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15.013 — INDUSTRIAL ECONOMICS FOR STRATEGIC DECISIONS

FALL 2019

This subject is designed to provide a working knowledge of the analytical tools of economics that bear most directly on the strategic decisions that firms must make. The kinds of decisions that will be of interest to us include: setting prices and output levels; advertising; investments in new production capacity; the introduction of new products, brands, and quality variations; investments in R&D; and the use of patents. Throughout the course, our emphasis will be on market structure, its relationship with the way firms interact strategically, and its implications for market power. The analysis of market structure, strategic interactions among rival sellers, and strategies for entering an industry, or for deterring entry or controlling its impact, will be covered with a mix of theory and case material.

Students taking this course should have a good background in microeconomics — specifically, course 15.010 or its equivalent. In addition, some background in finance is strongly recommended.

No textbook will be assigned for the course, but a set of readings is available on the Canvas course site. These readings include my lecture notes, along with various articles and book chapters. In addition, we will assign a number of HBS cases, which can be obtained via StudyNet. (A link to StudyNet is on the 15.013 Canvas site.) Also, from time to time we will post additional readings on Canvas.

You will need to find a teammate, with whom you will work on two aspects of the course: the Strategic Oligopoly Game and the written exercises. (Your teammate should be in the same section of 15.013.) Grading in the course will be based on four different aspects of your performance:

- *Classroom participation* (27% of grade) — All students are expected to have read the assigned materials, to attend class, and to participate actively in class discussions.
- *Strategic oligopoly game* (15% of grade) — You and your teammate will compete weekly against two other (anonymous) firms in this semester-long game. You will be graded on your performance as measured by your cumulative profits, relative to the overall performance of both sections of 15.013, *not* relative to the performance of your industry.
- *Exercises* (28% of grade) — We will assign 8 written "exercises" over the semester. *You are only required to turn in 7 of these exercises*. (If you do all 8, we will drop the lowest grade.) You and your teammate will work on these exercises together. To receive credit, exercises must be submitted electronically, and *on time*.
- *Final exam* (30% of grade) — This will be an in-class exam. (Closed-book, but you can bring an 8.5 x 11" sheet of paper with notes, formulas, etc. on both sides.)

Class Attendance: You are expected to attend all classes, and to arrive in class promptly. You are also expected to have done the required reading and be prepared to participate actively in class discussion. I will begin most classes by "cold calling" on several students.

Laptop Computers and Phones: Given the importance of class participation, we ask that you do *not* open your laptop computer during class. There are only two exceptions to this rule: (1) presentations and discussions of exercises, where spreadsheets or other results are on your computer; (2) students with special needs (e.g., handwriting difficulties), who get permission in advance to use their computers. The same rules apply to iPads and phones. ***As tempting as it might be to check your phone every 10 minutes, please turn it off and put it away during class***.

Group Work: *You are expected to participate fully in any exercise or other assignment that has your name on it. It is absolutely unacceptable to "rotate" assignments with your teammate, or take credit for an assignment in which you were not fully involved.*

Submission of Game Plays and Exercises: Your game play must be submitted every Monday before 5:00 pm. The game play and the exercises can be submitted using the links on Canvas.

DATES TO REMEMBER

Monday, Sept. 9	Please submit via the template on Canvas a short (1- or 2-paragraph) "biography" describing your background and interests. Include a photograph, and the *phonetic spelling* of your name.
Wednesday, Sept. 18	Exercise 1 is due.
Monday, Sept. 23	Trial Play of Strategic Oligopoly Game. (Submit by 5:00 pm.)
Monday, Sept. 30	First real play of Strategic Oligopoly Game. (Submit by 5:00 pm.)
Wednesday, Oct. 9	NO CLASS, Yom Kippur.
Monday, Oct. 14	NO CLASS, Columbus Day. However, game play is due at 5:00 pm.
Monday, Oct. 21	NO CLASS, SIP week. However, game play is due at 5:00 pm.
Wednesday, Oct. 23	NO CLASS, SIP week.
Monday, Nov. 11	NO CLASS, Veterans Day. However, game play is due at 5:00 pm.
Wednesday, Nov. 27	NO CLASS, Thanksgiving vacation.
Monday, Dec. 2	Last play of Strategic Oligopoly Game.
Monday, Dec. 9	FINAL EXAM (90 minutes, in-class).
Wednesday, Dec. 11	Debriefing, and results of strategy game. Discussion of additional topics as time permits.

TENTATIVE OUTLINE

Sept 4 *Wed* Introduction: Sources and Uses of Market Power. Overview of the course. Market structure, market power and the value of the firm. Strategic decisions that affect market structure and market power. Competing *in* the market versus competing *for* the market.

Sept 9 *Mon* Intertemporal Production Constraints, Pricing, and Market Power. How the dynamics of cost affects pricing and market power. Production and pricing with a learning curve. The learning curve in the strategic oligopoly game. The production and pricing of depletable resources. Effects of uncertainty over future market conditions. The option value of oil reserves. Why are oil prices so volatile? Can we predict oil prices?

Read: R. Pindyck & D. Rubinfeld, *Microeconomics*, Section 15.8.
Lecture Notes on Intertemporal Production and Pricing, Sections 1-5.

Turn in brief biography and photo via Canvas/Google form.
Be prepared to answer questions on learning curve and oil well problem.

Sept 11 *Wed* Market Structure and Evolution. The evolution of a mature industry: Market structure and firm behavior in the beer industry. Market definition: What is the "beer market?" Introduction to attribute space and its use in market definition. What are the relevant attributes of beer? Advertising and brand differentiation. How much to advertise? Competing through price versus advertising. Playing the game versus choosing the game.

Read: R. Pindyck & D. Rubinfeld, *Microeconomics*, Section 11.6.
Lecture Notes on Market Definition, Concentration, and Advertising.
"Which Brew for You?" *Consumer Reports*, August 2001.
Readings on beer.

Be prepared to answer questions on the beer industry.
Hand in choice of game and exercise partner.

Sept 16 *Mon* Market Structure and Evolution (continued). The evolution of an emerging industry: Internet music. Brief overview of Internet structure. Connectivity ("peering") in the Internet backbone. The sunk cost vs. marginal cost dilemma: Internet backbone providers and backbone pricing. Net neutrality: pros and cons. Web service providers. Amazon Web Services: Sources of success. Introduction to the economics of Internet music.

Read: Notes on Internet Economics and Internet Music.

Sept 18 *Wed* Market Structure and Evolution (continued). The evolution of Internet music. Buying music vs. renting music vs. "discovering" music. Market definition: downloads vs. streaming vs. CDs. Apple's iPods/iPhones and iTunes: pricing and compatibility decisions. Setting prices in a new market: What price should Apple charge for songs in 2003? In 2009? Today? Spotify, and competition in music streaming. Is Spotify pricing optimally? How should Apple (and other streaming services) compete?

Read: "Spotify." [HBS Case #9-516-046]
Lecture Notes on Pricing, Section 2.

Exercise 1 due.

Sept 23 *Mon* Market Structure and Evolution: Information and Industry Transformation. How does the greater availability of information affect industry structure? Can the Internet transform the medical industry? Asymmetric information in the medical industry. Analysis of WebMD. What went wrong, and what would you have done? The failure of Google Health. Predicting "the next big thing."

Read: "WebMD (A)." [HBS Case #9-701-007]
"WebMD (B)." [HBS Case #9-701-133]
Readings on WebMD.

Trial play of Strategic Oligopoly Game. Submit by 5:00 pm.

Sept 25 *Wed* Vertical Structure. The implications of vertical structure for market power. Double marginalization revisited. Decisions involving buyers and suppliers. "Build versus buy" decisions. The use of territorial exclusivity. The economics of franchising. Company-owned outlets versus franchised outlets. The free rider problem in franchising. Franchising versus licensing.

Read: Lecture Notes on Vertical Structure, Sections 1, 3 and 4.
Pindyck & Rubinfeld, *Microeconomics*, Review Section 11.4.

Exercise 2 due.

Sept 30 *Mon* Game Theory and Strategic Competition. Review of game-theoretic models of oligopolistic behavior, and development of tools and insights useful for strategic analysis. Rationalizable strategies. The war of attrition. The use of promises, commitments, threats, and retaliations. Unraveling in the repeated Prisoners' Dilemma. Retail store pricing. How to respond to shifts in demand? The strategic use of inventories. Applications to Strategic Oligopoly Game.

Read: Lecture Notes on Game Theory, Sections 1—6.

First real play of Strategic Oligopoly Game. Submit by 5:00 pm.

Oct 2 *Wed* The Value of Information and Strategic Timing of Investments. Competing with limited information. Does better information make a firm better off? Should you convey information to your competitors? Informational cascades and "wisdom after the fact." Rational versus irrational bubbles. Bubbles in housing markets. The timing of investment decisions. Learning from nature and learning from others: oil, real estate, and R&D. Entry decisions in the pharmaceutical industry. Product-specific versus brand-specific network externalities, and the implications for R&D. First-mover versus second-mover advantage in pharmaceutical markets.

Read: Lecture Notes on Information and Strategic Timing of Investments.
A. Dixit and R. Pindyck, *Investment Under Uncertainty*, Chapter 2.

Exercise 3 due.

Oct 7 *Mon* Entry Opportunities and Deterrence. Opportunities for entry. Entry decisions: How will the incumbent respond? Rational (and irrational) responses to entry: the Polaroid-Kodak experience. Discouraging potential entrants. Experience goods and first-mover advantage: Gillette's introduction of the Sensor and the Mach 3 razors. Disruptive entry via the Internet: Harry's and Dollar Shave Club. Markets for credence goods: wine, vitamins, and consulting services.

Read: Lecture Notes on Entry and Reaction to Entry.

Oct 9 *Wed* NO CLASS (Yom Kippur).

Oct 14 *Mon* NO CLASS (Columbus Day). *However, game play is due by 5:00 pm.*

Oct 16 *Wed* Entry Decisions under Uncertainty. Analyzing and predicting the behavior of new entrants. Learning from an entrant. The option to invest and the value of waiting. The disposable diaper industry. The importance of process R&D. Diapers as an "experience good." Consumer-driven price discrimination. Should Kao invest early in premium diapers?

Read: Pindyck & Rubinfeld, *Microeconomics*, Examples 13.6 and 15.4.
"Kao Corporation." [HBS Case #9-591-012]

Exercise 4 due.

Oct 21 *Mon* NO CLASS. (SIP week.)
However, play of strategic oligopoly game is due by 5:00 pm.

Oct 23 *Wed* NO CLASS. (SIP week.)

Oct 28 *Mon* Bargaining and Contracting: The Commercial Aircraft Industry. Game-theoretic models of bargaining. The durable good monopolist problem. Introduction to the commercial aircraft industry. The cost structure of the Boeing 787: sunk costs and variable costs. Competition between Boeing and Airbus in the sale of commercial aircraft. How bargaining between aircraft manufacturers and airlines limits market power and long-run profitability. The Boeing-Airbus-Delta Airlines bargaining problem.

Read: "Boeing 787: Manufacturing a Dream." [HBS Case #9-615-048]
Readings on Commercial Aircraft Industry.

Exercise 5 due.

Oct 30 *Wed* Bundling. Review of how bundling is used to capture consumer surplus. Bundling to deter entry and gain market power. Pricing and bundling complementary goods. Product line pricing. Bundling and monopoly leveraging. Bundling in the computer software industry: Microsoft in operating systems and office suites. Bundles competing against bundles: medical equipment. Monopoly leveraging via tying: Google's Android OS, Qualcomm's cellular modem chips. Technical ties: Microsoft in server and client operating systems, Monsanto's GM seeds and herbicides.

Read: Pindyck & Rubinfeld, *Microeconomics*, review Section 11.5.
Lecture Notes on Bundling and Brand Proliferation, Sections 1-2.
Lecture Notes on Pricing, Section 3.

Nov 4 *Mon* Brand Proliferation. Discussion of attribute space and its use in economic analysis. Local competition among brands in attribute space. Choosing the attributes for new brands. Brand proliferation, entry deterrence, and market power. Analysis of the breakfast cereal industry.

Read: Lecture Notes on Bundling and Brand Proliferation (complete).

Nov 6 *Wed* Network Externalities and Market Structure. How network externalities can affect market structure and market power, and implications for pricing, advertising, and investment. Market "tipping" and consumer holdout: compact discs, digital audio tape, and DVDs. Connectivity and compatibility. Strategic pricing decisions: static and dynamic. Setting price when you are behind: catch up or give up? The "DOS-MAC" pricing problem. Pharmaceutical markets revisited.

Read: Lecture Notes on Network Externalities.
Lecture Notes on Pricing, Section 4.
"Philips' Compact Disk Introduction (A)." [HBS Case #9-792-035]

Exercise 6 due.

Nov 11 *Mon* NO CLASS (Veterans Day holiday) .
However, play of strategic oligopoly game is due by 5:00 pm.

Nov 13 *Wed* Multi-Sided Platforms: Entry, Growth and Market Dominance. Two-sided platforms and the role of network externalities. Examples: eBay, Uber, Airbnb, MasterCard. "Chicken and egg problems:" How does a platform get started? How regulation can facilitate disruptive entry: Uber. Platform competition: Uber vs. Lyft. The market for ride-sharing services and the story of Fasten. Pricing problems for multi-sided platforms.

Read: D. Evans and R. Schmalensee, *Matchmakers: The New Economics of Multisided Platforms*, Chapters 2 and 6.
"Fasten: Challenging Uber and Lyft with a New Business Model." [HBS Case # 9-616-062]
Lecture Notes on Multi-Sided Platforms, Section 1.

Nov 18 *Mon* Multi-Sided Platforms: Credit and Charge Cards. Credit card networks as two-sided platforms. Economics of the credit and charge card industry. "Chicken and egg problems" in the evolution of card networks. Acquirers, issuers, and the interchange rate. The development and growth of debit cards. Competition among card networks. Competition among card issuers. International network competition and the emergence of China's UnionPay.

Read: D. Evans and R. Schmalensee, *Paying with Plastic*, 2nd Edition, MIT Press, 2005, Chapters 1, 3 and 9.
Lecture Notes on Multi-Sided Platforms, Section 2.

Exercise 7 due.

Nov 20 *Wed* Multi-Sided Platforms: Payment Systems. Strategic competition and market dynamics in card issuance. Pricing and profitability. Government regulation of card issuance. The impact of electronic money, including M-PESA and "bitcoins." What is "money?" Mobile payment systems in the U.S. and China: Apple Pay and Alipay.

Read: "Apple Pay." [HBS Case # 8-516-027]
"Special Report: The Payment Industry," *The Economist*, May 2018.

Nov 25 *Mon* R&D, Patenting, and Licensing. Implications of R&D and innovation for industry evolution and market structure. When do patents protect innovations? The race to innovate. Making the R&D investment decision: strategic and non-strategic aspects. Patents as options. Discount rates for risky R&D investments. Sleeping patents and the decision to adopt a new innovation. Licensing decisions. The use of licensing to gain market power.

Read: Lecture Notes on R&D and Patent Licensing.

Non 27 *Wed* NO CLASS (Thanksgiving vacation).

Dec 2 *Mon* R&D, Patenting, and Licensing (continued). Continued discussion of R&D and patent licensing decisions. Licensing to raise prices vs. licensing to lower prices. Licensing to become the standard: Intel in computer processors. Complementary patents: cross-licensing versus the formation of "patent pools." IP blocks and Systems-on-a-Chip.

Read: Lecture Notes on R&D and Patent Licensing.
S. den Uijl, et. al., "Managing Intellectual Property Using Patent Pools," *California Management Review*, Summer 2013.

Exercise 8 due.
Last play of Strategic Oligopoly Game. Submit by 5:00 pm.

Dec 4 *Wed* R&D, Patenting, and Licensing (continued). Completion of material on R&D and patent licensing decisions. The use of patent portfolios to deter entry. Patent "trolls" and other intermediaries. Can regulation deter "trolls?"

Read: A. Hagiu and D. Yoffie, "The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators," *Journal of Economic Perspectives*, Winter 2013.

Dec 9 *Mon* **FINAL EXAM**. (Closed-book, but you can bring an 8.5 x 11" sheet of paper with notes, formulas, etc. on both sides.)

Dec 11 *Wed* Wrap-Up Class. Results of strategic oligopoly game – meet your competitors! General discussion of topics related to course.