

AGEC 8080 – Productivity and Efficiency Analysis (Production Economics II) SPRING 2018 SYLLABUS

Class Schedule	MW 11.30am–1pm, Comer Hall 204
Professor	Emir Malikov
Office	304A Comer Hall
Phone	(334) 844-3512
Email	emalikov@auburn.edu
Office Hours	by appointment

COURSE DESCRIPTION

This is a second course in the production economics sequence; it primarily covers the productivity and efficiency analysis and largely has an applied focus. We will begin with a brief review of production theory along with some elements of industrial organization, followed by the discussion of issues pertaining to the econometric measurement of productivity and efficiency. Covered topics include single- and multi-product technologies, good and bad outputs, productivity and decompositions thereof, technical change, technical/cost/profit efficiency, scale and scope economies, market power and markups, learning by exporting, productivity spillovers, etc.

TEXTBOOK

While no book is required, you are strongly advised to consult the following texts:

- *Stochastic Frontier Analysis* by Kumbhakar and Lovell
- *Stochastic Frontier Analysis using Stata* by Kumbhakar, Wang and Horncastle
- *An Introduction to Efficiency and Productivity Analysis* by Coelli, Rao, O'Donnell & Battese
- *The Measurement of Productive Efficiency and Productivity Growth* by Fried, Lovell & Schmidt
- *Applied Production Analysis: A Dual Approach* by Chambers
- *Multi-Output Production and Duality: Theory and Applications* by Färe and Primont

PREREQUISITE KNOWLEDGE

Solid knowledge of the core graduate-level microeconomics, especially the theory of firm, and econometrics material is expected of all students.

GRADING & DELIVERABLES

Your course grade will be based on your class participation, presentations, midterm exam and the final paper (see Table 1). At the end of the course, your score on each of these components will be converted to a 100 point based scale. Your final score in the class will be a weighted average of these points. I will then map your final score (also on a 100 point based scale) to the grade you

will receive in the course using Table 2 (depending on performance of the class, I may adjust this table which you will be notified about).

Table 1: Course Deliverables

<i>Component</i>	<i>Weight</i>
Class Participation + Presentations	30%
Midterm Exam	35%
Final Paper	35%

Table 2: Grade Conversion

<i>Course Grade</i>	<i>Cumulative Score</i>
A	90–100
B	80–89
C	70–79
D	60–69
F	below 60

Requests to revise grades on assignments are accepted in writing only. Please compose a brief letter argumentatively explaining (point by point) why you think your grade should be changed, then turn in this letter along with the original assignment back to me. You may contest your grade within two weeks from the date your graded assignments was returned to you.

Attendance. Attendance is mandatory.

Class Participation. I expect you to come to class prepared to contribute to the class discussion. Hence, make sure to keep up with the material as well as to never be shy to speak up in class.

Exam. The exam date is to be determined depending on the flow of the class. You should expect it around April. I will announce the exact date at least two weeks in advance. No make-ups.

Final Paper. The final paper is meant to demonstrate your ability to apply the material and techniques covered in class in a practical context. I will provide you with both the data and the instructions about the analysis to be performed. If you have a viable research idea and the micro-level production data, I may let you work on your own project instead. The paper is due by 5 pm on Wednesday, May 2nd. No late submissions and no extensions.

ANNOUNCEMENTS

All announcements as well as supplementary material will be posted on *Canvas*. It is your responsibility to check for announcements at least once a day.

OFFICE HOURS

I do not have posted office hours, so please email me for an appointment or just drop by my office to see if I am available. If you cannot make it to see me in my office, feel free to email me with any questions — I will be happy to help. However, please keep in mind that it is nearly impossible to meaningfully answer *conceptual* questions via email. In such instances, I will customarily ask you to see me in person in order to get your question answered/explained.

ACADEMIC HONOR POLICY

Auburn University expects students to pursue their academic work with honesty and integrity. Violations of this principle may include:

- The possession, receipt or use of any material or assistance not authorized in the preparation of any essay, laboratory report, examination or class assignment to be submitted for credit as part of course or to be submitted in fulfillment of a University requirement. The possession, receipt or use of unauthorized material while an exam or quiz is in progress, or cheating of any other nature, will be a violation of the Code;
- Knowingly giving assistance to another in such preparation;
- Selling, giving, lending or otherwise furnishing to any other person any material that can be shown to contain the questions or answers to any examination scheduled to be given at some subsequent date in any course of study, excluding questions and answers from tests previously administered and returned to a student by the instructor;
- Altering or attempting to alter an assigned grade on any official University record. This violation may also be subject to review and action by the Student Disciplinary Committee;
- An instructor may delineate in advance other actions he or she considers a violation of the Code. For example, the teacher may consider it dishonest or unethical to submit the same paper for credit in more than one course unless specific permission has been given in advance.

For more, please consult the university's *Student Academic Honesty Code*.

STUDENTS WITH DISABILITIES

Students who need accommodations should electronically submit their approved accommodations through AU Access and then arrange a meeting during office hours to discuss your accommodations. If you have a conflict with my office hours, email me to arrange an appointment at different time. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

COURSE OUTLINE

This course outline is tentative and subject to change.

(1) Foundations of the Multi-Output Multi-Input Production Theory

- Set representations of production technologies
- Primal functional characterizations of production technologies: production/transformation functions, radial input/output distance functions
- Dual functional characterizations of production technologies: cost, revenue function and profit functions
- Scale elasticity and returns to scale: primal/dual measures
- Technical change: primal/dual measures

(2) Basics of Efficiency

- (Primal) technical efficiency: single-output and radial multi-output measures
- (Dual) economic efficiency and the decomposition thereof: cost/revenue/profit efficiency

(3) Productivity Growth

- Divisia index of productivity growth
- Primal and dual productivity growth decompositions

(4) (Parametric) Stochastic Frontier Models

- Cross-sectional models
 - Panel-data models
 - Modeling determinants of inefficiency
 - System-based models, models with allocative inefficiency
 - Solutions to the endogeneity problem
- Kumbhakar. (2013). Specification and Estimation of Multiple Output Technologies: A Primal Approach. *European Journal of Operational Research*
 - Atkinson, Cornwell, and Honerkamp. (2003). Measuring and Decomposing Productivity Change: Stochastic Distance Function Estimation versus Data Envelopment Analysis. *Journal of Business and Economic Statistics*
 - Tsionas, Kumbhakar, and Malikov. (2015). Estimation of Input Distance Functions: A System Approach. *American Journal of Agricultural Economics*

(5) Modeling Bad Outputs

- Hyperbolic and enhanced hyperbolic distance functions
 - Additive/multiplicative directional distance functions
- Cuesta and Zofío. (2005). Hyperbolic Efficiency and Parametric Distance Functions: With Application to Spanish Savings Banks. *Journal of Productivity Analysis*
 - Cuesta, Lovell, and Zofío. (2009). Environmental Efficiency Measurement with Translog Distance Functions: A Parametric Approach. *Ecological Economics*
 - Färe, Grosskopf, Noh, and Weber. (2005). Characteristics of a Polluting Technology: Theory and Practice. *Journal of Econometrics*
 - Malikov, Kumbhakar, and Tsionas. (2016). A Cost System Approach to the Stochastic Directional Technology Distance Function with Undesirable Outputs: The Case of US Banks in 2001–2010. *Journal of Applied Econometrics*
 - Agee, Atkinson, Crocker, and Williams. (2014). Non-Separable Pollution Control: Implications for a CO₂ Emissions Cap and Trade System. *Resource and Energy Economics*

(6) Scope Economies

- Pulley and Braunstein. (1992). A Composite Cost Function for Multiproduct Firms with an Application to Economies of Scope in Banking. *Review of Economics and Statistics*
- Evans and Heckman. (1984). A Test for Subadditivity of the Cost Function with an Application to the Bell System. *American Economic Review*
- Berger, Cummins, Weiss, and Zi. (2000). Conglomeration versus Strategic Focus: Evidence from the Insurance Industry. *Journal of Finance Intermediation*
- Malikov, Zhao, and Kumbhakar. (2017). Economies of Diversification in the US Credit Union Sector. *Journal of Applied Econometrics*

(7) Proxy Estimators

- OP/LP estimators

- ACF/GNR unidentification critiques and solutions thereto
 - Controlled productivity evolution: R&D, learning by exporting
 - OP-style productivity decomposition and extensions thereof
- Olley and Pakes. (1996). The Dynamics of Productivity in the Telecommunications Equipment Industry. *Econometrica*
 - Levinsohn and Petrin. (2003). Estimating Production Functions using Inputs to Control for Unobservables. *Review of Economic Studies*
 - Akerberg, Caves, and Frazer. (2015). Identification Properties of Recent Production Function Estimators. *Econometrica*
 - Gandhi, Navarro, and Rivers. (2017). On the Identification of Gross Output Production Functions. *Journal of Political Economy*
 - De Loecker. (2013). Detecting Learning by Exporting. *American Economic Journal: Microeconomics*
 - Malikov, Zhao, and Kumbhakar. (2017). Estimation of Firm-Level Productivity in the Presence of Exports: Evidence from China’s Manufacturing. *WP*
 - Melitz and Polanec. (2015). Dynamic Olley–Pakes Productivity Decomposition with Entry and Exit. *RAND Journal of Economics*
 - Hashiguchi. (2015) Allocation Efficiency in China: An Extension of the Dynamic Olley–Pakes Productivity Decomposition. *WP*

(8) Market power and markups

- Cost-based estimation of markups and stochastic frontier models
 - Production-function-based estimates of markups
- Koetter, Kolari, and Spierdijk. (2012). Enjoying the Quiet Life under Deregulation? Evidence from Adjusted Lerner Indices for US Banks. *Review of Economics and Statistics*
 - Tsionas, Malikov, and Kumbhakar. (2017). An Internally Consistent Approach to the Estimation of Banks’ Market Power and Cost Efficiency. *WP*
 - De Loecker and Warzynski. (2012). Markups and Firm-Level Export Status. *American Economic Review*