ECO 310 H1F (Sections 0101, 9101, 0201, 9201)
EMPIRICAL INDUSTRIAL ORGANIZATION

DEPARTMENT OF ECONOMICS. UNIVERSITY OF TORONTO

Winter 2021

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Course Website in Quercus: https://q.utoronto.ca/courses/191319

Online Lectures and Tutorials
- Sections 0101 & 9101: Thursdays 10am-1pm.
     Zoom Link: https://utoronto.zoom.us/j/88641015740 (Passcode 452376)
- Sections 0201 & 9201: Mondays 10am-1pm.
     Zoom Link: https://utoronto.zoom.us/j/82486543089 (Passcode 551917)

Online office hours: Wednesdays-Fridays 5-6pm.
     Zoom Link: https://utoronto.zoom.us/j/82333857288 (Passcode 128109)

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 profits and consumer welfare. IO emphasizes the interdependence in the decisions of firms operating in a market. For instance, when a firm decides to open a new store, it should take into account how other firms' in the market will response by changing their prices, or their advertising, or by closing stores or opening new ones. 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, firm productivity and profitability. They apply these measurements to understand firms' strategies, and to analyze how government regulations affect market competition and ultimately social welfare. Recently, the increasing availability of rich and detailed 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 concentrate 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 Data Analysis and Statistical Software package.

2. COURSE OBJECTIVES

By the end of this course, students will:
- Understand the main features of empirical models of demand, production function, price and quantity competition, and market entry.
- Know how to use market data to estimate the parameters of these empirical models, and interpret the economic implications of these estimations.
- 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:* ECO200Y1, or ECO204Y1, or ECO206Y1.
- *Quantitative Methods:* ECO220Y1, or ECO227Y1, or STA237, or STA238, or STA247, or STA248, or STA257, or STA261.

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

4. RECOMMENDED COURSES (but not prerequisites)

- ECO380H: Markets, Competition, and Strategy. This course covers the theory of IO.
- Applied Econometrics: ECO372H, ECO375H, or equivalent.

5. CLASS MEETINGS

Online Lectures and Tutorials

- Sections 0101 & 9101: Thursdays 10am-1pm.
    Zoom Link: https://utoronto.zoom.us/j/88641015740 (Passcode 452376)
- Sections 0201 & 9201: Mondays 10am-1pm.
    Zoom Link: https://utoronto.zoom.us/j/82486543089 (Passcode 551917)

Please, keep in mind the following **expectations**.
- **Missing a lecture** or tutorial without justification will be penalized with 3 percentage points from your maximum of 15 points from class participation. This does not mean that attending a lecture – without active participation – grants you points in your class participation grade.
- Show up for classes **on time**. Give your best effort to fully engage in learning activities.
- Class participation requires that you **turn your camera on** such that I can see you.
- **Dress for a school day**. You may wear casual clothing, but please, do not come to class in pyjamas. Use a **space** that puts you in the mind of working - ideally at a desk in a quiet room.

6. EVALUATION

- Your final grade will be based on the evaluation of class participation, two problem sets, a proposal of research paper, and final version of your research paper according to the following weighting:

Class Participation:	15%
Problem sets (2 sets):	40%
Research Proposal:	15%
Final Research Paper:	30%

- ***Class Participation.*** 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.*** There will be three 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 **Monday, January 25** (it will be posted at the course website in Quercus) and it is **due before Friday, February 5**, **through Quercus before 11:59pm**.
- Problem set 2 will be handed out on **Monday, March 15** (it will be posted at the course website in Quercus) and it is **due before Friday, March 26, 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.

7. RESEARCH PROPOSAL & FINAL RESEARCH PAPER

- ***Aim.*** The main objective of the research proposal and the term paper is to provide students with the opportunity to explore an empirical question in Industrial Organization using the tools learned in the course. These requirements are designed to develop and cultivate your econometric skills, to apply the economic concepts learned in the course, and to improve your general research, data gathering, and writing skills.

- ***Requirements for the Final Paper.***
- The paper should be empirical. It should use data and apply one (or several) of the models and methods that we use in the course: estimation of production function, demand system, price/quantity competition, or models of entry.
- It should contain the following parts: Title page with abstract; Introduction (with statement of the problem); Literature Review; Data and descriptive analysis; Model; Methods and econometric issues; Empirical Results; Conclusions; References; Appendix with tables and figures.
- The main text (without references and appendix) should not be longer than 20 pages of text (1.5 spacing, 1 inch margins, 11 point font).
- You must cite at least 3 (5 or more is better) recent and relevant journal articles related to your topic. Your paper will be evaluated to some extent on the quality of the papers you cite and discuss. It is strongly recommended that you restrict your choice of articles to higher quality economics journals. These references must be carefully cited in accordance with standard manuals of style. For example, the Chicago citation style is a widely used one in Economics and the social sciences in general. A quick reference guide is available at
  https://www.chicagomanualofstyle.org/tools_citationguide/citation-guide-2.html.

- You should write your own code in Stata to obtain the empirical results. You should submit your code, and being ready to submit your data (in Stata format) if requested by the instructor.

- **_Requirements for the Research Proposal._**
- Your research proposal should be a preliminary and incomplete version of your final paper.
- It should be at least 5 pages and contain the following parts: a tentative title; a brief description of a preliminary model; key references of papers closely related to this research project; a brief description of the dataset you will use in your paper, and ideally a table with some descriptive statistics; a brief description of the possible results you might find in this research project.
- It is extremely important that by the time you submit your research proposal you already have the dataset that you will use in your paper, have some preliminary understanding of the main features of that dataset, and have generated some preliminary descriptive evidence.

- **_Plagiarism & Turnitin.com_**
- Do not plagiarize.
- To reduce the possibility of inadvertent plagiarism, the university's writing support services explain how not to plagiarize at https://advice.writing.utoronto.ca/wp-content/uploads/sites/2/how-not-to-plagiarize.pdf
- Be ready to send your data and computer codes when asked to do so by the instructors. We should be able to run your code with your data on our computer and replicate your results.
- Students will be required to submit their course essays to Turnitin.com for review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website.
- Submit your paper to https://www.turnitin.com/. (1) Login to https://www.turnitin.com/, and create your own user profile. (2) Enroll in this class (ECO 310 2021). I will provide you with the class ID and password. (3) Follow the instructions for file upload.

- **_Assessment Criteria for the Final Paper._**
- Is the economic problem well thought out and well posed?
- Does it apply the models and methods we have seen in class?
- Quality of empirical work. Is the model and data used appropriate to answer the question of interest? Is the author aware of main econometric issues for answering the question of interest?
- Level of sophistication of econometric techniques.
- Quality of writing and presentation

- **_Due dates._**
- The Research Proposal is due **before Friday, February 26 [online through Quercus before 11:59pm]**. Please submit electronically through Quercus and name the file using your lastname. For instance, the name of my file would be "Aguirregabiria_proposal.doc" or "Aguirregabiria_proposal.pdf".
- Late submissions of the Research Proposal will be penalized with **3 percentage points per day** from the total 15 points assigned to this course requirement.
- The Final Paper is due **before Sunday, April 11 [online through Quercus before 11:59pm]**. Please submit electronically through Quercus and name the file using your lastname. For instance, the name of my file would be "Aguirregabiria finalpaper.doc" or "Aguirregabiria finalpaper.pdf".
- You must also attach a copy of the computer code (in *.txt format) used to produce the results in the paper.

-   Late submissions of the Final Paper will be penalized with **5 percentage points per day** from the total 30 points assigned to this course requirement.

8. 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 must then provide me with an official **University of Toronto Student Medical Certificate**, available from the Registrar's Office, the Faculty of Arts and Sciences (Sidney Smith Room 1006) and the Health Services. Proper documentation must be presented to the instructor within five consecutive days of the missed test. 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.

9. 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.

10. 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.

11. 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".

12. 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**.

13. COURSE WEBSITE

The course web-site in Quercus is https://q.utoronto.ca/courses/191319. 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.

14. COURSE MATERIAL

- There is no text book. 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 (2008). Introductory Econometrics: A Modern Approach, 4th Edition. South-Western College Publishers. Although it is not required, this textbook is available for purchase at the U of T Bookstore, and has also been put on the U of T Library course reserves.

15. 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.

16. 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

17. 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.

18. OUTLINE OF LECTURES & IMPORTANT DAYS

- **Week 1**. Thursday, Jan. 14 (Sections 0101 & 9101) & Monday, Jan. 11 (Sections 0201 & 9201)
    Lecture 1.   *Introduction to the course*

- **Week 2**. Thursday, Jan. 21 (Sections 0101 & 9101) & Monday, Jan. 18 (Sections 0201 & 9201)
    Lecture 2.   *Measuring Firm Productivity – Intro, Model*

- **Week 3**. Thursday, Jan. 28 (Sections 0101 & 9101) & Monday, Jan. 25 (Sections 0201 & 9201)
    Lecture 3.   *Measuring Firm Productivity – Econometric issues and methods*
    ✓ **Monday, Jan 25:   Problem Set #1 is handed out**

- **Week 4**. Thursday, Feb. 4 (Sections 0101 & 9101) & Monday, Feb. 1 (Sections 0201 & 9201)
    Lecture 4.   *Measuring Firm Productivity – Empirical applications*
    ✓ **Friday, Feb. 5: Problem Set #1 is due [online through Quercus before 11:59pm]**

- **Week 5**. Thursday, Feb. 11 (Sections 0101 & 9101) & Monday, Feb. 8 (Sections 0201 & 9201)
    Lecture 5.   *Consumer Demand – Intro*

*** READING WEEK: From February 15 to 19.

- **Week 6**. Thursday, Feb. 25 (Sections 0101 & 9101) & Monday, Feb. 22 (Sections 0201 & 9201)
    Lecture 6.   *Consumer Demand – Econometric Issues & Methods*
    ✓ **Friday, Feb. 26: Research Proposal is due [online through Quercus before 11:59pm]**

- **Week 7**. Thursday, Mar. 4 (Sections 0101 & 9101) & Monday, Mar. 1 (Sections 0201 & 9201)
    Lecture 7.   *Consumer Demand – Empirical Applications*

- **Week 8**. Thursday, Mar. 11 (Sections 0101 & 9101) & Monday, Mar. 8 (Sections 0201 & 9201)
    Lecture 8.   *Price & Quantity Competition - Intro*

- **Week 9**. Thursday, Mar. 18 (Sections 0101 & 9101) & Monday, Mar. 15 (Sections 0201 & 9201)
    Lecture 9.   *Price & Quantity Competition – Econometric Issues & Methods*
    ✓ **Monday, Mar. 15:   Problem Set #2 is handed out**

- **Week 10**. Thursday, Mar. 25 (Sections 0101 & 9101) & Monday, Mar. 22 (Sections 0201 & 9201)
    Lecture 10.   *Price & Quantity Competition – Empirical Applications*
    ✓ **Friday, Mar. 26: Problem Set #2 is due [online through Quercus before 11:59pm]**

- **Week 11**. Thursday, Apr. 1 (Sections 0101 & 9101) & Mar. 29 (Sections 0201 & 9201)
  Lecture 11.   *Market Entry – Intro*

- **Week 12**. Thursday, Apr. 8 (Sections 0101 & 9101) & Monday, Apr. 5 (Sections 0201 & 9201)
  Lecture 12.   *Market Entry – Methods and Applications*
  ✓ **Sunday, Apr. 11: <u>Research Paper is due [online through Quercus before 11:59pm]</u>**