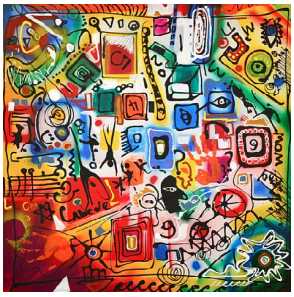
Econ 104
Introduction to Econometrics
Prof. F.X. Diebold
Fall 2017



This course provides an undergraduate introduction to modern econometrics, in both cross-section and time-series environments.

Prerequisites: Econ 103 must be taken *prior* to Econ 104. (Certain other introductory Penn courses in probability and statistics including regression may be acceptable, again taken prior to Econ 104, such as Penn's Stat 430/430 or Penn's Engineering equivalent. Any other background must be explicitly approved.)

Heavily-used site: *Econometrics* (open text, slides, data, code, etc.). The site is constantly evolving, so check frequently for updates. The course outline is effectively the text's table of contents, but the slides and lectures, *not the text*, are the centerpiece of everything. Although the slides are self-contained, there is no way to understand them without attending lectures, where I will interpret/embellish/generalize/specialize them, guiding you selectively. Hence regular class attendance is absolutely essential.

Relevant texts, recommended but not required, include: Gujarati, *Econometrics by Example*, latest edition (pragmatic, easy to read); Wooldridge, *Introductory Econometrics: A Modern Approach*, latest edition (balanced and comprehensive); Stock and Watson, *Introduction to Econometrics*, latest edition (deep and insightful, worth the investment).

Software: Your choice. The *Econometrics* site has R, EViews, Stata, and Python code samples.

TA office hours as announced in class. FXD office hours (held in McNeil 519) here. Read the instructions carefully.

Grading will be based on three problem sets (50% of final grade) and three in-class exams (50% of final grade). Problem sets are due at the start of class on the assigned day. UNDER NO CIRCUMSTANCES WILL LATE PROBLEM SETS BE ACCEPTED, so be sure to start (and finish) them early, to insure against illness and emergencies.

Important Administrative Policies: Here. (READ CAREFULLY!)

Important Dates:

In-Class Midterm Exam 1 (mt weight .33; no books, notes, electronic devices, etc.): *** Sept 14 ***

Problem Set 1 (ps weight .33; must be done alone, show all code in an appendix): *** Sept 26 ***
A1. (20 points) Consider an iid random sample of size N from density f for four cases: N=10, N=500, f=N(2,2), and f=ChiSquare(2), and consider the usual "t-statistic" t for the sample mean. In each case, what can be said ANALYTICALLY about the sampling distribution of t?
A2. (40 points) Support and/or extend your answers to (A1) via a Monte Carlo simulation using R=1000 replications. In each of the four cases, characterize the simulated sampling distribution using mean, variance, skewness, and kurtosis statistics, as well as a histogram and various percentiles (e.g., what is 2.5%, 97.5%).
B. (40 points) Obtain the three CPS wage datasets, do the following for each of the three datasets, and at the end compare your results. (1) Test the hypothesis that the population mean wage is $13/hour. (2) Test the hypothesis that the population mean wage is the same for men and women. (3) Display a scatterplot of wage vs. education (put wage on the vertical axis). (4) Regress wage on education, discuss the results in detail, and again graph wage vs. education, this time with the fitted regression line superimposed.

In-Class Midterm Exam 2 (mt weight .33; no books, notes, electronic devices, etc.): *** Oct 19 ***

Problem Set 2 (ps weight 0.33; may be done in groups of at most three. I expect a creative analysis, well-defended yet qualified as appropriate, thorough yet concise, maximum 15 pages. Show all code in an appendix.): *** Nov 9 ***
Obtain the three CPS wage datasets, do the following for each of them, and compare your results. (1) Specify and estimate a model of hourly wages using our CPS data. Among other things, you will likely want to consider non-normality, outliers, group effects, nonlinearities, and heteroskedasticity. (2) Suppose that a new person arrives (union white female, 12 years education, 3 years experience). Predict her wage (point, interval, density).

In-Class Midterm Exam 3 (mt weight .33; no books, notes, electronic devices, etc.): *** Dec 7 ***

Problem Set 3 (ps weight 0.45; may be done in groups of at most three. I expect a creative analysis, well-defended yet qualified as appropriate, thorough yet concise, maximum 15 pages. Show all code in an appendix.): *** Dec 14 ***

Specify and estimate a model of U.S. quarterly e-commerce retail sales, NSA in millions of dollars, using all available data (series ECOMNSA from FRED). Among other things, you may want to consider trend, seasonality and other calendar effects, nonlinearity, autoregressive dynamics, non-normality, outliers, dynamic heteroskedasticity, and structural change. Use your preferred model to predict ECOMNSA out-of-sample for the next quarter (point, interval, density).

NOTE WELL: Changes may be implemented at any time. Check the page frequently, and attend class, for updates.