Digital Systems for Humans Graduate School

2025-2026 PhD Subject Proposition

Proposition de Sujet de Thèse 2025-2026

AI and the labour market: theory and evidence

Doctoral School: Doctoral School in Law, Political Science, Economics and Management (ED DESPEG)

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Host laboratory: GREDEG (Université Côte d'Azur, CNRS)

Subject description:

This PhD thesis aims to explore the multifaceted effects of the recent developments in artificial intelligence (AI) on the labour markets. The successful applicant will focus on the impact of AI on firm employment, wage determination and firm dynamics.

The effect of technical progress on firm labour demand is certainly not a new issue. When technical progress allows for automation, this can lead to a capital-to-labour substitution, otherwise called labour-saving technical change (Berman et al., 1994; Berman et al., 1998). It has also been established that such technical change benefits the most skilled workers. According to Autor, Levy and Murnane (2003), technical change leads to the replacement of routine tasks: highly exposed to automation, low-skilled, routine work is then exposed to the substitution of capital and labour. In particular, Autor and Dorn (2013) highlight the fact that technological change was creating polarization in the labour market. While high-skilled workers enjoy sustained demand and wage rises, low-skilled workers cope with declining job opportunities and stagnant wages. In the same vein, the theoretical model of Acemoglu and Restrepo (2018) predicts that the effect on employment should be negative on labour demand, though limited by the corresponding increase in the user cost of capital.[1]

AI is different from simple automation. Defined as an algorithm capable of learning through its interactions with its environment, AI can now perform a series of non-routine tasks (Agrawal, et al., 2019) including: (i) data analysis; (ii) medical diagnosis; (iii) machine translation; (iv) virtual assistance; (v) creative content, commonly referred to as generative AI. Therefore, the significant difference of AI with previous waves of technology is that highly skilled labour is now exposed to labour-saving technical change.

[1] In a follow-up paper (2020) the authors estimate that the introduction of one robot per thousand employees reduces the employment rate by 0.2 percentage points (about 400 thousand jobs out of a working population of more than 160 million people), and depreciates wages by 0.4%. These overall adjustments are accompanied by significant reallocation effects between employment areas, so that some areas are subject to even more severe variations.

The question is therefore whether artificial intelligence will attenuate skilled-biased technical change, and whether and how it will permanently affect labour demand for skills by companies. Previous literature has already analysed the various consequences of AI on such dimensions:

- The study by Felten, et al. (2019), on US data from US companies between 2010 and 2016, show that occupations exposed to AI are experiencing a slight increase in wages in ICT-related occupation without affecting overall labour demand.

- The work of Babina et al. (2022, 2023), on US data between 2010 and 2018, shows that companies investing in AI increase labour demand with greater specialization in STEM and computer science fields.

- The OECD study (2021), covering 23 OECD countries for the period 2012-2019, shows that there is no clear capital-to-labour substitution as exposure to AI-performed tasks increases Yet in highly computerised occupations, AI exposure to AI is linked to higher employment growth.

Overall, it seems that technical change increases the demand for work of innovative companies. This increase in the demand for skilled labour validates the presence of, yet again, skill-biased technical change.

There are reasons to questions this preliminary finding. First, most studies were performed before the rise in generative AI, whereas generative AI represents a significant shift in the capabilities and applications of artificial intelligence compared to all previous AI technologies. Generative AI's ability to create new, synthetic content opens up new possibilities in the diffusion of artificial intelligence to creative activities which initially fell outside the realm of automation. Second, the recent developments of AI call for firm-level studies, rather than cross-country comparisons, with a larger time frame. As time goes by, firms experiment the developments of AI and make sounder choices relative to their work force composition. As of today, there is a general need for additional econometric analyses on the labour market effects of AI.

In this PhD project, the successful candidate will envisage to tackle one or several of the following questions:

1. How is generative AI different from traditional AI and how it affects the allocation of labour within company. This study will look at the specific effect of generative AI on occupations within companies. It aims to document the heterogeneous effect of recent AI developments on labour demand by occupations. It builds upon Gmyrek et al. (2023) and Bergeaud (2024).

2. What is the effect of AI adoption by firms on wage determination in a similar fashion as in Caselli, Nesta, Schiavo (2018, 2021). By labour market distortion, we mean the wedge of the observed wage with the theoretical one, i.e. the marginal revenue product of labour. The expected manuscript will document two wedges, one for skilled and one for unskilled labour, respectively.

3. What is the effect of AI adoption by firms on the dynamics of productivity, firm growth and innovation. Empirical evidence on the effect of AI remains scant and limited. The manuscript will build upon ongoing research on the measurement and evolution of product (goods and services) and factor (labour markets, intermediate consumption, energy) market distortions, productivity, and firm growth. This research avenue could be based a new theoretical approach based on, but distinct from, Koch et al. (2021).

Choosing at least two of the above research avenues is compulsory. However, the successful candidate can also suggest particular developments that, although falling under the general topic of AI and the

labour market, have not been exposed in the above set of potential questions. In terms of method, the successful candidate is encouraged combine theoretical models with high quality data qualifying the French economy.

The local research team will provide the candidate with confidential employer-employee and firm-level data as provided by the Centre d'Accès Sécurisé aux Données (CADS) providing access to data delivered by the Direction Générale des Finances Publiques (DGFiP); l'Institut National de la Statistique et des Etudes Economiques (INSEE). The various databases to be used in this research projects are: FARE data DADS, l'Enquête TIC, among others. Possible uses of patent data as provided by the European Patent Office (PatStat EPO, as done in Dibiaggio et al. 2022; Dibiaggio et al., 2024) and publication data (Open Alex) is not excluded, although unlikely. The research team also encourage the successful candidate to spend periods of time in foreign universities within Europe.

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