

**Oregon State University
Department of Economics**

Industrial Organization and Technological Change

Econ 660

Spring 2007

Time & Location: T&R 3-4:50 pm, Bexl 211
Instructor: V. Tremblay (Ballard 319A)
Office Hours: Tu & Thur 12:30-1:30 pm and Friday 2-3 pm
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Prerequisites: A working knowledge of graduate microeconomic theory, game theory, econometrics, and introductory industrial organization.

Required Textbooks:

Jean Tirole, *The Theory of Industrial Organization*, MIT Press, 1988 (T).
Stephen Martin, *Advanced Industrial Economics*, Blackwell Publishers, 2002 (M)

Review Textbooks:

Oz Shy, *Industrial Organization: Theory and Applications*, MIT Press, 1995 (S).
D. Carlton and J. Perloff, *Modern Industrial Organization*, Glenview, Ill: Scott, Foresman/Little, Brown, 2005 (C&P).

Supplementary Books:

W. Novshek, *Mathematics for Economists*, Academic Press, 1993 (N).
D. Fudenberg and J. Tirole, *Game Theory*, MIT Press, 1992 (F&T).
R. Sundaram, *A First Course in Optimization Theory*, Cambridge University Press, 1996 (Sun)
J. Sutton, *Sunk Costs and Market Structure*, Cambridge, MA: MIT Press, 1992 (S).
J. Sutton, *Technology and Market Structure*, MIT Press, 1999 (S2).
V. Tremblay and C.H. Tremblay, *The U.S. Brewing Industry: Data and Economic Analysis*, MIT Press, 2005 (T&T).
X. Vives, *Oligopoly Pricing*, MIT Press, 1999 (V).
Handbook of Industrial Organization, Richard Schmalensee and Robert Willig, eds., North Holland, 1989 (IO-Handbook).
Handbook of Game Theory, Robert J. Aumann and Sergiu Hart, eds, North Holland, 1992 (GT-Handbook).
Industrial Structure and in the New Industrial Economics, G. Bonanno and D. Brandolini, eds, Oxford: Clarendon Press, 1990 (NEW-IE).
Industry and Firm Studies, V. Tremblay and C. Tremblay, editors, M.E. Sharpe, 2007.

Course Objectives: To understand both the important theoretical and empirical models associated with advanced industrial organization. The focus will be on the development and testing of new theories that have important public policy implications. Each week we will analyze one or more papers from the outline below. To fully understand these papers, you will need to read the preceding “classics” and review articles. The instructor will provide suggestions as we go.

Grading: Each student will be expected to make a presentation on several required journal articles that are listed on the reading list. These will be assigned by the instructor. Students will also be expected to write a referee report and a term paper. The article for the referee report will be assigned by the instructor. Students are required to write a research proposal. Ph.D. students are encouraged to use their research proposal as a platform for their IO field paper requirement, after appropriate extension, revision, and polishing. The weights are as follows:

Referee Report ¹	10%
Class Presentations	20%
Research Proposal (due at the last class period in the 9 th week of classes)	30%
Final Exam (take home exam)	40%

Course Outline and Readings:
(* most important readings)

1. Review Material

A. Modeling in Economics

- Hal Varian, "How to Build an Economic Model in Your Spare Time," *American Economist*, Fall 1997.
 Leamer, Edward E., "Questions, Theory, and Data," in Steven G. Medema and Warren J. Samuels, editors, *Foundations of Research in Economics: How Do Economists Do Economics?*, Cheltenham, United Kingdom: Edward Edgar Publishers, 1996.
 William Thomas, "The Young Person's Guide to Writing Economic Theory," *JEL*, March 1999.
 Rubinstein, "Dilemmas of an Economic Theorist," *Econometrica*, July 2006.

B. Empirical Methods and IO

- *Outline for Empirical Research
 T. Haavelmo, "The Probability Method in Econometrics," *EM*, July 1944 (supplement).
 A. Spanos, "On Rereading Haavelmo: A Retrospective View of Econometric Modelling," *Econometric Theory*, 1989, 405-429.
 E. Leamer, "Let's Take the Con out of Econometrics," *AER*, March 1983.
 R. Porter, "Recent Developments in Empirical Industrial Organization," *JEE*, Spring 1994.
 A. Roth, "Game Theory as a Part of Empirical Economics," *EJ*, January 1991.

C. Overview of Industrial Organization

- *(T) Introduction
 *R. Schmalensee, "Interindustry Studies of Structure and Performance," (IO-Handbook), Ch. 16.
 (M) Chs. 5 and 6
 H. Demsetz, "Industry Structure, Market Rivalry, and Public Policy," *Journal of Law and Economics*, April 1973.
 R. Caves, "International Differences in Industrial Organization," (IO-Handbook), Ch. 21.
 Dutta and Radner, "Profit Maximization and the Market Selection Hypothesis," *Review of Economic Studies*, October 1999.
 M. Slade, "Competing Models of Firm Profitability," *International Journal of Industrial Organization*, March 2004.

¹The report should be typed and about 4-5 pages long, double spaced. In your report, please: 1) write a brief summary of the paper, 2) indicate the main strengths and weaknesses of the paper, 3) indicate how the paper might be improved, and 4) state how the paper could be extended in future research.

D. Game Theory
(T) Ch. 11.

2. Pricing Under Monopoly and Imperfect Competition

A. Static and Dynamic Settings

* (T) Chs. 1, 3, 5, and 6

A. Rabah and I. Grilo, "Stackelberg versus Cournot Equilibrium," *Games and Economic Behavior*, January 1999, pp. 1-21.

(V) Chs. 4 and 5

C. Price Wars and Preemption Races

* P. Ghemawat and B. Nalebuff, "The Devolution of Declining Industries," *Quarterly Journal of Economics*, 1990, 167-186.

* J. Bulow and P. Klemperer, "The Generalized War of Attrition," *American Economic Review*, 1999, 175-189.

Besanko and Doraszelski, "Capacity Dynamics and Endogenous Asymmetries in Firm Size," *Rand Journal of Economics*, Spring 2004.

3. Market Structure: Measurement and Causes

A. Measurement

* (M) Ch. 11 (pp. 335-339)

* Tremblay, Iwasaki, and Tremblay, "The Dynamics of Industry Concentration for Micro and Macro Brewers," *Review of Industrial Organization*, May 2005.

(T&T) Ch. 3.

B. Theory of Entry Barriers

* (M) Ch. 11 (pp. 341-360)

* (S1) Chs. 1-3

McAfee, Mialon, and Williams, "What is a Barrier to Entry?" *American Economic Review*, May 2004.

D. Carlton, "Why Barriers to Entry are Barriers to Understanding," *American Economic Review*, May 2004.

R. Schmalensee, "Sunk Costs and Antitrust Barriers to Entry," *American Economic Review*, May 2004.

Amir and Lambson, "Entry, Exit, and Imperfect Competition in the Long Run," *Journal of Economic Theory*, May 2003.

S. Martin, "Sunk Costs and Entry," *Review of Industrial Organization*, June 2002.

C. Empirical Evidence

* Iwasaki, Selton, and Tremblay, "Brewing Wars of Attrition for Profit and Concentration," Department of Economics, OSU, January 2007.

* P. Ellickson, "Quality Competition in Retailing: A Structural Analysis," *International Journal of Industrial Organization*, May 2006.

* W. Robinson and J. Chiang, "Are Sutton's Predictions Robust?: Empirical Insights into Advertising, R&D, and Concentration," *JIE*, December 1996.

Matraves, "Market Structure, R&D, and Advertising in the Pharmaceutical Industry," *Journal of Industrial Economics*, June 1999.

* Ashenfelter and Sullivan, "Nonparametric Tests of Market Structure: An Application to the Cigarette Industry," *Journal of Industrial Economics*, June 1987.

(T&T) pp. 45-63

Horvath, Schivardi, and Woywode, "On Industry Life-Cycles: Delay, Entry, and Shakeout in Beer Brewing," *International Journal of Industrial Organization*, 2001, 1023-1052.

Martin, "Advertising, Concentration, and Profitability: The Simultaneity Problem," *Bell Journal*, 1979, 639-47.

Geroski, Masson, and Shaanan, "The Dynamics of Market Structure," *International Journal of Industrial Organization*, 1987, 93-100.

- *Geroski and Mazzucato, "Modeling the Dynamics of Industry Populations," *International Journal of Industrial Organization*, 2001, 1003-1022.
- Symeonidis, "Price and Nonprice Competition with Endogenous Market Structure," *JEMS*, Spring 2000.
- Latcovich and Smith, "Pricing, Sunk Costs, and Market Structure Online: Evidence from Book Retailing," *Oxford Review of Economic Policy*, Summer 2001.
- C. Lee, "Advertising, Its Determinants, and Market Structure," *Review of Industrial Organization*, August 2002.
- Marsili and Verspagen, "Technology and the Dynamics of Industry Structures: An Empirical Mapping of Dutch Manufacturing," *Industrial and Corporate Change*, August 2002.
- Gschwandtner and Lambson, "The Effects of Sunk Costs on Entry and Exit: Evidence from 36 Countries," *Economics Letters*, September 2002.

4. The Measurement of Market Power

A. The New Empirical Industrial Organization (NEIO)

- *T. Bresnahan, "Empirical Studies of Industries with Market Power," (IO-Handbook), Ch. 11.
- L. Cabal, "Conjectural Variations as a Reduced Form," *Economics Letters*, 1995, 397-402.
- A. Nevo, "Identification of the Oligopoly Solution Concept in a Differentiated Products Industry," *Economics Letters*, 1998, 391-395.
- Genesove, David and Wallace P. Mullin, "Testing Static Oligopoly Models: Conduct and Cost in the Sugar Industry, 1890-1914," *Rand Journal*, Summer 1998, 355-377.
- K. Corts, "Conduct Parameters and the Measurement of Market Power," *JE*, February 1999.
- Vilcassim, Kadiyali, and Chintagunta, "Investigating Dynamic Multifirm Market Interactions in Price and Advertising: A Conjectural Variations Approach," *Management Science*, 1999, 499-518.
- *Dae-Wook and Knittel, "Biases in Static Oligopoly Models: Evidence from the California Electricity Market," *Journal of Industrial Economics*, December 2006.
- Joskow and Waterson, *Empirical Industrial Organization*, Elger Reference Collection, 2004.

B. Cartels

- V. Suslow, "Cartel Contract Duration: Empirical Evidence from Inter-war International Cartels," *Industrial and Corporate Change*, October 2005.
- *Levenstein and Suslow, "What Determines Cartel Success?" *Journal of Economic Education*, March 2006.
- Bockem, "Cartel Formation and Oligopoly Structure: A New Assessment of the Crude Oil Market," *Applied Economics*, July 2004.

C. NEIO in Dynamic Markets

- Pindyck, "The Measurement of Market Power in Dynamic Markets," *Journal of Law and Economics*, April 1985.

D. Game Theoretic Approach

- *F. Gasmi, J. J. Laffont, and Q. Vuong, "Econometric Analysis of Collusive Behavior in a Soft-Drink Market," *JEMS*, Summer 1992.

E. Empirical Applications

- *C. Wolfram, "Measuring Duopoly Power in the British Electricity Spot Market," *American Economic Review*, September 1999.
- *B. Lanier, "A Dynamic Analysis of the Market for Wide-Bodied Commercial Aircraft," *Review of Economic Studies*, July 2004.
- *A. Nevo, "Measuring Market Power in the Ready-to-Eat Cereal Industry," *Econometrica*, March 2001.
- A. Nevo, "Mergers and Differentiated Products," *Rand Journal of Economics*, forthcoming.
- *K. Sudhir and V. Kadiyali, "Structural Analysis of Competitive Behavior: New Empirical Industrial Organization Methods in Marketing," Working Paper, Yale School of Management, 2003.
- *Reiss and Wolak, "Structural Econometric Modeling: Rationales and Examples from Industrial Organization," working paper, Department of Economics, Stanford University, 2003.

- D. Kim and C. Knittel, "Biases in Static Oligopoly Models? Evidence from the California Electricity Market, NBER Working Paper, 2004.
- Berry, Levinsohn, and Pakes, "Automobile Prices in Market Equilibrium, *Econometrica* 1995.
- R. Feenstra and J. Levinsohn, "Estimating Markups and Market Conduct with Multidimensional Product Attributes," *Review of Economic Studies*, January 1995.
- Ashenfelter and Sullivan, "Nonparametric Tests of Market Structure: An Application to the Cigarette Industry," *Journal of Industrial Economics*, June 1987.
- M. Slade, "Sticky Prices in a Dynamic Oligopoly," *International Journal of Industrial Organization*, May 1999.
- M. Slade, "Empirical Games: The Oligopoly Case," *Canadian Journal of Economics*, May 1995.
- P. Chintagunta and D. Jain, "Empirical Analysis of a Dynamic Duopoly Model of Competition," *JEMS*, Spring 1995.
- M. Slade, "Competing Models of Firm Profitability," *International Journal of Industrial Organization*, March 2004.
- F. Verboven, "Testing for Monopoly Market Power When Products are Differentiated in Quality," *Manchester School*, January 2002.

F. Extensions

- *Busse and Rysman, "Competition and Price Discrimination in Yellow Pages Advertising," *Rand Journal*, Summer 2005.
- *R. Rao, "Econometric Specification and Identification of the Behavior of Economic Agents," *Journal of Quantitative Economics*, July 2004, 161-171.
- Genesove and Mullin, "Predation and its Rate of Return: The Sugar Industry, 1887-1914, *Rand Journal*, Spring 2006.
- Bajari, Hong, Krainer, and Nekipelov, "Estimating Static Models of Strategic Interaction," National Bureau of Economic Research, working paper no. 12013, 2006.
- Bajari, Benkard, and Levin, "Estimating Dynamic Models of Imperfect Competition, National Bureau of Economic Research, working paper no. 10450, 2004.
- Pakes and McGuire, "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," *Rand Journal of Economics*, Winter 1994.
- Pakes and Ericson, "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies*, January 1995, 53-82.
- Erickson and Pakes, "Empirical Implications of Alternative Models of Firm Dynamics," *Journal of Economic Theory*, 1998, 1-45.
- A. Pakes, "Common Sense and Simplicity in Empirical Industrial Organization," *Review of Industrial Organization*, December 2003.
- Brown and Wood, "The Social Cost of Monopoly Power," Cowles Foundation, Yale University, 2004.

5. Product Differentiation, Advertising, and Social Welfare

A. Introduction

- * (T) Ch. 2 (especially pp. 95-104)
- B. Eaton and R. Lipsey, "Product Differentiation," (IO-Handbook), Ch. 12.
- J. Gabszewicz and J-F Thisse, "Location," (GT-Handbook), Ch. 9.
- P. Anglin, "The Relationship Between Models of Horizontal and Vertical Differentiation," *BER*, January 1992.
- Kyle Bagwell, "The Economic Analysis of Advertising," Department of Economics, Columbia University, August 2005.

B. Horizontal-Vertical Differentiation and Persuasive-Informative Advertising

- * (T) Ch. 7 (especially pp. 277-289)
- Choi and Shin, "A Comment on a Model of Vertical Product Differentiation," *Journal of Industrial Economics*, 40 (2), June 1992, 229-231.

- X. Wauthy, "Quality Choice in Models of Vertical Differentiation," *Journal of Industrial Economics*, September 1996.
- Salop, "Monopolistic Competition with Outside Goods," *Bell Journal*, 1979.
- Akerlof and Dickens, "The Economic Consequences of Cognitive Dissonance," *American Economic Review*, June 1982.
- B. Klein and K. Leffler, "The Role of Market Forces on Assuring Contractual Performance," *JPE*, August 1981.
- Grossman and Shapiro, "Informative Advertising with Differentiated Products," *REStud*, 51, January 1984, 63-81.
- Dorfman and Steiner, "Optimal Advertising and Optimal Quality," *AER*, December 1954.
- Tremblay and Martins, "A Model of Vertical Differentiation, Brand Loyalty, and Persuasive Advertising," Michael Baye and Jon Nelson, editors, *Advances in Applied Microeconomics: Advertising and Differentiated Products*, New York: JAI Press, Volume 10, 2001.
- Tremblay and Polasky, "Advertising with Subjective Horizontal and Vertical Product Differentiation," *Review of Industrial Organization*, May 2002.
- F. Bass et al., "Generic and Brand Advertising Strategies in a Dynamic Duopoly," *Marketing Science*, Fall 2005.
- *S. McClure, J. Tomlin, K. Cypert, L. Montague, and P. Montague, "Neural Correlates of Behavioral Preference for Culturally Familiar Drinks," *Neuron*, 44 (2), October 14, 2004, 379-387.
- Sen, Sankar, "The Effectiveness of Brand Name Suggestiveness and Decision Goal on the Development of Brand Knowledge," *Journal of Consumer Psychology*, 8 (4), 1999, 431-455.
- Shiv, Cirmon, and Ariely, "Placebo Effects on Marketing Actions: Consumers May Get What They Pay For," *Journal of Marketing Research*, November 2005.
- C. Advertising, Name Brands, and Welfare
- * (T) pp. 115, 289-295
- *A. Dixit and V. Norman, "Advertising and Welfare," *Bell Journal*, Spring 1978.
- *G. Becker and K. Murphy, "A Simple Theory of Advertising as a Good or Bad," *QJE*, November 1993. (T&T) pp. 227-229.
- Stivers and Tremblay, "Advertising, Search Costs, and Welfare," *Information Economics and Policy*, 2005.
- S. Hahn, "The Advertising of Credence Goods as a Signal of Product Quality," *Manchester School*, January 2004.
- Cotterill, Putsis, and Dhar, "Assessing the Competitive Interaction between Private Labels and National Brands," *Journal of Business*, 2000, 109-137.
- Sen, Sankar, "The Effectiveness of Brand Name Suggestiveness and Decision Goal on the Development of Brand Knowledge," *Journal of Consumer Psychology*, 8 (4), 1999, 431-455.
- Anderson and Renault, "Advertising Content," *American Economic Review*, March 2006.
- D. Advertising and Demand Rotation
- *C. J. Aislable and C. A. Tisdell, "Profit Maximization and Marketing Strategies: Demand Rotation and Social Influence," *Managerial and Decision Economics*, 9 (1) March 1988, 77-82.
- *Johnson and Myatt, "On the Simple Economics of Advertising, Marketing, and Product Design," *American Economic Review*, June 2006.
- E. Empirical Evidence-- Advertising
- *J. Milyo and J. Waldfogel, "The Effect of Price Advertising on Prices: Evidence in the Wake of 44 Liquormart," *American Economic Review*, December 1999.
- *Akerberg, Daniel A., "Empirically Distinguishing Informative and Prestige Effects of Advertising," *Rand Journal of Economics*, 32 (2), Summer 2001, 316-333.
- *Gabszewicz, Laussel, and Sonnac, "Does Advertising Lower the Price of Newspapers to Consumers? A Theoretical Appraisal," *Economics Letters*, April 2005.
- Akerberg, "Advertising, Learning, and Consumer Choice in Experienced Good Markets: An Empirical Examination," *International Economic Review*, 2003, 1007-1040.

M. Slade, "Semi-Structural Models of Advertising Competition," *Journal of Applied Econometrics*, forthcoming.

Rogers and Tokle, "The Economics of Advertising: Where's the Data," *Review of Industrial Organization*, December 1995.

Golan, Karp, and Perloff, "Estimating Coke's and Pepsi's Price and Advertising Strategies," *J. of Business and Economic Statistics*, October 2000.

L. Benham, "The Effect of Advertising on the Price of Eyeglasses," *Journal of Law and Economics*, 1972.

M. Slade, "Product Rivalry and Multiple Strategic Weapons: An Analysis of Price and Advertising Competition," *Journal of Economics and Management Strategy*, 1995, 445-476.

F. Empirical Evidence-- Branded vs Generic Products (Klein-Leffler Hypothesis)

*Png and Reitman, "Why are some Products Branded and Others Not?" *JLE*, April 1995.

*Wiggins and Raboy, "Price Premia to Name Brands: An Empirical Analysis," *JIE*, December 1996.

Barron, Taylor, and Umbeck, "A Theory of Quality-Related Differences in Retail Margins: Why there is a 'Premium' on Premium Gasoline," *EI*, October 2000.

A. Chakravari and C. Janiszewski, "The Influence of Generic Advertising on Brand Preferences," *Journal of Consumer Research*, 2004, 487-502.

G. Hedonic Pricing

*Ariel Pakes, "A Reconsideration of Hedonic Price Indices with Application to PC's," National Bureau of Economic Research, NBER Working Paper 8715.

*Martins and Bin, "Estimation of Hedonic Price Functions via Additive Nonparametric Regression," *Empirical Economics*, May 2005.

Biey and Zanola, "The Market for Picasso Prints: A Hybrid Model Approach," *Journal of Cultural Economics*, May 2005.

Edward Castronova, "The Price of Bodies: A Hedonic Pricing Model of Avatar Attributes in a Synthetic World," *Kyklos*, 57 (2), 2004.

Philippe Bonnetain, "A Hedonic Model for Islands," *Journal of Urban Economics*, September 2006.

Gunter Schamel, "Geography versus Brands in a Global Wine Market," *Agribusiness*, Summer 2006.

6. Dynamic Issues in Industrial Organization

A. Review of Dynamic Programming Techniques

*(N) Ch. 11.

B. Dynamic Programming Applications to Industrial Organization

1) Learning-By-Doing

*(T) pp. 71-72

Lieberman, "Learning Curve and Pricing in the Chemical Processing Industries," *Rand Journal*, Summer 1984.

Bahk and Gort, "Decomposing Learning by Doing in New Plants," *Journal of Political Economy*, August 1993.

*Jarmin, "Learning-By-Doing and Competition in the Early Rayon Industry," *Rand Journal*, 1994

*C. Zulehner, "Testing Dynamic Oligopolistic Interaction: Evidence from the Semiconductor Industry," *International Journal of Industrial Organization*, December 2003.

J. Sengupta, "Dynamic Efficiency with Learning by Doing," *International Review of Applied Economics*, July 2004.

2) Market Power in Dynamic Markets

*Pindyck, "The Measurement of Monopoly Power in Dynamic Markets," *Journal of Law and Economics*, April 1985.

Denney et al., "Excise Taxes and Imperfect Competition in the U.S. Brewing Industry" mimeo, OSU, January 2002.

3) Optimal Pricing: Declining (mass market) vs Increasing (niche market) Prices over Time

*Bergemann and Valimaki, "Dynamic Pricing of Experience Goods, *Journal of Political Economy*, 2006, 713-743.

C. Other Dynamic Applications

*Roberts and Samuelson, "An Empirical Analysis of Dynamic, Nonprice Competition in an Oligopolistic Industry," *Rand Journal*, 1988.

*Sudhir, Pradeep, and Kadiyali, "Time-Varying Competition," *Marketing Science*, Winter 2005.

*Chevalier, Kashyap, and Rossi, "Why don't Prices Rise during Periods of Peak Demand? Evidence from Scanner Data," *American Economic Review*, 2003, 15-37.

Fenn, et al., "Cigarettes and Addiction Information: New Evidence in Support of the Rational Addiction Model," *Economics Letters*, July 2001.

Baltagi and Griffin, "The Econometrics of Rational Addiction: The Case of Cigarettes," *J. of Business and Economic Statistics*, October 2001.

Gisser, "Dynamic Gains and Static Losses in Oligopoly: Evidence from the Beer Industry," *Economic Inquiry*, July 1999.

Rust, "Optimal Replacement of GMC Bus Engines," *Econometrica*, 1987.

Becker and Murphy, "A Theory of Rational Addiction," *Journal of Political Economy*, August 1988.

Karp and Perloff, "Dynamic Oligopoly in the Rice Export Market," *Review of Economics and Statistics*, 1989.

Borenstein and Shepard, "Dynamic Pricing in Retail Gasoline Markets," *Rand Journal*, Autumn 1996.

Piga, "A Dynamic Model of Advertising and Product Differentiation," *Review of Industrial Organization*, October 1998.

Pakes and McGuire, "Computing Markov-Perfect Nash Equilibria: Numerical Implications of a Dynamic Differentiated Product Model," *Rand Journal of Economics*, Winter 1994.

Pakes and Ericson, "Markov-Perfect Industry Dynamics: A Framework for Empirical Work," *Review of Economic Studies*, January 1995, 53-82.

Erickson and Pakes, "Empirical Implications of Alternative Models of Firm Dynamics," *Journal of Economic Theory*, 1998, 1-45.

7. Comparative Statics and Imperfect Competition

A. Introduction

*Bulow, Geanakoplos, and Klemperer, "Multimarket Oligopoly: Strategic Substitutes and Complements," *JPE*, June 1985.

*V. Tremblay, "Comparative Statics: Classical and Modern Approaches, OSU Department of Economics, April 2007.

*Miravete and Pernias, "Innovation Complementarity and Scale of Production," *Journal of Industrial Economics*, March 2006.

B. Supermodular Games

*(Sun) Ch. 10, "Supermodularity and Parameteric Monotonicity"

*Milgrom and Roberts, "Rationalizability, Learning, and Equilibrium in Games of Strategic Complementarities," *ECM*, November 1990.

(V), pp. 16-39

Athey, "Monotone Comparative Statics under Uncertainty," *QJE*, February 2002.

Rabah, "Cournot Oligopoly and the Theory of Supermodular Games," *GEB*, August 1996.

Zhao, "A Necessary and Sufficient Condition for the Convexity (or Supermodularity) in Oligopoly Games," *Mathematical Social Sciences*, March 1999.

Astrid Jung, "Are Product Innovations and Flexible Technology Complements? Working Paper, Wissenschaftszentrum Berlin, 2004.

