

Stern School of Business
Advanced Microeconomics
Prof. Nicholas Economides

Preliminary Outline

Spring 2006

M 1:00-4:00

Office Hours: Mon. 5-6pm, Tue. 5-6pm

and by appointment, MEC 7-84

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Required Books

Jean Tirole, (1989), *Industrial Organization*, M.I.T. Press.

Recommended Books

Ken Arrow and Michael Intrilligator, (1981), *Handbook of Mathematical Economics*, North Holland.

Ken Binmore, (1992), *Fun and Games: A Text on Game Theory*, D.C. Heath.

Augustin Cournot, (1960), *Researches into the Mathematical Principles of the Theory of Wealth*, Kelly, NY (English translation by N.T. Bacon).

Jim Friedman, (1977), *Oligopoly and the Theory of Games*, North Holland.

Jim Friedman, (1983), *Oligopoly Theory*, Cambridge University Press.

Jim Friedman, (1990), *Game Theory With Application to Economics*, Oxford University Press.

Drew Fudenberg and Jean Tirole, (1991), *Game Theory*, MIT Press.

John Harsanyi, (1977), *Rational Behavior and Bargaining Equilibrium in Games and Social Situations*, Cambridge University Press.

David Kreps, (1990), *A Course in Microeconomic Theory*, Princeton University Press.

Kelvin Lancaster, (1979), *Variety, Equity and Efficiency*, Columbia University Press, New York.

R. Duncan Luce and Howard Raiffa, (1958), *Games and Decisions*, John Wiley, N.Y.

Guillermo Owen, (1982), *Game Theory*, second edition, W. Saunders.

Eric Rasmusen, (1989), *Games and Information*, Basil Blackwell.

Richard Schmalensee and Robert Willig, (1989), *Handbook of Industrial Organization*, North Holland.

Shapiro, Carl, and Hal Varian, *Information Rules*, Harvard Business School Press, 1999.

Martin Shubik, (1983), *Game Theory in the Social Sciences: Concepts and Solutions*, The M.I.T. Press.

John Sutton, *Technology and Market Structure* (MIT Press, 1998).

Carl von Weizsacker, (1980), *Barriers to Entry*, Springer Verlag.

Required reading is indicated by (*)

Course Outline

I. Review of Game Theory (1 week)

i. Games in Extensive and Normal Forms

1. D. Luce and H. Raiffa, (1958), *Games and Decisions*, ch. 3. (*)
2. K. Binmore, (1992), *Fun and Games*, ch. 1.
3. E. Rasmusen, (1989), *Games and Information*, ch. 1, 2.
4. D. Kreps, (1990), *A Course in Microeconomic Theory*, ch. 11.

ii. Non-cooperative Games

1. D. Luce and H. Raiffa, *Games and Decisions*, ch. 5.
2. J. Tirole, (1989), *Industrial Organization*, ch. 11. (*)
3. J. Nash, (1950), "Equilibrium Points in n-Person Games," *Proceedings of the National Academy of Sciences*, vol. 36, at http://www.stern.nyu.edu/networks/Nash_Equilibrium_in_N-person_games.pdf
4. J. Nash, (1951), "Non-cooperative Games," *Annals of Mathematics*, vol. 45, pp. 286-295.
5. G. Debreu, (1952), "A Social Equilibrium Existence Theorem," *Proceedings of the National Academy of Sciences*, vol. 38, pp. 886-893.
6. J. Friedman, (1977), *Oligopoly and the Theory of Games*, pp. 152-162, http://www.stern.nyu.edu/networks/Friedman_Nash_equilibrium_existence.pdf (*)
7. M. Shubik, (1983), *Game Theory in the Social Sciences*, ch. 9.
8. D. Kreps, (1990), *A Course in Microeconomic Theory*, ch. 12.
9. K. Binmore, (1992), *Fun and Games*, ch. 7.

iii. Cooperative Games

1. J. Nash, (1953), "Two-Person Cooperative Games," *Econometrica*, vol. 21, pp. 128-140, at http://www.stern.nyu.edu/networks/phdcourse/Nash_Two_person_cooperative_games.pdf (*)
2. J. Nash, (1950), "The Bargaining Problem," *Econometrica*, vol. 18, pp. 155-162, at http://www.stern.nyu.edu/networks/Nash_The_Bargaining_Problem.pdf
3. L. Shapley, (1953), "A Value for n-Person Games," in *Contributions to the Theory of Games*, vol. 2, pp. 307-317, eds. H. Kuhn and A. Tucker, at http://www.stern.nyu.edu/networks/Shapley_A_value_for_n-person_games.pdf. (*)
4. M. Shubik, *Game Theory in the Social Sciences*, ch. 6, 7.

II. Oligopoly in Homogeneous Goods (1.5 week)

i. Non-cooperative Oligopoly Games

1. Quantity-setting Games

- a. J. Friedman, *Oligopoly and the Theory of Games*, ch. 1, 2.
- b. A. Cournot, *Researches into the Mathematical Principles of the Theory of Wealth*.
- c. J. Friedman, *Oligopoly and the Theory of Games*, ch. 4.
- d. J. Tirole, (1989), *Industrial Organization*, pp. 218-228. (*)
- e. J. Roberts and H. Sonnenschein, (1977), "On the Foundations of the Theory of Monopolistic Competition," *Econometrica*, vol. 75, pp. 101-113, at http://www.stern.nyu.edu/networks/phdcourse/Roberts_Sonnenschein_On_the_foundations.pdf
- f. J. Roberts and H. Sonnenschein, (1976), "On the Existence of Cournot Equilibrium without Concave Profit Functions," *Journal of Economic Theory*, vol. 13, pp. 112-117, at http://www.stern.nyu.edu/networks/Roberts_Sonnenschein_On_the_Existence_of_Cournot_Equilibrium.pdf (*)
- g. W. Novshek and H. Sonnenschein, (1980), "Small Efficient Scale as a Foundation for Walrasian Equilibrium," *Journal of Economic Theory*, vol. 22, pp. 243-255.
- h. W. Novshek, (1980), "Cournot Equilibrium with Free Entry," *Review of Economic Studies*, vol. 47, pp. 473-486, at http://www.stern.nyu.edu/networks/Novshek_Cournot_Equilibrium_with_Free_Entry.pdf
- i. T. Bergstrom and H. Varian, (1985), "Two Remarks on Cournot Equilibrium," *Economics Letters*, vol. 19, pp. 5-8.

2. Price-setting Games

- a. J. Tirole, (1989), *Industrial Organization*, pp. 205-216. (*)

3. Other Strategy Spaces

- a. S. Grossman, (1981), "Nash Equilibrium and the Industrial Organization of Markets with Large Fixed Costs," *Econometrica*, vol. 49, pp. 1149-1172, at http://www.stern.nyu.edu/networks/phdcourse/Grossman_S_Nash_equilibrium.pdf (*)

4. Mixed Strategies

- a. H. Varian, (1981), "A Model of Sales," *American Economic Review*, vol. 70, no. 4, pp. 651-659, at http://www.stern.nyu.edu/networks/phdcourse/Varian_A_model_of_sales.pdf, errata at http://www.stern.nyu.edu/networks/phdcourse/Varian_A_model_of_sales_errata.pdf (*)

5. Asymmetric Oligopoly Games. Von Stackelberg Paradigm. Asymmetric Cournot Games.

- a. A. Dixit, (1979), "A Model of Duopoly Suggesting a Theory of Entry Barriers," *Bell Journal of Economics*, vol. 10, pp. 20-32, at http://www.stern.nyu.edu/networks/phdcourse/Dixit_A_model_of_dupoly.pdf (*)
- b. W. Novshek, (1984), "Finding All n-Firm Equilibria," *International Economic Review*, vol. 25, no. 1, pp. 61-70.

ii. Collusion, Coordination and Coalition Formation

1. M.-P. Donsimoni, N. Economides and H. Polemarchakis, (1986), "Stable Cartels," *International Economic Review*, vol. 22, no. 2, pp. 317-327, at http://www.stern.nyu.edu/networks/Stable_Cartels.pdf (*)
2. M. Perry and R. Porter, (1985), "Oligopoly and the Incentive for Horizontal Merger," *American Economic Review*, vol. 75, 219-227.
3. C. D'Aspremont and J. Jaskold-Gabszewicz, (1986), "On the Stability of Collusion," in J. Stiglitz and C. F. Mathewson (eds.) *New Developments in the Analysis of Market Structure*, MIT Press.

III. Oligopoly in Differentiated Products (2 weeks)

i. Variety Differentiation

1. Duopoly

- a. H. Hotelling, (1929), "Stability in Competition," *Economic Journal*, vol. 39, pp. 41-57, at http://www.stern.nyu.edu/networks/phdcourse/Hotelling_Stability_in_competition.pdf (*)
- b. C. D'Aspremont, J. Jaskold-Gabszewicz and J.-F. Thisse, (1979), "On Hotelling's 'Stability in Competition'," *Econometrica*, vol. 47, pp. 1145-1150, at http://www.stern.nyu.edu/networks/phdcourse/DAspremont_Gabszewicz_Thisse_On_Hotellings_Stability_in_Competition.pdf (*)
- c. N. Economides, (1984), "The Principle of Minimum Differentiation Revisited," *European Economic Review*, vol. 24, pp. 345-368, at http://www.stern.nyu.edu/networks/The_Principle_of_Minimum_Differentiation_Revisited.pdf (*)
- d. J. Tirole, (1989), *Industrial Organization*, pp. 277-282. (*)
- e. N. Economides, (1986), "Nash Equilibrium Existence in Duopoly with Products Defined by Two Characteristics," *Rand Journal of Economics*, vol. 17, no. 3, pp. 431-439, at http://www.stern.nyu.edu/networks/Nash_Equilibrium_in_Duopoly.pdf

2. Oligopoly

- a. K. Lancaster, (1979), *Variety, Equity and Efficiency*.

- b. S. Salop, (1979), "Monopolistic Competition with Outside Goods," *Bell Journal of Economics*, vol. 10, pp.141-156, at http://www.stern.nyu.edu/networks/phdcourse/Salop_Monopolistic_competition.pdf (*)
- c. W. Novshek, (1980), "Equilibrium in Simple Spatial (or Differentiated Product) Models," *Journal of Economic Theory*, vol. 22, pp. 286-295.
- d. N. Economides, (1989), "Symmetric Equilibrium Existence and Optimality in Differentiated Products Markets," *Journal of Economic Theory*, vol. 47, no. 1, pp. 178-194, at http://www.stern.nyu.edu/networks/Symmetric_Equilibrium_Existence.pdf (*)
- e. J. Tirole, (1989), *Industrial Organization*, pp. 282-289 (*)
- f. A. Dixit and J. Stiglitz, (1977), "Monopolistic Competition and Optimum Product Diversity," *American Economic Review*, vol. 67, pp. 297-308, at http://www.stern.nyu.edu/networks/phdcourse/Dixit_Stiglitz_Monopolistic_competition.pdf
- g. J. Tirole, (1989), *Industrial Organization*, pp. 298-300.
- h. M. Spence, (1976), "Product Selection, Fixed Costs and Monopolistic Competition," *Review of Economic Studies*, vol. 43, pp. 217-236, at http://www.stern.nyu.edu/networks/phdcourse/Spence_Product_selection.pdf (*)
- i. M. Spence, (1976), "Product Differentiation and Welfare," *American Economic Review, Papers and Proceedings*, vol. 66, no. 2, pp. 407-414, at http://www.stern.nyu.edu/networks/phdcourse/Spence_Product_differentiation_and_welfare.pdf
- j. O. Hart, (1985), "Monopolistic Competition in the Spirit of Chamberlin: A General Model," *Review of Economic Studies*, vol. 52, pp. 529-546.

3. Sequential Decisions

- a. E. Prescott and M. Visscher, (1977), "Sequential Location Among Firms with Foresight," *Bell Journal of Economics*, vol. 8, pp. 243-248, at http://www.stern.nyu.edu/networks/phdcourse/Prescott_Visscher_Sequential_location.pdf (*)
- b. N. Economides, J. Howell and S. Meza, (2002), "Does it Pay to be First? Sequential Locational Choice and Foreclosure," Discussion Paper EC-02-19, Stern School of Business, N.Y.U., at <http://www.stern.nyu.edu/networks/SeqlocAugust2002.pdf> (*)

4. Informational Advertising; Market Failure; Moral Hazard

- a. G. Grossman and C. Shapiro, (1984), "Informative Advertising with Differentiated Products," *Review of Economic Studies*, vol. 1, 63-82.
- b. J. Tirole, (1989), *Industrial Organization*, pp. 289-295, 106-126. (*)

5. Multi-product Firms

- a. A. Shaked and J. Sutton, (1990), "Multiproduct Firms and Market Structure," *Rand Journal of Economics*, vol. 21, no. 1, pp. 45-62, at http://www.stern.nyu.edu/networks/Shaked_Sutton_Multiproduct_Firms.pdf

ii. Quality Differentiation

1. Perfect Competition and Monopoly

- a. S. Rosen, (1974), "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *Journal of Political Economy*, vol. 82, pp. 34-55, at http://www.stern.nyu.edu/networks/phdcourse/Rosen_Hedonic_prices.pdf (*)
- b. M. Mussa and S. Rosen, (1978), "Monopoly and Product Quality," *Journal of Economic Theory*, vol. 18, pp. 301-317, at http://www.stern.nyu.edu/networks/Mussa_Rosen_Monopoly_and_Product_Quality.pdf (*)
- c. J. Jaskold-Gabszewicz, A. Shaked, J. Sutton and J.-F. Thisse, (1986), "Segmenting the Market: The Monopolist's Optimal Product Mix," *Journal of Economic Theory*, vol. 39, pp. 273-289, at http://www.stern.nyu.edu/networks/Gabszewicz_Shaked_Sutton_Thisse_Segmenting_the_Market.pdf.
- d. N. Economides, (1995), "The Incentive of a Multiproduct Monopolist to Provide All Goods," Discussion Paper no. EC-95-09, Stern School of Business, N.Y.U.

2. Duopoly

- a. A. Shaked and J. Sutton, (1982), "Relaxing Price Competition Through Product Differentiation," *Review of Economic Studies*, vol. 49, pp. 3-14, at http://www.stern.nyu.edu/networks/phdcourse/Shaked_Sutton_Relaxing_price_competition.pdf (*)
- b. J. Tirole, (1989), *Industrial Organization*, pp. 296-298. (*)

3. Oligopoly

- a. J. Jaskold-Gabszewicz and J.-F. Thisse, (1979), "On Product Quality, Duopoly and Income Disparities," *Journal of Economic Theory*, vol. 20, pp. 340-359, at http://www.stern.nyu.edu/networks/Gabszewicz_Thisse_Price_Competition_Quality_and_Income_Disparities.pdf.
- b. J. Jaskold-Gabszewicz and J.-F. Thisse, (1980), "Entry (and Exit) in a Differentiated Industry," *Journal of Economic Theory*, vol. 22, pp. 327-338, at http://www.stern.nyu.edu/networks/Gabszewicz_Thisse_Entry_and_Exit_in_a_Differentiated_Industry.pdf.

- c. A. Shaked and J. Sutton, (1983), “Natural Oligopolies,” *Econometrica*, vol. 51, pp. 1469-1484, at http://www.stern.nyu.edu/networks/phdcourse/Shaked_Sutton_Natural_oligopolies.pdf (*)
- d. P. Klemperer, (1992), “Equilibrium Product Lines: Competing Head-to-Head May be Less Competitive,” *American Economic Review*, vol. 82, no. 4, pp. 740-755, at http://www.stern.nyu.edu/networks/phdcourse/Klemperer_Head_to_head_competition.pdf

4. Combination of Variety and Quality Differentiation

- a. N. Economides, (1989), “Quality Variations and Maximal Product Differentiation,” *Regional Science and Urban Economics*, vol. 19, pp. 21-29, at http://www.stern.nyu.edu/networks/Quality_Variations_and_Maximal_Variety_Differentiation.pdf
- b. N. Economides, (1993), “Quality Variations in the Circular Model of Differentiated Products,” *Regional Science and Urban Economics*, vol. 23, no. 2, pp. 235-257, at http://www.stern.nyu.edu/networks/Quality_Variations_in_The_Circular_Model_of_Differentiated_Products.pdf (*)
- c. D. Neven and J.-F. Thisse, (1990), “On Quality and Variety Competition,” in *Economic Decision-Making: Games, Econometrics and Optimization*, eds. J.J. Gabszewicz, J.-F. Richard and L.A. Wolsey.
- d. A. Ansari, N. Economides and J. Steckel, (1998) “The Max-Min-Min Principle of Product Differentiation,” *Journal of Regional Science* vol. 38 (1998), pp. 207-230, at <http://www.stern.nyu.edu/networks/96-10.pdf>

IV. Coordination, Network Effects and Vertical Integration

i. Endogenous Market Creation (0.5 weeks)

- a. N. Economides and A. Siow, (1988), “The Division of Markets is Limited by the Extent of Liquidity,” *American Economic Review*, vol. 78, no. 1, pp. 108-121, at <http://www.stern.nyu.edu/networks/aer88.pdf> (*)
- b. N. Economides, (1993), “Network Economics with Application to Finance,” *Financial Markets, Institutions & Instruments*, vol. 2, no. 5, pp. 89-97, at <http://www.stern.nyu.edu/networks/fmii93.pdf>
- c. N. Economides and R. Schwartz, (1995), “Electronic Call Market Trading,” *Journal of Portfolio Management*, vol. 21, no. 3 (Spring 1995), pp. 10-18, at http://www.stern.nyu.edu/networks/Electronic_Call_Market_Trading.pdf
- d. N. Economides, “How to Enhance Market Liquidity,” in R. Schwartz (ed.) *Global Equity Markets*, Irwin Professional. New York: 1994, at <http://www.stern.nyu.edu/networks/how.pdf>
- e. N. Economides and R. Schwartz, (1995), “Equity Trading Practices and Market Structure: Assessing Asset Managers’ Demand for Immediacy,”

Financial Markets, Institutions & Instruments, vol. 4, no. 4, pp. 1-47, at http://www.stern.nyu.edu/networks/Equity_Trading_Practices.pdf

ii. The Economics of Compatibility and Networks

1. Introduction and Surveys (1 week)

- a. N. Economides, (1996), “The Economics of Networks,” *International Journal of Industrial Organization*, vol. 14, no. 2, pp. 675-699, at <http://www.stern.nyu.edu/networks/94-24.pdf> (*)
- b. N. Economides and L.J. White, (1996), “One-Way Networks, Two-Way Networks, Compatibility, and Antitrust,” in *Opening Networks to Competition: The Regulation and Pricing of Access*, David Gabel and David Weiman (eds). Kluwer Academic Press, at <http://www.stern.nyu.edu/networks/93-14.pdf>
- c. J. Tirole, (1989), *Industrial Organization*, pp. 404-409. (*)

2. Network Economics under Compatibility (1 week)

- a. J. Rohlfs, (1974), “A Theory of Interdependent Demand for a Communications Service,” *Bell Journal of Economics*, vol. 5, pp. 16-37, at http://www.stern.nyu.edu/networks/phdcourse/Rohlfs_A_theory_of_interdependent_demand.pdf (*)
- b. N. Economides, and C. Himmelberg, (1995), “Critical Mass and Network Size with Application to the US Fax Market,” Discussion Paper no. EC-95-11, Stern School of Business, N.Y.U., at <http://www.stern.nyu.edu/networks/95-11.pdf> (*)
- c. N. Economides, (1996), “Network Externalities, Complementarities, and Invitations to Enter,” *European Journal of Political Economy*, vol. 12, pp. 211-232, at http://www.stern.nyu.edu/networks/Network_externalities_EJPE_1996.pdf
- d. S. Oren and S. Smith, (1981), “Critical Mass and Tariff Structure in Electronic Communications Markets,” *Bell Journal of Economics*, vol. 12, no. 2, pp. 467-487, at http://www.stern.nyu.edu/networks/phdcourse/Oren_Smith_Critical_mass.pdf

3. Choice of Compatibility (1 week)

- a. J. Farrell and G. Saloner, (1985), “Standardization, Compatibility, and Innovation,” *Rand Journal of Economics*, vol. 16, pp. 70-83, at http://www.stern.nyu.edu/networks/phdcourse/Farrell_Saloner_Standardization_compatibility_and_innovation.pdf
- b. J. Farrell and G. Saloner, (1986), “Installed Base and Compatibility: Innovation, Product Pre-announcement, and Predation,” *American Economic Review*, vol. 76, pp. 940-955, at http://www.stern.nyu.edu/networks/phdcourse/Farrell_Saloner_Installed_base_and_compatibility.pdf (*)

- c. M. Katz and C. Shapiro, (1985), "Network Externalities, Competition and Compatibility," *American Economic Review*, vol. 75, no. 3, pp. 424-440, at http://www.stern.nyu.edu/networks/phdcourse/Katz_Shapiro_Network_exte_rnalities_competition_and_compatibility.pdf (*)
- d. N. Economides, and F. Flyer, (1998), "Compatibility and Market Structure for Network Goods," Discussion Paper EC-98-02, Stern School of Business, N.Y.U., at <http://www.stern.nyu.edu/networks/98-02.pdf> (*)
- e. N. Economides, (1999), "Market Structure in Network Industries," mimeo.
- f. J. Farrell and G. Saloner, (1992), "Converters, Compatibility, and the Control of Interfaces," *Journal of Industrial Economics*, vol. 40, no. 1, pp. 9-36, at http://www.stern.nyu.edu/networks/phdcourse/Farrell_Saloner_Converters.p_d_f

4. Technical Change with Network Effects (0.5 weeks)

- a. M. Katz and C. Shapiro, (1986), "Technology Adoption in the Presence of Network Externalities," *Journal of Political Economy*, vol. 94, pp. 822-841, at http://www.stern.nyu.edu/networks/phdcourse/Katz_Shapiro_Technology_adoption.pdf

5. Interconnection Pricing (1 week)

- a. N. Economides, "The Tragic Inefficiency of M-ECPR," in (Ed.) Shampine, A. (2003), *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies*. Nova Science Publishers, Inc., New York, at <http://www.stern.nyu.edu/networks/tragic.pdf> (*)
- b. N. Economides, G. Lopomo and G. Woroch, "Strategic Commitments and the Principle of Reciprocity in Interconnection Pricing, at <http://www.stern.nyu.edu/networks/96-13.pdf> (*)
- c. W. Baxter, (1983), "Bank Interchange of Transactional Paper: Legal and Economic Perspectives," *Journal of Law and Economics*, vol. 26, pp. 541-88. http://www.stern.nyu.edu/networks/Baxter_Bank_interchange_of_transactional_paper.pdf (*)
- d. J.-C. Rochet and J. Tirole, "Cooperation Among Competitors," *Rand Journal of Economics*, vol. 33, pp. 549-570, at http://www.stern.nyu.edu/networks/phdcourse/Rochet_Tirole_Cooperation_among_competitors.pdf (*)

6. Vertical Structure with Network Effects (1 week)

- a. C. Matutes and P. Regibeau, (1988), "Mix and Match: Product Compatibility Without Network Externalities," *Rand Journal of Economics*, vol. 19, no. 2, pp. 219-234, at http://www.stern.nyu.edu/networks/phdcourse/Matutes_Regibeau_Mix_and_match.pdf

- b. N. Economides, (1989), “Desirability of Compatibility in the Absence of Network Externalities,” *American Economic Review*, vol. 79, no. 5, pp. 1165-1181, at <http://www.stern.nyu.edu/networks/aer89.pdf> (*)
- c. N. Economides, (1991), “Compatibility and the Creation of Shared Networks,” in *Electronic Services Networks: A Business and Public Policy Challenge*, edited by M. Guerrin-Calvert and S. Wildman; Praeger, at <http://www.stern.nyu.edu/networks/compatib.pdf> (*)
- d. R. Gilbert, (1991), “On the Delegation of Pricing Authority in Shared ATM Networks,” in *Electronic Services Networks: A Business and Public Policy Challenge*, edited by M. Guerrin-Calvert and S. Wildman; Praeger.
- e. H. Sonnenschein, (1968), “The Dual of Duopoly is Complementary Monopoly: or, Two of Cournot’s Theories Are One,” *Journal of Political Economy*, vol. 3, pp. 316-318, at http://www.stern.nyu.edu/networks/phdcourse/Sonnenschein_The_dual_of_duopoly.pdf (*)
- f. S. Salop, (1991), “Evaluating Network Pricing Self-Regulation,” in *Electronic Services Networks: A Business and Public Policy Challenge*, edited by M. Guerrin-Calvert and S. Wildman; Praeger.
- g. N. Economides and G. Woroch, (1992), “Benefits and Pitfalls of Network Interconnection,” Discussion Paper no. EC-92-31, Stern School of Business, <http://www.stern.nyu.edu/networks/92-31.pdf>

7. Two-sided Networks (0.5 weeks)

- a. M. Armstrong (2004), “Competition in Two-sided Markets,” at <http://www.stern.nyu.edu/eco/io/armstrong.pdf> (*)
- b. N. Economides & E. Katsamakos (2005), “Two-sided competition of proprietary vs. open source technology platforms and the implications for the software industry,” at <http://www.stern.nyu.edu/networks/Two-sided.pdf>, forthcoming *Management Science*.

8. Switching Costs (1 week)

- a. P. Klemperer (1987), “The Competitiveness of Markets with Consumer Switching Costs,” *Rand Journal of Economics*, vol. 18, pp. 138-50, at http://www.stern.nyu.edu/networks/phdcourse/Klemperer_The_competitiveness_of_markets_with_switching_costs.pdf (*)
- b. P. Klemperer (1995), “Competition when consumers have switching costs,” *Review of Economic Studies*, vol. 62, pp. 515-539, at http://www.stern.nyu.edu/networks/phdcourse/Klemperer_Competition_when_consumers_have_switching_costs.pdf (*)
- c. J. Farrell and C. Shapiro (1989), “Optimal Contracts with Lock-In,” *American Economic Review*, vol. 79, pp. 51-68.
- d. J. Farrell and C. Shapiro (1988), “Dynamic Competition with Switching Costs,” *Rand Journal of Economics*, vol. 19, no. 1, at http://www.stern.nyu.edu/networks/phdcourse/Farrell_Shapiro_Dynamic_competition_with_switching_costs.pdf

- e. R. Caminal and C. Matutes (1990), "Endogenous Switching Costs," *IJIO*, vol. 8, pp. 353-373, at http://www.stern.nyu.edu/networks/phdcourse/Matutes_Caminal_Endogenous_switching_costs.pdf (*)

iii. Vertical Integration and Franchising (1 week)

1. K. Arrow, (1975), "Vertical Integration and Communication," *Bell Journal of Economics*, vol.6, no. 1, pp. 173-183. (*)
2. K. Arrow, (1974), *The Limits of Organization*, W. W. Norton.
3. A. Dixit, (1983), "Vertical Integration in a Monopolistically Competitive Industry," *International Journal of Industrial Organization*, vol. 1, pp. 63-78.
4. S. Salinger, (1989), "The Meaning of "Upstream" and "Downstream" and the Implications for Modeling Vertical Mergers," *Journal of Industrial Economics*, vol. 37, no. 4, pp. 373-387.
5. C. Fershtman and K. Judd, (1987), "Equilibrium Incentives in Oligopoly," *American Economic Review*, vol. 77, pp. 927-940.
6. P. Rey and J. Stiglitz, (1988), "Vertical Restraints and Producers' Competition," *European Economic Review*, vol. 32, pp. 561-568.
7. N. Economides, "The Benefits of Franchising and Vertical Disintegration in Markets for Locationally Differentiated Products," Discussion Paper N. 147, Studies in Industry Economics, Department of Economics, Stanford University.
8. W. Adams and J. Brock, (1982), "Integrated Monopoly and Market Power: System Selling, Compatibility Standards and Market Control," *Quarterly Review of Economics and Business*, vol. 22, pp. 29-42.
9. M. Abiru, (1988), "Vertical Integration, Variable Proportions, and Successive Oligopolies," *Journal of Industrial Economics*, vol. 36, no. 3, pp. 315-325.
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