ECO 310 H1F
EMPIRICAL INDUSTRIAL ORGANIZATION

DEPARTMENT OF ECONOMICS. UNIVERSITY OF TORONTO
Fall 2022

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Course Website in Quercus: https://q.utoronto.ca/courses/281040

- **Lectures (Presential):** Thursdays 10am-12pm – Classroom, Sidney Smith (SS) 1071
- **Tutorials (Presential):** Thursdays 12pm-1pm – Classroom, Sidney Smith (SS) 1071
- **Office Hours (Presential):** Thursdays 4pm-5pm – Max Gluskin House (GE), Office 309

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1. COURSE DESCRIPTION

This course is an introduction to Empirical Industrial Organization (IO). IO studies how markets work, how firms compete or collude with each other, and how these interactions determine important outcomes as prices, quality, profits and consumer welfare. IO emphasizes the interdependence in the decisions of firms operating in a market. For instance, when a firm decides increasing the price of its products, it should take into account how other firms' in the market will response by changing their own prices. These interdependences underly firms' decisions and market competition.

Over the last two decades, research in IO has become predominantly empirical. IO economists use data on consumers' and firms' decisions to measure consumer demand, firms' costs, and profitability. They apply these measurements to understand firms' strategies, and to analyze how government regulations affect market competition and ultimately social welfare. The growing availability of rich data on consumers' and firms' choices ("big data") is having an important impact in this field by generating new types of empirical questions that require new models and methods.

Empirical IO emphasizes the importance of combining data, economic models, and appropriate econometric techniques to answer empirical questions. In terms of models and econometric methods, there are four main *workhorses* that account for most of the research in this field: (i) production functions and the measurement of firm productivity; (ii) demand models and the estimation of consumer preferences; (iii) models of price and quantity competition; and (iv) models of market entry and innovation, both static and dynamic. This course is organized around these important models.

Econometrics and data analysis are fundamental tools for the modern economist of the 21st century. They are also key tools in this course. We will review and apply some standard econometric models and methods such as the linear regression model, instrumental variables estimation, and discrete choice models. Students will gain practical experience working with economic data and making use of the STATA Statistical Software package.

2. COURSE OBJECTIVES

- By the end of this course, students will:

  (i) Understand the main features of empirical models of demand, production function, price and quantity competition, and market entry.

  (ii) Know how to use market data to estimate the parameters of these empirical models and interpret the economic implications of these estimations.

  (iii) Have enough programming experience using Stata, and practical experience using actual data such that they can work in a research project in empirical IO.

- **Tutorials are a fundamental part of this course**. The main purpose of the tutorials is to provide programming experience and practical experience with actual market data. This part of the course is not only fundamental to complete the problems sets of the course, but also for some practical questions in the midterm and final exams. I expect students to attend and participate actively in all the tutorials.

3. COURSE PREREQUISITES

- *Microeconomic Theory:* ECO200 Y1, or ECO204 Y1, or ECO206 Y1.
- *Quantitative Methods:* ECO220 Y1, or ECO227 Y1, or (STA237 H1 & STA238 H1), or (STA247 H1 & STA248 H1), or (STA257 H1 & STA261 H1).

***** It is the student's responsibility to ensure s\he has met the prerequisites for this course.**

4. RECOMMENDED COURSES (but not prerequisites)

- ECO380 H1: Markets, Competition, and Strategy. This course covers the theory of IO.
- Applied Econometrics: ECO372 H1, ECO375 H1, or equivalent.

5. CLASS MEETINGS

- **Lectures (Presential):** Thursdays 10am-12pm – Classroom, Sidney Smith (SS) 1071

- **Tutorials (Presential):** Thursdays 12pm-1pm – Classroom, Sidney Smith (SS) 1071

- Please, keep in mind the following **expectations**.

  (i) **Missing a lecture** or tutorial without justification will be penalized with 3 percentage points from your maximum of 10 points from class participation. This does not mean that attending a lecture –without active participation – grants you points in your class participation grade.

  (ii) Show up for classes **on time**. Give your best effort to fully engage in learning activities.

6. EVALUATION

- Your final grade will be based on the evaluation of class participation, two problem sets, a midterm exam, and a final exam according to the following weighting:

Class Participation:	10%
Problem sets (2 sets):	40%
Midterm Exam:	20%
Final Exam:	30%

- ***Class Participation (10%).*** Your grade will be based on your active participation in class – asking and responding questions and engaging in discussions on the course material – and on (unannounced) in-class quizzes.

- ***Problem sets (40%).*** There will be two problem sets, each worth 20%. In these problem sets you will have to use the STATA software package.

  - Problem set 1 will be handed out on Thursday, September 22nd (it will be posted at the course website in Quercus) and it is **due before Thursday, September 29th, through Quercus before 11:59pm**.

  - Problem set 2 will be handed out on Thursday, November 3rd (it will be posted at the course website in Quercus) and it is **due before Thursday, November 17th, through Quercus before 11:59pm**.

  - Your answers to the problem sets should be typed and submitted in electronic version, preferably in PDF format.

  - Late assignments will not be accepted and will receive a grade of zero.

- ***Midterm Exam (20%).*** Closed-Book exam, no aids allowed. The material covered in this Midterm Exam includes all the lectures and tutorials from Week 1 to Week 7, included. The duration of the exam is 1.5 hours. The exam will take place in class during lecture/tutorial time on **Thursday, October 27th**.

- ***Final Exam (30%).*** Closed-Book exam, no aids allowed. The material covered in this Final Exam includes all the lectures and tutorials from Week 1 to Week 12, included. The duration of the exam is 3 hours. The exam will take place **during the University Final Exam Period**. **Date, Time, and Location to Be Announced**.

7. MISSED DEADLINES

If you miss a deadline due to illness or injury, you must send me an email from your UofT email account within 24 hours of the missed deadline, concisely explaining why you missed it. You should also report your absence through the online absence declaration available on **ACORN** under the Profile and Settings menu. Once the appropriate documentation is submitted and verified, you will have to write a make-up test within one week of the missed test, at a time and date chosen by the instructor, and with as little as one day's notice.

8. ACADEMIC CONDUCT

All students, faculty and staff are expected to follow the University's guidelines and policies on academic integrity. For students, this means following the standards of academic honesty when writing assignments, collaborating with fellow students, and writing tests and exams. Ensure that the work you submit for grading represents your own honest efforts. Plagiarism—representing someone else's work as your own or submitting work that you have previously submitted for marks in another class or program—is a serious offence that can result in sanctions. Speak to me or your TA for advice on anything that you find unclear. To learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at http://www.writing.utoronto.ca. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity and http://academicintegrity.utoronto.ca**.** All cases of suspected academic misconduct will be referred to the Dean's office.

9. ACCESSIBILITY

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting http://www.studentlife.utoronto.ca/as/new-registration. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work.

10. E-MAIL POLICY

Use e-mails for appointments, administrative matters, or urgent issues. Questions about the course material, lectures, and tutorials are more appropriate for office hours. I will normally reply to e-mails within 24 hours. You must use your UofT e-mail address and include the course number "ECO 310" in the subject line, otherwise your e-mail may be automatically quarantined as "junk e-mail".

11. TEST SCORE APPEALS

Please write a short paragraph explaining why you should obtain additional points. Turn in a hard copy of this by the end of the week following the week in which exams are first handed back. Your entire exam will then be re-graded, **and your score may go up or down**.

12. COURSE WEBSITE

The course web-site in Quercus is https://q.utoronto.ca/courses/281040. I will use the course web-site as a means of communication with the class, so I recommend you check the announcements regularly. In addition, I will periodically post the lecture slides online.

13. COURSE MATERIAL

- There is no textbook. The course is organized around a Book Project, four survey papers in Empirical IO and Structural Econometrics (see Main References below), and published articles on empirical applications. The lecture notes and the surveys are key references for this course.

- You are required to have access to the STATA software package. You can get the student version inexpensively from the software licensing office in Robarts library. The six month license of STATA/IC is sufficient for this course.

- In addition, a useful supplemental econometrics reference is:

  Jeffrey M. Wooldridge: "Introductory Econometrics: A Modern Approach", 4th Edition or later.

  Although it is not required, this textbook is available for purchase at the U of T Bookstore. Free copies are available online.

14. MAIN REFERENCES

PDF copies of these references are available online in the course website.

- [ABBP] Ackerberg, D., L. Benkard, S. Berry, and A. Pakes (2006): "Econometric Tools for Analyzing Market Outcomes," *Handbook of Econometrics*, volume 6.
- [AG] Aguirregabiria, V. (2019): Book Project: "Empirical Industrial Organization: Models, Methods and Applications." Available at the course website.
- [ASL] Aguirregabiria, V., and M. Slade (2017): "Empirical Models of Firms and Industries," *Canadian Journal of Economics*, 50(5), 1445-1466.
- [ASU] Aguirregabiria, V. and J. Suzuki (2016): "Empirical Games of Market Entry and Spatial Competition in Retail Industries," *Handbook on the Economics of Retail and Distribution*, Chapter 9, pp 201-233. Emek Basker (editor). Edward Elgar Publishing.
- [BR] Berry, S., & Reiss, P. (2007): "Empirical Models of Entry and Market Structure," in *Handbook of Industrial Organization*, Volume 3, pp. 1845-1886.
- [NE] Nevo, A. (2011): "Empirical Models of Consumer Behavior," *Annual Review of Economics*, 3, 51-75.
- [RW] Reiss, P., and Wolak, F. (2007): "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," in *Handbook of Econometrics*, Volume 6, pp. 4277-4415.

15. LIST OF TOPICS

1. Introduction to the Course.

2. Measuring Productivity. Estimation of Production Functions.

3. Measuring Consumer Preferences. Estimation of Demand of Differentiated Products

4. Competition in Prices and Quantities.

5. Empirical Models of Market Entry

16. OUTLINE AND REFERENCES

1. Introduction to the Course

1.1. Measuring and explaining market power
1.2. Data in Empirical IO
1.3. Structural models in Empirical Industrial Organization: An Example
1.4. An overview of the rest of the course

Readings:

- [AG] Chapter 1.
- [RW] Sections 1 to 5.

2. Measuring Productivity. Estimation of Production Functions

2.1 Introduction
2.2. Simultaneity Problem
2.3 Dynamic Panel Data Methods
2.4. Control function methods
2.5. Application.

Readings:

- [AG] Chapter 2.
- [ASL] Section 3.
- [ABBP] Section 2.
- Griliches, Z., and J. Mairesse (1998): "Production Functions: The Search for Identification," in Econometrics and Economic Theory in the Twentieth Century.

3. Measuring Consumer Preferences. Estimation of Demand of Differentiated Products

3.1. Introduction
3.2. Demand systems in product space
3.3 Demand systems in characteristics space
3.4. Application

Readings:

- [AG] Chapter 3.
- [ASL] Section 4.
- [ABBP] Section 1.
- [NE] whole paper.
- [RW] Section 7.
- Berry, S. (1994). "Estimating Discrete-Choice Models of Product Differentiation," *RAND Journal of Economics*, 25(2), 242-262.
- Berry, S., Levinsohn, J., and Pakes A. (1995). "Automobile Prices in Market Equilibrium," *Econometrica*, 63(4), 841-890.

4. Competition in Prices and Quantities

4.1. The Conjectural Variation Approach
4.2. Testing static oligopoly models (Genesove and Mullin: RAND 1998)
4.3. Nevo on Cereals (Nevo, 2001)

Readings:

- [AG] Chapter 4.
- [ASL] Section 3.
- [RW] Section 6.
- Genesove, D., and Mullin, W. (1998). "Testing static oligopoly models: Conduct and Cost in the Sugar Industry," RAND Journal of Economics, Vol. 29(2), pp. 355-377.

- Nevo, A. (2001): "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, 69(2), 307-342.

5. Empirical Models of Market Entry

5.1. Some general ideas
5.2. Bresnahan and Reiss (JPE, 1991)
5.3. Empirical Models of Market Entry with Heterogeneous firms

Readings:

- [AG] Chapter 5.
- [BR] All sections.
- [RW] Section 10
- [ASU] All sections.
- Bresnahan, T. and P. Reiss (1991): "Entry and Competition in Concentrated Markets," *Journal of Political Economy*, 95, 977-1009.

17. LECTURES, TUTIRUALS & IMPORTANT DAYS

- **Week 1**. Thursday, Sep. 8
  - Lecture 1. *Introduction to the course*
  - Tutorial 1. *Refreshing Econometrics*

- **Week 2**. Thursday, Sep. 15
  - Lecture 2. *Measuring Firm Productivity – Intro, Model*
  - Tutorial 2. *Introduction to STATA*

- **Week 3**. Thursday, Sep. 22
  - Lecture 3. *Measuring Firm Productivity – Econometric issues and methods*
  - Tutorial 3. *Estimating Production Functions in STATA*
  - ✓ **Thursday, Sep. 22: Problem Set #1 is handed out**

- **Week 4**. Thursday, Sep. 29
  - Lecture 4. *Measuring Firm Productivity – Empirical applications*
  - Tutorial 4. *Solution to previous years' problem set #1*
  - ✓ **Thursday, Sep. 29: Problem Set #1 is due [online through Quercus before 11:59pm]**

- **Week 5**. Thursday, Oct. 6
  - Lecture 5. *Consumer Demand – Intro*
  - Tutorial 5. *Solution to previous years' problem set #1*

- **Week 6**. Thursday, Oct. 13
  - Lecture 6. *Consumer Demand – Econometric Issues & Methods*
  - Tutorial 6. *Demand Estimation in STATA (1/2)*

- **Week 7**. Thursday, Oct. 20
  - Lecture 7. *Consumer Demand – Empirical Applications*
  - Tutorial 7. *Demand Estimation in STATA (2/2)*

- **Week 8**. Thursday, Oct. 27
  - Lecture 8. *Price & Quantity Competition - Intro*

- ✓ **Thursday, Oct. 27: MIDTERM EXAM (1.5 hours Exam – During Class/Tutorial)**

- **Week 9**. Thursday, Nov. 3
  - Lecture 9. *Price & Quantity Competition – Econometric Issues & Methods*
  - Tutorial 9. *Estimation of Demand and Marginal Costs in STATA*
  - ✓ **Thursday, Nov. 3: Problem Set #2 is handed out**

***** Thursday, Nov. 10: FALL READING WEEK – NO CLASSES**

- **Week 10**. Thursday, Nov. 17
  - Lecture 10. *Price & Quantity Competition – Empirical Applications*
  - Tutorial 10. *Merger Analysis in STATA*
  - ✓ **Thursday, Nov. 17: Problem Set #2 is due [online through Quercus before 11:59pm]**

- **Week 11**. Thursday, Nov. 24
  - Lecture 11. *Market Entry – Intro*
  - Tutorial 11. *Solution to Problem Set #2*

- **Week 12**. Thursday, Dec. 1
  - Lecture 12. *Market Entry – Methods and Applications*
  - Tutorial 12. *Estimation of Market Entry models in STATA*

- ✓ **FINAL EXAM: During Final Exam Period – To Be Announced**