PLCY 882 & HPM 882
Advanced Panel Data Methodology for Public Policy/Health Policy Management
Credit Hours: 3
Department of Public Policy
Disclaimer: This class uses STATA

Fall 2019 Syllabus
Class Location: Tuesday & Thursday 12:30 pm – 1:45 pm
Blue Cross Blue Shield Auditorium 1 Michael Hooker Research Center

Prerequisites: HPM 881 or equivalent and knowledge of Stata.

Faculty: Jeremy Moulton
Teaching Assistant: Dillan Bono-Lunn
(moulton@email.unc.edu) (dbono@live.unc.edu)
Office: 105 Abernethy Hall
Office: 120A Abernethy Hall (AB)
Phone: 919-962-1002
Office Hours: 3:00 to 5:00 Wed

Course Overview
This course is designed to increase your ability to apply models and statistical techniques to problems in health, education, employment, poverty and other areas of population policy. Course objectives are to:
• Understand major techniques used to estimate causal relationships in quasi-experimental designs, with an emphasis on panel data.
• Gain intuition and skills about the “art” of econometrics, including techniques for using complex survey data and dealing with missing data.
• Conduct original research applying the techniques covered in class (especially panel data techniques) to population related fields.

Learning Objectives and HPM Competencies

<table>
<thead>
<tr>
<th>Course Learning Objective</th>
<th>Competencies</th>
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<tbody>
<tr>
<td>1 Interpreting Multiple Regression and Modeling</td>
<td>Analytical Thinking</td>
</tr>
<tr>
<td>2 Panel Data Analysis</td>
<td>Analytical Thinking</td>
</tr>
<tr>
<td>3 Analysis of Complex Surveys</td>
<td>Analytical Thinking</td>
</tr>
<tr>
<td>4 Simultaneous Equations</td>
<td>Analytical Thinking</td>
</tr>
</tbody>
</table>

Resources

Website
The course has its own website on Sakai. (See http://sakai.unc.edu) The most current version of the syllabus is always on the website. Be sure to check that the email address Sakai has for you is correct.

Texts: Material will be drawn from required texts, supplemental readings, and Sakai lecture slides. Links to required non-textbook readings are available on Sakai. Optional readings may not be on Sakai.

Required:


Cameron, A. Colin and Pravin Trivedi. Microeconometrics Using Stata. A Stata Press Publication. (Note: either the original 2009 edition or the more recent 2010 second edition is fine.)

*Recommended (If you are interested in these books feel free to come by my office to look them over to see if they will be helpful):*

Murnane, Richard and John B. Willett. Methods Matter: Improving Causal Inference in Educational and Social Science Research. Oxford University Press, 2011. (This book is very well written and explains the models in this class using examples from relatively recent journal articles.)

Angrist, Joshua D. and Jorn-Steffen Pischke. Mostly Harmless Econometrics: An Empiricists Companion. Princeton University Press, 2009. (Murnane and Willett is an easier read, but there are a few additional methods and econometric issues that are dealt with in this book – quantile regression for instance.)

*Stata Manuals*

*This class will heavily use Stata.* Although there is an electronic help function, having easy access to Stata manuals (Stata User's Guide, Reference manuals, Survey Data manual and Graphics manual) will provide useful examples and will save you much frustration. You do not have to buy Stata as there is a version available on the Virtual Lab, but I highly recommend it.

*Recommended but I will provide access to any portions that you need to read:*


*Advanced Texts and References for Further Reading (not recommended to buy now)*


Odum courses on statistical computing are listed at: [http://www.odum.unc.edu/odum/contentSubpage.jsp?nodeid=183](http://www.odum.unc.edu/odum/contentSubpage.jsp?nodeid=183)

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**Requirements and Expectations**

*Class Preparation and Participation*

While students are expected to come to class, the most important requirements for this class are successful completion of all problem sets and demonstration of mastery of the material through the midterm, final, and paper. In other words, I am not going to be keeping track of your attendance, but if you miss class you need to get notes from a friend. If you are consistently absent it may reflect poorly on your final grade.
Cell Phones and Laptops

Turn off cell phones in class. Laptops may be used to take notes during class and follow along when we use Stata. Please do not check or write e-mails or use the internet during class for anything aside from class purposes. Using the internet can be very distracting to people behind you.

Evaluation Method

Grade Components

<table>
<thead>
<tr>
<th>Component</th>
<th>% of Grade</th>
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<tbody>
<tr>
<td>Homework (including Paper Proposal, Descriptive Statistics, Peer Review)</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam (Cumulative)</td>
<td>30%</td>
</tr>
<tr>
<td>Empirical Paper</td>
<td>25%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Exams

The midterm exam will be on Tuesday, October 15th during class. The final exam will be on Friday, December 6th from 12 (noon) to 3 pm as announced by the office of the University Registrar. Both exams will be closed book. No help from any other person or resource can be used on any exam, and full honor code rules apply.

Homework and Problem Sets

Your problem set answers should be submitted on Sakai by the deadline. Answers may be hand-written (scan any handwritten portions) or typed, copying Stata output from the log file where relevant. Problem sets will be graded as 2 points (full effort and mostly correct), 1 point (sufficient effort and at least a moderate understanding of concepts, but some problems with misunderstanding identified), or 0 (insufficient effort or poor understanding of concepts). The grader will attempt to help you identify larger problems/errors, but you should review the answer key to determine all errors. Persons submitting all homework on time with sufficient effort (i.e., at least a 1 or 2 on all problem sets) will receive all 25 points for their homework grade.

Doing the problem sets in a small group is an effective way to learn the material. Be sure to attempt all problems on your own before meeting with your group, so you can ensure that you are not just copying down answers but actually learning the material. Please write the names of the other students you have worked with at the top of your problem set, as this information can help the instructor identify any areas of group confusion. Please discontinue working in a group if you feel it is not an effective learning approach for you.

Original Empirical Paper and Peer Review

The paper will be based on a topic of your choice, using data of your choice, and should apply some of the panel data techniques covered in the first half of this class. You can also use some of the methods from the later portion of the class, but you should check with me before proceeding. You are encouraged to discuss your paper with others, but as always you must acknowledge any intellectual contributions made by others. See Sakai for more detailed guidelines and a list of possible panel datasets. There is often support available through the Odum Center to help with data preparation questions (e.g., accessing public use data, downloading, transferring between programs, manipulating, programming errors, etc.), but the TA and me will be available during office hours as well.

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1 At the very least silence your phone and don’t use it. And, I can tell when you are texting.
A two-page proposal for the paper is due on or before Tuesday October 15th. Your proposal must be approved, and you may be asked to revise it before approval. Descriptive statistics for your paper will be due on Thursday, October 31st. Be sure to bring all prior submissions/paperwork whenever you want to discuss your paper with me.

The paper is due on Tuesday December 3rd. Please submit two hard copies of this paper. One copy will be turned in for grading with the graded proposal and descriptive statistics with my handwritten comments. The other copy will be randomly distributed to another class member for peer reviewing. Please do not put your name on the papers, but use your PID instead. Peer reviews, which consist of a single page listing three strengths and three weaknesses or area of improvement for the paper you review, are due by noon on December 12th.

Doing research compliant with IRB procedures is very important. If you use a publicly available dataset for your class paper, you do not need to seek IRB determination or approval. If you are not using a publicly available dataset, you should seek IRB determination and approval as necessary. See http://ohre.unc.edu/guide_to_irb.php or the document on “Student Research IRB Guidance” that I have posted on Sakai. If you need to seek IRB determination or approval, you will also need proof of human subjects research ethics certification. (If you have not already been certified, please follow the instructions at http://research.unc.edu/offices/human-research-ethics/index.htm -- I highly recommend that you seek this certification anyway).

Evaluation Criteria

- Diligence in completing problem sets on time.
- Demonstration of competency with techniques on exams.
- Correct empirical analysis and clear presentation of findings in a paper on a topic of your choice.

UNC Honor Code

The principles of academic honesty, integrity, and responsible citizenship govern the performance of all academic work and student conduct at the University as they have during the long life of this institution. Your acceptance of enrollment in the University presupposes a commitment to the principles embodied in the Code of Student Conduct and a respect for this most significant Carolina tradition. Your reward is in the practice of these principles.

Your participation in this course comes with the expectation that your work will be completed in full observance of the Honor Code. Academic dishonesty in any form is unacceptable, because any breach in academic integrity, however small, strikes destructively at the University's life and work.

If you have any questions about your responsibility or the responsibility of faculty members under the Honor Code, please consult with someone in either the Office of the Student Attorney General (966-4084) or the Office of the Dean of Students (966-4042).

Read “The Instrument of Student Judicial Governance” (http://instrument.unc.edu). Also please take the quiz available at: http://www.lib.unc.edu/instruct/plagiarism/

Copyright Policy for Class Materials

UNC’s Copyright Policy clearly prohibits students from making commercial use of notes taken in class or labs; you may not sell or otherwise acquire financial or commercial gain from notes you take in this class. Students found to have violated this prohibition are in violation of the Honor Code and are subject to Honor Court proceedings.
**CLASS SCHEDULE, FALL 2019**

**NOTE THAT THIS SCHEDULE IS SUBJECT TO CHANGE**
**I WILL KEEP YOU INFORMED OF WHICH PAPERS WILL BE MOST IMPORTANT FOR OUR CLASS DISCUSSIONS.**

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Aug 20</th>
<th>Introduction and Course Overview</th>
</tr>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td>• Know what the course will cover and how it is structured&lt;br&gt;• Know what is expected of students</td>
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### I. INTERPRETING MULTIPLE REGRESSION

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Aug 22</th>
<th>I.1 Ceteris Paribus and Treatment Effects</th>
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<tr>
<td><strong>Learning Objectives:</strong></td>
<td>• Experiments to estimate impact of racial discrimination</td>
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**Optional:**

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<tr>
<th>Session 3</th>
<th>Aug 27</th>
<th>I.2. Using Control Variables to Reduce Bias: Theory and Examples</th>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td>• Using Ballentine diagrams to depict implications of omitted variable bias&lt;br&gt;• Formal derivation of bias when moving from simple to long regression</td>
<td></td>
</tr>
<tr>
<td><strong>Readings:</strong></td>
<td>Wooldridge: 3.3, 3.4, 6.2, 7 (all), 9.2&lt;br&gt;Kennedy: Chapter 6.2 and General Notes 6.2</td>
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<tr>
<th>Session 4</th>
<th>Aug 29</th>
<th>I.3. Monte Carlo Examples of Multiple Regression Limitations</th>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td>• Review of concepts of bias, consistency, and efficiency&lt;br&gt;• Value of Monte Carlo Experiments&lt;br&gt;• Using Monte Carlo to assess implications of measurement error&lt;br&gt;• Analogy between Monte Carlo and bootstrapping as they relate to sampling distributions</td>
<td></td>
</tr>
<tr>
<td><strong>Readings:</strong></td>
<td>Wooldridge: Chapter 5: Intro and 5.1; Chapter 9.4</td>
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</table>
### Session 5  Sep 3  I.4 Modeling: Controls vs. Mediating Variables

**Learning Objectives:**
- See the importance of the “way you think the world works” in terms of understanding the interpretation and value of parameters from different models

**Readings:**

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### II. PANEL DATA, SURVEYING, AND MISSING DATA

#### Session 6  Sep 5  II.1 Introduction to Panel Data Models

**Learning Objectives:**
- Consider data sets with two or more dimensions, and review key issues pertaining to their analysis
- Overview of Complex Survey Designs

**Readings:**
Wooldridge: Intro to 13, and 13.1

*Optional:*

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#### Session 7  Sep 10  II.2 Survey Data Analysis Estimation Strategies

**Learning Objectives:**
- Types of weights, and implications of using weights or adjusting standard errors for the complex survey design

**Readings:**

*Stata User's Guide* entries on: svy commands and weights
- Weighted estimation
- Overview of survey estimation

*Optional:*

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#### Session 8  Sep 12  II.3 Missing Data

**Learning Objectives:**
- Implications of the alternative assumptions for missing data
- Practical aspects of dealing with missing data, including the problem with the dummy variable approach to missing data
- How do you know if your survey will be large enough to find significant results

**Readings:**
Wooldridge 9.5
### III. PANEL DATA ANALYSIS

#### Session 9  Sep 17  II.2 Natural Experiments and Difference Estimators

**Learning Objectives:**
- Use a simple two period treatment-control comparison to see the essence of difference in difference models and how such models relate to the idea of first differencing.


*Examples of Natural Experiments (some personal):*


**Readings:**
- Wooldridge: 13.2 - 13.4, Kennedy Chapter 18, C&T, 8.1-8.2

#### Session 10  Sep 19  II.4 Difference-in-Difference-in-Differences Empirical Example

**Learning Objectives:**
- If you thought two differences was awesome, then three is “awesomer”

**Readings:**


#### Session 11  Sep 24  II.5 First Differences and Deviations from Means Estimators

**Learning Objectives:**
- How are fixed effects models actually estimated?

**Readings:**
- Wooldridge 13.5, 14.1, pp. 487-489, C&T 8.3, 8.5, 8.9, 8.11
<table>
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<tr>
<th>Session 12</th>
<th>Sep 26</th>
<th>II.6 Fixed Effects in Practice: Limitations and Tests</th>
</tr>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• Are there any problems with Fixed Effects?</td>
</tr>
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</table>
Wooldridge: 13.5, Summary of 13, App 13A, and 14.1 (pp. 481-487)  
Kennedy: Section 18.2 and 18.3 |

<table>
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<tr>
<th>Session 13</th>
<th>Oct 1</th>
<th>II.7 Random Effects Estimators</th>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• If the unit-specific component of the error term is not causing bias, how do we get more efficient estimators than pooled OLS or FE models?</td>
</tr>
<tr>
<td><strong>Readings:</strong></td>
<td>Wooldridge: 14.2 (Also, review Chapter 8), Appendix 14A. C&amp;T 8.6-8.7</td>
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<thead>
<tr>
<th>Session 14</th>
<th>Oct 3</th>
<th>II.8 Random Effects Specification Tests and Clustering</th>
</tr>
</thead>
</table>
| **Learning Objectives:** | | • Choosing between various models based on both bias and efficiency considerations.  
• Clustering or how to make “significant” results disappear… |
| **Readings:** | McCall, Nelda and Hoi S. Wai (1983) "An Analysis of the Use of Medicare Services by the Continuously Enrolled Aged," Medical Care, 21(6), pp. 567-585.  
Wooldridge 14.3 and Summary  
Kennedy, Chapter 18, C&T 8.10.6  
*Optional*:  

<table>
<thead>
<tr>
<th>Session 18</th>
<th>Oct 8</th>
<th>IV.1 Overview of Instrumental Variables and Overcoming Bias <em>(If time permits we will start IV before the midterm)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• Overview of IV</td>
</tr>
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</table>
| **Readings:** | Wooldridge: Chapter 15 intro, 15.1, 15.2, 16 Intro, 16.1, 16.2  
Kennedy Chapter 9  
*Optional*:  
<table>
<thead>
<tr>
<th>Session 15</th>
<th>Oct 10</th>
<th>Midterm Exam Review</th>
</tr>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• Summary of material through Section II</td>
</tr>
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<tr>
<th>Session 16</th>
<th>Oct 15</th>
<th>MIDTERM (closed book exam in class)</th>
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<tr>
<th>Session 17</th>
<th>Oct 22</th>
<th>Midterms Returned &amp; Paper Workshop</th>
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</table>
| **Learning Objectives:** | | • Return midterms  
  • Cover common mistakes on midterm  
  • The TA and I will be available to help answer questions for your final paper. |
| **Readings:** | None |
| **Paper:** | Paper proposal due (Two pages, submit on Sakai and hard copy in class) |

### IV. MORE CAUSAL MODELS (THESE DON’T REQUIRE PANEL DATA)

<table>
<thead>
<tr>
<th>Session 19</th>
<th>Oct 24</th>
<th>IV.2 IV in Practice</th>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• Using quarter of birth as an instrument for education and the weak instrument critique</td>
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<tr>
<th>Session 20</th>
<th>Oct 29</th>
<th>IV.3 Two Stage Least Squares Estimation</th>
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<tbody>
<tr>
<td><strong>Learning Objectives:</strong></td>
<td></td>
<td>• Mechanics of IV estimation</td>
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</tbody>
</table>
Readings:


Wooldridge 15.3-15.5, 15.8, Appendix 15A, 16.3, 16.4, 16.6

Kennedy Chapter 11, Section 22.5 (skim)

Optional:


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### Session 21  Oct 31  Regression Discontinuity

**Learning Objectives:**

- Similar to IV, but uses a discontinuity in the rule governing the assignment to treatment/control group

**Readings:**


Optional:


**Paper:**

Descriptive Statistics for Paper due (Submit on Sakai and hard copy with approved proposal)

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### Session 22  Nov 5  Regression Discontinuity Application
<table>
<thead>
<tr>
<th>Learning Objectives:</th>
<th>• How do you actually use Regression Discontinuity?</th>
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</table>

**Session 23**  
**Nov 7**  
**Last of Regression Discontinuity**

| Learning Objectives: | • Finalize discussion of regression discontinuity  
| | • Tests for Regression Discontinuity  
| | • Placebo Tests |

| | **Optional**  
| | **Example from:**  

**Session 24**  
**Nov 12**  
**Propensity Scores**

| Learning Objectives: | • Rather than control for observables, match individuals in treatment group to similar people in a potential control pool |

| | **Optional:**  


[Please read abstract and discussion. Feel free to read more if interested!]


### Session 25  Nov 14
**Application of Propensity Scores**

**Learning Objectives:**
- How do you actually use propensity scores?

### Session 27  Nov 19
**Paper Help Session**

**Learning Objectives:**
- Dillan will be available to answer questions about your paper.

### Session 26  Nov 21
**Synthetic Control Method**

**Learning Objectives:**
- Learn a relatively new method that creates a counterfactual trend using weighted values from several controls

**Readings:**

### Session 28  Nov 26
**Extra Method if Time Permits**

**Learning Objectives:**
- TBA

**Readings:**
TBA

### Session 29  Dec 3
**Final Exam Review Session**

**Learning Objectives:**
- Review session

**Readings:**
All the papers

**Paper:**
Empirical paper due in class (One copy in envelope with all other paper documents. A second hard copies with PID only for peer review.)

### Dec 6
**FINAL EXAM (closed book) 12 noon – 3 pm**

### Dec 12
**NO CLASS**

**Paper:**
Submit your peer review by 12 noon