

Lecture and Seminar (M.Sc.)

Economics of Science and Technology

Fachbereich Wirtschaftswissenschaften

Economic Policy Research Group (Professor Dr. Guido Bünstorf)

Summer Term 2016

Time and Location

Thursday, 14:15-17:30 (first class on April 14, 2016); Room: 0207 (Nora-Platiel-Strasse 6)

Overview

Innovation drives growth and job creation in modern economies. A major share of the new knowledge on which innovation is based 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 September 30, 2016) 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 by E-Mail to rbode@uni-kassel.de (open immediately; please name three preferred topics).

Maximum number of participants: 30

A. Introduction

1. Research and Development in Germany

- 1.1 The OECD Classification Scheme of Research and Development
- 1.2 Research and Development in Germany
 - 1.2.1 Universities and Non-University Public Research
 - 1.2.2 Industrial Research and Development
- 1.3 Current Trends and Challenges in German R&D
 - 1.3.1 Shifts in Funding
 - 1.3.2 The Quest for Excellence and Managerial Efficiency
 - 1.3.3 New Technologies in R&D
 - 1.3.4 Pitfalls of Federalism

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
 - 4.1.1 Intrinsic and Extrinsic Motivation
 - 4.1.2 Monetary Incentives
 - 4.1.3 *Peer Review*, Publication and Citations
 - 4.1.4 Prizes and Awards
- 4.2 The Behavior of Scientists: A Lifecycle Model

5. The Production Process in Science

5.1 Collaborative Research

5.2 Capital in Scientific Production: Equipment and Materials

5.3 Labor Markets for Scientists and Engineers

5.3.1 International Migration

5.3.2 Gender and Science

5.3.3 Recruitment of Young Researchers and the Reproduction of Science

6. Current Trends and Challenges to Open Science

6.1 Globalization

6.2 Digitalization

6.3 The Reliability of Empirical Research

6.4 Scientific Misconduct

C. Knowledge and Technology Transfer

7. Science and Economic Development

7.1 Conceptual Models of Science and Innovation

7.2 Economic Effects of Science: Empirical Evidence

7.3 Basic Research in Private-Sector Firms: Anomaly or Necessity?

8. The Institutional Framework of Knowledge and Technology Transfer

8.1. Channels of Knowledge and Technology Transfer

8.2 Technology Transfer and Science Policy

8.2.1 The Bayh-Dole Act

8.2.2 Germany's *Verwertungsoffensive*

8.2.3 Current Developments

9. Technology Transfer and the Advance of Science

9.1 Technology Transfer and Individual Scientific Productivity

9.2 Technology Transfer and the Diffusion of Knowledge

Topics for Seminar Papers

1. Merit, Networks and Gender: Determinants of Academic Careers in Germany

Lutter, M. and M. Schröder (2016): "Who becomes a tenured professor, and why? Panel data evidence from German sociology, 1980-2013" *Research Policy*, 45: 999-1013.

2. Career Imprints 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. Human Capital and Physical Capital in Science: Evidence from the Legacy of Nazi Germany

Waldinger, F. (2012): "Bombs, brains, and science: The role of human and physical capital for the creation of scientific knowledge", University of Warwick Working Paper.

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., & Wang, Y. (2014): "Matthew: Effect or Fable?" *Management Science*, 60(1), 92-109.

7. Citation Metrics and Labor Market Outcomes of Academic Economists

Ellison, G. (2013): "How Does the Market Use Citation Data? The Hirsch Index in Economics", *American Economic Journal: Applied Economics*, 5(3): 63-90.

8. The Impact of "False Science": Evidence from Retracted Articles

Azoulay, P., J. L. Furman, J. I. Krieger and F. Murray (2015): "Retractions", *Review of Economics and Statistics*, 97(5): 1118-1136.

9. Crowd Science: Non-Scientists' Involvement in Research Projects

Franzoni, C. and H. Sauermann (2014). "Crowd science: The organization of scientific research in open collaborative projects", *Research Policy*, 43(1), 1-20.

10. The Spatial Diffusion of Scientific Knowledge

Helmets, C. and H. G. Overman (2013): "My precious! The location and diffusion of scientific research: evidence from the Synchrotron Diamond Light Source", unpublished manuscript.

11. Social Learning and Academic Entrepreneurship

Bercovitz, J. and M. Feldman (2008): "Academic entrepreneurs: Organizational change at the individual level", *Organization Science*, 19(1): 69-89.

12. What restricts the Commercialization of University Research?

Bikard, M. (2014): "Hurdles to Invention Based on Academic Science: Evidence from 'Knowledge Twins'", unpublished manuscript.

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 Bayh-Dole Act – Really a Good Idea?

Kenney, M. and D. Patton (2011): "Does inventor ownership encourage university research-derived entrepreneurship? A six university comparison", *Research Policy*, 40(8): 1100-1112.

15. Institutional Responses to Patented Research Tools: the Case of the Oncomouse

Murray, F.,P. Aghion, P., M. Dewatripont, J. Kolev and S. Stern (2016): "Of mice and academics: Examining the effect of openness on innovation", *American Economic Journal: Economic Policy*, 8(1): 212–252.