Economics of Innovation and Technical Change

Syllabus

📖 Readings required

🎖 Suggested readings (not required)

MODULE 1 – 20 h. (Stefano Breschi, Università L. Bocconi)

1.1 INTRODUCTION AND OVERVIEW

The fundamental features and role of innovation and technical change in the contemporary economies. Impact of innovation on growth and development, industrial dynamics, business strategies, and public policies.

- 📖 Christopher Freeman and Luc Soete, *The Economics of Industrial Innovation*, London: Pinter, 1997: Chapter 1, pp. 1-25.
- 📖 OECD, "Science, technology and industry outloook 2000 – Highlights", Paris, 2001 (http://www.oecd.org/dsti/sti/s_t/prod/outlook_2000.htm)

1.2 BASIC CONCEPTUAL ISSUES: KNOWLEDGE AND INNOVATION

Innovation in neoclassical models: the production function. Invention, innovation, diffusion. Two views of the innovation process: from the 'linear' to the 'chain-linked' model of innovation. The role of science and users in innovative processes.

- 📖 Stephen Kline and Nathan Rosenberg, "An overview of innovation", in Ralph Landau and Nathan Rosenberg (Eds.), *The Positive Sum Strategy*, National Academy Press, Washington D.C., 1986, pp. 275-305.
- 📖 Nathan Rosenberg, "How exogenous is science?", in *Inside the Black Box*, Cambridge University Press, Cambridge, 1982, pp. 141-159.
- 📖 Eric Von Hippel, *The Sources of Innovation*, Oxford: Oxford University Press, 1988: Chap. 2, pp. 11-27.
- 🎖 Franco Malerba, "Learning by firms and incremental technical change", *Economic Journal*, July 1992, pp. 845-59.
- 🎖 Richard Nelson and Sidney Winter, *An Evolutionary Theory of Economic Change*, Harvard University Press, 1982: Chapters 4 and 5, pp. 72-136.

1.3 MARKET STRUCTURE AND INNOVATION: THE NEOCLASSICAL APPROACH

Schumpeterian hypotheses: monopoly or perfect competition? Firm size and innovation. From Arrow's model to game theoretic models: persistence of monopoly, patent races, licensing, and RJVs.

- 📖 Jean Tirole, *The Theory of Industrial Organisation*, MIT Press, Chapter 10, pp. 389-94, 399-401.
- 🎖 Joseph Schumpeter, *The Theory of Economic Development*, Harvard University Press, Cambridge MA, 1934, Chapters 2 and 4.
- 🎖 Joseph Schumpeter, *Capitalism, Socialism and Democracy*, New York: Harper and Row, 1942, Chapter 12.
- 🎖 Kenneth Arrow, "Economic welfare and the allocation of resources for invention", in Richard Nelson (Ed.) *The Rate and Direction of Inventive Activity*, Princeton: Princeton University Press, 1962, pp. 609-25.

1.4 Differences Across Industries in Innovation Patterns: from High-Tech to Traditional Sectors

The notion of technological regime. Technological regimes and industrial patterns of innovation. Pavitt's taxonomy. Science-based, scale-intensive, specialised suppliers, and supplier dominated industries.

- 🕮 Stefano Breschi, Franco Malerba, and Luigi Orsenigo, "Technological Regimes and Schumpeterian Patterns of Innovation", *Economic Journal*, 110(463) April 2000, pp. 388-410.
- 🕮 Keith Pavitt, "Sectoral Patterns of Innovation: Towards a Taxonomy and a Theory", Research Policy, vol. 13, no. 6, 1984, pp. 343-373.
- 🎖 Richard Levin, Alvin Klevorick, Richard Nelson and Sidney Winter, "Appropriating the returns from industrial research and development", *Brookings Papers on Economic Activity*, 3, 1987, pp. 783-820.
- 🎖 Alvin Klevorick, Richard C. Levin, Richard R. Nelson, Sidney G. Winter, "On the sources and significance of interindustry differences in technological opportunities", *Research Policy* (24)2, 1995, pp. 185-205

1.5 Innovation and Industrial Evolution

Innovation and industrial dynamics. Entry, exit, and innovation. Industry life cycles. The forces driving industry evolution.

- 🕮 Franco Malerba and Luigi Orsenigo, "The dynamics and evolution of industries", *Industrial and Corporate Change*, vol. 5, no.1, 1996, pp. 51-87.
- 🕮 David B. Audretsch, "Technological regimes, industrial demography, and the evolution of industrial structures", *Industrial and Corporate Change*, vol. 6, no.1, 1997, pp. 49-81.
- 🎖 Steve Klepper, "Industry life cycles", *Industrial and Corporate Change*, vol. 6, no.1, 1997, pp. 145-81.

1.6 How rapid is the Diffusion of Innovations?

Ancient and modern views of innovation diffusion: from epidemic models to adoption models. Spatial diffusion of innovations. Implications for public polic and firm strategy.

- 🕮 Francesco Lissoni and Stan Metcalfe, "Diffusion of Innovation Ancient and Modern: A Review of the Main Themes", in Mark Dodgson and Roy Rothwell (Eds.) *The Handbook of Industrial Innovation*, Edward Elgar, Aldershot, 1994, pp. 106-141.

1.7 The Economics of QWERTY: Competing Technologies in the Presence of Network Externalities

Network externalities and increasing returns to adoption. Path-dependence and technological lock-in. The importance of network externalities in the New Economy. Antitrust implications: the Microsoft case.

- 🕮 Paul David, "Clio and the economics of QWERTY", *American Economic Review, Papers and Proceedings*, vol. 75, 1985, pp. 332-337.
- 🕮 Brian W. Arthur, "Competing technologies: an overview", in G. Dosi et al. (Eds.) *Technical Change and Economic Theory*, London: Pinter, pp. 590-607.
- 🕮 United States of America vs. Microsoft Corporation: Findings of Facts, November 1999 (http://law.about.com/medianews/law/library/docs/blmsfind.htm – edited version available at http://www.liuc.it/didattica/)
- 🎖 Richard Gilbert, "Networks, standards, and the use of market dominance: Microsoft 1995", in J. Kwoka and L. White (Eds.) *The Antitust Revolution: The Role of Economics*, Oxford: Oxford University Press, 1999.
- 🎖 Michael Katz and Carl Shapiro, "Systems competition and network effects", *Journal of Economic Perspectives*, 8, 1994, pp. 93-116.
- 🎖 S. Liebowitz and Stephen Margolis, "Network externality: An uncommon tragedy", *Journal of Economic Perspectives*, 8, 1994, 133-150.

1.8 FROM INDUSTRIAL DISTRICTS TO SILICON VALLEY: THE GEOGRAPHY OF INNOVATION

Knowledge externalities and geographical agglomeration of innovations. The coexistence of local and global innovation systems.

- 🕮 Pari Patel, "The Localised Production of Global Technology", *Cambridge Journal of Economics*, vol. 19, 1995, pp. 141-153.
- 🕮 Maryann P. Feldman, "An Examination of the Geography of Innovation", *Industrial and Corporate Change*, vol. 2, no. 3, 1993, pp. 451-470.
- 🖱 Adam B. Jaffe, Manuel Trajtenberg, and Rebecca Henderson, "Geographic Localization and Knowledge Spillovers as Evidenced by Patents Citations", *Quarterly Journal of Economics*, vol. 108, 1993, pp. 557-598.

1.9 NATIONAL SYSTEMS OF INNOVATION: THE ROLE OF INSTITUTIONS

The main actors and relationships in innovation systems. The role of universities. Sectoral vs. national systems of innovation. Boundaries of innovation systems. The Italian innovation system: strengths and weaknesses.

- 🕮 Richard R. Nelson, "National Innovation Systems: A Retrospective on a Study", *Industrial and Corporate Change*, vol. 1, no. 2, 1992, pp. 347-374.
- 🕮 Franco Malerba, "The National System of Innovation: Italy", in Richard Nelson (Ed.) *National Innovation Systems. A Comparative Analysis*, Oxford University Press, New York, 1993, pp. 230-259.
- 🖱 Stefano Breschi and Franco Malerba, "Sectoral Innovation Systems: Technological Regimes, Schumpeterian Dynamics, and Spatial Boundaries", in Charles Edquist (Ed.) *Systems of Innovation*, Pinter, London, 1997, pp. 130-156.

1.10 MEASUREMENT OF TECHNICAL CHANGE

Innovation indicators: advantages and limitations. R&D expenditures, patents, surveys, and bibliometrics. Sources of data on innovative activities. Methods of analysis.

- 🕮 Pari Patel and Keith Pavitt, "Patterns of Technological Activities: Their Measurement and Interpretations", in Paul Stoneman (Ed.) *Handbook of Economics of Innovation and Technological Change*, Blackwell, Oxford, 1995, pp. 14-51.

MODULE 2 – 10 h. (Bruce Tether, University of Manchester)