

MODULE SPECIFICATION • ELECTIVE

# Econometric Production Analysis

This course provides students with an in-depth understanding of the fundamental concepts of econometric production analysis and with the practical skills to use econometric software to empirically analyse production technologies and producer behaviour. The module builds on the foundation of core econometrics courses and prepares students for MSc and PhD research or work as an econometrician, consultant or quantitative analyst for public and private institutions within the broad area of econometric production analysis.

|                      |                             |                             |                            |
|----------------------|-----------------------------|-----------------------------|----------------------------|
| <b>10</b><br>CREDITS | <b>15h</b><br>CONTACT HOURS | <b>85h</b><br>PRIVATE STUDY | <b>100h</b><br>TOTAL STUDY |
|----------------------|-----------------------------|-----------------------------|----------------------------|

COURSE CONVENOR

NAME      Prof Anne Vanhems

OFFICE    By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 7910 is a 10-credit course and students are expected to input approximately 100 hours of study. The total number of contact hours is 15 hours, leaving 85 hours for private study. Delivery is by lectures — 15 hours across the first three weeks of term, comprising 10 hours of lectures and 5 hours of tutorials. Optional clinics run on the last day of the course.

During private study, balance the course material (the primary source) against the recommended textbooks: think critically about how these fit into the body of knowledge, perform the exercises, complete coursework and revise. You can expect to perform well only by working consistently through the year.

## MODULE PROGRAMME

| LECT. | TOPIC                                                                    | SESSION CONTENT                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01    | Introduction and Econometric Analysis with Production Functions (part 1) | <ul style="list-style-type: none"> <li>— Microeconomic production theory (primal approach)</li> <li>— Statistical methods</li> <li>— Empirical analyses</li> <li>— Cobb–Douglas production function</li> </ul>                                                                                                                                                                                                             |
| 02    | Econometric Analysis with Production Functions (part 2)                  | <ul style="list-style-type: none"> <li>— Translog production function</li> <li>— Constant Elasticity of Substitution (CES) production function</li> <li>— General topics regarding production functions</li> </ul>                                                                                                                                                                                                         |
| 03    | Econometric Analysis with Cost Functions                                 | <ul style="list-style-type: none"> <li>— Microeconomic theory: cost functions</li> <li>— Cobb–Douglas and Translog cost functions</li> <li>— General topics regarding cost functions</li> </ul>                                                                                                                                                                                                                            |
| 04    | Stochastic Frontier Analysis                                             | <ul style="list-style-type: none"> <li>— Microeconomic theory</li> <li>— Stochastic frontier analysis</li> <li>— Cobb–Douglas and Translog stochastic production frontier</li> <li>— Cobb–Douglas stochastic cost frontier</li> </ul>                                                                                                                                                                                      |
| 05    | Econometric Analysis of Multiple–Output Technologies                     | <ul style="list-style-type: none"> <li>— Microeconomic theory</li> <li>— Cobb–Douglas and Translog cost functions for multiple outputs</li> <li>— Other topics regarding cost functions for multiple outputs</li> <li>— Cobb–Douglas and Translog output distance function</li> <li>— Cobb–Douglas and Translog input distance function</li> <li>— Cobb–Douglas and Translog stochastic ray production frontier</li> </ul> |

## KEY SKILLS

By the end of this course, students should have some knowledge and understanding of:

- The basics of microeconomic production theory that build the theoretical foundation of econometric production analysis
- The taught approaches to econometric production analysis and their suitability in various empirical settings
- Using econometric software to empirically analyse production technologies and producer behaviour

## DESIRED OUTCOMES

By the end of this course, students should be able to:

- Calculate various indicators of production technologies and producer behaviour and interpret their meaning in the real world
- Apply various approaches to econometric production analysis to investigate real-world questions
- Critically evaluate the appropriateness of a specific econometric production analysis for analysing a specific real-world question
- Communicate and present the results of econometric production analysis in oral and written form with clarity and succinctness

## ASSESSMENT

WEIGHTING      100% coursework

|            |                                                                                                   |
|------------|---------------------------------------------------------------------------------------------------|
| ISSUED     | End of week 6                                                                                     |
| DUE        | End of week 10 — four weeks for completion                                                        |
| SUBMISSION | Electronically via the Moodle site for this course                                                |
| FEEDBACK   | Returned within 4 weeks of the deadline, as marker's notes appended to the PDF of your coursework |

Marking criteria and penalties are set out in the Economics Undergraduate Handbook and the general course information paper, available via the Current Student page of the university website under Academic Regulations.

#### COURSE TEXT & RECOMMENDED READING

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Copies of the lecture slides are made available on the course web pages, together with additional material and course announcements.

- Henningsen, A. (2020). Introduction to Econometric Production Analysis with R. Collection of Lecture Notes, 5th draft version. Department of Food and Resource Economics, University of Copenhagen. Available at <http://leanpub.com/ProdEconR/>
- Chambers, R. G. (1988). Applied Production Analysis: A Dual Approach. Cambridge University Press
- Coelli, T. J., Rao, D. S. P., O'Donnell, C. J. and Battese, G. E. (2005). An Introduction to Efficiency and Productivity Analysis, 2nd edition. Springer
- Henningsen, A., Bělin, M. and Henningsen, G. (2017). New Insights into the Stochastic Ray Production Frontier. Economics Letters 156, 18–21
- Henningsen, A. and Henning, C. H. C. A. (2009). Imposing Regional Monotonicity on Translog Stochastic Production Frontiers with a Simple Three-Step Procedure. Journal of Productivity Analysis 32, 217–229
- Henningsen, A., Henningsen, G. and Literáti, G. Econometric Estimation of the Constant Elasticity of Substitution Function in R: the micEconCES Package. In Hashimzade, N. and Thornton, M. (eds), Handbook of Research Methods and Applications in Empirical Microeconomics. Edward Elgar