Econometrics: Cross-Section and Panel Data (26:223:554:01)   **Spring 2018**

Professor Robert H. Patrick
Department of Finance and Economics
Rutgers Business School - Newark and New Brunswick

Class meets in 1 Washington Park 402, Newark Campus, Thursdays 1-3:50 PM

Office: 1 Washington Park 1148

Office Hours: NB, 100 Rockafeller Road (BRR) 5167, Wednesdays 5:30-6:30 P.M,
            Newark, Thursdays 11:50-12:50PM,
            and by appointment.

Phone: Newark 973-353-5247 (communication by email is preferred outside of office hours).
e-mail: rpatrick@rutgers.edu (please include **Ecs** at beginning of subject line).

This is a Ph.D. course in applied econometrics of cross-section and panel data.
The course will provide students with a working knowledge of asymptotic statistical methods
and the application of these statistical concepts to study large-sample properties of estimators
(defined as the solution to an optimization problem, under various assumptions regarding the true
data generating process). The large sample results will be applied to linear and nonlinear (in
parameters) generalized least squares (GLS) and maximum likelihood (ML) estimators. These
results are extended to develop a nonlinear instrumental variables estimator, the generalized
method of moments (GMM) and various asymptotic testing procedures are derived for this
general modeling framework. Instrumental variables, panel data, simultaneous equations,
discrete dependent, limited dependent and duration models, dynamic panel models, and their
applications are covered.

Prerequisites: Statistics and Probability courses; and Econometrics (22:839:654), Introduction
to Linear Statistical Models (26:960:577) or equivalent.

Course References
I will provide extensive lecture and background documents through Blackboard. Additionally,
the references listed below will serve as your background material for the topics covered.
Students are also encouraged to seek out whatever reference material facilitates their learning of
each topic (this should be a given for you in all of your courses). The *Handbooks* (chapters can

be downloaded from the library) provide more detail and references for further research. Related empirical articles from the economics and finance literature will also be assigned, as well as selected material from the books listed as references below.

(W) Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, 2nd Edition, MIT Press, 2010.

(CT) A. Colin Cameron and Pravin K. Trivedi, *Microeconometrics: Methods and Applications*, Cambridge University Press, 2005.

(G) William H. Greene, *Econometric Analysis,* 8th Edition, New Jersey: Prentice Hall, 2018.

(HBE) *Handbook of Econometrics* Volumes 1-6, North-Holland, various years.

W is the primary reference text for this course. CT and G will serve well for background material for the topics listed below, as well as cover some topics not covered in W. HBE surveys various topics and provides references to further literature. Other econometrics and related empirical articles from the economics and finance literature will be assigned. Students are encouraged to seek out whatever other reference material facilitates their learning of each topic.

Topics
1   Introduction and overview
2   Review of the classical linear regression model
3   Asymptotic theory and OLS estimation (W 3, 4)
            Maximum Likelihood (G 14)
            Instrumental variables (W5)
            Specification Tests (W 6)
4   Panel Data: fixed and random effects models (W 10)
5   Systems of Regression Equations, SUR, Simultaneous Equations Models, 2SLS,
            LIML, 3SLS, FIML. (W 7, 8, 9, 13)
6   Nonlinear (in parameters) Regression Models, NLS, QML and GMM (W 12, 13, 14)
            Estimation Frameworks, Estimators
7   Models with Discrete Dependent Variables (W 15-22)
            Limited Dependent Variable and Duration Models

              Discrete-Continuous Models

              Censored data and sample selection

8   Dynamic panel data models

9   Final Exam (May 3)

Other topics, depending on class interests, may be added as time permits.

There are a number of very good econometric software packages available. SAS and STATA (Rutgers has site licenses) and NLOGIT/LIMDEP are three such packages that are widely used. The examples I provide in the course will primarily use these packages. R, which is freeware, is increasingly popular. There are other possibilities as well, e.g., GAUSS and MATLAB. While no specific software package is required, the use of some computational software (or programming if you prefer) will be required to complete the requirements in this course and it is your responsibility to understand the details of the particular software you use. (Note that you may be asked to defend the accuracy of your chosen software.) Examples used in class will primarily be computed using STATA, LIMDEP (NLOGIT), or SAS; preprogrammed routines as well as matrix programming.

Rutgers University software availability and resources
http://libguides.rutgers.edu/c.php?g=336179&p=2271781
American Economic Association econometrics resources
https://www.aeaweb.org/RFE/toc.php?show=complete

Evaluation of your performance in this course
You are responsible for all problems and problem sets assigned in class, which you may be asked to demonstrate in class or may be randomly collected and graded. Presentations, class participation, quizzes and graded problems will comprise 20% of your grade.

There will be two short projects for the course, one cross-sectional and panel data. These projects will allow you to apply the econometric techniques developed in this course to your particular research interest. The projects will comprise 40% of your grade.

The comprehensive final exam will count for 40% of your course grade.

ACADEMIC INTEGRITY

I do NOT *tolerate cheating*. Students are responsible for understanding the RU Academic Integrity Policy (http://academicintegrity.rutgers.edu/files/documents/AI_Policy_2013.pdf). I will strongly enforce this Policy and pursue *all* violations. Don't let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.