MANSHOLT GRADUATE SCHOOL of Social Sciences

THEORY AND PRACTICE OF EFFICIENCY & PRODUCTIVITY MEASUREMENT: STATIC & DYNAMIC ANALYSIS

Summer School for PhDs and Postdocs, 2 weeks

Organised by Mansholt Graduate School of Social Sciences

WAGENINGEN UNIVERSITY

Week 1: 7 - 11 July 2008
Nonparametric Efficiency and Productivity Analysis

Lecturers:

Harold Fried
Professor of Economics and
David L. and Beverly B. Yunich Professor of Business Ethics
Union College, USA

Loren Tauer
Professor of Applied Economics and Management
Cornell University, USA

Week 2: 14 – 18 July 2008
Dynamic Efficiency and Productivity Analysis

Lecturers:

Alfons Oude Lansink
Professor of Business Economics
Wageningen University, NL

Elvira Silva
Faculty of Economics
University of Porto, PT

Spiro Stefanou
Professor of Agricultural Economics
Pennsylvania State University, USA

Introduction to the summer school
Productivity growth entails changes in scale, efficiency gains and technological change. Innovations are needed to keep pushing the competitive envelope, and efficiency gains are needed to ensure that implemented technologies achieve their potential. Conventional economic approaches assume that all firms operate rationally and efficiently. The summer school, however, challenges this assumption and presents concepts, models and tools needed to analyze and quantify the levels of *in*efficiency and productivity at a point in time and their movement over time.

The summer school is designed to bridge the gap between theory and practice. It is organized into distinct parts: "Nonparametric, Static Approaches" (Week 1) and "Dynamic Approaches" (Week 2). Students may enroll for either week 1 or 2, or both weeks. Although each week is independent, students are encouraged to take both weeks.

Week 1: Nonparametric Efficiency and Productivity Analysis
The nonparametric course uses Data Envelopment Analysis (DEA) techniques to measure efficiency and productivity by letting the data span the frontier to establish best practice. This approach coupled with the microeconomic theory of the firm provides firm-specific measurements of efficiency and best practice role models for improving performance.

Week 2: Dynamic Efficiency and Productivity Analysis
The dynamic efficiency course presents nonparametric and introduces some parametric perspectives to measure efficiency and productivity. When addressing dynamic efficiency we need to distinguish between a) tracking efficiency over time (which involves modeling exogenous versus endogenous forces and the impact of covariates/environmental variables on econ performance), and b) persistence which involves identifying the contributions of structural (deterministic) sources and the stochastic sources. The sources of economic dynamics include: i) economic forces (e.g., adjustment cost and financial constraint models), ii) technological characteristics (e.g., physical/biological nature of production, and vintage investment/stock non-convexities like we see with lumpy investment), and iii) cognitive capacity (e.g., learning to adapt to new asset levels).

Course activities
The course consists of theory and method sessions in the morning followed by an afternoon practicum session. The practicum will include applications of the theory, computer analyses with actual data sets, and interpretations in practice. Applications to various economic sectors will be considered such as agriculture, banking and finance, chain management, health, electrical power generation, and sports. Extensions of these models will be addressed that measure the efficiency of value chains, characterize the dynamic linkages in decision making, and introduce hybrid nonparametric-parametric approaches.

Objective
Participants will learn the theories concerning efficiency and productivity measurement and will develop proficiency with software to facilitate the initiation of their own research in efficiency and productivity measurement. The course deals with both conceptual and methodological issues.

In particular, students will understand the following from either course:

- Sources of efficiency from the perspective of technical feasibility, allocating scarce resource among competing ends, and the firm scale of operations;
- The input and output perspectives of technical and allocative efficiency;
- Characterizations of efficiency and productivity growth from a primal, dual and distance function perspectives;
- Decomposition of productivity growth that explicitly accounts for the presence of inefficiency;

- Use DEA models to measure technical, allocative, and scale efficiency levels and productivity growth;
- Characterize definitions of variables of interest to be employed (goods and services; inputs, outputs, environmental, nonmarket goods/services);
- Assess the appropriate use of parametric and nonparametric approaches given the data and problem setting (understanding the advantages and disadvantages of both perspectives);
- Use these approaches to articulate the forces driving efficiency gains and productivity growth;
- Use these approaches for benchmarking, identifying best practice and role models to plan for performance enhancement/gains;

The Dynamic Analysis"" course will further cover:

- Delineation of variable and quasi-fixed factors and their treatment in efficiency and productivity (Dynamic Course);
- Use econometric approaches to address efficiency and productivity change measurement over time (Dynamic Course).

Target Group
The course is oriented toward PhD students, postdoctoral researchers and others with background in agricultural and applied economics.

Duration
Two full weeks comprising 2 distinct parts each of which can be taken separately. Each course will involve daily sessions, with a 3-hour theory session in the morning and a 3-hour practicum session in the afternoon.

Group size
10-20 participants

Location: Wageningen University Building: De Leeuwenborch
Morning sessions:
9.00-12.00 Lecture room C70

Afternoon sessions:
13.30-16.00 Computer room PC 62

Prerequisites:

Nonparametric Efficiency and Productivity Analysis Course:

Microeconomic theory at the graduate level such as the treatment in H. Varian, *Microeconomic Theory*, W.W. Norton. Knowledge of linear programming at the level of Chapter 17 of E. Silberberg and W. Suen, *The Structure of Economics: A Mathematical Analysis*, McGraw-Hill, 2000.

Dynamic Efficiency and Productivity Analysis Course:

Microeconomic theory at the graduate level such as the treatment in H. Varian, Microeconomic Analysis, W.W. Norton. Completion of a course in dynamic optimization is strongly recommended. Econometric theory and applications at the graduate level to include

topics in Maximum Likelihood Estimation and System Estimation are required and some exposure to panel data econometrics is desirable.

Credits and Examination:

For each of the courses, participants will write a paper applying efficiency and productivity concepts discussed in the course. Details of the composition of the paper will be distributed to participants on the first day of the course. The paper will be due 90 days after the course's conclusion. Each course load is 4 ECTS (incl. written assignment) or 1,5 ECTS (no written assignment).

Course Materials:

Fried, H. O., C. A. Knox Lovell and S. S. Schmidt (Editors) The Measurement of Productive Efficiency and Productivity Change, Oxford University Press, 2008. ISBN-10: 0195183525;ISBN-13: 978-0195183528**(Nonparametric Course)**

Kumbhakar, S. and C.A.K. Lovell, Stochastic Frontier Analysis, Cambridge University Press, 2000. **(Dynamic Course)** Reading materials on dynamic production analysis prepared by the authors will be sent to participants in advance of course.

Participants should make sure they have these books before the course starts (books are not included in participation fee).
Articles and other accompanying materials will be distributed at the course

Software

DEA Excel Solver by Joe Zhu will be provided. (This is an add-in to MS Excel which uses the Solver Routine in MS Excel). Some problems may also be solved by LIMDEP (Version 9.0) **(Nonparametric Course)**

STATA and MATLAB will be provided. A software training session will be offered on Sunday afternoon, 2 July 2006 **(Dynamic Course)**

TIMETABLE AND OUTLINE (see at the end of the document)

Each course will involve daily sessions, with a 3-hour theory session in the morning and a 3-hour practicum session in the afternoon.

Course fee:
The course fee for each week is €600. For PhD students of Mansholt Graduate School with an approved TSP the course fee is reduced to €300. For those registering for both weeks the course fees are €950 (€475 for MGS PhDs with an approved TSP).
The course fee does not include books. It includes additional training material, coffee / tea, lunches and informal reception.

Registration Procedure:
Register via the website

http://www.sls.wau.nl/mi/mgs/courses/registration_form_mgs_courses.htm

Please make sure you provide the most recent contact details so that in case of any changes you will be notified promptly. After your Internet registration you will receive a short notification that your name has been registered. At least 2 weeks before the course you will receive a confirmation about the location and the schedule. MG3S will also send a bill to your address indicated in the registration form.

Please e-mail to Marcella.haan@wur.nl in case you have not received the second confirmation two weeks before the course.

Cancellations:
The participants can cancel their registration without any fee 4 weeks before the course starts. Cancellation fee of 100% applies if participant cancels the course less than 4 weeks prior to a course. A replacement is always preferred.

Further Information
For further information please contact dries.hegger@wur.nl

For questions about registration please contact
Marcella Haan
Tel +31 317 484126
Marcella.haan@wur.nl

Further information on Mansholt Graduate School and its educational activities:
http://www.sls.wau.nl/mi/mgs/courses/index.htm

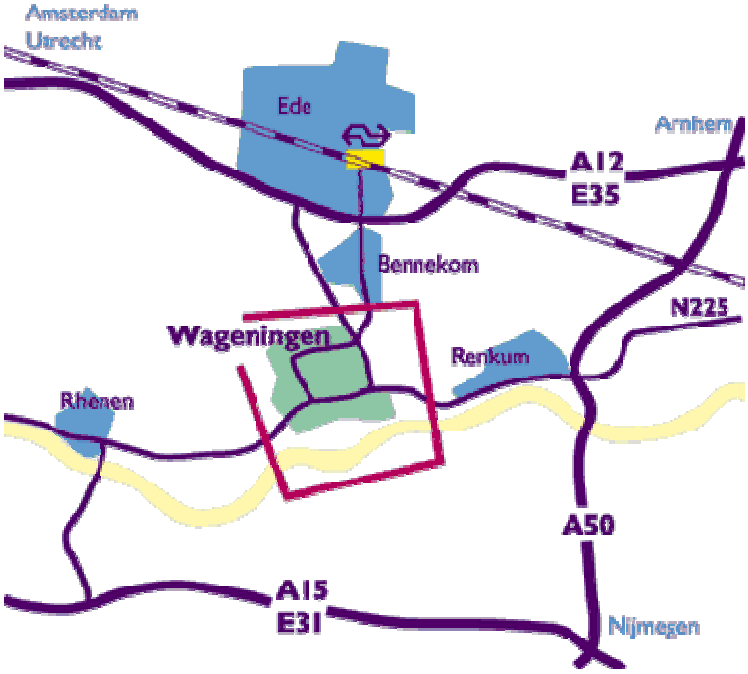
Useful information for participants from outside Wageningen

For more information about the accommodation at the Wageningen International Centre, go to
http://www.wicc-wir.nl

From Schiphol Airport Amsterdam to Wageningen

At the Airport you can buy a train ticket in the baggage claim area. You will see the sign "Train tickets" near the exit. Then follow the signs 'Nederlandse Spoorwegen' (www.ns.nl) or 'Trains and busses' to the railway station.
Purchase a one-way ticket to station Ede-Wageningen, this will cost € 12,50 and € 0,50 service charge if you buy the ticket at the ticket counter. It is also possible to buy the ticket from the ticket vending machines in the station.
There will be a train leaving every 30 minutes from Schiphol, in the direction of Utrecht from rail platform number 1 or 2. On the platform, you will see signs hanging from the ceiling with all names of the different stations where the train will stop. In Utrecht you will need to transfer to another train to "Ede-Wageningen". The train will arrive at station Ede-Wageningen after about 25 minutes.

For Dutch train connections use www.ns.nl, www.thalys.com, www.db.de



Wageningen has no railway station. This lack is fully compensated by accurate means of buses and taxis, as described next.

For information about tickets to some 1400 European destinations and to order them, call Teleservice NS Internationaal: +31 (0)900 92 96 (0.35 euro per minute). You can pay by credit card (EuroCard, MasterCard, VISA or American Express), or by remittance. On-line booking for NS trains (choose station Ede-Wageningen): pre-registration with NS electronic system is required. Prices are mentioned there as well.

From railway station Ede-Wageningen you can take a taxi (approx.15 min.) Taxis leave at the north side of the station. You can also come by bus (bus 86 (direction Arnhem) or bus 88 (Valleilijn, direction Wageningen). Bus 86 leaves at the north side of the station, bus 88 leaves at the South side of the station. You have to purchase a bus "strippenkaart" at the railroad ticket office (in the bus itself the "strippenkaart" is more expensive). Those coming to the Wageningen International Centre have to get off the bus at the bus stop "Busstation". The WIR hotel is situated next to the bus terminal and the WICC hotel approximately 250 meters to the west.

Nonparametric Efficiency & Productivity Analysis Course Schedule and Plan, July 7-11, 2008

Day	Lecture (Leeuwenboch, C70)	Practicum (Leeuwenborch, PC62)
1	• Defining the concept of efficiency using input and output distance functions • Computation of cost efficiency and separation into allocative and technical efficiencies • Linear programming specification to compute technical and cost efficiency • Primal versus dual specification and virtual prices	Participants will compute both technical and allocative efficiency with an input orientation using a prepared and provided data set.
2	• Computation of revenue efficiency and separation of revenue efficiency into allocative and technical efficiencies using linear programming • Environmental variables • Short and long run setting	Participants will compute technical and allocative efficiency with an output orientation, and experiment with specifying short and long run setting.
3	• Profit function and linear programming specification • Directional distance functions • Weight restrictions • Frontier separation • Free Disposable Hull (FDH)	Participants will compute profit efficiency, supply chain efficiencies, frontier separation, and Free Disposal Hull measures.
4	• Value Chain • Bootstrapping • Explaining inefficiency	Bootstrapping DEA. Explaining efficiencies.
5	• Definitions of productivity using input and output measures of productivity • Decomposition into efficiency and technical change components • Malmquist specification • Linear programming specification	Computing Malmquist Productivity and decomposing into efficiency and technological change components.

Dynamic Efficiency & Productivity Analysis Schedule and Plan, July 14-18, 2008

Day	Lecture (Leeuwenborch, C70)	Practicum (Leeuwenborch, PC62)
0	Saturday, July 12 **or** Sunday, July 13 (depending on the availability of rooms)	Optional: Introduction to STATA and Matlab. When registering please mention if will attend (tentatively 14:00-17:00)
1	Characterizing Dynamic Production Analysis • Dynamic Production Functions and Feasible Sets • Primal, Dual & Distance Functions • Dynamic Optimization • Economic Interpretations • Parametic specification	Specifying a system of equations and estimating a dynamic cost and profit functions using a) parametric functional form, and b) distance function. Assume perfect efficiency Introduce data series: US Ag Production: some use aggregate, some use individual states
2	Defining Technical Efficiency • Variable and Quasi-Fixed Perspectives • Primal, Dual & Distance Functions • Nonparametric Perspective • Parametric Perspective • Efficiency Evolution	Computational basis as nonparametric Specify a production function with technical inefficiency. Application: Panel of US Electric utility firms
3	Defining Allocative Efficiency • Variable and Quasi-Fixed Perspectives • Primal, Dual & Distance Functions • Nonparametric Perspective • Parametric Perspective • Efficiency Evolution	Computational basis as nonparametric Parametric Estimation of allocative inefficiency Application: Panel of US Electric utility firms
4	Defining Productivity Growth: Definition and Decompositions • Efficiency Change • Adjustment components • Nonparametric Perspective • Parametric Perspective	Computational basis as nonparametric Parametric Estimation Application: US Ag data series to construct productivity growth series
5	Advanced Topics • Nonconvexities • Imperfect Competition • Stochastic Specifications in Frontier Setting	Discussion of the research literature and empirical applications

Accommodation possibilities in Wageningen:

Hotels:
WICC: 75 euro for 1 persons room, 98.50 euros for 2 persons room, both prices are including breakfast; www.wicc.nl

Hotel de Wageningseberg: 62.50 euro 1 person room, 97.50 euro for 2 persons room, also including breakfast; www.wageningseberg.com

Hotel Nol in 't Bosch: 83,50 euro for 1 person room, 110 euro for 2 persons room, also including breakfast; http://www.nolintbosch.nl/

Hotel de Nieuwe Wereld (Hotel School): 50-60 euro for a 1 person room.
http://www.denieuwewereld.nl (only in Dutch)

Bed&Breakfast:
B& B De Heksenspeeltuin: 25 euro for a 1 person room
Address: Einthovenstraat 15, 6706JA Wageningen
Phone: +31 317-418161
E-mail: callyd@zonnet.nl
Website: www.heksenspeeltuin.nl (only in Dutch)

Villaria Bed en Breakfast: 32-38 euro for a 1 person room
Address: Nassauweg 21, 6703CG Wageningen
Phone: +31 317-419636
Emai: villaria@hari.demon.nl

Ons Bakhuus Bed & Breakfast: 25 euro for a 1 person room
Address: Dolderstraat 64, 6706 JG Wageningen
Phone.:+31 317-411994
E-mail: janny.wijbo@chello.nl

Knollywood Bed & Breakfast: 35 euro for a 1 person room
Address: L. Roggeveenstraat 39, 6708 SL Wageningen
Phone: +31 317-420970
E-mail: Knollywood@hetnet.nl

De Herbergh Bed & Breakfast: 45 euro for a 1 person room
Address: Generaal Foulkesweg 8, 6703 BR Wageningen
Phone: +31 317-410747
E-mail: glindenbergh@wanadoo.nl