Course Description and Objectives

The purpose of this course is to prepare students for their own empirical work by giving them hands-on experience in applying contemporary econometric techniques, with examples drawn from the literature on development, agricultural economics and environmental and natural resource economics. Taking a research-driven and applied approach, the course will guide students through a selection of methods in applied microeconometrics and a replication of a recently published paper in a top journal. By working through how other researchers have approached econometric problems, students will improve their understanding of empirical work – the good, the bad, and the ugly.

Students will work in groups on one main replication throughout the semester, presenting the methodology and discussing the identification assumptions to the class. The instructor will provide a list of papers for replication that fit the topics of the course, but students can propose alternatives; good alternatives will allow the student to become familiar with a method or a data set that they are considering using in their dissertation. Student teams will then write up the replication in a publishable format and present it to the class. The ideal final paper will describe the initial article, carefully delineate the ease with which the results replicate, and propose/carry out extensions or improvements to the research design.

In addition to the main replication, several problem sets will require students to manipulate and analyze data in various ways; the data sets for the problem sets will be available on Canvas. Students will also conduct a peer-review of one of their peers’ replication projects.

We will focus quite heavily on estimating causal effects, and topics will include randomized experiments, matching, instrumental variables, regression discontinuity designs, difference-in-differences, synthetic control methods, panel data, various important adjustments for correct inference (clustering, bootstrapping), as well as falsification tests and sensitivity analysis.

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1 Course requirements & grades

Course prerequisites
- Graduate-level training in econometrics/statistics; comfortable with data handling in a commonly-used statistical software.

The course components are the following:
- Problem sets (25%)
- Class presentation of paper(s) relevant to replication (10%)
- Referee report of job market candidate paper (15%)
- Peer review of another team’s paper (15%)
- Final replication paper (35%)
- In borderline cases, I will use lecture attendance and the quality of your classroom comments as the ‘tie breaker’. Of course, I hope that you don’t need this extrinsic motivation, since active class participation enriches the course, benefiting yourself, other students, and me.

You should not be too worried about your grade; instead, you should focus on learning the tools taught in this course. Using these tools to write a great dissertation is far more important than your actual grade (when you are on the job market, no one will care what grade you got in your PhD courses). Instead, I recommend viewing your grade in this course as a signal of where I think you stand in terms of your understanding and ability to apply the tools of this course.

I strongly prefer that you submit assignments electronically on Canvas. Please include FirstName_LastName in file names!

Academic integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison’s community of scholars in which everyone’s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Dean of Students Office for additional review. For more information, or if you have any doubts about how the above terms are defined, please refer to http://www.students.wisc.edu/doso/academic-integrity/.

The UW Writing Center has a handout on acknowledging, paraphrasing and quoting sources. For your final replication project, please read this handout – especially if you have any doubts about how to cite sources. I also recommend scheduling a writing consultation with the Writing Center to go over your writing; their trained instructors can offer feedback for revision.
Religious observances

If a religious observance will require you to miss class time, please notify me within the first two weeks of class of the specific days or dates on which you request relief. If the date you will miss is an exam, we will schedule a make-up exam time either before or after the regularly scheduled exam.

Communication and office hours

I usually respond to written requests and questions quite quickly, but please do not assume that I will respond in less than 48 hours (I may be traveling, or at a conference, for example). In other words, be prepared to email me questions or meeting requests well in advance. Here is a part-serious, part-humorous discussion on writing professional emails. Most of you will know most of it, but it is worth a glance if you ever find yourself foregoing punctuation or capitalization in professional correspondance.

My office hours are listed above, and will be held in my La Follette office.

2 Course materials

I will assign readings from this textbook, available at the UW Bookstore:


This is a great book to have on hand, and some of you may already have it. All other readings and class materials listed in this syllabus will be available on Canvas, or via links in the syllabus.

3 Description of assignments

Problem sets

Since we can’t replicate a paper on each method, I will assign empirical problem sets that will allow you to get hands-on experience with a greater number of methods. You are free to collaborate in small groups on the problem sets, but please turn in your own answers and note who you worked with. Answers should be typed, and include key output and well-commented Stata .do files (or other log files) for performing the estimation. The problem sets will altogether account for 25% of your grade.

Readings and paper presentations

For most classes, a number of papers will be assigned (marked with an asterisk) on the topic of that class. You are expected to read them and be prepared to discuss them in class. Hopefully your chosen replications will cover a variety of topics, as I will also assign you to lead the class discussion of papers a few times during the course of the semester. This discussion will be based on a brief presentation, followed by in-class discussion. The purpose of this assignment is twofold: (1) To give you practice presenting in front of an audience (presentations are how others assess you and your work); (2) To help you apply and think critically about the empirical tools that we are discussing. Depending on the quality of class discussions, I may also occasionally ask you to type up brief written paper summaries and/or questions on the papers before class. This will count as part of your class presentation grade.
Referee report

You will choose a paper from a list of current job market candidate papers to referee. The referee report can be 3-5 typed pages (definitely not more than 5). The purpose of a referee report is to help the editor of a journal decide if they should reject the paper or request revisions (and if so, what revisions to request). Begin your report with a one-paragraph summary of the main argument of the article. You should describe your main 3-4 points in detail as if you were writing directly to the author. Conclude the report with more minor comments. A good referee report not only clearly states the shortcomings of the work, but also lays out constructive, detailed and realistic suggestions for improvement. I would also like you to comment specifically on whether the data and analyses are described in sufficient detail to allow for a replication. Imagine that you received the author’s data: could you conduct their analysis without needing to see their code? If the data come from an experiment, is the randomization and treatment described in sufficient detail?

Peer review of colleague’s replication draft

You will be asked to write a brief, constructive review of another team’s first paper draft. You should include a discussion both of the quality of the write-up and the code that the student is using for the replication. I would encourage you to sit down with a member of that team to discuss the code, since reading other people’s code can be painfully slow.

Final replication paper

You will work on one main replication throughout the semester, presenting various parts of the methodology and discussing the identification assumptions to the class. As the semester progresses, a variety of assignments are designed to keep you on track, and get help if you are stuck. I will provide a list of papers for replication that fit the topics of the course, but you can propose an alternative; good alternatives are those that allow you to become familiar with a method or a data set that you are considering using in your dissertation. The final paper should be written up in a publishable format and presented to the class. The ideal final paper will describe the initial article, carefully delineate the ease with which the results replicate, and propose/carry out extensions or improvements to the research design. If your paper is well-done, it can be submitted for publication either as a comment in the original journal or one of several journals that accept replications. For example, the Journal of Applied Econometrics\(^1\) and Public Finance Review\(^2\) both publish replications regardless of the outcome (i.e. even if the results replicate perfectly). I will advise you on appropriate potential outlets at the end of the semester.

As part of the replication paper submission, I will ask each of you for a brief summary of what you have learned from the assignment. Examples could include: details on issues obtaining data and/or code (incomplete data sets, flawed code, etc.) and how you have/will change your data management practices in response, what you learned about a certain estimator/method and whether you feel more prepared to apply it/them in your dissertation work, and surely many others.

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\(^1\)For papers that were originally published in Econometrica, AER, JPE, QJE, RES, REStat, Journal of Econometrics, Journal of Business and Economic Statistics, and Economic Journal

\(^2\)For papers broadly in the area of public economics.
4 Schedule/overview

Rough outline of topics; full description of readings and assignments below. Please note that I may add or drop readings during the semester; I will announce changes in class and update the syllabus on Learn@UW.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>1</td>
<td>09/07/17</td>
<td>Replication: what &amp; why?</td>
<td></td>
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<tr>
<td>2</td>
<td>09/12/17</td>
<td>Publication bias, file drawer, the GRIM test</td>
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<tr>
<td>2</td>
<td>09/14/17</td>
<td>Causality</td>
<td>Repl: paper choice</td>
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<tr>
<td>3</td>
<td>09/19/17</td>
<td>Randomization: ethics, external validity</td>
<td>PS1 (Power &amp; randomization)</td>
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<tr>
<td>3</td>
<td>09/21/17</td>
<td>Selection on observables (I)</td>
<td></td>
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<tr>
<td>4</td>
<td>09/26/17</td>
<td>Selection on observables (II)</td>
<td>PS2 (ATEs)</td>
</tr>
<tr>
<td>4</td>
<td>09/28/17</td>
<td>Instrumental variables</td>
<td>Repl: data downloaded</td>
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<tr>
<td>5</td>
<td>10/03/17</td>
<td>IV with heterogeneous treatment effects</td>
<td>PS3 (Matching)</td>
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<tr>
<td>5</td>
<td>10/05/17</td>
<td>IV issues: weak instruments, etc.</td>
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<tr>
<td>6</td>
<td>10/10/17</td>
<td>Regression discontinuity: sharp</td>
<td>PS4 (IV)</td>
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<td>6</td>
<td>10/12/17</td>
<td>I am out of town</td>
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<tr>
<td>7</td>
<td>10/17/17</td>
<td>Replication mini-presentations/updates</td>
<td>Repl: table of means + PS5 (RD)</td>
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<tr>
<td>7</td>
<td>10/19/17</td>
<td>RD: fuzzy, regression kink</td>
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<td>8</td>
<td>10/24/17</td>
<td>Diff-in-diff, ANCOVA</td>
<td>PS6 (D-D)</td>
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<td>8</td>
<td>10/26/17</td>
<td>Nonlinear DD (changes-in-changes)</td>
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<td>9</td>
<td>10/31/17</td>
<td>Synthetic control methods</td>
<td>PS7 (Versions of D-D)</td>
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<tr>
<td>9</td>
<td>11/02/17</td>
<td>Panel models</td>
<td></td>
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<tr>
<td>10</td>
<td>11/07/17</td>
<td>Panel models</td>
<td>Repl: Results tables</td>
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<tr>
<td>10</td>
<td>11/09/17</td>
<td>Inference - bootstrapping</td>
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<tr>
<td>11</td>
<td>11/14/17</td>
<td>Inference - clustering &amp; bounds</td>
<td>PS8 (Inference)</td>
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<tr>
<td>11</td>
<td>11/16/17</td>
<td>Inference - randomization inference</td>
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<tr>
<td>12</td>
<td>11/21/17</td>
<td>Pre-analysis plans</td>
<td>Repl: Peer reviews due</td>
</tr>
<tr>
<td>12</td>
<td>11/23/17</td>
<td>Thanksgiving</td>
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<tr>
<td>13</td>
<td>11/28/17</td>
<td>Catch-up class</td>
<td>Referee reports due</td>
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<td>13</td>
<td>11/30/17</td>
<td>Supplementary analysis - falsification tests</td>
<td>Repl: First paper draft</td>
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<td>14</td>
<td>12/05/17</td>
<td>Supplementary analysis - sensitivity</td>
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<tr>
<td>14</td>
<td>12/07/17</td>
<td>Presentations</td>
<td>Repl: Peer review due</td>
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<tr>
<td>15</td>
<td>12/12/17</td>
<td>Presentations</td>
<td></td>
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</tbody>
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5 Detailed schedule & readings

Book readings are required; other required readings are marked with an asterisk

9/7/2017 – Introduction - what is reproducibility & why is it important?


9/12/2017 – Publication bias, file drawer problem, etc.


9/14/2017 – Causality, the experimental ideal, potential outcomes framework

Submit your preferences for replication paper

• Angrist & Pischke, Ch. 1 & 2


9/19/2017 – Randomization: ethics, external validity

Problem set 1 due (Power & randomization)


9/21/2017 – Selection on observables (matching, propensity scores, MD, genetic matching?)

- Angrist and Pischke, Ch. 3.2 - 3.3


9/26/2017 – Selection on observables (II)

Problem set 2 due: Estimating ATEs

9/28/2017 – Instrumental variables

Replication deadline: before class, you should have you should have downloaded the data for your replication project and opened it

- Angrist and Pischke, Ch. 4.1


10/3/2017 – Instrumental variables (cont.): heterogeneous treatment effects

Problem set 3 due: Matching

• Angrist & Pischke, Ch. 4.4


10/5/2017 – IV issues: dealing with weak instruments, etc.

• Angrist & Pischke, Ch. 4.6


10/10/2017 – Regression discontinuity (sharp)

Problem set 4 due (IVs)

• Angrist & Pischke, Ch. 6.1


10/12/2017 – I am out of town

10/17/2017 – Replication mini-presentations / updates

Replication deadline: table of means due. Submit a table of means comparing your sample to the original sample, to be presented in class

Problem set 5 due (RDD)

10/19/2017 – Regression discontinuity (fuzzy, regression kink)

• Angrist & Pischke, Ch. 6.2


10/24/2017 – Difference-in-differences + ANCOVA

Problem set 6 due (D-D)

• Angrist & Pischke, Ch. 5.2


10/26/2017 – Nonlinear DD (changes-in-changes) & long differences


10/31/2017 – Synthetic control methods

Problem set 7 due (Versions of D-D)


11/2/2017 & – Panel data methods


11/7/2017 – Panel data methods (cont.)

Replication deadline: Table of results. Submit a table comparing your estimates to the ones in the original paper, a brief write-up of discrepancies and trouble that you have faced, and the code you have used to replicate these tables. If your replication is going very smoothly, please also suggest potential extensions to the paper.

11/09/2017 – Inference: bootstrapping, clustering, bounds


11/14/2017 – Inference (cont.)

Problem set 8 due (Inference)

11/16/2017 – Inference: randomization inference


11/21/2017 – Pre-analysis plans: Pros and cons and methods

11/23/2017 – Thanksgiving

11/28/2017 – Catch-up class

Referee reports of job market papers due. Review one of the posted JMPs (TBD)

11/30/2017 – Supplementary analysis: falsification tests

First draft of replication paper due


12/5/2017 – Supplementary analysis - sensitivity


12/7/2017 – Presentations

Peer review due.

12/12/2017 – Presentations

Final replication paper due during finals period, date TBD.