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INNOVATION MANAGEMENT

Master in Business and Finance (MRes.)

Prof. Neus Palomeras

Course Description: This course focuses on innovation, its determinants and consequences, and its links to firm strategy and organizational choices. We will analyze these issues through the economic and management lenses. Economics offers a powerful way of thinking about problems of choice, incentives, optimization and strategic interaction. The course should be of interest to students in the area of management who want to build up a more analytical understanding of firms' behavior and strategies related to technology and innovation.

Organization of classes: The professor makes a broad introduction of each theme aimed at providing the basic concepts and the analytical tools. Then, the class will be based on the study of specific papers. Students are expected to do the starred (*) reading before the class (except as otherwise noted) and be prepared to participate actively to the in-class discussion. Other readings are recommended for those with an interest in the topic. (Note that some of the links to the papers may work only if you are at the university or connected through your university account)

Grading: Final exam (40%), Assignments and Presentations (60%)

For the paper presentations (to be assigned at the beginning of the course), students must prepare a brief oral presentation (15 minutes) covering the following points: (a) research question, (b) methods and data, (c) findings and (d) limitations.

Aula Global will be used to post course material and key course information, such as deadlines, assignments and any update. Students are assumed to check it on a regular basis.

Tentative Course Outline

Class 1: The nature of technological knowledge, the process of technical change and the diffusion of innovation

In this introductory class we will review the basic definitions and concepts that we will use during the course. We will also discuss some of the classic contributions in the economics of innovation.

Readings:

1. Kline, J., and Rosenberg, N. 1985. An overview on innovation. In Landau, R., and Rosenberg, N. (eds.) *The Positive Sum Strategy*. National Academy of Sciences, 275-306. http://books.nap.edu/books/0309036305/html/275.html#pagetop
2. Winter, S. 1987. Knowledge and competence as strategic assets. In Teece, D.J. (ed.) *The Competitive Challenge*. Harper and Rowe, New York, read only 169-175.
3. Arora, A., and Gambardella, A. 1994. The changing technology of technological change. *Research Policy* 23, 523-532.
4. Utterback, J.M. 1994. *Mastering the Dynamics of Innovation*. Harvard Business School Press, Boston, Massachusetts.
5. Rosenberg, N. 1976. Factors affecting the diffusion of technology. In *Perspectives in Technology*. Cambridge University Press, 189-210.

Class 2: Innovation and market structure

This class will focus on the industry-level determinants of innovation.

Readings:

1. Schumpeter, J., Capitalism, Socialism and Democracy. Ch. 7-8.
2. Arrow, K. 1962. Economics Welfare and the Allocation of Resources for Inventions. In Nelson, R. (ed.) The Rate and Direction of Inventive Activity. Princeton, NJ, Princeton University Press.
3. Cohen, W. Empirical studies of innovative activity and performance. In Stoneman (ed.) Handbook of the economics of innovation and of technological change.
4. Acs, Z., and Audretsch, D. 1988. Innovation in Large and Small Firms: An Empirical Analysis. American Economic Review 78, 678-690.
5. Aghion P., Bloom N., Blundell R., Griffith R., Howitt P.. 2005. Competition and innovation: An inverted-U relationship. Quarterly Journal of Economics 120:701–28.
6. Bloom, N., Draca, M., Van Reenen, J. , 2016. Trade induced technical change? The impact of Chinese imports on innovation, IT and productivity. The Review of Economic Studies, 83 (1), 87-117
7. Autor, D., D. Dorn, G.H. Hanson, G. Pisano, and P. Shu. 2020. Foreign Competition and Domestic Innovation: Evidence from US Patents. American Economic Review: Insights, 2 (3): 357-74.

Class 3: Organizational structure and incentives to innovate

This class will focus on firm-specific determinants of innovation.

Readings:

1. Nelson, R. 1959. The simple economics of basic research. Journal of Political Economy, 297-306.
2. Henderson, R. 1993. Underinvestment and incompetence as responses to radical innovation: evidence from the photolithographic alignment equipment industry. RAND Journal of Economics 24(2), 248-270.
3. Henderson, R., and Cockburn, I. 1994. Measuring Competence: Exploring Firm Effects in Pharmaceutical Research. Strategic Management Journal 15, 63-84. **(*)**

4. Arora, A., Belenzon, S. and Rios, L. 2014. Make, Buy, Organize: The interplay between R&D, external knowledge sourcing and firm structure. Strategic Management Journal, 35 (3), 317-337

Class 4: Absorptive capacity

This class will focus on firm-specific determinants of innovation.

Readings:

1. Rosenberg, N. 1990. Why do firms do basic research (with their own money)? *Research Policy* 19(2), 165–174.
2. Cohen, W., and Levinthal, D. 1989. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*.
3. Arora, A., and Gambardella, A. 1994. Evaluating technological information and utilizing it. *Journal of Economic Behavior and Organization*, 91-114.
4. Zahra, S. and G. George, 2002. Absorptive Capacity: A Review, Reconceptualization, and Extension. *The Academy of Management Review*, Vol. 27, No. 2, 185-203
5. Knott, A.M. 2008. R&D/Returns Causality: Absorptive Capacity or Organizational IQ. *Management Science*, 54(12), 2054-2067
6. Arora, A., Belenzon, S., Patacconi, A., 2018. The Decline of Science in Corporate R&D, Strategic Management Journal, 39 (1) (*)

Class 5: Protecting innovations through patents

Readings:

1. Mazzoleni, R., and Nelson, R. 1998. The benefits and costs of strong patent protection: a contribution to the current debate. Research Policy 27, 273-284.
2. Heller, M.A., and Eisenberg, R.S. 1998. Can Patents Deter Innovation? The Anticommons in Biomedical Research? Science 280, 698-701.
3. Cohen, Nelson and Walsh, 2000. Protecting their intellectual assets: Appropriability conditions and why US manufacturing firms patent (or not), NBER WP 7552.
4. Gallini, N. 2002. The Economics of Patents: Lessons from Recent U.S. Patent Reform. Journal of Economic Perspectives 16(2), 131-154.
5. Arora, A., Ceccagnoli, M., and Cohen, W., 2003. R&D and the Patent Premium. International Journal of Industrial Organization, 26.
6. Ham Ziedonis, R, 2004. Don't Fence Me In: Fragmented Markets for Technologies and the Patent Acquisition Strategies of Firms. Management Science 50, 803-820.
7. Murray, F., and Stern, S. Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge?: A Test of the Anti-Commons. Journal of Economic Behavior and Organization 63: 648-687.
8. Moser, P. 2012. Innovation without Patents – Evidence from World's Fairs, The Journal of Law and Economics, Vol. 55 (1), pp. 43-74. (*)
9. Galasso, A., M. Schankerman, 2015. Patents and Cumulative Innovation: Causal Evidence from the Courts , The Quarterly Journal of Economics, vol 130(1), pages 317-369.
10. Sampat, B. and H. Williams, 2019. How Do Patents Affect Follow-On Innovation? Evidence from the Human Genome, American Economic Review 2019, 109(1): 203–236

Class 6: Using patents / survey data for empirical research on innovation

Readings:

1. Hall, B.H., A. Jaffe, M. Trajtenberg. 2001. The NBER Patent Citations Data File: lessons, insights and methodological tools, *NBER Working Paper* 8498.

2. Hall, B.H., A. Jaffe, M. Trajtenberg. 2005. Market value and Patent Citations, *The Rand Journal of Economics* 36 (1) 16-38.
3. Giuri, P., Mariani, M., Brusoni, S., Crespi, G., Francoz, D., Gambardella, A., Garcia-Fontes, W., Geuna, A., González, R., Harhoff, D., Hoisl, K., Le Bas, Ch., Luzzi, A., Magazzini, L., Nesta, L., Nomaler, Ö., Palomeras, N., Patel, P., Romanelli, M. and B. Verspagen, 2007. Inventors and Invention Processes in Europe. Results from the PatVal-EU survey. *Research Policy*, Vol. 36 (8): 1107-1127.
4. Gambardella, A., Harhoff, C, Verspagen, B., 2008. The value of European patents. *European Management Review*, Vol 5 (2), 69-84.
5. Alcacer, J., Gittelman, M., Sampat, B., 2009. Applicant and examiner citations in U.S. patents: An overview and analysis, Research Policy, Vol. 38 (2):415-427.
6. Fleming, L R. Lai and A. D'Amour, A. Yu, Y. Sun, V. Torvik, 2012. Disambiguation and co-author networks of the U.S. Patent Inventor Database, *Working Paper*
7. Jaffe, A., De Rassenfosse, 2016. Patent Citation Data in Social Science Research: Overview And Best Practices, NBER Working Paper # 21868
8. Ge, C., Huang, K.-W., Png, I. P. L. 2016. Engineer/scientist careers: Patents, online profiles, and misclassification bias. Strat. Mgmt. J., 37: 232–253.
9. Lerner, J., A. Seru, 2017. The Use and Misuse of Patent Data: Issues for Corporate Finance and Beyond, NBER WP No. 24053
10. Ferguson, J.P., Carnabucci, G., 2017. Risky Recombinations: Institutional Gatekeeping in the Innovation Process, *Organization Science*, 133 – 151
11. Moser, P, J. Ohmstedt, P W. Rhode, 2018. Patent Citations—An Analysis of Quality Differences and Citing Practices in Hybrid Corn, Management Science, 64 (4) (*)

Class 7: The exploitation of innovation

Readings:

1. Teece, D. 1986. Profiting from technological innovation. Research Policy 15, 285-305.
2. Arora, A., Fosfuri, A., and Gambardella, A. 2001. Ch (3) Markets for Technology: Economics of Innovation and Corporate Strategy. MIT Press: Cambridge, MA.
3. Gans, J.S., Hsu, D.H., and Stern, S. 2002. When Does Start-Up Innovation Spur the Gale of Creative Destruction? RAND Journal of Economics 33, 571-586. (*)
4. Gans, J.S., and Stern, S. 2003. The Product Market and the 'Market for Ideas': Commercialization Strategies for Technology Entrepreneurs. Research Policy 32, 333-350.
5. Aggarwal, V., and Hsu, D. 2009. Modes of cooperative R&D commercialization by start-ups. Strategic Management Journal 30, 835-864.
6. Arora, A., and A. Nandkumar. Insecure Advantage? Markets for technology and the value of resources: Evidence from the information security market. Strategic Management Journal.
7. Arora, A, W. Cohen, J. Walsh, 2016. The acquisition and commercialization of invention in American manufacturing: Incidence and impact, Research Policy, vol 45(6), 1113-1128.

Class 8: Licensing of innovation

Readings:

1. Arora, A., and Fosfuri, A. 2003. Licensing the Market for Technology. *Journal of Economic Behavior and Organization* 52, 277-295.
2. Fosfuri, A. 2006. The Licensing Dilemma: Understanding the Determinants of the Rate of Technology Licensing. Strategic Management Journal 27(12), 1141-1158. (*)
3. Arora, A., and Ceccagnoli, M. 2006. Patent protection, complementary assets, and firms' incentives for technology licensing. *Management Science* 52, 293-308.
4. Gans, J., Hsu, D., Stern, S. 2008. The Impact of Uncertain Intellectual Property Rights on the Market for Ideas: Evidence from Patent Grant Delays. *Management Science* 54: 982-997.

5. Somaya, D., Kim, Y. and Vonortas, N. S. 2011, Exclusivity in licensing alliances: using hostages to support technology commercialization. Strat. Mgmt. J., 32: 159-186
6. Moser, P. and Voena, A. 2012. Compulsory Licensing: Evidence from the Trading with the Enemy Act, The American Economic Review, 102(1), 396-427.

Class 9: R&D collaboration strategies

Readings:

1. Cassiman, B., Veugelers, R. 2002. R&D Cooperation and Spillovers: Some Empirical Evidence from Belgium. American Economic Review: 1169-1184.
2. Laursen, K., Salter, A. 2006. Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. Strategic Management Journal, 27: 131-150.
3. Oxley, J. and T. Wada, 2009. Alliance structure and the scope of knowledge transfer: Evidence from US-Japan agreements, Management Science, 55 (4) (*)
4. Diestre, L., Rajagopalan, N., 2012. Are All 'Sharks' Dangerous? New Biotechnology Ventures and Partner Selection in R&D Alliances. Strategic Management Journal, 33: 1115-1134
5. Cassiman, B. and Valentini, G., 2016, Open innovation: Are inbound and outbound knowledge flows really complementary? Strategic Management Journal, 37(6)

Class 10: Localization of knowledge and technology spillovers

Readings:

1. Jaffe, A., Trajtenberg, M., and Henderson, R. 1993. Geographic localization of knowledge spillovers as evidenced by patent citations. Quarterly Journal of Economics 108, 577-598.
2. Saxenian, A. 1994. Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Harvard University Press, Cambridge, MA
3. Fosfuri, A., and Roende, T., 2004, High-tech clusters, technology spillovers, and trade secret laws. International Journal of Industrial Organization 22, 45-65.
4. Almeida, P., and Kogut, B. 1999. Localization of knowledge and the mobility of engineers in regional networks. Management Science 45, 905-916.
5. Matt, M., D. Strumsky and L. Fleming. 2009. Mobility, Skills, and the Michigan Non-compete Experiment. Management Science 55(6): 875-889. (*)
6. Marx, M., J. Singh, L. Fleming, 2015. Regional disadvantage? Employee non-compete agreements and brain drain, Research Policy, 44 (2)
7. Ganguli, I., J. Lin, and N. Reynolds, 2020. The Paper Trail of Knowledge Spillovers: Evidence from Patent Interferences. American Economic Journal: Applied Economics, 12 (2): 278-302.

Class 11: Mobility and diffusion of knowledge among firms

Readings:

1. Zucker, Lynne G., Michael R. Darby, and Marilynn B. Brewer. 1998. Intellectual Human Capital and the Birth of U.S. Biotechnology Enterprises. American Economic Review 88(1): 290-306.
2. Song, J., Almeida, P., Wu, G. 2003. Learning-by-Hiring: When is Mobility More Likely to Facilitate Interfirm Knowledge Transfer? Management Science 49(4), 351-365.
3. Fallick, Bruce, Charles A. Fleischmann, and James B. Rebitzer. 2006. Job Hopping in Silicon Valley: Some Evidence Concerning the Micro-foundations of a High Technology Cluster. Review of Economics and Statistics 88 (3): 472-481.

4. Kapoor, R. and K. Lim, 2007. The impact of acquisitions on the productivity of inventors at semiconductor firms: A synthesis of knowledge-based and Incentive-based perspectives, Academy of Management Journal, 50 (5)
5. Corredoira, R. and L. Rosenkopf. 2010. Should an acquaintance be forgot: The reverse transfer of knowledge through mobility ties. Strategic Management Journal, 31:159-181.
6. Palomeras, N. and E. Melero, 2010. Markets for Inventors: Learning-by-Hiring as a Driver of Mobility, Management Science 56 (5), 881-895 (*)
7. Agrawal, A. and J. Singh. 2011. Recruiting for Ideas: How Firms Exploit the Prior Inventions of New Hires. Management Science, 57 (1)
8. Marx, M. and B. Timmermans, 2017. Hiring Molecules, Not Atoms: Comobility and Wages, Organization Science, 28:6, 1115-1133
9. Melero, E., Palomeras, N. and Wehrheim, D., 2020. The Effect of Patent Protection on Inventor Mobility, Management Science, 66 (12).

Class 12: Human capital and knowledge production

Readings:

1. Wuchty, S., B. F. Jones, and B. Uzzi. 2007. The Increasing Dominance of Teams in Production of Knowledge. Science **316** (5827): 1036-1039.
2. Agrawal, Ajay K., and Avi Goldfarb. 2008. Restructuring Research: Communication Costs and the Democratization of University Innovation. American Economic Review 98(4): 1578-1590. (*)
3. Jones, Benjamin F. 2009. The Burden of Knowledge and the 'Death of the Renaissance Man': Is Innovation Getting Harder? Review of Economic Studies 76(1): 283-317.
4. Jones, Benjamin F. 2010. Age and Great Invention. Review of Economics and Statistics 92(1): 1-14.
5. Azoulay, P., J.G. Zivin, and J.Wang. 2010. Superstar Extinction. Quarterly Journal of Economics 125 (2)
6. Fleming, L and J. Singh, 2010. Lone Inventors as Sources of Breakthroughs: Myth or Reality? Management Science, 56 (1)
7. Waldinger, F. 2012. Peer Effects in Science - Evidence from the Dismissal of Scientists in Nazi Germany. The Review of Economic Studies, 79 (2)
8. Melero, E., Palomeras, N., 2015. The Renaissance Man is not dead! The role of generalists in teams of inventors, Research Policy, Vol. 44(1), 154-167.
9. Bhaskarabhatla, A., L Cabral, D Hegde and T Peeters. Are Inventors or Firms the Engines of Innovation? Management Science, forthcoming

Class 13: Individual incentives in research

1. Stern, S. 2004. Do scientists pay to be scientists? Management Science, 50 (6): 835-853
2. Azoulay, P., J. Graff Zivin, and G. Manso, 2011. Incentives and creativity: evidence from the academic life sciences, The RAND Journal of Economics, 42(3): 527-554.
3. Toivanen, O. and L. Vaananen, 2012. Return to Inventors, The Review of Economics and Statistics, 94(4): 1173-1190.
4. Borjas, George J., and K. B. Doran, 2015. Prizes and Productivity: How Winning the Fields Medal Affects Scientific Output. Journal of Human Resources 50 (3): 728-758.
5. Belenzon, S and M. Schankerman, 2015. Motivation and Sorting of Human Capital in Open Innovation, Strat. Mgmt. J., 36: 795–820 (2015)
6. Giarratana, M., M. Mariani, and I. Weller, 2018. Rewards for Patents and Inventor Behaviors in Industrial Research and Development, Academy of Management Journal, 61:1, 264-292 (*)

Class 14: Wrap-up