

SYLLABUS

Measuring the Efficiency of Public Institutions: Theoretical Foundations, Methodological Approaches, and Evidence from Judicial Systems

Lecturer: Prof. Dr. Waldemar Florczak, Institute of Economics, Finance and
Management, Jagiellonian University in Cracow

Course type: Lecture / Workshop (10 academic hours; 1 academic hour = 45 minutes)

Target group: Undergraduate students in Business, Economics and Real Estate

The structure of the course:

Enrollment: March 2 – April 10, 2026

Deadline to de-register from the seminar: March 2 – April 13, 2026

UR Students of the Faculty of Business, Economics and Real Estate: Registration in person at the Examination Office with Mr. Hendel and Mrs. Ehemann

Erasmus/exchange students (of the Faculty of Business, Economics and Real Estate) by email to: sekretariat.fo@ur.de using the [accreditation form](#)

Wednesday April 15: 4 – 7.15 pm in R 006
Thursday April 16: 6 – 7.30 pm in R 006
Friday April 17: 12 – 3.15 pm in H 7
Monday April 20: 6 – 7 pm in R 006 (exam)

A successful pass in this course is worth **2 Credits**. The course may be integrated in the **elective module**.

Course description:

This intensive lecture-workshop provides a rigorous introduction to the measurement of efficiency in public institutions, with particular emphasis on judicial systems. The course combines theoretical foundations of efficiency analysis with advanced methodological tools and empirical applications. Special attention is paid to non-market public services, where outputs are multidimensional and prices are missing or distorted. The course integrates economic theory, operational research, and applied econometrics.

The empirical backbone of the course is Data Envelopment Analysis (DEA), including cross-sectional, time-as-DMU, and panel-data approaches, supported by hands-on applications using the open-access Python package pyDEA. Students will work with stylized and real-world data inspired by the Polish system of ordinary courts. The Malmquist Productivity Index (MPI) is introduced as a dynamic extension enabling the analysis of productivity change over time.

Learning objectives:

Upon successful completion of the course, students will:

1. Understand the economic rationale for efficiency measurement in the public sector.
2. Distinguish between technical, allocative, and scale efficiency in non-market settings.
3. Critically assess the limitations of ratio-based and indicator-based performance measures.
4. Understand the theoretical foundations of frontier efficiency analysis.
5. Apply DEA models under CRS and VRS assumptions.
6. Interpret efficiency scores in cross-sectional and temporal contexts.
7. Compute and interpret Malmquist productivity indices.
8. Use pyDEA software to solve applied efficiency problems.
9. Critically evaluate empirical results from judicial efficiency studies.

Skills and competencies acquired:

Students completing the course will be able to:

- Formulate efficiency measurement problems for public institutions.
- Select appropriate input-output specifications for judicial systems.
- Implement DEA models using open-source software.
- Conduct cross-sectional, time-as-DMU, and panel DEA analyses.
- Measure productivity change using the Malmquist Index.
- Interpret efficiency and productivity results in policy-relevant terms.
- Critically assess methodological assumptions and robustness.

Course structure (8 academic hours):

Block 1: Conceptual and theoretical foundations

- Efficiency in economic theory: Pareto efficiency, production theory.
- Specificity of public-sector production.
- Outputs without market prices.
- Judicial systems as public production units.
- Typology of efficiency measures.
- Limitations of traditional indicators.

Block 2: Frontier methods and DEA foundations

- Frontier efficiency analysis.
- Parametric vs non-parametric approaches.

- DEA methodology: basic intuition.
- CRS vs VRS models.
- Input vs output orientation.
- Geometric interpretation of DEA.

Block 3: Advanced DEA applications to judicial systems

- Choice of inputs and outputs in courts.
- Cross-sectional DEA.
- Time-as-DMU approach.
- Panel DEA concepts.
- Introduction to pyDEA (open access).
- Hands-on illustration using judicial data (Poland).

Block 4: Dynamic efficiency and Malmquist Index

- Productivity vs efficiency.
- Distance functions.
- Malmquist Productivity Index.
- Decomposition into efficiency change and technical change.
- Interpretation issues.
- Empirical examples from judiciary studies.

Teaching methods:

- Lectures with theoretical exposition.
- Guided discussion of empirical studies.
- Demonstration of pyDEA in Python environment.
- Interpretation exercises based on real datasets.

Assessment:

- Active participation.
- Short analytical assignment based on DEA or MPI interpretation.

Recommended literature:

- Avikran, N.K. (2015). Productivity in the Service Sector with Data Envelopment Analysis. *SSRN Working Papers*. DOI:[10.2139/SSRN.2627576](https://doi.org/10.2139/SSRN.2627576)
- Bogetoft, P., Otto, L. (2011). Benchmarking with DEA, SFA, and R. Springer.
- Dyson R.G., Allen R., Camanho A.S., Podinovski V.V., Sarrico C.S., (2001), Pitfalls and Protocols in DEA, *European Journal of Operational Research*, vol. 132, pp. 245-259
- Florczak, W. (2025). Limitations of two-dimensional indicators and unconstrained radial DEA models in evaluating judicial efficiency : insights from Poland's appellate court system. *Ekonomia i Prawo-Economics and Law*, vol. 24, pp. 405-440.
- Ippoliti, R., Tria, G., (2020). Efficiency of judicial systems: model definitions and output estimation. *Journal of Applied Economics*, 23(1), 385-408. <https://doi.org/10.1080/15140326.2020.1776977>.
- Panwar A., Olfati M., Pant M., Snasel V. (2022), A Review on the 40 Years of Existence of Data Envelopment Analysis Models: Historic Development and Current Trends, *Archives of Computational Methods in Engineering*, vol. 29, pp. 5397-5426
- Voigt, S. (2016). Determinants of judicial efficiency: a survey. *European Journal of Law and Economics*, 42, 183-208. <https://doi.org/10.1007/s10657-016-9531-6>.