Lecture and Seminar (M.Sc.)

Economics of Science and Technology

Fachbereich Wirtschaftswissenschaften

Economic Policy, Innovation and Entrepreneurship Group (Johannes König)

Summer Term 2020

Time and Location

Tuesday, 14:15-17:30 (first class on April 21, 2020) (SUBJECT TO CHANGE DUE TO THE SITUATION WITH COVID-19. PLEASE, BE ATTENTIVE NEXT WEEKS TO ANNOUNCEMENTS).
Room 0207 (Nora-Platiel-Strasse 6)

Overview

Innovation drives growth and job creation in modern economies. New knowledge on which innovation is based often derives from scientific research. Understanding the economics of science and the processes in which new scientific knowledge is transferred to the economy is therefore of major importance to explain and possibly improve innovation performance. At the same time, knowledge is a good with rather unusual economic properties, which raises various types of externality and incentive problems. With the system of *Open Science*, a specific set of institutions has developed over time to address these issues. Studying *Open Science* therefore helps economists to better understand the working of competitively self-governing societal subsystems outside the sphere of traditional markets. It is therefore little surprising that a burgeoning literature deals with the economics of science. The course will provide an introduction into this literature.

The course combines a lecture part (about the first 60% of the term) with seminar sessions in which students present and discuss selected recent articles in the economics of science and technology.

Recommended background reading: Stephan, Paula (2012): *How Economics Shapes Science*, Harvard University Press.

Requirements (6 ECTS Credits):

- Seminar paper (about 15 pages; due date July 28, 2020) plus oral presentation (about 20 minutes).
- Attendance and active participation in the seminar sessions (dates will be announced).
- All individual requirements have to be passed to earn credits.

Registration and choice of topics via Moodle (available from Friday, 6 March 2020)

Maximum number of participants: 30. Each topic will be allocated to no more than two students.

Part 1: Lecture

A. Introduction

1. Research and Development in Germany

1.1 The OECD Classification Research and Development
1.2 Research and Development in Germany: Structure and Current Trends

B. Economics of Science

2. Knowledge as an Economic Good

2.1 Production and Reproduction of Knowledge
2.2 The "Knowledge Dilemma" and Its Solutions

3. The Reward System of Open Science and the Production of New Scientific Knowledge

3.1 *Open Science:* Disclosure, Priority and Reputation
3.2 The Evolution of *Open Science*: A Brief Historical Overview

4. The Motives of Individual Researchers

4.1 Motives and Incentives
4.2 The Behavior of Scientists: A Lifecycle Perspective

5. Current Trends and Challenges

5.1 Globalization
5.2 Digitalization
5.3 Misconduct and Non-Reliable Results

C. Knowledge and Technology Transfer

6. Science and Economic Development

6.1 Conceptual Models of Science and Innovation
6.2 Economic Effects of Science: Empirical Evidence
6.3 Basic Research in Private-Sector Firms: Anomaly or Necessity?

7. The Institutional Framework of Knowledge and Technology Transfer

7.1. Channels of Knowledge and Technology Transfer
7.2 Science Policy and Technology Transfer

8. Technology Transfer and the Advance of Science

8.1 Technology Transfer and Individual Scientific Productivity
8.2 Technology Transfer and the Diffusion of Knowledge

Part 2: Seminar

Topics for Seminar Papers

(Note: The listed article should help you familiarize with the topic. It should be discussed in detail in the seminar part, including a discussion of both methods and results. However, the seminar paper needs to go beyond providing a mere summary of the article.)

1. Human Capital and Physical Capital in Science: Evidence from the Legacy of Nazi Germany

Waldinger, F. (2016). Bombs, brains, and science: The role of human and physical capital for the creation of scientific knowledge. *Review of Economics and Statistics*, 98(5), 811-831.

2. Socialization Effects in Science: Professor Quality and the Outcomes of Doctoral Education

Waldinger, F. (2010). Quality matters: The expulsion of professors and the consequences for PhD student outcomes in Nazi Germany. *Journal of Political Economy*, 118(4): 787-831.

3. How Important are Collaborators for the Success of Scientists?

Azoulay, P., Fons-Rosen, C., & Graff Zivin, J. S. (2019). Does science advance one funeral at a time?. American Economic Review, 109(8), 2889-2920.

4. Mobility and Productivity: Soviet Immigrants and Academic Mathematics in the U.S.

Borjas, G. J., and K. B. Doran (2012). The collapse of the Soviet Union and the productivity of American mathematicians. *Quarterly Journal of Economics*, 127(3): 1143-1203.

5. Who Is (not) an Author? Evidence for Scientific Publications and Patents

Haeussler, C. and H. Sauermann (2013): Credit where credit is due? The impact of project contributions and social factors on authorship and inventorship. *Research Policy*, 42(3): 688-703.

6. The Matthew Effect in Science: An Empirical Test

Azoulay, P., Stuart, T., and Wang, Y. (2014). Matthew: Effect or Fable? *Management Science*, 60(1), 92-109.

7. Influences on Science I: Funding

Wang, J., Lee, Y. N., and Walsh, J. P. (2018). Funding model and creativity in science: Competitive versus block funding and status contingency effects. *Research Policy*, *47*(6), 1070-1083.

8. Influences on Science II: Costs of Equipment

Furman, J. L., and Teodoridis, F. (2017). The Cost of Research Tools and the Direction of Innovation: Evidence from Computer Science and Electrical Engineering. Unpublished manuscript.

9. Influences on Science III: Prior Knowledge

Thompson, N., and Hanley, D. (2017). Science is shaped by Wikipedia: Evidence from a randomized control trial. Unpublished manuscript.

10. The Spatial Diffusion of Scientific Knowledge I: Research Labs

Helmers, C., and Overman, H. G. (2017). My precious! The location and diffusion of scientific research: evidence from the Synchrotron Diamond Light Source. *The Economic Journal*, *127*(604), 2006-2040.

11. The Spatial Diffusion of Scientific Knowledge II: Displacement of Scientists

Catalini, C. (2018). Microgeography and the direction of inventive activity. Management Science, 64(9), 4348-4364.

12. How Widespread Is the Use of Questionable Research Practices?

John, L. K., G. Loewenstein and D. Prelec (2012). Measuring the prevalence of questionable research practices with incentives for truth telling. *Psychological Science*, 23(5): 524-532.

13. Secrecy and Delay in Disclosure of Industry-Sponsored Research

Czarnitzki, D., C. Grimpe and A. A. Toole (2015). Delay and secrecy: Does industry sponsorship jeopardize disclosure of academic research? *Industrial and Corporate Change*, *24*(1): 251-279.

14. The costs of being a Scientist

Levecque, K., Anseel, F., De Beuckelaer, A., Van der Heyden, J., & Gisle, L. (2017). Work organization and mental health problems in PhD students. Research Policy, 46(4), 868-879.

15. The Bayh-Dole Act – Really a Good Idea? Evidence from Norway

Hvide, H. K., and Jones, B. F. (2018). University Innovation and the Professor's Privilege*. American Economic Review*, 108(7), 1860-98.