

REGIS Summer School on Science, Technology, and Innovation

Abstracts and key references

Scuola Superiore Sant'Anna, Pisa, Italy

NOTE: The references reported are introductory only and should not be considered as mandatory readings. However, an overview of the main content will put you up to speed and will enrich your learning experience. The lectures will provide additional references to extend and follow up on the topics discussed.

Session I

DIETMAR HARHOFF (Max Planck Institute for Innovation and Competition) “*Patents, Licensing and Technology Markets*”

Abstract: This lecture considers options for improving the diffusion and dissemination of patented inventions. Such options have received renewed attention during the pandemic when an international discussion erupted around “patent waivers” on mRNA technology. The lecture starts with classical models of patenting developed by William Nordhaus (1967) and Pankaj Tandon (1982). Students will learn about the distinction between liability and property regimes and about the compulsory licensing discussion that has been raging in the innovation economics (and law) community for decades. I also highlight the role of licensing in markets for technology (MFTs) and discuss reasons why MFTs may not be working well. I then concentrate on a little-known institution – the license of right (LOR) – which is present in many national patent systems. Once a LOR declaration has been made, any interested party may obtain a non-exclusive license, but has to compensate the patent owner. We will study some properties of LOR in the German patent system and contrast liability regime systems with other instruments, such as the patent buy-out as proposed by Kremer.

References:

- ◇ *Arora, A., A. Fosfuri and A. Gambardella, (2001). Markets for technology and their implications for corporate strategy. *Industrial and Corporate Change*, 10(2), 419-451. <https://academic.oup.com/icc/article/10/2/419/678614>
- ◇ *Moser, P. and A. Voena (2012). Compulsory licensing: Evidence from the trading with the enemy act. *American Economic Review*, 102(1), 396-427. <https://www.aeaweb.org/articles?id=10.1257/aer.102.1.396>
- ◇ Nordhaus, W. D. (1967). The Optimal Life of a Patent. *Cowles Foundation Discussion Paper No 474*. <https://elischolar.library.yale.edu/cowles-discussion-paper-series/474>
- ◇ *Tandon, P. (1982). Optimal patents with compulsory licensing. *Journal of Political Economy*, 90(3), 470-486. <https://www.journals.uchicago.edu/doi/pdf/10.1086/261070>
- ◇ Torrisi, S., A. Gambardella, P. Giuri, D. Harhoff, K. Hoisl and M. Mariani (2016). Used, blocking and sleeping patents: Empirical evidence from a large-scale inventor survey. *Research Policy*, 45(7), 1374-1385. <https://www.sciencedirect.com/sdfe/reader/pii/S0048733316300440/pdf>

Session II

HANNA HOTTENROTT (TUM School of Management) “*Web-based Data in Innovation Research*”

Abstract: The availability of online data or web-based information has grown substantially over the past decades. It is also increasingly used for research purposes. What can we learn from web-based data? What are the opportunities, and what are the possible pitfalls? The use of website texts and data from social media can indeed be used to develop new economic indicators, as shown in the articles contained

in the reading list. In this talk, I will present two examples in more detail. The first uses survey data in combination with company websites to train a model that can predict the innovation activities of companies. The second example describes the use of professional, career-oriented social network data for generating a non-administrative employer-employee data set and to map company networks through employee mobility. Other uses and applications, as well as the strengths and limitations of the use of web-based data for innovation and entrepreneurship research, will be discussed.

References:

- ◇ Arifi, Dorian, Bernd Resch, Jan Kinne und David Lenz (2023): Innovation in hyperlink and social media networks: Comparing connection strategies of innovative companies in hyperlink and social media networks, *PLoS ONE* 18(3): e0283372. <https://doi.org/10.1371/journal.pone.0283372>
- ◇ Breithaupt, Patrick; Hanna Hottenrott; Christian Rammer and Konstantin Römer (2023): Mapping Employee Mobility and Company Networks using Professional Network Data, unpublished manuscript. (Attached)
- ◇ Guzman, Jorge and Aishen Li (2023): Measuring Founding Strategy, *Management Science* 69:1, 101-118. <https://pubsonline.informs.org/doi/10.1287/mnsc.2022.4369>
- ◇ Rammer and Es-Sadki (2022): Using Big Data for Generating Firm-level Innovation Indicators - a Literature Review. <https://madoc.bib.uni-mannheim.de/62337/1/dp22007.pdf>

Session III

NEUS PALOMERAS (Universidad Carlos III de Madrid) “*Localization of Knowledge, Technology Spillovers, and Mobility of Workers*”

Abstract: This lecture will focus on the phenomenon of localized technology spillovers and one of its underlying causes, the mobility of workers. We will explore how knowledge and technology transfer can occur within a specific geographic area, and how this localized knowledge can lead to innovation and economic growth. Additionally, we will discuss the role of worker mobility in facilitating these localized technology spillovers and examine the benefits and challenges of a mobile workforce. By the end of this lecture, you will have a deeper understanding of the literature on localized knowledge and technology spillovers, and the impact of worker mobility on innovation and economic growth.

References:

- ◇ Almeida, P., and Kogut, B. (1999). Localization of knowledge and the mobility of engineers in regional networks. *Management Science*, 45(7), 905-917. <https://doi.org/10.1287/mnsc.45.7.905>
- ◇ Jaffe, A. B., Trajtenberg, M., and Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *Quarterly Journal of Economics*, 108(3), 577-598 <https://doi.org/10.2307/2118401>
- ◇ Melero, E., Palomeras, N., and Wehrheim, D. (2020). The effect of patent protection on inventor mobility. *Management Science*, 66(12), 5485-5504. <https://doi.org/10.1287/mnsc.2019.3500>
- ◇ Palomeras, N., and Melero, E. (2010). Markets for inventors: Learning-by-hiring as a driver of mobility. *Management Science*, 56(5), 881-895. <https://doi.org/10.1287/mnsc.1090.1135>

Session IV

ALESSANDRO NUVOLARI (Scuola Superiore Sant'Anna) “*Patents and Innovation: Some Historical Perspectives*”

Abstract: The lecture will discuss ongoing research based on historical patent data. We shall examine the methods used in handling patents as historical sources, exploring their merits and limitations in shedding light on sources and drivers of innovative activities. In particular, we will present research dealing with England, France, and Italy during the XVIII and XIX centuries, examining the sources of breakthrough innovations, international technology transfer, and the role of independent inventors.

References:

- ◇ Nuvolari, A. and Vasta, M. (2015), 'Independent Invention in Italy during the Liberal Age, 1861-1913', *Economic History Review*, vol. 68, pp. 858-886. <https://doi.org/10.1111/ehr.12087>
- ◇ Nuvolari, A., Tartari, V. and Tranchero, M. (2021), 'Patterns of Innovation during the Industrial Revolution: a Reappraisal using a Composite Indicator of Patent Quality', *Explorations in Economic History*, vol. 82, 101419. <https://doi.org/10.1016/j.eeh.2021.101419>
- ◇ Nuvolari, A., Tortorici, G. and Vasta, M. (2022), 'British-French technology transfer from the Revolution to Louis Philippe (1791-1844): evidence from patent data', *Journal of Economic History*, forthcoming. <https://repec.cepr.org/repec/cpr/ceprdp/DP15620.pdf>

WORKSHOPS

STEFANO BARUFFALDI AND EMILIO RAITERI "Scientific Publications Data and Non-Patent Literature Citations"

Abstract: In this practice-oriented workshop, we will introduce scientific publications data as well as data that allow to link scientific publications to patents, via non-patent literature citations in patent documents. In particular, we will discuss the basic characteristics of scientific publications data as a source of information for research in science and innovation, we will give an overview of the main data sources available and demonstrate how to approach some of these (Scopus and OpenAlex). Similarly, we will explore past and current options to link scientific publications to patents.

References:

- ◇ Marx, M., and Fuegi, A. (2022). Reliance on science by inventors: Hybrid extraction of in-text patent-to-article citations. *Journal of Economics & Management Strategy*, 31(2), 369-392. <https://doi.org/10.1111/jems.12455>
- ◇ Poege, F., Harhoff, D., Gaessler, F., and Baruffaldi, S. (2019). Science quality and the value of inventions. *Science Advances*, 5(12), eaay7323. (Including Appendix) <https://www.science.org/doi/full/10.1126/sciadv.aay7323>
- ◇ Priem, J., Piwowar, H., and Orr, R. (2022). OpenAlex: A fully-open index of scholarly works, authors, venues, institutions, and concepts. arXiv preprint arXiv:2205.01833. <https://explore.openalex.org/>
- ◇ Rose, Michael E. and John R. Kitchin: "pybliometrics: Scriptable bibliometrics using a Python interface to Scopus", *SoftwareX* 10 (2019) 100263. <https://pybliometrics.readthedocs.io/en/stable/>
- ◇ Verluise, C., Cristelli, G., Higham, K., and de Rassenfosse, G. (2020). The missing 15 percent of patent citations. Available at SSRN 3754772. <https://ssrn.com/abstract=3754772>

STEVE GONG AND ARIANNA MARTINELLI "Patents Data"

Abstract: This will be a second practice-oriented workshop, where we will discuss patent data. In the first introductory part of the workshop, we will provide an overview of the main data sources, how to access them, and move the first steps to use them for research in science and innovation. In the second part of the workshop, Google researchers will provide an in-depth presentation on Google Patents, discussing its potential for research.

References:

- ◇ Hall, B. H., and Harhoff, D. (2012). Recent research on the economics of patents. *Annu. Rev. Econ.*, 4(1), 541-565. <https://doi.org/10.1146/annurev-economics-080511-111008>
- ◇ Jaffe, A., and de Rassenfosse, G. (2017). Patent Citation Data in Social Science Research: Overview and Best Practices. *Journal of the Association for Information Science and Technology*, 68(6), 1360-1374. <https://doi.org/10.1002/asi.23731>
- ◇ Replicale Patent Indicators Kaggle Notebook: <https://www.kaggle.com/code/georgeabiyounes/paper3/edit/run/105473614>

List of participants (in alphabetical order)

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