

EFFICIENCY AND PRODUCTIVITY ANALYSIS – DETERMINISTIC APPROACHES

Instructors

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Course Description

The course learning objectives address both conceptual and methodological issues of deterministic approaches of efficiency and productivity measurement. Data envelopment analysis (DEA) is the methodological core of the course. This non-parametric approach uses empirical data to determine a frontier representing the best practice as a basis for measuring inefficiency. DEA bridges the gap between theory and practice. To accomplish this objective, theoretical and methodological sessions will be followed by examples of empirical applications in agriculture and practical exercises. Upon completion of this course, students will understand the underlying theory and become familiar with the software to initiate their own research project using parametric approaches to modeling efficiency and productivity.

This course on deterministic approaches to efficiency measurement can be complemented by a course on parametric approaches. Both courses comprise 5 days of teaching. Students may enroll for either the deterministic or the parametric course, or both. Students are encouraged to take both parts, although each part is independent.

Course Outline - Topics

I. Introduction to Efficiency and Productivity Measurement Theory

- Introduction
- Some Informal Definitions
- Overview of Methods

II. Some Issues of Production Economics

- Introduction
- Production Functions
- Price Information and Cost Minimization and Profit Maximization
- Econometric Estimation of Production Functions
- Duality in Production
- Multi-Output Production and Distance Functions
- Conclusions

III. Index Numbers Theory

- Introduction
- The General Input Numbers problem
- Price and Quality Index Numbers
- Total Factor Productivity Measurement (TFP) Using Index Numbers
- Practical Calculations Using Computer

IV. Efficiency Measurement Using Data Envelopment Analysis (DEA)

- Concepts of Technical, Allocative and Scale Efficiencies
- Input-Oriented Measures
- Output-Oriented Measures
- Return-to-Scales
- Simple Numerical Example
- Data Envelopment Analysis Model
- Practical Calculation Using Computer

V. Productivity Measurement Using Efficiency Measurement Methods

- Introduction
- Malmquist TFP Index and Distance Functions
- Decomposition of Malmquist TFP Index
- Lueneberger Productivity Index
- Window Analysis
- Practical Calculation Using Computer

Teaching methods

Lectures (50 %), exercises (20 %), group work (5 %), home work (25 %)

Grading

Participants will work on an assignment applying efficiency and productivity concepts presented in the course to a given data set. Details of the composition of the assignment will be distributed to participants on the last day of the course. The assignment will be due six weeks after the course end and will be sent to the instructors by email.

Credit points

3

Requirements

Microeconomic theory at the graduate level such as the treatment in H. Varian, Microeconomic Analysis, 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.

Necessary course materials

CHARNES, A., COOPER, W., LEWIN, A., SEIFORD, L. (1994): Data envelopment analysis. Theory, methodology and applications, Kluwer Academic Publishers, Boston/Dordrecht/London.

COELLI, T., RAO, P., BATTESE, G. (1998): An introduction to efficiency and productivity analysis, Kluwer Academic Publishers, Boston/Dordrecht/London.

COOPER, W., SEIFORD, L., TONE, K. (1999): Data envelopment analysis: A comprehensive text with models, applications, references and DEA-solver software, Kluwer Academic Publishers, Boston/Dordrecht/London.

FÄRE, R., PRIMONT, D. (1995): Multi-output production and duality: Theory and applications, Kluwer Academic Publishers, Boston/Dodrecht/London.

Software

DEAP, EMS, OnFront

Organisation and time

The course is organised as a one-week (5 full days) block module. It will be held at the Institute of Agricultural Development in Central and Eastern Europe (IAMO).

Language

English