

Network Effects and Two-sided Markets

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Objectives of the course

These lectures provide an overview of the specific features of markets with network effects and multi-sided markets. In particular, we will cover some basic industrial organization models to characterize firms' optimal strategies in this type of markets and derive relevant welfare implications.

Course syllabus

- I. Introduction: an overview of markets with network effects**
 1. Simple network effects: main features and examples Cross network effects and two-sided markets: main features and examples

- II. Network effects**
 1. Baseline static model with network effects: competitive strategies and welfare implications
 2. Dynamics in markets with network effects

- III. Two-sided markets**
 1. Baseline model
 2. Welfare and policy implications: application to the media industry
 3. Public Policy in two-sided markets: Taxation & Collusion

Bibliography

Books

Armstrong, M., & Porter, R. (2007). Handbook of industrial organization. Volume 3. *Handbooks in economics*, North-Holland.

Belleflamme, P., & Peitz, M. (2015). *Industrial organization: markets and strategies*. Cambridge University Press.

Tirole, J. (1988). *The theory of industrial organization*. MIT press.

Reading list on network effects and two-sided markets

[Note: most of these papers will not be covered in class]

Ambrus, A., & Argenziano, R. (2009). Asymmetric networks in two-sided markets. *American Economic Journal: Microeconomics*, 1(1), 17-52.

Amir, R., Lazzati, N. (2011). "Network effects, market structure and industry performance". *Journal of Economic Theory*, 146, 2389-2419.

- Amir, R., Gabszewicz, J., & Resende, J. (2014). Thematic clubs and the supremacy of network externalities. *Journal of Public Economic Theory*, 16(5), 706-729.
- Argenziano, R. (2008). "Differentiated networks: Equilibrium and efficiency". *The RAND Journal of Economics*, 39.3,747-769.
- Armstrong, M.(2006). "Competition in Two-Sided Markets," *Rand Journal of Economics*, 37(3): 668-691.
- Armstrong, M. and Wright, J. (2007). "Two-sided Markets, Competitive and Exclusive Contracts," *Economic Theory*, 32(2): 353-380.
- Arthur, W.B. (1989). "Competing Technologies, Increasing Returns and Lock-in by Historical Events". *Economic Journal*
- Belleflamme, P. (1998). "Adoption of Network Technologies in Oligopolies". *International Journal of Industrial Organization*, 16, 415-444.
- Belleflamme, P., & Toulemonde, E. (2009). Negative intra-group externalities in two-sided markets. *International Economic Review*, 50(1), 245-272.
- Bensaid B, Lesne, J.-P. (1996). "Dynamic monopoly pricing with network externalities". *International Journal of Industrial Organization*, 14(6), 837-855
- Bental, B., Spiegel, M. (1995). "Network Competition, Product Quality, and Market Coverage in the Presence of Network Externalities". *The Journal of Industrial Economics*, 43, 197-208.
- Besen, S., Farrell, J. (1994). "Choosing How to Compete: Strategies and Tactics in Standardization". *Journal of Economic Perspectives*, 8(2), 117-131.
- Biglaiser, G., Crémer, J., Dobos, G. (2013). "The value of switching costs". *Journal of Economic Theory*, 148(3), 935-952.
- Cabral, L, Salant, D. Woroch, G. (1999). "Monopoly pricing with network externalities". *International Journal of Industrial Organization*, 17(2), 199-214.
- Cabral, L. (2011). "Dynamic price competition with network effects". *Review of Economic Studies*, 78, 83-111.
- Cabral, L. (2012). "Oligopoly Dynamics". *International Journal of Industrial Organization*, 30, 278-282.
- Caillaud, B. and Jullien, B (2003). "Chicken & Egg: Competition among Intermediation Service Providers," *Rand Journal of Economics*, 34(2), pp. 309-328.
- Chen J., Harrington J., Doraszelsk, U. (2009). "Avoiding Market Dominance: Product Compatibility in Markets with Network Effects". *RAND Journal of Economics*, 49(3), 455-485.
- Choi, J. P. (2010). Tying in two-sided markets with multi-homing. *The Journal of Industrial Economics*, 58(3), 607-626.
- Colla, P., Garcia, F. (2016). "Technology adoption: Hysteresis and absence of lock-in". *Economics Letters*, 141(C), 107-111.

Cr mer, J., Rey, P., Tirole, J. (2000). "Connectivity in the Commercial Internet". *The Journal of Industrial Economics*, 48, 433-472.

Dhebar, A., Oren, S. (1985). "Optimal Dynamic Pricing For Expanding Networks". *Marketing Science*, 4(4), 336-351.

Dhebar, A., Oren, S. (1986). "Dynamic nonlinear pricing in networks with interdependent demand". *Operations Research*, 34 (3), 384-94.

Doganoglu, T. (2003). "Dynamic Competition with Consumption Externalities". *Netnomics*, 5(1): 16-35.

Driskill, R. (2007). "Monopoly and Oligopoly Supply of a Good with Dynamic Network Externalities", mimeo.

Economides, N. (1996). "The economics of networks". *International Journal Of Industrial Organization*, 14.6, 673-699.

Evans, D. S. (2002). The antitrust economics of two-sided markets. *Available at SSRN 332022*.

Farrell, J., Klemperer, P. (2007). "Coordination and Lock-in: Competition with Switching Costs and Network Effects," in *Handbook of Industrial Organization*. 3. Edited by Armstrong, M, Porter, R.

Fudenberg, D., Tirole, J. (2000). "Pricing a Network Good to Deter Entry". *Journal of Industrial Economics*, 48, 373-390.

Gabszewicz, J. J., Garcia, F. (2008). "A note on Expanding Networks and Monopoly Pricing". *Economics Letters*, 98(1), 9-15.

Gabszewicz, J.J., Laussel, D. and Sonnac, N. (2001) "Press Advertising and the Ascent of the 'Pensee Unique', ". *European Economic Review*, 45(4-6): 641-651.

Gabszewicz, J. J., Garella, P. G., & Sonnac, N. (2007). Newspapers' market shares and the theory of the circulation spiral. *Information economics and policy*, 19(3), 405-413.

Gabszewicz, J.J. and Wauthy, X. (2004). "Two-sided Markets and Price Competition with Multi-homing," *mimeo CORE DP 2004/30*.

Gabszewicz, J.J., Garcia, F. (2007). "Optimal Monopoly Price Paths with Expanding Networks". *Review of Network Economics*, 6(1), 42-49.

Garcia, F. Vergari, C. (2016). "Revealing Incentives for Compatibility Provision in Vertically Differentiated Network Industries". *Journal of Economics and Management Strategy*, 25(3), 720-749.

Garcia, F., Resende, J. (2011). "Dynamic games of network effects". In *Dynamics, Games and Science II* (pp. 323-342). Springer Berlin Heidelberg.

Garcia, F., Resende, J. (2016). "Conformity based behavior and the dynamics of price competition: a new rationale for fashion shifts". forthcoming in the *Journal of Dynamics and Games*.

Hagiu, A. (2006). Pricing and commitment by two-sided platforms. *The RAND Journal of Economics*, 37(3), 720-737.

Hagiu, Andrei, and Julian Wright. "Multi-sided platforms." *International Journal of Industrial Organization* 43 (2015): 162-174.

Hagiu, Andrei, and Julian Wright. "Marketplace or reseller?." *Management Science* 61.1 (2014): 184-203.

Hagiu, A., & Spulber, D. (2013). First-party content and coordination in two-sided markets. *Management Science*, 59(4), 933-949.

Hagiu, A. (2009). Two-Sided Platforms: Product Variety and Pricing Structures. *Journal of Economics & Management Strategy*, 18(4), 1011-1043.

Katz, M. (1986). "An Analysis of Cooperative Research and Development". *RAND Journal of Economics*, 17, 527 – 543.

Katz, M., Shapiro, C. (1985). "Network Externalities, Competition, and Compatibility". *The American Economic Review*, 75, 424-440.

Katz, M., Shapiro, C. (1994). "System Competition and Network Effects". *Journal of Economic Perspectives*, 8(2), 93 -115.

Kind, H.J. and Schjelderup, G. and Stähler, F. (2013) "Newspaper Differentiation and Investments in Journalism: The Role of Tax Policy," *Economica*, 80(317), 131-148.

Kind, H.J. and Koethenbueger, M. and Schjelderup, G. (2010) "Tax responses in platform industries," *Oxford Economic Papers*, 62(4), 764-783.

Kind, H.J. and Koethenbueger, M. and Schjelderup, G. (2010) "On revenue and welfare dominance of ad valorem taxes in two-sided markets," *Economics Letters*, 104(2), 86-88.

Kind, H.J. and Koethenbueger, M. and Schjelderup, G. (2008) "Efficiency enhancing taxation in two-sided markets," *Journal of Public Economics*, 92(5-6), 1531-1539.

Kotsogiannis, C. and Serfes, K. (2010) "Public Goods and Tax Competition in a Two-Sided Market," *Journal of Public Economic Theory*, 12(2), 281-321.

Laussel, D., Long, N-V, Resende, J. (2015). "Network effects, aftermarket and the Coase conjecture: A dynamic Markovian approach." *International Journal of Industrial Organization* 41, 84-96.

Laussel, D., Montmarin, M., Long, N-V. (2004). "Dynamic Duopoly with Congestion Effects". *International Journal of Industrial Organization*, 22(5), 655-677

Laussel, D., Resende, J. (2014). "Dynamic price competition in aftermarket with network effects". *Journal of Mathematical Economics*, 106-118.

Liebowitz, S. J., Margolis, S.E. (1995). "Path Dependence, Lock-in, and History". *Journal of Law, Economics and Organization*, 11(1), 205-26.

Markovich, S. (2008), "Snowball: a Dynamic Oligopoly Model with Indirect Network Effects," *Journal of Economic Dynamics & Control*, 32, 909-938.

Markovich, S., and Moenius, J. (2009). "Winning while losing: Competition dynamics in the presence of indirect network effects." *International Journal of Industrial Organization* 27(3), 346-357.

Lee, R. S. (2013). Vertical integration and exclusivity in platform and two-sided markets. *The American Economic Review*, 103(7), 2960-3000.

Mason, R. (2000). "Network externalities and the Coase conjecture". *European Economic Review*, 44, 1981-1992

Mitchell, M., Skrzypacz, A. (2006). "Network Externalities and Long-run Market Shares". *Economic Theory*, 29 (3), 621-648

Parker, G. G., & Van Alstyne, M. W. (2005). Two-sided network effects: A theory of information product design. *Management science*, 51(10), 1494-1504.

Reisinger, M. (2014). Two-part tariff competition between two-sided platforms. *European Economic Review*, 68, 168-180.

Rochet J. and Tirole J. (2006). "Two-Sided Markets: A Progress Report," *Rand Journal of Economics*, 37(3): 645-667.

Rochet, J. and Tirole, J. (2003). "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association*, 1(4): 990-1029.

Rohlf, J. (1974). "A Theory of Interdependent Demand for a Communication Service". *Bell Journal of Economics*, 5, 16-37.

Rysman, M. (2009). The economics of two-sided markets. *The Journal of Economic Perspectives*, 23(3), 125-143.

Weyl, E. G. (2010). A price theory of multi-sided platforms. *The American Economic Review*, 100(4), 1642-1672.

Xie, J., Sirbu, M., (1995). "Price competition and compatibility in the presence of positive demand externalities". *Management Science*, 41(5), 909-926.