

Economics, Applied
Course Number: 26:223:554
Course Title: Econometrics: Cross-Section and Panel Data

COURSE DESCRIPTION

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.

COURSE MATERIALS

I will provide extensive lecture and background documents through Canvas. 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.

PREREQUISITES

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

ACADEMIC INTEGRITY

I do NOT tolerate cheating. Students are responsible for understanding the RU Academic Integrity Policy <http://academicintegrity.rutgers.edu/>

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don’t let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

GRADING POLICY

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 the other using 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 50% of your grade. The comprehensive final exam will count for 30% of your course grade.

COURSE SCHEDULE

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

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>

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are *pregnant*, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek **religious accommodations**, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of **gender or sex-based discrimination or harassment**, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at <http://vpva.rutgers.edu/>.

[Rutgers University-New Brunswick incident report link: <http://studentconduct.rutgers.edu/concern/>. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via <https://temporaryconditions.rutgers.edu> .

If you are a military **veteran** or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of **mental health** services, please use our readily available services.

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services–New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of **physical health** services, please use our readily available services.

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of *legal* services, please use our readily available services: <http://rusls.rutgers.edu/>

Students experiencing difficulty in courses due to *English as a second language (ESL)* should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional *academic assistance*, please use our readily available services.

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>

[Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

- Students must sign, date, and return a statement declaring that they understand this syllabus.]