

Econometrics 220E Weeks 1–5

Instructor

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Disclaimer

- The information below reflects the official schedule of classes as of January 1, 2021. Please check the schedule for updates.
- Given the uncertainty due to the Covid-19 pandemic, some of the details on the syllabus may change. Please check Canvas and the syllabus regularly for updates.

1 Organization

1.1 Class

Monday/Wednesday 3:00pm – 4:20pm online (Zoom)

No class on Monday, January 18 (Martin Luther King Holiday)

1.2 Asynchronous access

All class sessions will be recorded and made available asynchronously via Canvas.

1.3 Office hour

By appointment (Zoom). Please email me.

2 Course outline

The first part of Econ 220E (weeks 1–5) covers microeconomic methods for causal inference. The material is divided into the following sections.

1. Potential outcomes, experiments, randomization inference
 - Chapter 2 in [Angrist and Pischke \(2009\)](#), Chapters 1, 2, 5 and 7 in [Imbens and Rubin \(2012\)](#)
 - Paper for referee report: [Young \(2018\)](#)
2. Identification and estimation of treatment effects under unconfoundedness

- Chapter 3 in Angrist and Pischke (2009), Chapter 6 in Hansen (2019), Chapters 12–16 and 18 in Imbens and Rubin (2012), Chapter 21 in Wooldridge (2010), Imbens (2004)
 - Paper for referee report: Abadie and Imbens (2006)
3. Instrumental variables with heterogeneous effects
- Chapter 4 in Angrist and Pischke (2009), Chapters 23-24 in Imbens and Rubin (2012), Abadie (2003), Huber and Wüthrich (2018), Imbens and Angrist (1994)
 - Paper for referee report: Brinch et al. (2017)
4. Difference-in-differences, synthetic controls, and related methods
- Chapter 5.2 in Angrist and Pischke (2009), Abadie et al. (2010), Abadie et al. (2015), Abadie (forthcoming), Athey and Imbens (2006), Chernozhukov et al. (2017), Lechner (2010), Melly and Santangelo (2015), Doudchenko and Imbens (2016), Roth and Sant’Anna (2020)
 - Paper for referee report: de Chaisemartin and D’Haultfoeuille (2018)
5. Distributional effects, distribution and quantile regression
- Chapter 7 in Angrist and Pischke (2009), Chapters 1-2 in Koenker (2005), Andrews (1994), Chernozhukov et al. (2013), Firpo (2007), Heckman et al. (1997), Koenker and Bassett (1978)
 - Paper for referee report: Chernozhukov et al. (2013)

3 Grading policy

3.1 Referee report (20%)

For the referee report, you can choose one out of the five papers in Section 2. The referee report should contain the following elements:

1. Short description of the paper with a focus on its contribution.
2. Detailed and **formal** discussion of the main theoretical results/arguments and their proofs/derivations. If there are several key results, choose one or two main results.
3. Critical assessment including key strengths and weaknesses of the paper.

The referee report should contain about 5 pages of text (1.5 spacing, 12pt). The deadline for the referee report is **February 7**.

3.2 Monte Carlo study (30%)

Choose a theoretical/methodological paper which (1) analyzes/develops a method related to the material discussed in this course, (2) was published at least at top-field level after 2010 (exceptions are possible, please check with me), and (3) is not on the syllabus or in the references on the slides. Please check with me to get my approval as soon as you have made your choice.

The assignment should contain the following elements:

1. Summary of the paper
2. Description of the theoretical properties of the method
3. Monte Carlo simulations investigating the theoretical properties. The simulations should be based on at least 3 different data generating processes and demonstrate cases where the method works and cases where it does not. When discussing the simulation results, you should provide a connection to the theoretical results and the underlying assumptions.
4. Code to replicate the simulation results (you may use any statistical software you want).

The assignment should contain about 6-8 pages of text (1.5 spacing, 12pt) and no more than 4 additional pages with tables and figures. You may work in groups of two students (both students will get the same grade). The deadline for the paper is **February 7**.

4 Course material

The course material will be available online via Canvas.

5 References and textbook

- The papers and books indicated in the outline are the main references. I will sometimes refer you to additional references and discuss specific empirical papers.
- The course material is self-contained and no textbooks are required.
- All the papers should be available via scholar.google.com when using UCSD WLAN or VPN. Please let me know if you cannot find a paper and I will send you a copy.

6 Preexisting knowledge

This course heavily builds on Econometrics 220A–220D.

7 Other

- **Basic Needs:** Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their academic performance, is encouraged to contact: foodpantry@ucsd.edu, basicneeds@ucsd.edu, or call 858-246-2632.
- **Triton Food Pantry** is an emergency food relief program to provide food for students and fight food insecurity. You can get canned food, pasta, beans, and rice as well as fruit and vegetables at the pantry. foodpantry@ucsd.edu
- **The Hub Basic Needs Center** coordinates basic needs resources vital to thrive as a student, which includes access to nutritious food, stable housing, and financial wellness resources. We provide basic needs services and resource referrals to registered UC San Diego students. Ask us about **CalFresh** food benefits! basicneeds@ucsd.edu 858-246-2632.

References

- Abadie, A., 2003. Semiparametric instrumental variable estimation of treatment response models. *Journal of Econometrics* 11, pp. 231–263.
- Abadie, A., forthcoming. Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature* .
- Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic control methods for comparative case studies: Estimating the effect of california’s tobacco control program. *Journal of the American Statistical Association* 105, 493–505. doi:[10.1198/jasa.2009.ap08746](https://doi.org/10.1198/jasa.2009.ap08746).
- Abadie, A., Diamond, A., Hainmueller, J., 2015. Comparative politics and the synthetic control method. *American Journal of Political Science* 59, 495–510. doi:[10.1111/ajps.12116](https://doi.org/10.1111/ajps.12116).
- Abadie, A., Imbens, G.W., 2006. Large sample properties of matching estimators for average treatment effects. *Econometrica* 74, 235–267. URL: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1468-0262.2006.00655.x>, doi:<https://doi.org/10.1111/j.1468-0262.2006.00655.x>, arXiv:<https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1468-0262.2006.00655.x>.
- Andrews, D.W., 1994. Chapter 37 empirical process methods in econometrics, Elsevier. volume 4 of *Handbook of Econometrics*, pp. 2247 – 2294.
- Angrist, J., Chernozhukov, V., Fernández-Val, I., 2006. Quantile regression under misspecification, with an application to the u.s. wage structure. *Econometrica* 74, pp. 539–563.
- Angrist, J.D., Pischke, J.S., 2009. *Mostly Harmless Econometrics: An Epiricist’s Companion*. Princeton University Press.

- Athey, S., Imbens, G.W., 2006. Identification and inference in nonlinear difference-in-differences models. *Econometrica* 74, pp. 431–497.
- Brinch, C.N., Mogstad, M., Wiswall, M., 2017. Beyond late with a discrete instrument. *Journal of Political Economy* 125, 985–1039. URL: <https://doi.org/10.1086/692712>, doi:10.1086/692712, arXiv:<https://doi.org/10.1086/692712>.
- de Chaisemartin, C., D’Haultfoeuille, X., 2018. Fuzzy Differences-in-Differences. *The Review of Economic Studies* 85, 999–1028. URL: <https://doi.org/10.1093/restud/rdx049>, doi:10.1093/restud/rdx049, arXiv:<http://oup.prod.sis.lan/restud/article-pdf/85/2/999/24473453/rdx049.pdf>.
- Chernozhukov, V., Fernandez-Val, I., Melly, B., 2013. Inference on counterfactual distributions. *Econometrica* 81, pp. 2205–2268.
- Chernozhukov, V., Wüthrich, K., Zhu, Y., 2017. An exact and robust conformal inference method for counterfactual and synthetic controls. arXiv:1712.09089.
- Doudchenko, N., Imbens, G.W., 2016. Balancing, Regression, Difference-In-Differences and Synthetic Control Methods: A Synthesis. Working Paper 22791. National Bureau of Economic Research. URL: <http://www.nber.org/papers/w22791>, doi:10.3386/w22791.
- Firpo, S., 2007. Efficient semiparametric estimation of quantile treatment effects. *Econometrica* 75, pp. 259–276.
- Hansen, B.E., 2019. *Econometrics*. Book Manuscript.
- Heckman, J.J., Smith, J., Clements, N., 1997. Making the most out of programme evaluations and social experiments: Accounting for heterogeneity in programme impacts. *The Review of Economic Studies* 64, pp. 487–535.
- Huber, M., Wüthrich, K., 2018. Local average and quantile treatment effects under endogeneity: A review. *Journal of Econometric Methods* 8.
- Imbens, G.W., 2004. Nonparametric estimation of average treatment effects under exogeneity: A review. *The Review of Economics and Statistics* 86.
- Imbens, G.W., Angrist, J.D., 1994. Identification and estimation of local average treatment effects. *Econometrica* 62, pp. 467–475.
- Imbens, G.W., Rubin, D.B., 2012. *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction*. Cambridge University Press, Cambridge. doi:10.1017/CB09781139025751.
- Koenker, R., 2005. *Quantile Regression*. Cambridge University Press.
- Koenker, R., Bassett, Gilbert, J., 1978. Regression quantiles. *Econometrica* 46, pp. 33–50.
- Lechner, M., 2010. The estimation of causal effects by difference-in-difference methods. *Foundations and Trends in Econometrics* 4, pp. 165–224.

- Melly, B., Santangelo, G., 2015. The changes-in-changes model with covariates. Unpublished Manuscript.
- Roth, J., Sant'Anna, P.H., 2020. When is parallel trends sensitive to functional form? arXiv preprint arXiv:2010.04814 .
- Wooldridge, J.M., 2010. Econometric Analysis of Cross Section and Panel Data, Second Edition. The MIT Press.
- Young, A., 2018. Channeling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results*. The Quarterly Journal of Economics 134, 557–598. URL: <https://doi.org/10.1093/qje/qjy029>, doi:10.1093/qje/qjy029, arXiv:<http://oup.prod.sis.lan/qje/article-pdf/134/2/557/28289325/qjy029.pdf>.