Economics 4349 and 5349

Advanced Causal Inference

Tuesday and Thursday, Foster 402 11am-12:15pm

Dr. Scott Cunningham

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This syllabus may change, but I am making an effort to make it fixed.

Course Description: Causal inference can be thought of as subfield of econometrics that is primarily built on the potential outcomes framework (Cunningham, 2021; Imbens and Rubin, 2015). It emphasizes design and model based inference, traditionally built on the applications described in chapters of Cunningham (2021). Our focus this semester will be on learning and applying the "robust difference-in-differences" literature and the new synthetic control literature, and if time, a deeper discussion of instrumental variables. Over half the class will cover in detail all of the difference-in-differences work, maybe 25-30% synthetic control, and the remainder IV. These models are advanced, both in terms of econometric content and programming, and thus I expect all of you to reach a conversant level of comprehension as well as successful programming-based execution. We will be replicating and extending a gun control study in the crime literature Lott and Mustard (1997); Donohue, Aneja and Zhang (2011), using the newer DiD methods. We will also have interspersed coding exercises that I hope give you greater confidence in your ability to execute these methods, and greater understanding of them more generally. The hope is that by the end of the semester, you will possess more experience in applied research and the writing of an applied paper.

Prerequisite(s): Econometrics, Causal Inference.

Course Objectives: The primary objective of this course is for students to develop a solid understanding of the new difference-in-differences literature, the more advanced synthetic control methods and if time permits, instrumental variables. Complementary course objectives consist of developing rudimentary programming skills in Stata and R, as well as competency in working with larger quantitative data sources. Finally, we will learn to conduct original empirical analysis on the Lott and Mustard (1997) dataset and research question by extending their analysis to use robust DiD methods and tools. Much of this will be somewhat canned followed by group discussion on progress.

Grade Distribution:

Weekly google doc commentary	20%
Substack summary	10%
Coding assignments	25%
Final DiD paper	25%
Final presentations	20%

Letter Grade Distribution:

>= 90-100	A	70 - 89.99	B
50 - 69.99	C+	<= 49.99	F

Classwork and your final grade:

- **Weekly google drafts (20%)**: For each class, we will have a google document briefly describing the paper and listing some questions. Throughout the week, as you read the paper, you will comment on the paper in the google doc. The first 10 minutes of class will be spent silently reviewing the google doc, reading the papers, as well as contribute to the google document at which point it will close and we will begin class. We will discuss the technical details of the paper via lecture and discussion, ask and answer questions. This is called a silence model and it has been widely used at companies like Amazon, as well as MIT, in place of meetings. It's my first time to do it, so it'll be an experiment. My hope is that it will help us move through papers more rapidly with greater comprehension. Feel free to share code, ask questions about code, as well as share insights, answer others' questions and anything you think of. You are graded by participation only, where participation is defined as comments made to the shared google document. The google document will be our main way of communicating, so I encourage everyone to start checking it regularly for updates throughout the week. Think of it as our class Slack channel (although you may want to use it to find a way to better communicate also). There will also be a standing Lott and Mustard (1997) google document for collaboration on that project. Our google document will be stored here: `https://docs.google.com/document/d/1Hh7b_xZNAQDZ7on7uoTbPgslFltGxeOTHYAABBHdWks/edit?usp=sharing` . I grade this based on your participation up to the 10 minutes after class starts. It is designed purely to help you get ready for class.

- **Substack summary (10%)**: At the end of each week, by Friday night at 8:00pm, you must publish a substack entry "explaining" the 2+ papers of the week. The newsletter must be well written with an intended of audience of PhD level economists and other social scientists who are interested in the "new difference-in-differences" or "new synthetic control" methods, but who do not have the time or the inclination to study it as closely as you have. These should be readable and interesting. Your focus should be to put the papers into accessible language but still being useful to the reader as possible.

  You will be graded according to a simple rubric: (3 points) showing you learned the papers well enough to communicate them, (3 points) well crafted and (+1 bonus points) if there is workable code (embedded using `https://gist.github.com`). The 4 point scale ranges from excellence (3), average (2), acceptable (1) to unacceptable (0). There are no late acceptances. Excellent is difficult but doable. Please create your substack after the first day of class, send me its URL as well as URL to the other students, and subscribe to one another's Substack. I encourage everyone to leave comments in one another's Substacks.

- **Coding assignments (25%)**: Throughout the semester, there will be several coding assignments. You are expected to work on these together but you must turn in your assignments separately. These are pass/fail.

- **Final paper (25%)**: At the conclusion of the semester, you will produce a solo authored final paper using LaTeX in Overleaf or another LaTeX compiler. You will have complete freedom to design the paper's structure, tables, and figures. I expect there to be publication quality figures and tables with replicable code. This draft will utilize at least two of the robust DiD models, as well as original TWFE replications, of Lott and Mustard (1997). You are expected to be thoroughly familiar with the original paper, the followup Donohue, Aneja and Zhang (2011), the laws more generally and the methods at

a deep level. The dataset we will use is the state-level versions (i.e., not the county-level version of the original). You will need to study Lott and Mustard (1997) closely, as well as Donohue, Aneja and Zhang (2011). See `https://works.bepress.com/john_donohue/89/` and scroll to the bottom for the data.

- **Final presentations (20%)**: On the last day of class, you will present a 20 minute talk on your final paper. Use the Jesse Shapiro "How to Present an Applied Micro" deck in the "Helpful stuff" directory at our github repo. The rubric will be on along three dimensions, each measured on a 3 point rubric: Presentation quality (both deck quality and presentation quality), technical comprehension and analysis. Each dimension will be judged on a four point scale: excellent (3), average (2), acceptable (1) and unacceptable (0).

Academic Honesty Policy Summary:

Introduction

In addition to skills and knowledge, Baylor University aims to teach students appropriate Ethical and Professional Standards of Conduct. The Academic Honesty Policy exists to inform students and Faculty of their obligations in upholding the highest standards of professional and ethical integrity. All student work is subject to the Academic Honesty Policy. Professional and Academic practice provides guidance about how to properly cite, reference, and attribute the intellectual property of others. Any attempt to deceive a faculty member or to help another student to do so will be considered a violation of this standard.

Academic Integrity

The student's work must match the instructor's intended purpose for an assignment. While the instructor will establish the intent of an assignment, each student must clarify outstanding questions of that intent for a given assignment.

Plagiarism or any form of cheating involves a breach of student-teacher trust. This means that any work submitted under your name is expected to be your own, neither composed by anyone else as a whole or in part, nor handed over to another person for complete or partial revision. Be sure to document all ideas that are not your own. Instances of plagiarism or any other act of academic dishonesty will be reported to the Honor Council and may result in failure of the course. Not understanding plagiarism is not an excuse. As a Baylor student, I expect you to be intimately familiar with the Honor Code at: http://www.baylor.edu/honorcode/

Academic Success

I believe every student who has been admitted to Baylor can be successful and I want to partner with you to help you thrive academically. Be sure to take advantage of the many resources available for academic success, including coming to see me during my office hours. Students who regularly utilize the great resources in the Paul L. Foster Success Center (http://www.baylor.edu/successcenter/) are among my most successful students. If your academic performance in this class is substandard, I will submit an Academic Progress Report to the Success Center so that the team of coordinated care professionals can ensure that you get the help you need.

Attendance

During this unprecedented time of a global pandemic, class attendance must be approached differently from the way it would in a standard semester. If you are sick or have any symptoms (even if they are slight) that might relate to COVID-19, please stay home to protect yourself, your classmates, and your professors. As your instructor, I will expect that you work with me to enable you to receive any necessary course content (including classroom lectures) and complete any assignments, quizzes, or exams that you may miss due to being sick or having COVID-19- related symptoms. I also expect you to notify me prior to class if you will be missing for COVID-19 or any other health-related reason. If you are well, have no symptoms, and are not required to remain at home for any COVID-19 or other health-related reason, you should attend class and abide by all of the University's health protocols. Attendance during this time may take many forms due to the various course formats being offered this fall. Be sure to pay careful attention to the additional details below that describe how attendance and class participation will be incorporated into my course.

Importantly, Baylor's Health Services department on the Waco campus no longer provides notes to "excuse" students from missed classes. Please do not ask Health Services for such documentation.

Class Format Conversion

Due to the COVID-19 pandemic, this course may need to be converted to a [hybrid or] online format at some point in the semester. I have anticipated this possibility as I have prepared for the course, and will provide necessary information for you in that event.

Face Coverings

Baylor University is committed to providing a safe educational environment for all students, faculty, and staff. In order to create the healthiest environment possible, students and instructors must properly wear face coverings over their mouths and noses while in Baylor buildings and while in the classroom. In addition, social distancing should be maintained within all classroom environments.

Any student who does not bring a face covering or refuses to wear one will be dismissed from class and be considered absent. If a student who is not wearing a face covering refuses to leave class, the instructor may dismiss in-person class for that day. Such a student will be subject to disciplinary action through the Student Code of Conduct.

First Generation College Students

Baylor University defines a first-generation college student as a student whose parents did not complete a four-year college degree. The First in Line program at Baylor is a support office on campus for first-generation college students to utilize if they have any questions or concerns. Please contact First in Line at firstinline@baylor.edu, call 254-710-6854, or visit www.baylor.edu/firstinline to learn more about the services available. [If you are a first gen college student, you may wish to add:] I was also the first in my family to graduate with a four- year bachelor's degree and can answer questions about experiences as a first-generation college student.

Military Student Advisory

Veterans and active duty military personnel are welcomed and encouraged to communicate, in advance if possible, any special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the VETS Program Office with any questions at (254) 710-7264.

Office Hours

One of the best ways to take full advantage of learning in my course is by coming to my office hours. I look forward to guiding you in your academic pursuits. Take advantage of the hours listed above or email me for an appointment.

Office of Equity and Title IX

Civil Rights Policy and Sexual and Interpersonal Misconduct Policy

Baylor University does not tolerate unlawful harassment or discrimination on the basis of sex, gender, race, color, disability, national origin, ancestry, age (over 40), citizenship, genetic information or the refusal to submit to a genetic test, past, current, or prospective service in the uniformed services, or any other characteristic protected under applicable federal, Texas, or local law (collectively referred to as Protected Characteristics).

If you or someone you know would like help related to an experience involving:

1. Sexual or gender-based harassment, sexual assault, sexual exploitation, stalking, intimate partner violence, or retaliation for reporting one of these types of prohibited conduct, please visit www.baylor.edu/titleix, or contact us at (254) 710-8454, or TitleIX_Coordinator@baylor.edu.

2. Harassment (excluding those issues listed in #1) or adverse action based on Protected Characteristics, please visit www.baylor.edu/equity, or contact us at (254) 710-7100 or Equity@baylor.edu.

Optional add-ons:

The Office of Equity and Title IX understands the sensitive nature of these situations and can provide informationaboutavailableon-andoff-campusresources,suchascounselingand psychological services, medical treatment, academic support, university housing, advocacy services, and other forms of assistance that may be available. Staff members at the office can also explain your rights and procedural options. You will not be required to share your experience. If you or someone you know feels unsafe or may be in

imminent danger, please call the Baylor Police Department (254-710-2222) or Waco Police Department (9-1-1) immediately.

Except for Confidential Resources, all University Employees are designated Responsible Employees and thereby mandatory reporters of potential sexual and interpersonal misconduct violations. Confidential Resources who do not have to report include those working in the Counseling Center, Health Center and the University Chaplain, Dr. Burt Burleson.

Students Needing Accommodations

Any student who needs academic accommodations related to a documented disability should inform me immediately at the beginning of the semester. You are required to obtain appropriate documentation and information regarding accommodations from the Office of Access and Learning Accommodation (OALA). Contact Information: (254) 710-3605 - Paul L. Foster

Success Center, 1st floor on the East Wing of Sid Richardson.

University Writing Center

I encourage you to visit the University Writing Center (UWC) this semester and get feedback on your writing for this course. Located in Moody Library 2nd floor West, the UWC offers free assistance to you at any stage of the writing process (brainstorming, researching, outlining, drafting, revising, editing). In their feedback, the consultants focus on higher order concerns, such as content, thesis, evidence, and organization, before grammar or style.

The UWC tutors will not proofread, edit, or write your paper for you, but they will equip you with a toolbox of strategies to improve your writing, research, and editing skills. Please take the assignment prompt, your paper/text, and other materials you might need with you to your appointment. Please include my name as the professor, and a report will automatically be sent to me after your session. You can set up an appointment online at www.baylor.edu/uwc, call the UWC at (254)710-4849, or stop by in person.

Contact Sinda_Vanderpool@baylor.edu for more information.

Tentative Course Outline:
The weekly coverage might change as it depends on the progress of the class. However, you must keep up with the reading assignments. Remember each Friday your Substack must cover no fewer than 2 of the readings.

Week	Content
Week 1	• Topics: Syllabus overview, hidden curriculum (mental health, definition of professional success and coding principles) • Reading assignment: Gentzkow and Shapiro (2014)
Week 2	• **Announcement about Twitch and cancelation** – Tuesday August 24 on Twitch platform due to professor travel – Thursday August 26 **canceled** due to professor travel • Topics: Potential outcomes, DAGs, estimands • Reading assignment: Imbens and Rubin (2015) chapters 1 and 2; Imbens (2020); Cunningham (2021) (potential outcomes chapter, DAGs); Lundberg, Johnson and Stewart (2021)
Week 3	• Topics: Simple 2x2 without covariates; Covariates with semiparametric DiD; doubly robust DiD; TWFE under differential timing with example from guns and crime • Reading assignment: Lott and Mustard (1997); Donohue, Aneja and Zhang (2011); Abadie (2005); Sant'Anna and Zhao (2020); Chang (2020); Goodman-Bacon (2021); and Cunningham (2021) (DiD chapter on Bacon decomposition) • Coding assignment I: – Lalonde (1986); Dehejia and Wahba (2002) NSW dataset using Sant'Anna and Zhao (2020) double robust method and/or the Chang (2020) double select method. NSW data can be downloaded by looking at the matching chapter on Cunningham (2021). – Due date: End of week 5
Week 4	• Topics: Manual aggregation estimators for robust DiD, including stacking, event studies and application • Reading assignment: de Chaisemartin and D'Haultfoueille (2020); Callaway and Sant'Anna (2020); Borusyak and Jaravel (2018); Sun and Abraham (2020); Cengiz et al. (2019a,b); Gardner (2020); Baker, Larcker and Wang (2021) • Coding assignment: – TWFE of Lott and Mustard (1997); Donohue, Aneja and Zhang (2011). Include Bacon decomposition (Goodman-Bacon, 2021). – Due date: End of week 7
Week 5	• Topics: Manual aggregation (continued) • Reading assignments (continued) • Coding assignment: – Application of Callaway and Sant'Anna (2020) to Lott and Mustard (1997); Donohue, Aneja and Zhang (2011). Examine event study (dynamic) as well as overall ATT (static). Use never treated and not-yet-treated as controls and compare results. – Due date: End of week 8
Week 6	• Topics: Imputation estimators, Fuzzy designs, MCNN, continuous treatments • Reading assignment: Borusyak, Jaravel and Spiess (2021); Gardner (2020); de Chaisemartin and D'Haultfoueille (2017); Athey et al. (2021); Callaway, Goodman-Bacon and Sant'Anna (2021)
Week 7	• Topics: Parallel trends, randomization, inference • Reading assignment: Roth and Sant'Anna (2021a); Rambachan and Roth (2021); Roth and Sant'Anna (2021b); Roth (2021); Ferman, Pinto and Possebaum (2020)
Week 8	• Topics: Introduction to synthetic control, Terrorism, Mariel boatlift, Rhode Island prostitution • Reading assignment: Card (1990); Abadie and Gardeazabal (2003); Abadie, Diamond and Hainmueller (2010); Peri and Yasenov (2019); Cunningham and Shah (2018) • Coding assignment: – Replicate smoking assignment. Consider using the coding example from Cunningham (2021). – Due date: End of week 10
Week 9	• Topics: Covariates and cherry picking • Reading assignment: Ferman, Pinto and Possebaum (2020); Botosaru and Ferman (2019); Ferman (2021)

Week	Content
Week 10	• Topics: Imperfect fit and negative weights • Reading assignment: Ferman and Pinto (2021); Doudchenko and Imbens (2017); Ben-Michael, Feller and Rothstein (2020)
Week 11	• Topics: Augmented synthetic control with and without staggered rollout • Reading assignment: Ben-Michael, Feller and Rothstein (2020, 2021) • Coding assignment: – Replicate smoking using augmented synthetic control. Compare results. – Due date: End of week 13.
Week 12	• **Topics**: Review of bias of 2SLS, overview of new IV framework, leniency design • **Reading assignment**: Imbens and Angrist (1994); Angrist and Imbens (1995); Cunningham (2021); Aizer and Jr. (2015)
Week 13	• **Topics**: Multiple instruments, LIML, JIVE and UJIVE • **Reading assignment**: Angrist, Imbens and Krueger (1999); Kolesar (2013); Stevenson (2018); Agan, Doleac and Harvey (2021)
Week 14	• **Topics**: ML based IV selection • **Reading assignment:** Chernozhukov, Hansen and Spindler (2015); Vigliotti, Seward and Cunningham (2021)
Week 15	• **Topics**: Presentations

Articles and Books on the Syllabus

Abadie, Alberto. 2005. "Semiparametric Difference-in-differences estimators." Review of Economic Studies 72:1–19.

Abadie, Alberto, Alexis Diamond and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." Journal of the American Statistical Association 105(490):493–505.

Abadie, Alberto and Javier Gardeazabal. 2003. "The Economic Costs of Conflict: A Case Study of the Basque Country." American Economic Review 93(1):113–132.

Agan, Amanda Y., Jennifer L. Doleac and Anna Harvey. 2021. "Misdemeanor Prosecution." Unpublished Manuscript.

Aizer, Anna and Joseph J. Doyle Jr. 2015. "Juvenile Incarceration, Human Capital, and Future Crime: Evidence from Randomly Assigned Judges." Quarterly Journal of Economics 130(2):759–803.

Angrist, Joshua D. and Guido W. Imbens. 1995. "Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity." Journal of the American Statistical Association 90(430):431–442.

Angrist, Joshua D., Guido W. Imbens and Alan B. Krueger. 1999. "Jackknife Instrumental Variables Estimation." Journal of Applied Econometrics 14(1):57–67.

Athey, Susan, Mohsen Bayati, Nikolay Doudchenko, Guido Imbens and Khashayar Khosravi. 2021. "Matrix Completion Methods for Causal Panel Data Models." Journal of the American Statistical Association forthcoming:1–15.

Baker, Andrew C., David F. Larcker and Charles C. Y. Wang. 2021. "How Much Should We Trust Staggered Difference-in-Differences Estimates?" Unpublished Manuscript.

Ben-Michael, Eli, Avi Feller and Jesse Rothstein. 2020. "The Augmented Synthetic Control Method." Unpublished Manuscript.

Ben-Michael, Eli, Avi Feller and Jesse Rothstein. 2021. "Synthetic Controls with Staggered Adoption." Unpublished Manuscript.

Borusyak, Kirill and Xavier Jaravel. 2018. "Revisiting Event Study Desigsn, with an Application to the Estimation of the Marginal Propensity to Consume." Unpublished Manuscript.

Borusyak, Kirill, Xavier Jaravel and Jann Spiess. 2021. "Revisiting Event Study Designs: Robust and Efficient Estimation." Unpublished Manuscript.

Botosaru, Irene and Bruno Ferman. 2019. "On the Role of Covariates in the Synthetic Control Method." Econometrics Journal 22:117–130.

Callaway, Brant, Andrew Goodman-Bacon and Pedro H. C. Sant'Anna. 2021. "Difference-in-differences with a continuous treatment." Unpublished Manuscript.

Callaway, Brant and Pedro H. C. Sant'Anna. 2020. "Difference-in-differences with Multiple Time Periods." Journal of Econometrics .

Card, David. 1990. "The Impact of the Mariel Boatlift on the Miami Labor Market." Industrial and Labor Relations Review 43(2):245–257.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner and Ben Zipperer. 2019a. "The Effect of Minimum Wages on Low-Wage Jobs." Quarterly Journal of Economics pp. 1405–1454.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner and Ben Zipperer. 2019b. "The Effect of Minimum Wages on Low-Wage Jobs." Quarterly Journal of Economics Online Appendix .

Chang, Neng-Chieh. 2020. "Double/Debiased Machine Learning for Difference-in-differences Models." The Econometrics Journal 23(2):177–191.

Chernozhukov, Victor, Christian Hansen and Martin Spindler. 2015. "Post-Selection and Post-Regularization Inference in Linear Models with Many Controls and Instruments." American Economic Review: AEA Papers and Proceedings 105(5):486–490.

Cunningham, Scott. 2021. Causal Inference: The Mixtape. 1st ed. Yale University Press.

Cunningham, Scott and Manisha Shah. 2018. "Decriminalizing Indoor Prostitution: Implications for Sexual Violence and Public Health." Review of Economic Studies 85(3):1683–1715.

de Chaisemartin, Clement and Xavier D'Haultfoueille. 2017. "Fuzzy Difference-in-differences." Review of Economic Studies 01:1–30.

de Chaisemartin, Clement and Xavier D'Haultfoueille. 2020. "Two-way Fixed Effects Estimators with Heterogenous Treatment Effects." American Economic Review 110(9):2964–2996.

Dehejia, Rajeev H. and Sadek Wahba. 2002. "Propensity Score-Matching Methods for Nonexperimental Causal Studies." Review of Economics and Statistics 84(1):151–161.

Donohue, John J., Abhay Aneja and Alexandria Zhang. 2011. "The Impact of Right to Carry Laws and the NRC Report: Lessons for the Empirical Evaluation of Law and Policy." American Law and Economics Review 13(2):565–632.

Doudchenko, Nikolay and Guido W. Imbens. 2017. "Balancing, Regression, Difference-in-differences and Synthetic Control Methods: A Synthesis." Unpublished Manuscript.

Ferman, Bruno. 2021. "On the Properties of the Synthetic Control Estimator with Many Periods and Many Controls." Unpublished Manuscript.

Ferman, Bruno and Cristine Pinto. 2021. "Synthetic Controls with Imperfect Pre-Treatment Fit." Unpublished Manuscript.

Ferman, Bruno, Cristine Pinto and Vitor Possebaum. 2020. "Cherry Picking with Synthetic Controls." Journal of Policy Analysis and Management 39(2):510–532.

Gardner, John. 2020. "Two-stage differences-in-differences." Unpublished Manuscript.

Gentzkow, Matthew and Jesse M. Shapiro. 2014. "Code and Data for the Social Sciences: A Practitioner's Guide." Unpublished Manuscript.

Goodman-Bacon, Andrew. 2021. "Difference-in-differences with variation in treatment timing." Journal of Econometrics .

Imbens, Guide W. and Donald B. Rubin. 2015. Causal Inference for Statistics, Social and Biomedical Sciences: An Introduction. 1st ed. Cambridge University Press.

Imbens, Guido W. 2020. "Potential Outcome and Directed Acyclic Graph Approaches to Causality: Relevance for Empirical Practice in Economics." Journal of Economic Literature 58(4):1129–1179.

Imbens, Guido W. and Joshua D. Angrist. 1994. "Identification and Estimation of Local Average Treatment Effects." Econometrica 62(2):467–475.

Kolesar, Michal. 2013. "Estimation in an Instrumental Variables Model with Treatment Effect Heterogeneity." Unpublished Manuscript.

Lalonde, Robert. 1986. "Evaluating the Econometric Evaluations of Training Programs with Experimental Data." American Economic Review 76(4):604–620.

Lott, John R. and David B. Mustard. 1997. "Crime, Deterrence and the Right-to-Carry Concealed Handguns." Journal of Legal Studies 26:1–68.

Lundberg, Ian, Rebecca Johnson and Brandon M. Stewart. 2021. "What is Your Estimand? Defining the Target Quantity Connects Statistical Evidence to Theory." American Sociological Review https://doi.org/10.1177

Peri, Giovanni and Vasil Yasenov. 2019. "The Labor Market Effects of a Refugee Wave: Synthetic Control Method Meets the Mariel Boatlift." Journal of Human Resources 54(2):267–309.

Rambachan, Ashesh and Jonathan Roth. 2021. "Design-Based Uncertainty for Quasi-Experiments." Unpublished Manuscript.

Roth, Jonathan. 2021. "Pre-Test with Caution: Event-Study Estimates After Testing for Parallel Trends." Unpublished Manuscript.

Roth, Jonathan and Pedrdo H. C. Sant'Anna. 2021a. "Efficient Estimation for Staggered Rollout Designs." Unpublished Manuscript.

Roth, Jonathan and Pedro H. C. Sant'Anna. 2021b. "When Is Parallel Trends Sensitive to Functional Form?" Unpublished Manuscript.

Sant'Anna, Pedro and Jun Zhao. 2020. "Doubly Robust Difference-in-Differences Estimators." Journal of Econometrics 219:101–122.

Stevenson, Megan T. 2018. "Distortion of Justice: How the Inability to Pay Bail Affects Case Outcomes." The Journal of Law, Economics and Organization 34(4):511–542.

Sun, Liyang and Sarah Abraham. 2020. "Estimating Dynamic Treatment Effects in Event Studies with Heterogenous Treatment Effects." Journal of Econometrics Forthcoming.

Vigliotti, Vivian, Jonathan Seward and Scott Cunningham. 2021. "Indigent Defense, Social Workers and Suicide Attempts in Jail: Evidence from Randomized Therapists in Mental Health Court." Unpublished Manuscript.