ECON 900
Advanced Econometrics
Analysis of Efficiency and Production

P.W. Wilson  Spring 2018

Class location and time:  310 Sirrine Hall, Tue. and Thu., 2:00–3:15pm
Office:  200D Sirrine Hall
Office hours:  11:00–12:00am Tue. and Thu., or by appointment
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Required text:
There is no required textbook for this course; readings will be from working papers, journal articles, etc. Additional course materials can be accessed by going to my home page (see above), clicking on the link entitled “course materials for students,” and following the obvious links.

Course Objectives:
This course develops analytical and econometric techniques, both parametric and non-parametric, for benchmarking performances of firms and other decision-making units. The course will begin with a discussion of microeconomic theory of the firm, where producers combine inputs to produce outputs while constrained by a feasible set of input-output combinations. Various notions of efficiency will be introduced, and important features of the economic model will be identified. However, measures of efficiency and other features of interest must typically be estimated from observed data. Various statistical models will be examined by adding probabilistic structures to the economic model; within the context of each statistical model, various estimators of efficiency and other features of interest will be discussed. Special attention will be given to statistical inference and hypothesis testing.

Benchmarking has become a wildly popular idea in management, finance, economics, education, public policy, and other arenas; the Google internet search engine currently returned approximately 29,200,000 hits for the keyword “benchmarking” on 9 January 2018. The Oxford English Dictionary defines benchmarking as “the action or practice of comparing something to a benchmark; evaluation against an established standard,” suggesting that while an established standard is important for benchmarking, there may be more than one such standard. Benchmarking may involve detailed evaluation and comparison of a particular unit’s operating procedures with those of a competitor, perhaps using standard accounting ratios such as return-on-assets or other measures. Efficiency analysis is a more formal approach, wherein a statistical model of a production process with a well-defined benchmark for purposes of comparison is specified and then estimated, allowing possibilities for statistical inference.

The performance of firms and other decision-making units in terms of technical efficiency, as well as allocative, cost, and other efficiencies, has received widespread attention in the economics, statistics, management science, and related literature. In the case of private firms, estimates of inefficiency have been used to explain insolvency rates and merger activities, the effects of changes in regulatory environments, and overall industry performance. In the case of public and non-profit entities, estimates of inefficiency are intrinsically interesting because these entities do not face a market test, and inefficiency estimates often provide the only objective criteria for gaging performance. Measuring the performance of public entities may
be important for allocating scarce public resources, for deciding which to eliminate during periods of consolidation, etc. In particular, identifying inefficient entities is a critical first step in any attempt to improve performance.

**Intended Audience:**

This is a graduate-level course for Ph.D. students in economics, statistics, management science, operations research, and perhaps other areas who are interested in benchmarking in a production context. Students should have a working knowledge of statistics and probability at the level of ECON 806 (Econometrics I), and linear estimation at the level of ECON 807 (Econometrics II).

**Course Grade Determination:**

Students will have the following opportunities to demonstrate their abilities: homework assignments (10%), in-class presentations (30% each), and a paper (60%). The relative weightings shown above are approximate. In particular, homework assignments are mandatory, as is class attendance. Shirking will result in (perhaps severely) reduced grades.

Class attendance is not mandatory in the sense that I will not check the class roster in each class. However, it is not possible to pass this class (or any other worthwhile graduate-level class) without attending and actively engaging in the intellectual exercises that take place in class.

Reading assignments will be made in class. Students should review material from the previous class as well as any reading assignments before each class.

**Office Hours:**

My office hours are shown above. If you need to see me at other times, I will be happy to meet with you; a good approach is to ask me about an appointment after class. I will be happy to meet with you.

**Topics:**

1. Microeconomic Theory of the Firm
2. Nonparametric Envelopment Estimators
3. Nonparametric Partial Frontier Estimators
4. Conditional Efficiency Estimators
5. Inference and Hypothesis Testing
6. Parametric Stochastic Estimators
7. Semi-Nonparametric Stochastic Estimators
8. Dynamic Considerations

Other topics may be covered as time permits. The above list may be revised as the course progresses, but relevant announcements will be made in class.