TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Business and Economics
Chair for Economics, esp. Economic Policy and Economic Research

Economics of Innovation, Automation, and Artificial Intelligence

Summer Semester 2024

Description

The emergence of artificial intelligence (AI) has been one of the most transformative technological developments in recent years, with far-reaching implications for various aspects of our lives, including the economy and labor markets. Within the rapidly evolving field of AI, large language models (LLMs) like ChatGPT have garnered significant attention for their remarkable capabilities, ranging from engaging in human-like conversations to assisting with complex tasks across diverse domains.

This seminar aims to provide students with a comprehensive understanding of the economics of innovation, growth, and artificial intelligence, with a particular focus on the impact of LLMs on labor markets and productivity. It is structured into three main sections.

- The first two sections serve as a foundation, revisiting key concepts in the economics of innovation, and automation. The first section explores the role of general-purpose technologies (GPTs) in driving economic growth, the significance of property rights in incentivizing innovation, the historical interplay between military research and development (R&D) and technological progress, as well as the methods used to measure the dispersion of knowledge and the impact of inventor networks. It concludes by examining the relationship between technology policy and innovation.

- The second section shifts the focus to the economics of automation, investigating the effects of automation technologies on labor markets and inequality. It examines the polarization of the labor market in developed countries, the displacement of manufacturing jobs due to automation, and the complex relationship between automation and wage inequality by skill-level.

- The third and final section dives into the cutting-edge research surrounding the "ChatGPT paradigm" – the advent of LLMs and their potential to disrupt labor markets. It explores the gendered impact of AI on the workforce, the effects of LLMs on productivity in knowledge-intensive sectors like consulting, and the differential impact of these technologies on workers with varying skill levels.

By the end of this seminar, students will have gained a nuanced understanding of the economic forces shaping innovation, growth, and the labor market implications of artificial intelligence, particularly in the context of LLMs. They will be well-equipped to critically analyze the latest research on the future of work in the age of AI innovation.

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Instructors

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Prerequisites

Knowledge of economics as taught in the modules Introduction to Economics (EVWL) and Introduction to Microeconomics.

Modules

Programmes of Faculty of Business and Economics: BA-WW-VWL-2703, D-WW-WIWI-2703

Bachelor/Master International Relations: BA-IB-ID2, BA-IB-S, BA-IB-EF, MA-IB-ECG

Other programmes: according to export and/or learning agreements

Schedule

Kick–off meeting	April 08, 2024, 4:40 – 6:10 pm, room tbd
Topic choice and group formation	April 08 – April 15, *Topics* folder, OPAL
Exposé submission	May 21, 2024, *Resources – Exposé* folder, OPAL
Seminar paper submission	June 14, 2024, *Resources – Seminar* paper folder, OPAL & secretary
Presentations	June 21 & July 5, 2024, 9:20 am – 4:20 pm, detailed timing and room tbd

Examination and Grading

Examination comprises a seminar paper building on an exposé, its presentation, and discussion, all conducted in English.

Participants form groups of (at most) two persons by choosing a topic (see list below) in OPAL. In case of excess demand, additional topics will be provided.

Exposé (15 percent of grade):

Each group submits a three to five-page exposé of the seminar paper as a PDF file in OPAL. The exposé should include the following:

- Short Introduction
    - Why is the topic of the basic paper currently important for society?
    - What current debates are linked to the paper topic?
- Main takeaways of the research paper
    - What research question(s) do its authors address?
    - What methods do they use and why?
    - What are the results of the paper?
    - What are the main limitations of the paper?

- Short presentation of 1 or 2 additional papers that tackle the same or a very similar research questions.

Seminar paper (45 percent of grade):

The seminar paper has to provide an informative summary and a critical review of the seminal article. This means:

- The main task of the seminar paper is to detail the methods and the results of the seminal article.
- In addition, you should discuss the paper critically and – more importantly - place it into the context of the literature closely related in terms of methods and the specific topic.
- You may also describe how your article fits into the general context of the seminar. However, we expect to develop this in detail in the discussions of the presentations.

The maximum length of the seminar paper (excluding bibliography) should not exceed 15 pages for Bachelor students and 20 pages for Master students (based on 12pt fonts size, 1.5 line spacing).

The seminar papers are to be uploaded on time in OPAL and handed over to the secretary of the chair (Heike Becker, SCH C 264, office hours 8:00 am - 12:00 pm).

Presentation (30 percent of grade):

The presentations should provide a summary of the seminar paper. They should not exceed 20 minutes for Bachelor students and 35 minutes for Master students, excluding interposed questions, and are followed by a discussion of about 25 minutes.

Presentations slides are to be uploaded beforehand in OPAL.

Discussion (10 percent of grade):

All participants, not merely the instructors, are expected to contribute constructively to the discussion of each presentation.

Seminar Topics

I. Innovation

1. GPTs and their Role for Society

Bresnahan, T.F., Trajtenberg, M., 1995. General Purpose Technologies 'Engines of Growth'? Journal of Econometrics 65, 83–108.

2. The Role of Property Rights

Scotchmer, S., 1991. Standing on the Shoulders of Giants: Cumulative Research and the Patent Law. Journal of Economic Perspectives 5, 29–41. https://doi.org/10.1257/jep.5.1.29

3. The Relationship between the Military and Innovation

Moretti, E., Steinwender, C., Van Reenen, J., 2023. The Intellectual Spoils of War? Defense R&D, Productivity, and International Spillovers. The Review of Economics and Statistics 1–46. https://doi.org/10.1162/rest_a_01293

4. How to Measure the Dispersion of Innovation

Jaffe, A.B., Trajtenberg, M., Henderson, R., 1993. Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations. The Quarterly Journal of Economics 108, 577–598. https://doi.org/10.2307/2118401

5. The Role of Inventor Networks

Breschi, S., Lissoni, F., 2009. Mobility of skilled workers and co-invention networks: an anatomy of localized knowledge flows. Journal of Economic Geography 9, 439–468. https://doi.org/10.1093/jeg/lbp008

6. How to Set Technology Policy

Bloom, N., Van Reenen, J., Williams, H., 2019. A Toolkit of Policies to Promote Innovation. Journal of Economic Perspectives 33, 163–184. https://doi.org/10.1257/jep.33.3.163

II. Automation

7. The Polarization of the Labor Market in Developed Countries

Autor, D.H., 2019. Work of the Past, Work of the Future. AEA Papers and Proceedings 109, 1–32. https://doi.org/10.1257/pandp.20191110

8. Automation and the Displacement of Manufacturing Jobs

Acemoglu, D., Restrepo, P., 2019. Automation and New Tasks: How Technology Displaces and Reinstates Labor. Journal of Economic Perspectives 33, 3–30. https://doi.org/10.1257/jep.33.2.3

9. The Effect of Automation on Income Inequality

Acemoglu, D., Restrepo, P., 2022. Tasks, Automation, and the Rise in U.S. Wage Inequality. Econometrica 90, 1973–2016. https://doi.org/10.3982/ECTA19815

III. The ChatGPT Paradigm

10. The Gendered Impact of AI

Chavda, J., 2023. Which US Workers Are More Exposed to AI on Their Jobs? Pew Research Center's Social & Demographic Trends Project. URL https://www.pewresearch.org/social-trends/2023/07/26/which-u-s-workers-are-more-exposed-to-ai-on-their-jobs/).

11. The Impact on Productivity – The Case of Consultants

Dell'Acqua, F., McFowland, E., Mollick, E.R., Lifshitz-Assaf, H., Kellogg, K., Rajendran, S., Krayer, L., Candelon, F., Lakhani, K.R., 2023. Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality. https://doi.org/10.2139/ssrn.4573321

12. The Impact of the Productivity by Skill-Level

Noy, S., Zhang, W., 2023. Experimental evidence on the productivity effects of generative artificial intelligence. Science 381, 187–192. https://doi.org/10.1126/science.adh2586