Firms' adoption of emerging technologies: Evidence from online job vacancies

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Extended abstract

Sciences, Technologies and Innovations (STIs) transform occupations and industries as firms adopt them. However, there is limited knowledge about which technologies are adopted, particularly regarding the most recent STIs, such as neural networks or 3D printers. Understanding the adoption of these emerging technologies by firms is crucial for social sciences to apprehend future technological transitions and their consequences for workers, as today's emerging STIs are the heart of tomorrow's digital economy.

In this paper, we study the adoption of the most recent emerging STIs through the change in firms' labor demand for skills and knowledges. Our identification strategy is based on the assumption that firms' labor demand reflects firms' needs in terms of both skills and knowledges that are related to technologies. As firms adopt new emerging technologies (e.g. neural networks), the labor demand for complementary skills and knowledges (e.g. big data) increases, while the labor demand for substitute ones decreases (e.g. analyze images).

We combine data on emerging STIs identified in Chaturvedi et al. (2023) with data on the near universe of Online Job Vacancies (OJV) in Europe between 2018 and 2020. Using state-of-the-art natural language processing techniques, such as sentence transformers (Reimers and Gurevych 2019), we identify the skills and knowledges that are related to STIs that emerged between 2010 and 2020.

We estimate the changes in the intensive labor demand for skills and knowledges at the region-industry-occupation level that can be attributed to these emerging STIs. We also study the heterogeneity in the intensive labor demand changes across regions, industries and occupations to account for disparities in technology adoption across European firms.

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Our work contributes to several strands of the literature. First, we are the first to estimate European firms' adoption of the most recent emerging technologies. Using the change in the intensive labor demand for skills and knowledges related to these technologies, highlighting that technology adoption is fostered by specific occupations, industries, and regions.

Second, we provide a complementary approach to Kogan et al. (2021), who focused on the consequences of novel technologies that emerged between 1850 and 2010, by examining the consequences of the latest emerging technologies that emerged between 2010 and 2020.

Third, we contribute to the literature on the link between the content of work and technologies by providing an analysis of European OJVs that relies on the ESCO Classification (v1.0.9), complementing prior work that has focused on the US and linked technologies with tasks provided by the Dictionary of Occupational Titles (see, for instance, Kogan et al. 2021, Webb 2019, Autor et al. 2021).

Keywords: Emerging technologies, Labor demand, Online job ads, Skills, Knowledges.
JEL Codes: J23, J24, O33, R23

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