Discrete Choice Econometrics

Instructor  Patrick McCarthy
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Meeting Days  Tuesday/Thursday, 3:05pm – 4:35pm. Old CE Bldg, Room 310
Office Hours  Generally here in mornings. Email or call for appointment
Course Webpage  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.
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
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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework Sets</td>
<td>40%</td>
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<tr>
<td>Project</td>
<td>30%</td>
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<tr>
<td>3 Mid-Term Exams</td>
<td>30%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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*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

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

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’
## 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

WB, Ch 3; notes

**Homework 1 Assigned** (Sep 1)

**Sep 6**
- Hypothesis tests, GOF
- Review for exam

**Homework 1 Due (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

WB, Ch 5, notes

**Homework 2 Assigned** (Oct 6)

**Oct 11**
- *Fall Break – No Class*

**Oct 13**
- IIA Property
- Aggregate alternatives

WB, Ch. 5, notes  
Notes

**Homework 2 Due (Oct 13)**

**Oct 18**
- Review for exam

**Oct 20**
- **Exam 2**
### Weeks 10 – 16

**Oct 25, 27**
- Exogenous, endogenous sampling
- GEV and nested logit
  
**Nov 1, 3**
- GEV and nested logit
- RU1, RU2 normalizations
  
**Nov 8, 10**
- Mixed logit models
- Ordered response model
  
**Nov 15, 17**
- Ordered response, interval models
- Discrete-continuous models
  
**Nov 22**
- Discrete-continuous models
  
**Nov 24**
- Thanksgiving, No Class
  
**Nov 29, Dec 1**
- Selection models
- Count models
  
**Dec 5**
- 5:00 PM **Project Paper Due (submit electronically)**

**Dec 6**
- **Exam 3**