ECO671: Topics in Applied Econometrics.
Spring 2010

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Course Description: This course reviews a range of statistical methods that have been developed for testing economic hypotheses with micro level data. Starting with a review of the classical linear model and hypothesis testing, the course will proceed to more advanced econometric methods for addressing specific problems generated by either the nature of the data generation process or the economic relationships being examined. The course will develop your econometric skills in several ways. First, the course will review numerous econometric models and in each case discuss the type of problems the model is suited for, how to test hypotheses, and the shortcomings of various models. Second, you will be asked to solve problems and interpret results associated with the models discussed. Third, to assist in the development of your data management, modeling, computer, and interpretative skills, you will use Stata to analyze data. The topics to be covered, relevant reading material, and the grading process are described below.

TOPICS AND READINGS

Readings will be selected from two books primarily:

Additional readings will be assigned as needed.

I. The Linear Model (3 days)
   - The classical linear model. (PR appendix 4.3)
   - Hypothesis testing: multiple parameter restrictions (PR Ch. 5)
   - Dummy variables: intercepts, slopes.
   - Biases: Omitted variables, errors in variables, instrumental variables
     (PR Ch. 7.1-7.3, appendix 7.1)
   - Generalized Least Squares (PR app 6.1)

II. Simultaneous Equations Models. (2 days)
   - [PR Ch 12, including appendix; W Ch 15]
   - Simultaneous Equations Bias.
   - The identification problem -- rank and order conditions.
   - Estimation Methods -- two and three stage least squares, instrumental variables.
   - Testing exogeneity -- the Hausman test.*
   - Testing over-identifying assumptions.*

III. Maximum Likelihood Estimation. (2 days)
   - [PR Ch 10.2]
   - The Likelihood Function.
   - Properties of Maximum Likelihood Estimators.
   - The gradient and information matrix.
   - Numerical Optimization Methods.
The likelihood ratio, Wald, and Lagrange multiplier tests.

IV. Qualitative Dependent Variable Models (3 days)  
   [PR Ch 11, W Ch. 17.1-17.2]  
   Dichotomous choice: the linear probability model, probit, and logit.  
   Multiple choice models: multinomial logit and probit.  
   Ordered probit.*

V. Limited Dependent Variable Models (3 days)  
   [W 17.3-17.5]  
   Truncation: the Tobit model.  
   Censored regression and sample selection bias: the Heckit model.  
   Treatment Effects Models.*

VI. Panel Data (2 days)  
   [W: Ch. 13, 14]  
   Fixed and random effects models.

VII. Special Topics (Readings TBA)*  
   Quantile Regressions  
   Bootstrapping  
   Duration models

[* indicates that these topics will be covered only if time permits.]

Grades. Your grades will be based on 4 class assignments, a midterm exam, and a final exam. Each exam will cover approximately one half of the course. Exam dates will be announced at least one week in advance. The class is scheduled to finish on 3/27. The precise date of the final exam is yet to be determined. There will be two graded assignments for each one-half of the course. Each assignment will have computer based and/or analytical problems and will be assigned to teams of 2-3. The quality of your class participation will influence marginal grade decisions.

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<td>Midterm Exam</td>
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Participation. Your participation in the class can influence marginal grade decisions – either positively or negatively. It will have a neutral effect if your participation includes regular attendance and an occasional willingness to contribute to the class by either answering or asking questions. Participation can have a positive effect if you regularly participate with good answers and/or questions. It's important to emphasize that excessive participation can work against you if the questions or answers you provide are not well reasoned or become so frequent as to disrupt the flow of the class.

Computing: This course requires that you become familiar with several aspects of STATA to estimate some of the econometric models we discuss. As time goes by, you will be expected to search through the on-line manual to learn the necessary routines as they are assigned for homework problems. I am willing to provide assistance on Stata problems, but expect that you will have made a good faith effort to resolve them on your own first.