NYU | ROBERT F. WAGNER GRADUATE SCHOOL OF PUBLIC SERVICE

PADM-GP 2902
Multiple Regression and Introduction to Econometrics
Fall 2020 (Remote)

Instructor Information

- Morgan C. Williams, Jr., Assistant Professor and Faculty Fellow
- Email: mcw394@nyu.edu
- Office Address: The Puck Building, Room 3087 (Remote Fall 2020)

- Office Hours: Tuesdays (2:50 PM - 3:50 PM and 5:30 PM – 6:30 PM) by appointment only and requests can be made at the wejoin link https://www.wejoinin.com/sheets/ucban. All office hours appointments will be held via Zoom this semester.

Teaching Colleagues

- Benjamin Heller (brh327@nyu.edu)
- Matthew Pietrus (mp5065@nyu.edu)

Course Information

- Class Meeting Times: Tuesday, 6:45 PM - 8:25 PM
- Class Location: In response to disruptions attributable to the COVID-19 pandemic, this course will now be taught remotely for the Fall 2020 semester.
- Zoom Information: You are expected to participate in each class with your Zoom audio and video on. Please review Wagner's Zoom in the Classroom series about classroom etiquette, participation, and more. Students may not share the Zoom classroom recordings. The recordings are kept within the NYU Classes site and are for students enrolled in this course only.

Course Description

Econometrics remains the (empirical) lynchpin of modern economics, public policy, and other disciplines within the social sciences. Multivariate regression analysis is a generalization of the bivariate framework allowing us to explore important economic and social behavior in new ways. This course will train you in the fundamentals of multivariate regression analysis—closely examining how to estimate these models, interpreting the results, and navigating some of the well-known challenges to statistical (causal) inference.

Using one specific dataset throughout the course, you will learn how to employ some of these key econometric techniques through the use of powerful and commonly used statistical software (most notably Stata). In order to demonstrate proficiency in these skills, students (in partnership with classmates in their assigned group) will carry out a final empirical project based on datasets provided by the professor. This project remains critical to learning important course concepts, navigating the logistics involved in group collaboration, and how to think critically when evaluating empirical work.

Course Prerequisites

Core-GP 1011 or Equivalent

Course and Learning Objectives

Through this course, students will be able to:

1. Understand the basic principles of Ordinary Least Squares (OLS) regressions and their usefulness in econometrics
2. Write and verbally (and in some instances graphically) interpret mathematical equations associated with regression models
3. Produce and interpret regression results through statistical software (e.g., Stata) often reported in public policy analyses and other research in the social sciences
4. Critically assess the numerous assumptions often made in the interpretation of statistical output and the validity of these assumptions
5. Apply course concepts and skills to research within students' specific fields of interest

Learning Assessment Table

Course Learning Objective Covered	Assignment Title
#1, #2, #3, #4	Problem Sets and Computer Exercises
#1, #2, #4	Midterm Exam
#1, #2, #3, #4, #5	Group Regression Project

Recitation Information

Although attendance is optional, you must register for recitation and you are highly encouraged to attend these sessions. Each recitation will review the learning objectives associated with each problem set due in the following week. If time permits, TC's will also answer any additional follow-up questions regarding lecture concepts and Stata programming. Recitations will be held remotely at the following times:

- Mondays: 8:35 PM - 9:35 PM
- Tuesdays: 8:35 PM – 9:35 PM

Academic Integrity

Academic integrity is a vital component of Wagner and NYU. All students enrolled in this class are required to read and abide by Wagner's Academic Code. All Wagner students have already read and signed the Wagner Academic Oath. Plagiarism of any form will not be tolerated and students in this class are expected to report violations to me. If any student in this class is unsure about what is expected of you and how to abide by the academic code, you should consult with me.

Henry and Lucy Moses Center for Students with Disabilities at NYU

Academic accommodations are available for students with disabilities. Please visit the Moses Center for Students with Disabilities (CSD) website and click on the Reasonable Accommodations and How to Register tab or call or email CSD at (212-998-4980 or mosescsd@nyu.edu) for information. Students who are requesting academic accommodations are strongly advised to reach out to the Moses Center as early as possible in the semester for assistance.

NYU's Calendar Policy on Religious Holidays

NYU's Calendar Policy on Religious Holidays states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify me in advance of religious holidays that might coincide with exams to schedule mutually acceptable alternatives.

Grading Policy and Assignments

1. Problem Sets and Computer Exercises - 20%
2. Midterm Exam - 35%
3. Group Regression Project - 45%

Course Materials

- **Required Text:** *Using Econometrics: A Practical Guide (Seventh Edition)* by A.H. Studenmund (Cited as S. ISBN 9780134182742)

- **Required Statistical Software:** Stata/IC should be purchased and loaded onto your computer by Week One. You can purchase Stata here in order to obtain the student discount: https://www.stata.com/order/new/edu/gradplans/campus-gradplan/. Please purchase Stata/IC and not Small Stata. The least-cost option involves purchasing an annual license. If you plan on taking Estimating Impacts, Advanced Empirical Methods, or the Research Capstone you may want to consider purchasing a perpetual license. Stata/IC is not platform-dependent and will run on both Windows and Mac operating systems. Previous knowledge of Stata is not required for the course and you can find additional assistance at NYU Libraries Data Services: https://library.nyu.edu/departments/data-services/.

- **Computer Exercise Dataset:** By the first week of class, students are expected to download the computer exercises dataset from NYU Classes under the assignment tab and save them to a folder on your computer reserved for PADM-GP 2902 work:

  Class 3 Computer Exercise_new.do;
  Newschools9816.dta;
  Computer Exercises ALL-new.pdf.

  Please also watch video on using Stata and read "Using Stata Chapter 1" from the course textbook (both provided via NYU Classes under "Resources → Stata Learning Materials"). In addition to these materials, please read Appendix 1.7, pp. 30-34.

- **Lecture Slides:** Students will also receive a copy of the completed lecture slides before the beginning of each lecture. Lecture slides can be found on NYU Classes under the resources tab.

Assignments

Problem Sets and Computer Exercises:

15 problem sets and computer exercises (worth 100 points each) will be graded based on the completion of each exercise in its entirety. You are strongly encouraged to solve for the correct solutions given that you will be asked to do so on the midterm exam. I will drop the two lowest grades among these submissions. You must submit these assignments online via NYU Classes by the beginning of the specified lecture as outlined in the course schedule (see the Semester Overview Section below for assignment dates). All solutions will be posted under the NYU Classes tab after the specified due date. As a friendly reminder, I ***unambiguously do not***

accept late submissions and providing any form of unoriginal work (e.g., copying the work of others or work from previous semesters) will result in a zero for that assignment.

- For ***Stata output***, please submit only the last "run" of the analysis and turn in the log file in PDF format.
- For ***Stata exercise answers***, please submit all responses within a Microsoft Word file.
- Lastly, please submit all ***problem set responses*** using the answer sheet provided for each problem set (as a Microsoft Word file).

Midterm Exam:

An "in-class" exam will be given during Week 11 of the course (additional details will be provided on the format early in the semester). Students may use a non-graphing calculator and two-pages of *single-sided* notes.

Group Regression Project:

Students will be placed into groups of four in order to conduct a regression analysis and write a paper based on these results.

Project Preliminaries

- Students must complete the Project Data Preference Form no later than ***Friday, September 18, 2020 by 5 PM EST*** with your preferred dataset rankings. You can find each dataset and their description on the NYU Classes website under "Resources → Project Descriptions and Datasets."
- As an introduction to carrying out an empirical project, all group members should read Chapter 11 of the course text entitled, "Running Your Own Regression Project."
- Each group must contact me during ***Week 3 or Week 4*** to discuss the project and put forth at least one specification of interest for estimation.
- All groups are required to present your results during Weeks 12-14 in order to receive critical feedback before writing the paper. Groups will have 30 minutes to present their work and each session will be immediately followed by a 15 minute question and answer period. ***All students are required to attend each day of presentations.***
- Groups will be required to turn in an 8-10 page paper (organized into five sections with two tables) based on their findings. Each submission must be double-spaced, using one-inch margins and 12-point Times New Roman font. The full-page count does not include title pages, tables, or figures (or excessive block quotes/footnotes). Please abstain from citing anecdotal evidence, personal experiences, or referencing any other form of non-scholarly work. Please cite all references using the Chicago Manual of Style with author last name(s) and year within the text.
- A peer evaluation will also factor into the overall grade for the project.
- Make sure that you proofread each submission and include all group member names on the paper. All papers are due on ***December 15, 2020 by 5 PM EST***. ***No Exceptions!***

- Papers should be submitted directly to the professor via email: mcw394@nyu.edu.

Paper Outline

- **Introduction:** What is the purpose of this study? Why is the underlying research question worthy of study? What (added) value do your findings bring to the larger academic and policy communities?
- **Data:** Describe all data sources used within the project and discuss the descriptive statistics presented in Table 1.
- **Empirical Strategy:** What is the model of interest for your analysis and why is it relevant to addressing your stated research question? What are the necessary assumptions readers should keep in mind when assessing your results? How exactly are variables constructed and measured within your analysis? What does previous literature suggest one would expect when estimating your model?
- **Results:** Discuss and interpret all results in Table 2.
- **Concluding Remarks:** What do your results say about your stated research question and how close are these estimates to previous work? What are the notable limitations of your analysis? How are these results relevant to the policy landscape and what suggestions can you make for future research?
- **Appendix:** Please include your descriptive statistics table (Table 1; must include all variables in your model) and main results table (Table 2; contains all results in four to five columns), and the corresponding Stata log file in the appendix.

Letter Grades

Letter grades for the entire course will be assigned as follows:

Letter Grade	Points
A	4.0 points
A-	3.7 points
B+	3.3 points
B	3.0 points
B-	2.7 points
C+	2.3 points

Letter Grade	Points
C	2.0 points
C-	1.7 points
F	0.0 points

Student grades will be assigned according to the following criteria:

- (A) Excellent: Exceptional work for a graduate student. Work at this level is unusually thorough, well-reasoned, creative, methodologically sophisticated, and well written. Work is of exceptional, professional quality.

- (A-) Very good: Very strong work for a graduate student. Work at this level shows signs of creativity, is thorough and well-reasoned, indicates strong understanding of appropriate methodological or analytical approaches, and meets professional standards.

- (B+) Good: Sound work for a graduate student; well-reasoned and thorough, methodologically sound. This is the graduate student grade that indicates the student has fully accomplished the basic objectives of the course.

- (B) Adequate: Competent work for a graduate student even though some weaknesses are evident. Demonstrates competency in the key course objectives but shows some indication that understanding of some important issues is less than complete. Methodological or analytical approaches used are adequate but student has not been thorough or has shown other weaknesses or limitations.

- (B-) Borderline: Weak work for a graduate student; meets the minimal expectations for a graduate student in the course. Understanding of salient issues is somewhat incomplete. Methodological or analytical work performed in the course is minimally adequate. Overall performance, if consistent in graduate courses, would not suffice to sustain graduate status in “good standing.”

- (C/-/+) Deficient: Inadequate work for a graduate student; does not meet the minimal expectations for a graduate student in the course. Work is inadequately developed or flawed by numerous errors and misunderstanding of important issues. Methodological or analytical work performed is weak and fails to demonstrate knowledge or technical competence expected of graduate students.

- (F) Fail: Work fails to meet even minimal expectations for course credit for a graduate student. Performance has been consistently weak in methodology and understanding, with serious limits in many areas. Weaknesses or limits are pervasive.

NYU Classes

All announcements, resources, and assignments will be delivered through the NYU Classes website– including the submission of online discussion board assignments. Any assignment modifications, due dates, and other course-related matters will be posted as soon as possible through this website.

Semester Overview

Date	Topic	Assignment Due
September 8, 2020	The OLS Bivariate Regression Model	Submit Student Info Form by September 7, 2020 by 5 PM EST
September 15, 2020	The OLS Multivariate Regression Model	Problem Set 2 Data Preference Form (9-18-20)
September 22, 2020	Multivariate OLS & Hypothesis Testing	Problem Set 3 Computer Exercise 3 Schedule Meeting with Prof. to discuss group project model
September 29, 2020	Functional Form Part I: Polynomials and Dummy Variables	Problem Set 4 Group Project Meeting with Prof.
October 6, 2020	Functional Form Part II: Interactions and Logarithmic Transformations	Problem Set 5 Computer Exercise 5
October 13, 2020	Multicollinearity and Autocorrelation	Problem Set 6 Computer Exercise 6
October 20, 2020	Heteroskedasticity	Problem Set 7 Computer Exercise 7
October 27, 2020	Panel Data Estimation Part I	Problem Set 8 Computer Exercise 8
November 3, 2020	Panel Data Estimation Part II: Introduction to Linear Probability Models	Problem Set 9 Computer Exercise 9
November 10, 2020	Simultaneous Equation Models; Introduction to Causal Inference	Computer Exercise 10
November 17, 2020	Exam	Schedule Meeting with Prof. to discuss Tables 1-2 for Group Project
November 24, 2020 – December 8, 2020	Group Presentations	Papers Due December 15, 2020 by 5 PM EST

Detailed Course Overview

Week One: The OLS Bivariate Regression Model

Topics

Theoretical regression line; deterministic versus stochastic relationships; population versus sample regression line; error and residuals; OLS estimators

Required Reading:

- Studenmund: Chapters 1 and 2 (pp.35-40 and 47-57)

Covered in Recitation:

- Problem Set 2

Week Two: The OLS Multivariate Regression Model

Topics

Reducing bias; Coefficient interpretation; BLUE assumptions

Required Reading:

- Studenmund: Chapters 2 (40-47) and 4

Covered in Recitation:

- Problem Set 3

Week Three: Multivariate OLS and Hypothesis Testing

Topics

Significance tests; Confidence intervals; F tests; R^2 and Adjusted R^2; Interpreting statistical output

Required Reading:

- Studenmund: Chapters 3 (pp. 65-79) and 5

Covered in Recitation:

- Problem Set 4

Week Four: Functional Form Part One: Polynomials and Dummy Variables

Topics

Functional form; Using qualitative data (i.e., dummy variables); Joint tests of significance; Curvilinear relationships

Required Reading:

- Studenmund: Chapters 6 (Appendix IX optional), 3 (pp. 79-83), and 7 (pp. 189-194; pp. 199-201)

Covered in Recitation:

- Problem Set 5

Week Five: Functional Form Part Two: Interactions and Logarithmic Transformations

Topics

Interaction terms (various types); Logarithmic transformations and elasticities

Required Reading:

- Studenmund: Chapter 7 (pp. 194-199; pp. 201-209)

Covered in Recitation:

- Problem Set 6

Week Six: Multicollinearity and Autocorrelation

Topics

Addressing multicollinearity and autocorrelation

Required Reading:

- Studenmund: Chapters 8-9

Covered in Recitation:

- Problem Set 7

Week Seven: Heteroskedasticity

Topics

Addressing heteroskedasticity

Required Reading:

- Studenmund: Chapter 10

Covered in Recitation:

- Problem Set 8

Week Eight: Panel Data Estimation Part I

Topics

Pooled cross-sections; Time series; Panel data; Fixed effects

Required Reading:

- Studenmund: Chapter 16

Covered in Recitation:

- Problem Set 9

Week Nine: Panel Data Estimation Part II: Introduction to Linear Probability Models

Topics

Linear probability models and nonlinear (e.g., probit and logit) models

Required Reading:

- Studenmund: Chapter 13

Covered in Recitation:

- Problem Set 10 and Computer Exercise

Week 10: Simultaneous Equation Models; Introduction to Causal Inference

Topics

Brief introduction to simultaneous equation models and causal inference

Required Reading:

- Studenmund: Chapter 14 and Table 11-2 through 11-3 (pp.354-356)

Covered in Recitation:

- Midterm Exam Review

Week 11: Midterm Exam

Weeks 12-14: Group Presentations

Final Paper Due: December 15, 2020 by 5 PM EST