Graduate Topics in Industrial Organization
Fall 2013 (ECON-GA.3001.10 / ECON-GB.3360.01)

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(Thursday 3:00-7:00, KMC 7-191)

1 Overview

This is a course in the Graduate Industrial Organization sequence. We aim to give a solid grounding in understanding the structure of markets, and the strategic behavior of firms and their consumers.

Beyond academic careers, there are clear policy issues (on anti-trust, regulation, and consumer protection) and commercial implications (reflected by the growing economics consulting sector, which is based primarily around IO issues including pricing and competitive analysis). Beyond the economics discipline, estimating demand, understanding product positioning, pricing, the communication, gathering and use of product information, merger analysis, and the other topics that we cover are central concerns in the literatures on marketing, strategy and information systems.

We have designed the course to be a complement to the other IO courses being taught at NYU. The goal is to familiarize students with selected theoretical and empirical topics in industrial organization and help students start their own research agendas.

2 On Learning and Doing IO

Like everything else, the secret to a successful research or professional career in IO is practice, practice, practice. However, like everything else in life. this is a constrained problem.

We suggest (and in some cases require) that you read papers ahead of time. Also read them after and make sure you understand them (for theory, this might involve writing down the structure model, making sure you can identify and understand key steps in proofs etc). Discuss them with your friends. What questions does this work lead you to ask? What is good/convincing/insightful? Where does it leave you unsatisfied? Think about these questions first (and think might mean mulling over a period of days or weeks) before chasing through the literature. You are more likely to come up with something original if you haven't already read 57 loosely related papers around the subject. If there is a gap then thinking about the issues beforehand, should help you find that rather than staring at the literature and trying to figure out where it is.

Outside of classwork, we *strongly recommend* that you attend the IO seminar which runs on Tuesday afternoons, this will give you a sense of where the frontier is, and will give you an insight into how the process of research actually works (rather than seeing the culmination of that process). Details of the seminar are available at `http://www.stern.nyu.edu/experience-stern/about/`

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departments-centers-initiatives/academic-departments/economics/events/industrial-org-seminar/index.htm.

Moreover, we are fortunate that there is a fantastic annual one-day IO conference held in the Fall which this year is being held on September 6 (details are at http://www.stern.nyu.edu/experience-stern/about/departments-centers-initiatives/academic-departments/economics/events/io-day/index.htm) and every spring there is a one-day conference on network economics which often contains a great deal of IO (see http://www.netinst.org/).

2.1 Course Requirements

1. Participation: where the syllabus lists a paper with a star next to it, this indicates reading is required before class. This paper will be discussed in class and an inability to discuss the paper will reflect badly on you and, more importantly, you won't get much from the class.

2. Problem Sets: two problem sets will be given.

3. Referee report: An important aspect of doing research (and for that matter of a successful academic career) is the ability to evaluate work - most importantly your own, but also others'. We ask you to write a report on one of the papers presented either at the IO day held at NYU on September 6, 2013 or on one of the papers presented at the IO seminar.

4. Research Proposal: You all will be starting dissertation research, and it is never too early to start mulling over ideas. To encourage you to do this we will require a research proposal of around 5 pages. Use this to look for topics that excite you for your dissertation.

3 Background Reading

You are expected to remember the micro-theory, game theory, and econometrics that you took last year. If you don't then refresh your memory!

Books:

1. Tirole's *"The Theory of Industrial Organization"* is a required text. If you haven't got it already, buy it. It is an invaluable reference.

2. If you don't face financial constraints, you will also find the *Handbook of Industrial Organization*, particularly volume 3 edited by Armstrong and Porter, very worthwhile.

3. Many other books are useful generally for IO economists and may be referred to from time-to-time. These include:

   Ran Spiegler, *"Bounded Rationality and Industrial Organization"* [A very useful reference for our topic on behavioral IO]

   John Sutton, *"Sunk Costs and Market Structure"*, and *"Technology and Market Structure"*

   Luis Cabral, *"Introduction to Industrial Organization"* or Paul Belleflamme and Martin Peitz *"Industrial Organization: Markets and Strategies"* [undergraduate versions of Tirole that are useful when you want to see the simplest possible version of a model - good bedtime reading]

   Andersen, de Palma and Thisse, *"Discrete Choice Theory of Product Differentiation"* [a very useful companion to the section on demand estimation that provides all the conceptual underpinnings of the models used to think about product differentiation]

Fumio Hayashi, "*Econometrics*" - a great text with a strong GMM approach to econometrics. Most empirical IO work is done in the GMM setting.

Peter Davis and Eliana Garces, *"Quantitative Techniques for Competition and Antitrust Analysis"* is a newer text covering some of the more recent empirical techniques to have been developed and used in IO. Kenneth Train, "*Discrete Choice Methods with Simulation*", and Kenneth Judd, "*Numerical Methods in Economics*", also prove useful for implementing recent numerical empirical methods.

Finally, Paolo Buccirossi (ed.) *Handbook of Antitrust Economics* is a useful reference as well.

4 Course Structure

The course will be a mixture of theory and empirics.

4.1 The Theory Component

The theory part of this course covers three topics: consumer search models (including some models which were developed in labor search literature but have applications in consumer markets), behavioral IO, and dynamic pricing (mainly in the monopoly setting). Consumer search and dynamic pricing are not new topics in the IO literature, and they have been existing since 1970s (or even earlier). But recently economists have a revived interest in them, mainly because people are paying more and more attention to the online market and the emergence of more sophisticated firm pricing practices. Behavioral IO is a new topic in the IO literature, and it aims to examine the market implications of "non-standard" consumer behavior which has been well documented in the psychology, marketing and other related literature. In addition, consumer search and behavioral IO are also very related to the public's recent interest in consumer protection issues.

How to read a theory/applied theory paper?

[This section borrows from notes from Heski Bar-Isaac.]

A good way to think about how to read papers is to think about how to write them to this end, see McCloskey *Economical Writing* and Thomson's *Guide to the Young Economist*.

There are a number of questions worth keeping in mind when reading a theory paper, unsurprisingly perhaps they turned out not to be shockingly different to those you should consider when reading an empirical paper as well...

1. What is the paper about?
   - What is the central question in the paper?
   - What is the bottom line?
   - If Boyan Jovanovic stopped you in the elevator and asked you "What was that paper about?" What would you tell him?
2. Even before getting into the nuts and bolts.
   - Is it in an interesting question? Is it one you have given any thought to before? Do you care what the answer will be? How does it help you understand the world?

- Given the question, what would you answer? What do you think are the key forces/mechanisms at work in the economic situation? (if you have a view, you can better assess whether the paper is reasonable and/or insightful)
- What is their basic answer? What is the consequence/implications of the result? Are there are other relevant applications of the insight?

3. Next (if you still care) take a look at the model. In most new applied theory, things are set up as a game, and so get clear the underlying structure of the game.

   - Who are the players and how many?
   - What are actions/strategies
   - Rules/timing etc
   - Payoffs
   - Information assumptions (what do they know, about each other, structure of game etc and whn)
   - What is the equilibrium notion?

4. As you get more experience this will be easier to address, in the meantime, this may require going back and reading through the references etc. What is unusual in the structure of the game (Different functional form for payoff, different kind of information problem? Etc)

5. (Usually this will have something to do with step 4) What is the key driver of the result? What is the driving economic mechanism, where are any unusual assumptions really playing a role (If you can't see what the driving economic mechanism is, be suspicious!)

6. If you've seen the central forces, how they tie up to the particular set-up of the model, it's easier then to think about how plausible the mechanism in the application, how particular it is to the set-up, how robust the effect is, or how sensitive to particular and/or peculiar assumptions

7. Remember Alfred Marshall's advice to Pigou: "(1) Use mathematics as shorthand language, rather than as an engine of inquiry. (2) Keep to them till you have done. (3) Translate into English. (4) Then illustrate by examples that are important in real life (5) Burn the mathematics. (6) If you can't succeed in 4, burn 3. This I do often." (Buchholz, Todd G. 1989. New Ideas from Dead Economists. New York: Penguin Group. p. 151) ... in much of the course we may be focused on stage (1) and (2).

4.2 The Empirical Component

The empirical component of the course aims to prepare you as both a producer and consumer of empirical work in IO. The last 20 years has seen a resurgence in empirical work in IO. A large amount of work in IO is now empirical, often combining sophisticated econometrics with serious theory. Even as a theorist interested in IO it is important to be able to be an informed consumer of empirical work.

The empirical component will do three things: first it will provide a coverage of demand estimation. Demand systems often provide the bedrock of empirical IO work and understanding how to deal with the problems that arise in dealing with estimation of demand from micro-econometric

data sets is a core skill for the applied IO economist (it is also useful for public finance and other applied micro areas). We will spend about two lectures on this area and its applications.

Second, we will discuss entry-exit models, and introduce single-agent dynamics. Dynamics are important, as many questions asked in IO require thinking outside of a standard static framework. We will discuss how dynamics can be applied to both demand and entry-exit.

Finally, we will discuss the empirics of vertical markets, and in particular how the theory of integration and contracting informs our empirical analysis; in the end, we will spend some time on recent attempts to bring bargaining into the analysis of these questions. We will also discuss the connection to the recent literature on "two-sided markets."

[At the end of the course, we will have guest lectures on additional topics including productivity estimation.]

It is important to understand how our tools from demand estimation can be applied to these settings, as how these estimates enable us to answer larger and perhaps more important questions. Some of these classes may be run more as a reading group, with the selected papers chosen ahead of time. It is a waste of time to turn up to these classes if you have not done the assigned reading. When doing the assigned reading try to make sure you can understand the following questions about the paper:

1. What is the research question?
    - How does the research question relate to existing theoretical and empirical literature?
    - Why is it worth asking?
2. What is are the data being used here?
    - How was it collected?
    - What are the important variables?
    - How are they defined?
    - What is the unit of observation?
3. What is the empirical strategy for answering this research question?
    - If you had an ideal data set, what would it look like? What empirical strategy would you use on it?
    - How is the data set in this paper different from that ideal data set?
    - How does identification work in this paper?
    - What are the sources of exogenous variation?
    - How much of the identification is coming from the model and how much from the data?
4. What econometric techniques are being used in this paper?
    - Are they appropriate?
    - What is the central estimating equation (or equations)?
    - What is in the unobservable component?
    - What are the instruments being used? Do you think they are valid?
    - How does the econometric model relate to the theoretical framework?

5. What are the main results of the paper?

    - What are the economic implications of the results?

6. What do we learn from this paper?

7. What questions does this paper leave unanswered? How might you answer them?

5 Outline and selected reading

[THIS SYLLABUS IS STILL PRELIMINARY AND SUBJECT TO CHANGE]
An asterisk next to a paper means it is required reading before class.

Class 1: Introduction to Course (RL/JZ) - Sept. 12

Basic models of competition:

- *Tirole's book (Chapters 5 and 7)
- Handbook of Industrial Organization (Chapters 6 and 12 in Vol. I)
- Anderson et al.'s book on discrete choice theory of product differentiation
- *Perloff, J. and S. Salop (1985): "Equilibrium with Product Differentiation," *REStud*, 52(1), 107-120.
- Caplin, A. and B. Nalebuff (1991): "Aggregation and Imperfect Competition: On the Existence of Equilibrium," *ECMA*, 59(1), 25-59.
- Klemperer, P. and M. Meyer (1989): "Supply Function Equilibria in Oligopoly Under Uncertainty," *ECMA*, 57(6), 1243-1278.

Note: We will only discuss the random utility approach of price competition in the class. Students should know other basic competition models which include: Cournot (quantity) competition, Bertrand competition with homogenous products, the spatial approach of price competition with differentiated products, the representative consumer approach (which is very useful in macro and trade), and price competition with vertical differentiation. All can be found in Tirole's book.

Classes 1.5-2: Search Models (JZ) - Sept 12, 19

The literature on search models is huge, and the list here, though far from being exhaustive, is already long. I am NOT(!) recommending you to read all papers. Reading those papers with a star next to them should be enough to equip you with the basic tools and for starting your own research.

Useful survey papers:

- *Baye, M., J. Morgan, and P. Scholten (2006): "Information, Search, and Price Dispersion," in *Handbook of Economics and Information Systems*, Amsterdam
- Rogerson, R., R. Shimer, and R. Wright (2005): "Search-Theoretic Models of the Labor Market: A Survey," *JEL*, 43(4), 959-988.

Note: We will also discuss some basic search models which were developed in the literature of labor economics but are potentially useful for IO research.

Optimal search decisions:

- Stigler, G. (1961): "The Economics of Information," *JPE*, 69(3), 213-225.
- Lippman, S. and J. McCall (1972): "The Economics of Job Search: A Survey," *Economic Inquiry*, 14(2), 155–189.
- Kohn, M. and S. Shavell (1974): "The Theory of Search," *JET*, 9, 93-123.
- *Weitzman, M (1979): "Optimal Search for The Best Alternative," *ECMA*, 47(3), 641-654.
- De los Santos, D., A. Hortacsu, and M. Wildenbeest (2012): "Testing Models of Consumer Search Using Data on Web Browsing and Purchasing Behavior," *AER*, 102(6), 2955-80

1. Basic Models

Consumer search with homogeneous products and price dispersion:

- Diamond, P. (1971): "A Model of Price Adjustment," *JET*, 3(2), 156-168.
- *Varian, H. (1980): "A Model of Sales," *AER*, 70(4), 651-659.
- *Stahl, D. (1989): "Oligopolistic Pricing with Sequential Consumer Search," *AER*, 79(4), 700-712.
- *Burdett, K. and K. Judd (1983): "Equilibrium Price Dispersion," *ECMA*, 51(4), 955-970.
- Stahl, D. (1996): "Oligopolistic Pricing with Heterogeneous Consumer Search," *IJIO*, 14(2), 243-268. [A more general version of Stahl (89)]
- Rob, R. (1985): "Equilibrium Price Distributions," *REStud*, 52(3), 487-504.
- *Armstrong, M., J. Vickers, and J. Zhou (2009a): "Consumer Protection and the Incentive to Become Informed," *JEEA*, 7(2-3), 399-410. [A more general treatment of Burdett&Judd (83).]
- Jassen, M. and J.L. Moraga-Gonzelaz (2004): "Strategic Pricing, Consumer Search and the Number of Firms," *REStud*, 71(4), 1089-1118. [A mix of Stahl (89) and Burdett&Judd (83).]
- Benabou, R. (1993): "Search Market Equilibrium, Bilateral Heterogeneity, and Repeat Purchases," *JET*, 60(1), 140-158.
- McAfee, P. (1995): "Multiproduct Equilibrium Price Dispersion," *JET*, 67(1), 83-105.
- Hong, H. and M. Shum (2006): "Using Price Distributions to Estimate Search Costs," *RAND*, 37(2), 257-275.
- Sorensen, A. (2000): "Equilibrium Price Dispersion in Retail Markets for Prescription Drugs," *JPE*, 108(4), 833-850.
- Lach, S. (2002): "Existence and Persistence of Price Dispersion: An Empirical Analysis," *REStat*, 84(3), 433-444.

Consumer search with differentiated products:

- *Wolinsky, A. (1986): "True Monopolistic Competition as a Result of Imperfect Information," *QJE*, 101(3), 493-512.
- *Anderson, S. and R. Renault (1999): "Pricing, Product Diversity, and Search Costs: A Bertrand-Chamberlin-Diamond Model," *RAND*, 30(4), 719-735. [Similar to Wolinsky (1986), but explores equilibrium existence and comparative statics.]
- Zhou, J. (2012): "Multiproduct Search," working paper.
- Hortacsu, A. and C. Syverson (2004): "Product Differentiation, Search Costs and Competition in the Mutual Fund Industry: A Case Study of S&P 500 Index Funds," *QJE*, 119(2), 403-456.
- Wildenbeest, M. (2011): "An empirical model of search with vertically differentiated products", *RAND*, 42(4), 729-57.

Dynamic search with posted prices:

- *Burdett, K. and D. Mortensen (1998): "Wage Differentials, Employer Size, and Unemployment," *IER*, 39(2), 257-273.
- Burdett, K. and M. Coles (2003): "Equilibrium Wage-Tenure Contracts," *ECMA*, 71(5), 1377-1404.
- Galenianos, M., R. Pacula, and N. Persico (2012): "A Search-Theoretic Model of the Retail Market for Illicit Drugs," *REStud*, 79(3), 1239-1269.
- Cebul, R., J. Rebitzer, L. Taylor, and M. Votruba (2011): "Unhealthy Insurance Markets: Search Frictions and the Cost and Quality of Health Insurance," *AER*, 101(5), 1842-71.

Decentralized matching with search frictions:

- Burdett, K. and M. Coles (1999): "Long-Term Partnership Formation: Marriage and Employment," *EJ*, 109(456), F307-F334.
- Smith, L. (2011): "Frictional Matching Models," *Annual Review of Economics*, 3, 319-338.
- *Mortensen, D. and R. Wright (2002): "Competitive Pricing and Efficiency in Search Equilibrium," *IER*, 43(1), 1-20.
- *Burdett, K. and M. Coles (1997): "Marriage and Class," *QJE*, 112(1), 141-168.
- Smith, L. (2006): "The Marriage Model With Search Frictions," *JPE*, 114(6): 1124-44.
- *Shimer, R. and L. Smith (2000): "Assortative Matching and Search," *ECMA*, 68(2), 343-369.
- Atakan, A. (2006): "Assortative Matching with Explicit Search Costs," *ECMA*, 74(3), 667-680.

Search and intermediaries:

- Rubinstein, A. and A. Wolinsky (1987): "Middlemen," *QJE*, 102(3), 581-593.
- *Duffie, D., N. Garleanu, L. Pedersen (2005): "Over-the-Counter Markets," *ECMA*, 73(6), 1815–1847.
- *Spulber, D. (1996): "Market Making by Price-Setting Firms," *REStud*, 63(4), 559-580.
- Gavazza, A. (2012): "An Empirical Equilibrium Model of a Decentralized Asset Market," working paper.

[Note: We have ignored a few branches of search models developped in the labor search literature (especially directed search models).]

2. Applications

Search models can be used to address lots of economic issues in IO. Here are a few examples:

Search, advertising, and information platform:

- Butters, G. (1977): "Equilibrium Distributions of Sales and Advertising Prices," *REStud*, 44(3), 465-491.
- Robert, J. and D. Stahl (1993): "Informative Price Advertising in a Sequential Search Model," *ECMA*, 61(3), 657-686.
- Baye, M. and J. Morgan (2001): "Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets," *AER*, 91(3), 454-474.
- Haan, M. and J. Moraga-Gonzalez (2011): "Advertising for Attention in a Consumer Search Model," *EJ*, 121(552), 552-579.
- Lal, R. and C. Matutes (1994): "Retail Pricing and Advertising Strategies," *Journal of Business*, 67(3), 345-370.
- Rhodes, A. (2012): "Multiproduct Retailing," working paper.

Search and learning:

- Rothschild, M. (1974): "Searching for the Lowest Price When the Distribution of Prices Is Unknown," *JPE*, 82(4), 689-711.
- Benabou, R. and R. Gertner (1993): "Search with Learning from Prices: Does Increased Inflationary Uncertainty Lead to Higher Markups?" *REStud*, 60(1), 69–93.
- Fishman, A. (1996): "Search with Learning and Price Adjustment Dynamics," *QJE*, 111(1), 253–268.
- Yang, H. and L. Ye (2008): "Search with Learning: Understanding Asymmetric Price Adjustments," *RAND*, 39(2), 547-564.

- Jassen, M., P. Pichler, and S. Weidenholzer (2011): "Sequential Consumer Search with Incompletely Informed Consumers," *RAND*, 42(3), 444-470.

Prominence (paid placements/sponsor links) and non-random search:

- Anthey, S. and G. Ellison (2011): "Position Auctions with Consumer Search," *QJE*, 26(3), 1213-1270.
- Armstrong, M., J. Vickers, and J. Zhou (2009b): "Prominence and Consumer Search," *RAND*, 40(2), 209-233.
- Armstrong, M. and J. Zhou (2011): "Paying for Prominence," *EJ*, 121, F368-F395.
- Chen, Y. and C. He (2011): "Paid-Placement: Advertising and Search on the Internet," *EJ*, 121, F309-F328.

Obfuscating pricing:

- Ellison, G. and S. Fisher Ellison (2009): "Search, Obfuscation, and Price Elasticities on the Internet," *ECMA*, 77(2), 427-452.
- Ellison, G. and A. Wolitzky (2012): "A Search Cost Model of Obfuscation," *RAND*, 43(3), 417-441.
- Wilson, C. (2010): "Ordered Search and Equilibrium Obfuscation," *IJIO*, 28(5), 496-506.
- Carlin, B. (2009): "Strategic Price Complexity in Retail Financial Markets," *JFE*, 91, 278-287.

The impact of internet and online market:

- Bar-Issac, H., G. Caruana, and V. Cunat (2012): "Search, Design, and Market Structure," *AER*, 102(2), 1140-1160.
- Brown, J. and A. Gooolsbe (2002): "Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry," *JPE*, 110(3), 481-507.
- Goldmanis, M., A. Hortacsu, C. Syverson, and O. Emre (2010): "E-Commerce and the Market Structure of Retail Industries," *EJ*, 120(545), 651-682.

Classes 3-4: Behavioral IO (JZ) - Sept 26, Oct 3

Books and survey papers:

- *Spiegler, R. (2011): *Bounded Rationality and Industrial Organization*, Oxford University Press
- Ellison, G. (2006): "Bounded Rationality and IO," in *Advances in Economics and Econometrics: Theory and Applications: Ninth World Congress*, ed. by R. Blundell, W. Newey, and T. Persson, Cambridge University Press.

- *Armstrong, M. (2008): "Interactions Between Competition and Consumer Policy," *Competition Policy International*, 4(1), 97-147.
- Huck, S. and J. Zhou (2011): "Consumer Behavioral Biases in Competition: A Survery", OFT report.

Misprediction of future demand:

- *Della Vigna, S. and U. Malmedier (2004): "Contract Design and Self-Control: Theory and Evidence," *QJE*, 119(2), 353-402.
- DellaVigna, S. and U. Malmendier (2006): "Paying not to go to the gym," *AER*, 96 (3), 694-719.
- Eliaz, K. and R. Spiegler (2006): "Contracting with Diversely Naive Agents," *REStud*, 73(3), 689-714.
- Heidhues, P. and B. Koszegi (2009): "Exploiting Naivete about Self-Control in the Credit Market", *AER*, 100(5), 2279-2303.
- Ellison, G. (2005): "A Model of Add-On Pricing," *QJE*, 120(2), 585-637.
- *Gabaix, X., and D. Laibson (2006): "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *QJE*, 121(2), 505-540.
- *Grubb, M. (2009): "Selling to Overconfident Consumers," *AER*, 99(5), 1770-1807.
- Sandroni, A. and F. Squintani (2007): "Overconfidence, Insurance, and Paternalism," *AER*, 97(5), 1994-2004.
- Miravete, E. (2003): "Choosing the Wrong Calling Plan? Ignorance and Learning," *AER*, 93(1), 297-310.
- Brown, J., T. Hossain, and J. Morgan (2010): "Shrouded Attributes and Information Suppression: Evidence from Field Experiments," *QJE*, 125(2), 859-876.

Context-dependent preferences:

- *Heidhues, P. and B. Koszegi (2008): "Competition and Price Variation when Consumers Are Loss Averse," *AER*, 98(4), 1245-1268.
- Heidhues, P. and B. Koszegi (2013): "Regular Prices and Sales," forthcoming in *TE*.
- Zhou, J. (2011): "Reference Dependence and Market Competition," *JEMS*, 20(4), 1073-1094.
- Karle, H. and M. Peitz (2013): "Competition Under Consumer Loss Aversion," forthcoming in *RAND*.
- Armstrong, M. and Y. Chen (2013): "Discounting Prcing," working paper.
- *Bordalo, P., N. Gennaioli, and A. Shleifer (2013): "Competition for Attention," working paper.

- Koszegi, B. and A. Szeidl (2013): "A Model of Focusing in Economic Choice," *QJE*, 128(1), 53-107.

Market complexity and boundedly rational decision making:

- Schmalensee, R. (1978): "A Model of Advertising and Product Quality," *JPE*, 86(3), 485-503.
- Smallwood, D. and J. Conlisk (1979): "Product Quality in Markets where Consumers are Imperfectly Informed," *QJE*, 93(1), 1-23.
- Dow, J. (1991): "Search Decisions with Limited Memory," *REStud*, 58(1), 1-14.
- Rubinstein, A. (1993): "On Price Recognition and Computational Complexity in a Monopolistic Model," *JPE*, 101, 473-484.
- *Spiegler, R. (2006): "The Market for Quacks," *REStud*, 73(4), 1113-1131.
- Spiegler, R. (2006): "Competition over Agents with Boundedly Rational Expectations," *TE*, 1(2), 207-231.
- Spiegler, R. and K. Eliaz (2011): "Consideration Sets and Competitive Marketing," *REStud*, 78, 235-262.
- *Spiegler, R. and M. Piccione (2012): "Price Competition under Limited Comparability," *QJE*, 127, 97-135.
- Spiegler, R. (2013): "Competitive Framing," forthcoming in *AEJ: Micro*.
- Chioveanu, I. and J. Zhou (2013): "Price Competition With Consumer Confusion", forthcoming in *Management Science*.
- Armstrong, M. and Y. Chen (2009): "Inattentive Consumers and Product Quality," *JEEA*, 7(2-3), 411-422.
- Baye, M. and J. Morgan (2004): "Price Dispersion in the Lab and on the Internet," *RAND*, 35(3), 449-466.
- Lee and Malmendier (2011): "The Bidder's Curse," *AER*, 101(2), 749-787.

[Note: There are more topics in behaviroal economics and bounded rationality in general. Here we only discuss the "biases" or "non-standard behavior" of which economists have found useful applications in IO.]

Classes 5-6: Introduction to "New" Empirical IO, Demand Estimation (RL) - October 10, 17

Class 5:

- Class Notes
- * Working (1927) What do Statistical Demand Curves Show? QJE 41 212-35

- * Berry (1994) Estimating Discrete Choice Models of Product Differentiation, RAND 25(2) 242-262
- * Bresnahan (1987) Competition and Collusion in the American Automobile Industry: The 1955 Price War, J.I.E. 35(4) 457-482
- Chaudhuri, Goldberg, Jia (2008) Estimating the Effects of Global Patent Protection in Pharmaceuticals: A Case Study of Quinolones in India, AER
- Deaton and Muellbauer (1980) An Almost Ideal Deamand System AER
- Hausman, Leonard & Zona (1994) Competitive Analysis with Differentiated Products, Annales d'Econ. et Stat.

Class 6:

- * Berry, Levinsohn and Pakes (1995) Automobile Prices in Market Equilibrium Econometrica 63(4) 841-90 [see also the NBER working paper version for arguably a more pleasant read]
- Petrin (2002) Quantifying the Benefits of New Products: The Case of the Minivan, JPE 110(4) 705-29.
- Nevo (1998) A Research Assistants Guide to Random Coefficient Discrete Choice Models of Demand NBER Technical Working Paper T0221
- Nevo (2001) Measuring Market Power in the Ready-to-Eat Cereal Industry, Econometrica 69(2) 307-322
- Gentzkow (2007) Valuing new goods in a model with complementarities: online newspapers, AER

Textbook References

- Hayashi (2000) *Econometrics* [Ch3 has a nice discussion of the standard endogeneity problems in demand estimation in a GMM framework]
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Class 7: Introduction to Single Agent Dynamics and Applications - Oct 24

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Class 8: Vertical Markets: Contracting, Integration, Exclusivity (RL) - Oct 31

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Class 9: Bargaining in Vertical Markets: Theory + Empirics (RL) - Nov 7

Theory:

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Class 10: Two Sided Markets: Theory and Empirics (RL/JZ) - November 14

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Class 11: Dynamic Pricing and Sequential Screening (JZ) - November 21

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NO CLASS (THANKSGIVING) - November 28

Class 12: Guest Lecture - Political Economy (Kei Kawai), Regulation/Auctions (John Asker) - December 5

Class 13: TBD - December 12

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