental Variables, Natural Experiments, and Wrap Up

Mandatory readings:

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

Barone, Guglielmo, and Gaia Narciso. 2015. "Organized crime and business subsidies: Where does the money go?." *Journal of Urban Economics* 86: 98–110.

Titiunik, Rocío (2021). "Natural Experiments". In: *Advances in Experimental Political Science*, edited by James N. Druckman and Donald P. Green. Cambdrige: Cambridge University Press.

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