Productivity and Efficiency Analysis 生產力與效率分析

Course Syllabus

Time & Place: Monday 14:10-17:00 at 儀器設備大樓 IDC Instrument Building 95519
Instructor: 李家岩 博士 Dr. Chia-Yen Lee
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Objective: The objective of this course is to develop an understanding of the analytical and empirical techniques required to conduct a sophisticated analysis of the productivity and efficiency. The subject of the analysis can be as small as a machine or a firm, or as large as an industry or a nation. The techniques integrate the engineering and economic domains. As we study the analytical techniques we shall also examine a wide variety of empirical applications.

Course Content: This course will provide students to learn the engineering characteristics of production systems, understand the microeconomics theory, and evaluate the performance using the methodologies of productivity and efficiency analysis so as to drive productivity. The models include queueing theory, stochastic frontier analysis (SFA), and data envelopment analysis (DEA), etc. The course focuses on “nonparametric DEA technique” and integrates the knowledge domains of the engineering and economics. Finally we should know how to solve the real problem systematically using statistics or optimization methods.

Announcement: Announcements and other information concerning the course will be updated in class or maintained on e-learning website. In addition, it will be used to distribute homework assignments, lectures, and other material as required during the course. Please check this website regularly. Any information posted on it will be as valid as if it was mentioned in class.

Learning Requirement:
1. Know the techniques of productivity and efficiency analysis
2. Create the theoretical model to solve the problem in real setting
3. Develop the research writing skills and prepare a project report

Grading Policy:
Homeworks/ Midterm Exam  20%
Literature Review Project  20%
Research Project  60%
Course Policies

Examinations: All exams will be comprehensive up to a specified topic although emphasis will be on the newer material. The formula sheet will be provided in exam. You are allowed to use calculator. There will be no make-up examinations unless prior arrangements have been made with the instructor. An official written authorized excused is required.

Literature Review Project: This is an individual project. The objective of this project is to ask student to develop the research capability in finding the interesting topic with niche and organize the related knowledge so as to solve the real problem. The student should pick up the specific topic and review the related literature (no more than 3 papers). Write a summarized report (around 5-10 pages) and your review comment.

Research Project: This is an individual project. The objective of the project is to 1) apply the tools you learn from class to solve “real” problem and support decision-making, or 2) Fill the gap in the literature and find the research topic with “niche”. The project should follow the project instruction (delivered to you in class later) and write a research project report (around 15-20 pages). The report violating the project instruction is not accepted.

Any disagreements or questions regarding any graded material must be discussed within one week after it was returned. No grade will be changed after one week time limit.

Course Outline:

1. Introduction
   1.1 Production Systems
   1.2 Productivity vs. Efficiency
2. Queueing Theory
   2.1 Poisson Process
   2.2 Markov Chain
   2.3 Queueing Theory and Network
3. Productivity Analysis
   3.1 Production Economics and Production Function
   3.2 Stochastic Frontier Analysis (SFA)
   3.3 Data Envelopment Analysis (DEA)
      CRS, VRS, Economic Efficiency, Farrell, Koopmans, & Russell measure
   3.4 Advanced Topic in DEA
      Bad Output, Weak Disposability, Bootstrap, Congestion, Contextual Variable, Two-stage
3.5 Productivity Change with Panel Data
   Malmquist Productivity Index, DEA with stochastic data
3.6 Efficiency Aggregation and Decomposition
   Network DEA
3.7 Cutting-Edge Topics
   Stochastic Nonparametric Envelopment of Data (StoNED), Rational Inefficiency

4. Productivity Improvement (if time is allowed)
   4.1 Overall Equipment Effectiveness
   4.2 Lean Manufacturing

Textbook:

References:

Remarks:
1. Teaching in English
2. The students in business school and economics department are welcome.