

Discrete Choice Econometrics

Instructor	<i>Patrick McCarthy</i>
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Email	<u>mccarthy@gatech.edu</u>
Meeting Days	<i>Tuesday/Thursday, 3:05pm – 4:35pm. Old CE Bldg, Room 310</i>
Office Hours	<i>Generally here in mornings. Email or call for appointment</i>
Course Webpage	<i>Important announcements and assignments will be posted on t-square for this course. All students must have access to the site and check it regularly.</i>
Course TA	Tony Harding (tony.harding@gatech.edu)

Discrete Choice Econometrics is an applied econometrics course which focuses upon econometric problems for data which are

- 'limited', representing an "either-or" choices
- censored or truncated
- small counts with a large number of zeros

The nature of the dependent variable requires alternative estimation methodologies. There exist many alternative models for analyzing such problems. Among the course topics are:

- conditional expectation and conditional probability function
- maximum likelihood techniques, and hypothesis testing
- binary, multinomial, and ordered response models including
 - linear probability, logit/probit, discrete choice, random utility models
 - bivariate models
 - aggregate models
 - mixed and nested logit
 - ordered and interval models
- limited dependent variable models including
 - discrete-continuous models and selection models
 - Poisson, negative binomial, and zero-inflated models
- Other topics include
 - endogenous regressors effects
 - exogenous and choice-based sampling

Attendance – All students are expected to attend each class and an excessive number of unexcused absences will result in a failing grade.

Honor Code – Students are expected to act according to the highest ethical standards. Academic misconduct is any act that does or could improperly distort student grades or other student academic records. Such acts include but need not be limited to:

- possessing, using or exchanging improperly acquired written or verbal information in preparing for examinations or other assignments;
- substitution for, or unauthorized collaboration with, a student in meeting course requirements;
- submitting materials that are wholly or substantially identical to that created or published by another person or persons, without adequate credit notations indicating authorship (plagiarism).

LEARNING GOALS FOR THIS COURSE

- Develop a solid understanding of a portfolio of limited dependent variable and probability models that many researchers use in their empirical work
- Have extensive experience empirically estimating and interpreting limited dependent variable and probability models

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- Use these models for hypothesis testing, drawing policy inferences, and to clearly and concisely communicate the results
- Be familiar with various software programs for estimating limited dependent variable models
- Critically evaluate research papers that use these methodologies

Course Evaluation

Grading - Your grade will be determined as follows:

Homework Sets	: 40%
Project:	: 30%
3 Mid-Term Exams	: 30%
Total	: 100%

Homework – There will be 4 homework sets. Each set will be worth 100 points.

Course Paper –There is a required paper for the course. The paper is to be 15 – 17 pages in length, **excluding** title page, footnote page, and reference page.

Paper Format

1” margins on all sides
12 point Times Roman font
Double spacing.
No appendices
Footnotes and References on a separate page(s) at the end of the paper

Estimation model – One or more of the limited dependent variable models covered in class
Data – Of your own choosing.

Text

Winkleman, R. and Stefan Boes. *Analysis of Microdata* (2nd Edition), 2010, Springer: New York.

Non-Required References which are useful and may help clarify and/or extend the covered:

Cameron, C. and Trivedi, P. *Microeconometrics*, 2005. Cambridge University Press, NY.

Cramer, J.S. *Econometric Applications of Maximum Likelihood Methods*. Cambridge: Cambridge University Press, 1986.

Hilbe, Joseph M. *Negative Binomial Regression*. Cambridge: Cambridge University Press, 2008.

Hensher, David et al. *Applied Choice Analysis: A Primer*. Cambridge: Cambridge University Press, 2005.

J. Scott Long. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage Publications.

Louviere, J., Hensher, D., and Swait, J. *Stated Choice Methods: Analysis and Application*, Cambridge, UK: Cambridge University Press, 2000.

Train, Kenneth. *Discrete Choice Methods with Simulation*. Cambridge: Cambridge University Press, 2003.

Train, Kenneth. *Qualitative Choice Analysis*. Cambridge: The MIT Press, 1986.

Computer Software

The emphasis in this course is on application and interpretation of limited dependent variable and probability models. Numerous software programs exist for estimating these models, including LIMDEP, STATA, SAS, SPSS, EViews, and R. I will primarily use SAS.

Students can use the any software package for the homework assignments as long as you answer all questions.

Computer Assignments

Must conform to instructions in the word document: ‘160803 FormattingAssignments.docx’

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Readings

Weeks 1 – 3

Aug 23, 25	Introduction, Microdata Regression and probability models CEF and CPF	WB, Ch 1 WB, Ch 2
Aug 30, Sep 1	Elements of maximum likelihood Score and Hessian matrix Invariance property, Delta method <u>Homework 1 Assigned</u> (Sep 1)	WB, Ch 3; notes
Sep 6	Hypothesis tests, GOF Review for exam <u>Homework 1 Due</u> (5:00pm)	
Sep 8	Exam 1	

Weeks 4 – 9

Sep 13, 15	Linear Probability model Logit, Probit models Scaling, Examples	WB, Ch 4; notes WB, Ch 4; notes
Sep 20, 22	RUM, Discrete Choice	WB, Ch 4; notes
Sep 27, 29	Bivariate probit/logit Endogenous regressors	WB, Ch 4; notes WB, Ch 5, notes
Oct 4, 6	MRM – polychotomous logit, odds ratio Marginal effects, examples Discrete choice model revisited <u>Homework 2 Assigned</u> (Oct 6)	WB, Ch 5, notes
Oct 11 Oct 13	<i>Fall Break – No Class</i> IIA Property Aggregate alternatives	WB, Ch. 5, notes Notes
	<u>Homework 2 Due</u> (Oct 13)	
Oct 18	Review for exam	
Oct 20	Exam 2	

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Weeks 10 – 16

Oct 25, 27	Exogenous, endogenous sampling GEV and nested logit	WB, Ch 4, 5, Notes WB, 5, notes
Nov 1, 3	GEV and nested logit RU1, RU2 normalizations	WB, Ch 4, 5; notes WB, Ch 5, Notes
	<u>Homework 3 Assigned</u> (Nov 3)	
Nov 8, 10	Mixed logit models Ordered response model	WB, Ch 5, Notes WB, Ch 6, Notes
	<u>Homework 3 Due</u> (Nov 10)	
Nov 15, 17	Ordered response, interval models Discrete-continuous models	WB, Ch 6, notes
Nov 22 Nov 24	Discrete-continuous models <i>Thanksgiving, No Class</i>	WB, Ch 6, notes
	<u>Homework 4 Assigned</u> (Nov 22)	
Nov 29, Dec 1	Selection models Count models Review for exam	WB, Ch 6, notes WB, Ch 8 (283-98), notes
	<u>Homework 4 Due</u> (Dec 1)	
Dec 5	5:00 PM Project Paper Due (submit electronically)	
Dec 6	Exam 3	