



MASTER OF COMMERCE IN COMPETITION AND ECONOMIC REGULATION

Quantitative Methods and Econometrics for application in
Competition and Economic Regulation (QEC9X01)

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Lecture 1: Introduction

Objective of the course

The purpose of this course is to introduce quantitative techniques which are used to empirically test the economic theories of competition, and which are commonly applied to competition policy and regulatory proceedings.

You should become comfortable with the use of these techniques and understand their limitations. You should also learn how to evaluate critically empirical work carried out by others.

For those of you who are interested in working as economists for:

- ❑ the regulators and antitrust authorities
- ❑ economic consulting firms
- ❑ any other firms which may be involved in regulated activities
- ❑ academia or think tanks
- ❑ or just interested in understanding antitrust and regulatory matters

Syllabus

- ❑ Prerequisites: intermediate microeconomics and intermediate econometrics. Familiarity with theoretical concepts of industrial organization and with programming statistical software: R or Stata.
- ❑ Textbooks (selected chapters):
Davis, P. and E. Garces, *“Quantitative Techniques for Competition and Antitrust Analysis”*, Princeton University Press, 2009.
- ❑ To refresh theory you can read an online (free) textbook: *“Industrial organization: a strategic approach”*, by Jeffrey Church and Roger Ware
- ❑ Many other sources are available online: academic papers, lecture notes, presentations.
- ❑ Lecture notes will be distributed before each lecture and available in shared dropbox folder.

Lecture schedule and contacts

LECTURE SCHEDULE:

- ❑ See the course outline, Tuesdays and selected Wednesdays, Thursdays between July 18 and September 27, 17:30-19:30 (CAT)

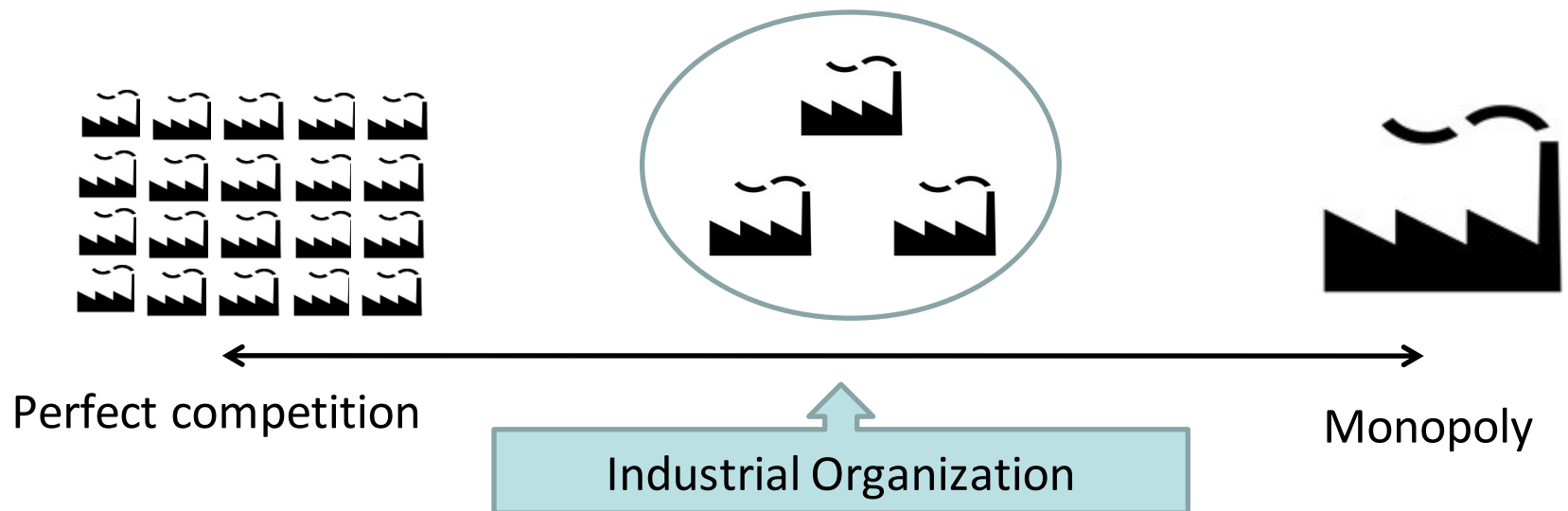
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Industrial Organization

Industrial organization is about the structure of industries in the economy and the behavior of firms and individuals in these industries.

- ❑ Departures from perfect competition
 - Strategic behavior
 - Scale economies
 - Product differentiation / transaction costs
 - Information frictions
- ❑ Impact on firms' profits and consumers' welfare.



What does Industrial Organization study?

BusinessWeek

Google, Apple: Two Mobile Software Visions

Smartphone apps should be browsed, not downloaded, a Google exec says.
Apple and others beg to differ

Product
differentiation

FT.com
FINANCIAL TIMES

Horizontal
merger

Kirin-Suntory merger to spur consolidation

By Michiyo Nakamoto
Published: July 14 2009 17:40 | Last updated: July 14 2009 17:40

Kirin confirmed on Tuesday it was in early merger talks with Suntory, its local rival, in a move that is likely to trigger further consolidation in Japan's food and drinks sector.

The New York Times | International Herald Tribune

Barnes & Noble Plans an Extensive E-Bookstore

E-book pricing has become one of the most delicate topics in book circles. Publishers are concerned that by selling new books at such low prices, e-book retailers will undercut sales of hardcover editions, which average about \$26, and eventually erode publisher margins.

"The pricing policies won't remain static," Mr. Lynch said in an interview. "We're working with our publishers on various pricing models. As the pricing model evolves over time, we will adjust."

Pricing strategies

guardian.co.uk

Big pharma 'delaying' cheaper drugs

European commissioner unveils inquiry results and attacks industry for impeding generic drugs' entry to market

Entry deterrence

Approach to questions in IO

- ❑ Construct models (abstractions)
 - well established tradition in all sciences
- ❑ Assumptions:
 - make clear and simple but realistic assumptions
- ❑ Focus on strategy and interaction
 - rely on the tools of game theory
- ❑ Given the assumptions, mathematics allows us to provide answers:
 - but these results change with assumptions
 - hence discussion of assumptions is key

Empirical Industrial Organization

- ❑ In general, to answer most of the questions in Industrial Organization we not only need economic models but also data.
- ❑ Empirical Industrial Organization (EIO) focuses on structural economic models, which are based on economic theory combined with suitable empirical estimation methods.
- ❑ The tools of EIO are used in practice by firms, government agencies, consulting companies, and academic researchers.

Empirical Industrial Organization: example

- ❑ Regulation vs. competition in mobile telephony: the government considers introducing regulation of mobile termination rates (MTR) or granting a new license to operate mobile network (entry). The objective is to maximize total welfare (or consumer surplus).
 - Need to set up and estimate a structural model of demand and supply.
 - Estimate price elasticities of demand.
 - Use the model to conduct counterfactual simulations of the impact of entry and MTR regulation on equilibrium prices, distribution of market shares and welfare.
 - Requires data on prices, subscriptions to mobile services by a representative sample of consumers over time (or aggregate market level data on market shares) as well as instrumental variables.

See CESifo Working Paper “Benefits from competition in a high-inequality economy: The case of mobile telephony in South Africa”, Lukasz Grzybowski and Ryan Hawthorne

Historical approaches to Empirical IO

- ❑ 1940s and earlier: case studies
 - Careful descriptions of specific industries, firms, or events
 - Little quantification or formal tie to theory
- ❑ 1950s-1970s: Structure-Conduct-Performance
 - Cross-industry regressions relating market structure to market outcomes
 - E.g. regress Lerner index, $(P - MC)/P$, on the Herfindahl-Hirschman index, $HHI = \sum_i \text{share}_i^2$
 - Drawbacks: (1) ignores industry heterogeneity, (2) does not identify causal effect
- ❑ Late 1980s-present: New Empirical Industrial Organization (NEIO):
 - Analyses of individual industries
 - Empirical analysis framed in terms of an economic theory of the relevant industry or a set of competing theories

Ingredients of a structural model in EIO

1. Question
2. Economic model
 - Key features of the industry that are important to answer our empirical question
 - Should not be needlessly complicated
3. Data
4. Econometric specification of model
5. Estimation
6. Reporting of results

2. Economic model

- ❑ To study competition in an industry, EIO researchers propose and estimate structural models of demand and supply where firms behave strategically.
- ❑ These models typically have the following components:
 - a model of consumer behavior or demand;
 - a specification of firms' costs;
 - a model of firms' competition in prices or quantities;
 - and/or a model of firms' competition in some form of investment such as capacity, advertising, quality, or product characteristics.
- ❑ The parameters of these models are structural in the sense that they describe consumer preferences, production technology, and institutional constraints.

3. Data & identification of parameters

- ❑ In the old EIO, sample variability in the data came from having multiple industries.
- ❑ In the NEIO, there is usually one industry and limited sample variation across firms.
- ❑ Hence, most of the sample variation comes from observing many geographic local markets, or many products, or both.
- ❑ For instance, the existence of transportation costs typically implies that firms compete for consumers at the level of local geographic markets → the particular description of a geographic local market (e.g., a city, a county, etc.) depends on the specific industry under study → prices and market shares are determined at the local market level.
- ❑ Therefore, having data from many local markets can help to identify the parameters of our models.

3. Data & identification of parameters

- ❑ Sample variation at the product level: most industries are characterized by product differentiation → firms produce and sell many varieties of a product → data on prices, quantities, and other variables, at the firm-product level is also extremely important to identify some IO models.
- ❑ Finally, in some empirical applications we may have the luxury of sample variation both across products and geographic markets, and over time.
- ❑ Ideally, we would like to have data on firms' costs, which is very rare → firms are very secretive about their costs and strategies.
- ❑ Typically we have to infer firms' costs from our information on prices, quantities and exogenous variables that affect demand and costs.
- ❑ Similarly, we will have to estimate price-cost margins (market power) and firms' profits using this information.

4. Econometric specification of the model

- ❑ Economic models are deterministic and will never match data, so need to add heterogeneity and/or shocks
 - Unobserved heterogeneity
 - E.g. firms vary in their productivity
 - Must clearly specify to whom what is observed/unobserved
 - e.g. all firms' productivities are unobserved by the econometrician, and firms observe their own productivity but not others
 - Optimization errors
 - Agents fail to exactly maximize their payoffs
 - Measurement errors

4. Econometric specification of the model

- ❑ Functional forms and distributional assumptions
 - Economic models involve utility, profit, etc. functions of unknown form.
 - We often restrict functions and distributions to be of a known parametric form for the ease of estimation and identification:
 - E.g. linear utility function, Cobb-Douglas production function, etc.
- ❑ Identification: given the distribution of the observed data, is there a unique value of model parameters that match that distribution?

Papers to read

1. Porter, 1983, “A Study of Cartel Stability: The Joint Executive Committee, 1880-1886,” *Bell Journal of Economics*, 14(2), pp. 301-314.
2. Graddy, 1995, “Testing for Imperfect Competition at the Fulton Fish Market” *RAND Journal of Economics* 26: pp.75-92
3. Bresnahan, 1987, “Competition and Collusion in the American Automobile Industry: The 1955 Price War” *Journal of Industrial Economics*
4. Nevo, 2000, Mergers with differentiated products: the case of the ready-to-eat cereal industry, *RAND Journal of Economics* 31, pp. 395-421.
5. Ivaldi and Verboven, 2004, “Quantifying the effects from horizontal mergers in European competition policy”, *International Journal of Industrial Organization*, 23, pp. 669-691.
6. Bresnahan, T. and P. Reiss, 1991 “Entry and Competition in Concentrated Markets”, *Journal of Political Economy* 99(5), pp. 977–1009.