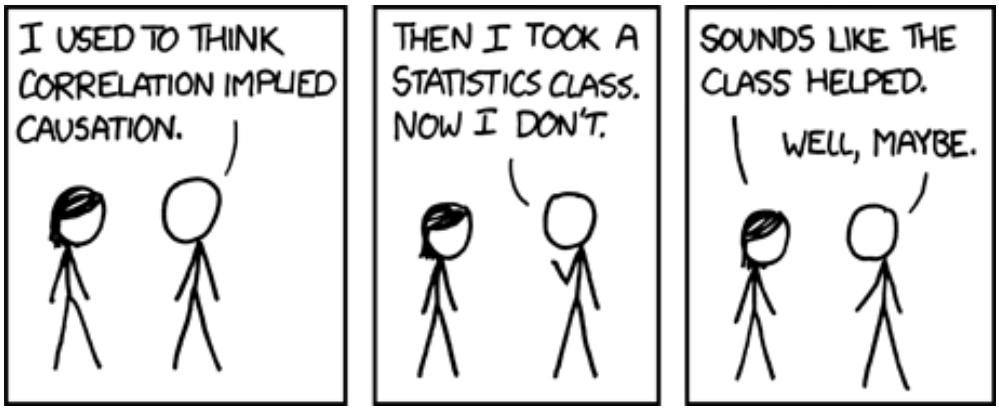
Econ 102B: Introduction to Econometrics: Spring 2011



Lecture: Tuesdays and Thursdays, 10:00AM-11:50AM, in 530-127

Professor: Aprajit Mahajan

Office: Landau Economics Building, Room 233

Office Hours: Tu: 12:00PM-1:00PM, Wed: 1:30PM-2:30PM and by appointment

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Course Web: coursework.stanford.edu

Teaching Assistants:

Dominic Coey, dcoey@stanford.edu

Office Hours: Monday 4:35-6:35 in Landau Economics Rm. 140.

Andrey Fradkin, afradkin@gmail.com

Office Hours: Office Hours: Wednesday 5:30-7:30 in Landau Economics Rm. 139.

There will be weekly TA sessions with times and location to be announced.

Required Textbook: *Introduction to Econometrics* by James H. Stock and Mark W. Watson (Addison-Wesley, 3[d] Edition). In addition, Angrist and Pischke (2008) and Freedman (2005) contain complementary material and are particularly useful if you are contemplating an honors thesis. However, they are not required for the course.

Prerequisites**:** Econ 50 (*Economic Analysis 1*), Econ102A (*Introduction to Statistical Methods*). Recall that Math 51 (*Linear Algebra and Differential Calculus of Several Variables*) is a prerequisite for Econ 50 and I will make use of material from this course freely.

Assumed Preparation in Mathematics**:** I am assuming that all students have knowledge of calculus and linear algebra at the level of Math 51. In particular, I assume students are familiar with basic multivariate calculus (first and second derivatives and how to obtain them), summation and integration, matrices and matrix operations. More generally, I expect students to be comfortable following mathematical arguments and the structure of mathematical proofs.

If you do not have sufficient mathematical preparation, you will not be able to understand the material covered in this course and you should not take this course.

Assumed Preparation in Statistics and Econometrics**:** I am assuming that all students have knowledge of the topics covered in Econ 102A. Particularly important are: the difference between the population and the sample, the difference between a parameter and an estimator, basic properties of random variables (including both discrete and continuous random variables), calculating expectations, variances, correlations, conditional expectations and conditional variances, working with the univariate normal distribution and constructing confidence intervals and conducting hypothesis tests.
The sections will briefly review some of this material, but the review will be very intense and designed for people who have already learned this material in a previous course.
If you have not learned this material before, or if you have forgotten this material, then you will not be able to understand the material covered in this course and you should not take this course.

Expected Learning Outcomes**:**

1. Formal understanding of econometric theory, including the ability to construct econometric proofs.
2. Ability to apply regression techniques with a competency sufficient for academic level research.
3. Ability to critically evaluate empirical work in popular, work related and academic settings.

Course Requirements**:**

- Problem Sets, 20% of your grade.
- First Midterm Exam, 15% of your grade
- Second Midterm Exam, 25% of your grade.
- Final, 40% of your grade.

Course Management**:**

- The course management policies can be downloaded here.[1] Please read these policies carefully if you have not done so already.
- We will make extensive use of the course web-site[2] throughout the quarter. Adding 102B to your course-list in Axess will make it much easier for you to register for the course web-site. Lecture handouts, problem sets and solutions will all be posted on coursework. In addition, important announcements about office hours, times and locations will also be made on coursework. Please make sure to check the site regularly.
- In particular, we will try to use the Forums section of the course web-site to answer questions on an ongoing basis. Feel free to post any course-related questions on the Forums (which will be organized on a weekly basis) and one of us (the instructor or the TAs) will try to answer them regularly. Please check the Forums section to see if your question has been answered already before contacting us.
- To help us deal efficiently with the potentially large volume of course-related correspondence, please include "Econ102B" in the subject heading (e.g. Subject: Econ102B problem set question) when emailing the TAs or the instructor . There is no guarantee that emails that do not contain Econ102B in the subject line will be read.

[1] http://economics.stanford.edu/undergraduate/economics-common-syllabus
[2] http://coursework.stanford.edu/

EXAMS:

All exams will be closed book. However, students will be allowed to carry a letter sized (8.5×11 inch) page "cheat-sheet" with them to the exams (both sides can be used).

1. Tuesday 4/19 (7^{th} Class), First midterm (Closed Book), In Class.
2. Tuesday 5/17 (15^{th} Class), Second midterm (Closed Book), In Class
3. Tuesday 6/7, Final Exam (Closed Book), 7:00-10:00 P.M.

The exam dates are not flexible. The only exception to this rule is for death of a family member or illness requiring immediate attention of a physician. There will be no exception for job interviews or other non-Stanford activities. Athletes on the road must take the exam at the same time and date as the rest of the class, but may do so outside of Stanford under the supervision of their coach. See the course management policies[3] for more details on these issues.

PROBLEM SETS:

There will be 6 problem sets during the course. **All problem sets must be turned in to the Economics Academic Office by 4 P.M. on the due date**. Late homework will be assigned a grade of 0 and the lowest grade will be dropped in computing grades. It is *entirely* your responsibility to ensure that you complete the assignments and remember to turn them in on time at the designated location. **There will be no extensions for the problem sets**. The only exception to this rule is for death of a family member or illness requiring immediate attention of a physician. There will be no exception for job interviews or other non-Stanford activities or for completed work that students forget to turn in. Athletes on the road must still turn in the problem sets by the stated deadlines, although may do so by fax. See the course management policies[4] for more details on these issues.

1. Thursday 4/7 (4^{th} Class): Problem Set 1 Due.
2. Thursday 4/21 (8^{th} Class): Problem Set 2 Due.
3. Tuesday 5/3 (11^{th} Class): Problem Set 3 Due.
4. Thursday 5/12 (14^{th} Class): Problem Set 4 Due.
5. Tuesday 5/24 (17^{th} Class): Problem Set 5 Due.
6. Tuesday 5/31 (19^{th} Class): Problem Set 6 Due

OUT OF CLASS COLLABORATION:

You are allowed to work together in groups for the problem sets, but each student must turn in an individual problem set with their own solutions. It is not a violation of this policy to submit essentially the same answer on a problem set as another student, but is a violation of this policy to submit a close to exact copy.

COMPUTATIONAL EXERCISES:

The TAs for this course will provide instruction in the use of STATA, a statistical software package that

[3] http://economics.stanford.edu/undergraduate/economics-common-syllabus
[4] http://economics.stanford.edu/undergraduate/economics-common-syllabus

will be used for the problem sets and is available on the Stanford Unix system. Students are welcome to use any other statistical package that they wish to use, but the TAs are not required to support any package other than STATA. Details on how to get started with STATA on the Stanford Unix system can be found here[5]. A useful resource for working with STATA is here.[6] You can also purchase[7] a student version of STATA for your own computer but that is not required for the course.

Course Outline

1. Linear Regression with One Regressor, Asymptotic Distribution Theory

   Required Reading: Stock and Watson, Chapters 4, 5, 17

2. Regression with Multiple Regressors I

   Required Reading: Stock and Watson, Chapters 6, 7, 8, 18

   First Midterm, (Tuesday, 4/19).

3. Regression with Multiple Regressors II

   Required Reading: Stock and Watson Chapters 8, 9

4. Instrumental Variables, Experiments and Quasi-Experiments I

   Required Reading: Stock and Watson, Chapters 12, 13

   Second Midterm, (Tuesday, 5/17)

5. Instrumental Variables, Experiments and Quasi-Experiments II

   Required Reading: Stock and Watson, Chapters 12, 13

6. Panel Data

   Required Reading: Stock and Watson, Chapter 10

7. Limited Dependent Variables (Binary Choice Models) [Time Allowing]

   Required Reading: Stock and Watson, Chapter 11

Acknowledgement: The strip on p.1 is from xkcd.com

References

Angrist, J., and J. Pischke (2008): *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton Univ Press.

Freedman, D. (2005): *Statistical models: Theory and Practice.* Cambridge Univ Press.

[5] http://www.stanford.edu/group/ssds/cgi-bin/drupal/content/software-services-getting-started-guides-documents
[6] http://www.ats.ucla.edu/stat/stata/
[7] http://www.stanford.edu/services/softwarelic/stata