Syllabus of Financial Econometrics II: Panel Data  
(Spring 2018 Term B)

Instructor: Wei Jiang, Arthur F. Burns Professor of Free and Competitive Enterprise
Class Meetings: 9:00am - 12:15pm, Wednesday, Uris 331
Office Hours: 4:00-5:00pm, Thursday, Uris Hall 101
Contact: wj2006@columbia.edu

Teaching Assistant: Daheng Yang (dyang22@gsb.columbia.edu)
Review Sessions: On Fridays starting from the second week. Will be announced by the TA.

Target Audience

This is the second course in Financial Econometrics. It is required for first-year students in the Finance Ph.D. Program and the Master in Financial Economics Program. It is also open to graduate students and visiting scholars who satisfy pre-requisites. The minimum pre-requisites are:

1. One Ph.D. level course in econometrics;
2. One of each of the following courses at the graduate level or honor undergraduate level:
   Microeconomics; Calculus; Statistics; Probability Studies; and Matrix Algebra.

The course aims to cover the most important materials in Panel Data, with emphases on their applications to empirical research, especially empirical finance. The course will deliver a comprehensive list of empirical methods that allow researchers to interpret correlations and to identify causal relationships in data. Such tools are essential for graduate students who aspire to conduct careful, state-of-art empirical research. In addition, the course will provide general guidance on formulating and executing (empirical) research ideas.

Assignments and Grades

Your grade will be based on class participation (10%), five homework assignments (25%), a mini empirical project (15%), and a final exam (50%).
1. Class participation has three elements: (1) Your contribution to the learning environment of the whole class. (2) The quality of your presentation (there are six slots allocated on a first come first served basis) and your questions to the presenters. (3) Professional conduct, starting with arriving on time well prepared.

2. All homework assignments and the mini empirical project are individual assignments, and must be typed up—no handwriting. A latex-based word processing system is highly recommended but other software with equation editors are also acceptable. You are encouraged to discuss work with your peers but must not consult anyone outside your class. Moreover, you must hand in your own write-up. Please note that it is a violation of honor code (and will hence be subject to academic discipline) to seek solutions for similar homework problems from senior students. Solutions will be provided at the review session.

3. The empirical project involves discussing one economic relationship from the “WRDS Master Database” which contains main variables for U.S. public companies and which will be given to you. Your job is to characterize one clearly defined empirical relation (e.g., what factors explain CEO pay?), and to make qualified inferences. The project should include a table for summary statistics, a table for your main regressions, and a write up that motivates the questions and discuss the results. The length of the write up should be between three and ten pages double-space all inclusive. More instructions will be provided during the second week.

4. The final exam will be scheduled during the week after the last lecture. The exam is closed-book but allows one letter-size “cheat sheet,” and lasts for three hours (if typing) or two hours (if handwriting). Typing is strongly preferred to handwriting.

References

There is no standard textbook for the course. The following books are useful references:
Supplemental readings will be assigned to individual topics. While I will offer suggestions and recommendations, I mostly leave it to the students to pick their own reading list. Use Google Scholar and SSRN to identify classic and upcoming papers that fit your interest and level of technicality.

**Course Outline**

Here is a list of topics that I plan to cover in the course. The topics are not going to be aligned exactly to the lectures because they vary in depth and width. The exact content and sequence may also change depending on the dynamics of the class.

1. **Introduction: What do we learn from regressions?**
   
   *We will start the course with a list of seemingly easy questions to test your intuition and real understanding of the very basic econometrics. We will then discuss how to interpret regression results in the economics/finance context, and how the interpretation changes with the assumptions we make. The most important takeaway from the topic is the meaning of “causality” and the necessary hurdle researchers must overcome before concluding causality from a statistical correlation.*

   Pre-class reading:
   
   Required:
   
   
   Recommended:
   
   - Wooldridge, Chap 1 – 3.
   
   Post-class reading recommended:
   
   - Wooldridge, Chap 4.
   - Angrist and Pischke, Chap 1 – 3.

2. **Panel data structure: Pooling and segregation of information**
This lecture lays out the basic structure of a panel dataset, and explores ways to extract information from both the time-series and the cross section. The key takeaways from this topic are the relation among estimates from “pooled,” “within” and “between” regressions, and the appropriate estimation of standard errors under different assumptions about the data generating process.

Pre-class reading required:


Post-class reading recommended:

- Wooldridge, Chap 10.

3. Instrumental variables: How do we make the cure better than the disease?

The IV method is among the most important tools to identify causality in observational data. We first go over the basic econometrics associated with this method, and then delve into discussions about the empirical implications of the assumptions that make IV work (and work well). Lastly, we discuss the potential problems of the IV estimates under realistic circumstances.

Pre-class reading:

Required:


Recommended:

- Wooldridge, Chap 5.

Post-class reading recommended:

- The following two articles are excellent work that informs on the debate on the IV method (all published in the same issue of the *Journal of Economic Literature*):
- Angrist and Pischke, Chap 3.
4. Selection models: Identification in the non-linear models

When a firm announces a diversifying acquisition, its stock price suffers. Can we conclude that diversification destroys value (a treatment effect) or that investors learn that the acquiring firm is worse than they expected (a selection effect)? Selection models are important only because selection is usually less interesting than treatment. The discrete nature of the choices makes the standard IV method non-applicable. This section focuses on how to incorporate selection issues in discrete-choice and other non-linear models.

Pre-class reading required:

- Heckman (1979, EMA):
  
  [link](http://faculty.smu.edu/millimet/classes/eco7321/papers/heckman02.pdf)

Post-class reading recommended:

- Wooldridge, Chap 15.

5. Discontinuity: A thin layer that contains a lot of information

When assignment to a treatment is determined at least partly by the value of a variable lying on either side of a fixed threshold, there is hope to evaluating the causal effects of the treatment based on the assumption that observations in the narrow window around the cut-off should be “the same” in the absence of the treatment. We will discuss the numerous issues concerning the consistency and power of the method, as well as the best practice in applying it.

Pre-class reading required:

  
  [link](https://www.sciencedirect.com/science/article/pii/S0304405X16300319)

Post-class reading recommended:

- Imbens and Lemieux (2008, JOE):
  
  [link](http://www.sciencedirect.com/science/article/pii/S0304407607001091)

- Angrist and Pischke, Chap 6.

6. Difference in difference: Shock-based event study in corporate finance
Conducting an event study establishing before-after differences is a straightforward exercise. The challenge is to construct the counterfactual. In this section we will discuss the key issues that concern the validity of the assumed counterfactual, such as exogeneity and sharpness of the event and parallel trends.

Pre-class readings required:

- Azar, Schmalz, and Tecu (2017):  

Post-class reading recommended:

- Bertrand, Duflo, and Mullainathan (2004, QJE):
  http://qje.oxfordjournals.org/content/119/1/249.abstract
- Angrist and Pischke, Chap 5.

Class Policies and Etiquette

1. About registration and auditing:
   a. All Columbia students must formally registered for the course for credit, no auditing is allowed. The reason is purely pedagogical: You get more out of the course if you commit yourself to living up to the standards.
   b. The course welcomes all curious learners provided you satisfy the pre-requisites and are committed to putting work toward the course. Even as an auditor, you must turn in finished assignments (which will be graded). If the quality of your work falls below a minimum threshold you will be asked to leave the course. The reason for this rule is, again, purely pedagogical: You gain little (if any) auditing the course without doing any work on the assignments (or participating in class discussions). If you are up for the challenge, please send me your formal request and I will put your name to the Canvas course portal. If you do not want to put in the work, please free yourself from the drudgery of the three-hour lectures.
   c. All students, regardless of registration status, are encouraged to participating in classroom discussions. I reserve the right to cold-call anyone in the classroom.
d. For auditing students who are not able to register and who wish to obtain some certification: At your request, I will issue a personal letter indicating the grade you would have earned based on your performance in homework, project, and exam.

2. About class attendance:
   a. Attending a class is a choice you make, but missing a class will obviously impact your participation score.
   b. You should make every effort to arrive about 2-5 minutes before the class starts. If you are late for more than 15 minutes, it is strongly recommended that you wait till the intermission (at 10:30am) to enter.

3. About classroom etiquette:
   a. Drink is allowed but not food.
   b. All electronic devices for communication purposes: cell phones, iPhones, Blackberries, and any other devices in this category, must be turned off.
   c. Laptops, iPads, and any other devices in this category are strongly discouraged during the class time. If your find it absolutely necessary, you can use these devices to take notes. All devices are strictly prohibited during peer presentations.