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Generative Artificial Intelligence and Employers' Requirements on New Employees: Experiences on Changes in Recruitment Processes in the German Labor Market

Extended abstract
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Motivation

Systems based on artificial intelligence (AI) are being used in a growing number of companies and administrations, as well as in social and private life (Lane/Williams 2023; Warning et al. 2022). They are part of a digitalization trend that has grown over the last few decades and has accelerated massively with its latest stage of development, the market introduction of so-called Generative Artificial Intelligence (GenAI) in November 2022 (Zarifhonarvar 2023). GenAI-systems answer questions and solve problems by generating new content and results in the form of new texts, images, videos, etc., while they research, analyze and summarize knowledge stored in electronic databases, linking different sources together (Brynjolfsson et al. 2023). In particular, GenAI-systems do not require any special IT knowledge or programming languages for use, and the language-based applications do not even require reading or writing skills. Therefore, if AI-applications are well programmed and trained and, as a result, work reliably and according to data protection law, they promise unprecedented efficiency gains. Given the growing investment in this technology, the use is likely to increase significantly within a short period of time not only in large, but also in small and medium sized firms.

As in previous stages of digitalization there is a wide debate about the employment effects of GenAI. In the past, the potential for automation or substitution was the focus of many empirical studies. But with the introduction of GenAI, another aspect is gaining an increasing importance: the change of occupations without substituting human labor with technology, what can even mean a broadening of the fields of activity and responsibility (also called augmentation potential).

This paper examines the employment effects of GenAI on the basis of representative German data on new hires in 2023. New hires reflect employer's expectations about the further development of labor demand and employment relationships. They enable them to formulate adapted requirements and working conditions, largely independently of the existing workforce, where reorientation might be more difficult to enforce (also depending on the strength of works councils) or for which substantial investment in further training must be made. The paper analyzes, if and how recruitment behavior and outcome are changing in those occupations and sectors, that are expected to be more affected by the GenAI technology than others.

The so-called exposure to AI is measured with two sources: American score data on the GenAI exposure by occupations by Felten et a. 2023, and a German source measuring the automation potential on occupations by Grienberger et al. 2024. The data on new hires comes from the IAB Job Vacancy Survey, a unique database to investigate recruitment processes at the occupational and sectoral level in detail (Institute for Employment research 2024).

Available Research and New Idea

There is a wide range of empirical findings on the labor market effects of digitalization. They show some substitutability potential, but also a high potential for creating new jobs so that total employment does not decrease (Lane et al. 2023). Analyzes on hires and recruitment behavior by Warning/Weber 2018 had shown that not only the current state of development is relevant for employers' recruitment decisions, but that expectations regarding upcoming changes play a major role. In their representative study, companies and administrations that assumed strong future changes in digitalization were significantly more likely to require specific skills, which employees acquire in the form of further training, as well as special social-communicative, team and intercultural skills. At the same time, these employers were significantly less likely to require longer working experience. The effects were particularly strong for new hires in companies and administrations that had expected a strong increase in the use of artificial intelligence. These employers also showed a significantly higher employment dynamic in terms of more hires and more layoffs, without reducing the overall number of employees.

On the basis of recruitment data from the IAB Job Vacancy Survey Warning et. al 2022 showed significant changes in both requirements and working conditions for hires in occupations with a high proportion of cognitive tasks, closely related to AI applications. This applies above all to flexibility in working time and employees' self-organization at work. Derived from this, the authors discuss the risks that may arise from an increasing use of AI for the individual workload of newly hired employees and an increasing delimitation of work and family life.

The rapid adoption of GenAI is likely to have an even greater impact on employment than the previous stages of digitalization. In terms of its application potential, the technology goes far beyond what we know and makes work even more possible and efficient, regardless of location, time and human cooperation partners. Initial studies look at specific fields in the labor market (Brynjolfsson 2023). Some studies discuss employment effects closely following the approach of previous research on the substitution potential of automation (Grienberger et al. 2024 for Germany). However, GenAI is primarily concerned with the question of how the fields of activity change within the existing occupations, resulting in adapted requirements on (potential) employees and new kinds of working conditions.

As it currently stands, there is only little literature that has empirically studied the possible effects of GenAI. The so-called "occupational exposure to generative AI" is compared for different professions, occupational fields, industries and regions, for instance in Nurski and Ruer 2024 and Eloundou et al. 2023. An example widely discussed also in the media, is the study of the WEF, based on US data on 867 occupations and 19,000 tasks (World Economic Forum 2023), discussing results for the occupational and the sectoral level in the form of rankings. There are occupations with a very high potential for their tasks to be automatized by GenAI, for instance business consultancies and accounting. Other fields will change noticeably, but the amount of automation will remain limited. This includes numerous professions in the fields of mathematics, computer science, natural sciences and engineering. A third group of professions will remain largely unaffected by GenAI, as their tasks require original human action and are associated with a high proportion of communication, team exchange and reflection, e.g. education, vocational and career planning or pediatricians.

All comparative studies are based on scores that are extensively calculated to express the potential for changes of occupations by GenAI. For example, Felten et. al. 2023 provide scores based on American O-NET data and Gmyrek et al. 2023 provide data based on ILO data with the

ISCO classification. What all these scores have in common is that they are not expressing an actual situation, rather they define an expectation value on potential changes in individual occupations and fields of activity by GenAI. For estimates of overall macroeconomic employment trends and the effects of automation, this implies some uncertainties. But it is precisely these expectations that are relevant to employers in their hiring decisions, and therefore these score data are highly exciting in the context of the study of recruitment behavior with GenAI.

Empirical Work in the Paper - Overview

I contribute to the growing literature on GenAI through the link of data on job-related assessments of expected employment changes by GenAI – the score data – with data from a representative German business survey on the course and outcome of job recruitment processes for the year 2023, the IAB Job Vacancy Survey (Institute for Employment Research 2024). The survey provides unique information in details of job recruitment processes on the occupational level in Germany. In addition to personal characteristics of the recruited person, information on the duration and the course of the recruitment process and on the position filled are available. This includes recruitment channels, information on recruitment difficulties, data on professional and other requirements, on the amount and distribution of working time, as well as on other special requirements and special working conditions. Data for 2023 are expected to be available until March 30, 2024. They will contain representative information for more than 10,000 hires in the year 2023.

To minimize the effects of outliers in single occupations, the analysis will use the data for all hires, for which there are at minimum 25 hires in the specific occupation described by the employers. Occupational information is coded according to the German classification of occupations as well as according to ISCO 2008. This allows several approaches:

Firstly, hiring data from the Job Vacancy Survey will be combined via ISCO with available score data for the GenAI exposure by Felten et al. 2023. Their scores calculated for the US labor market are convincing in terms of content. Although, they are based on American occupational data, for which there is no current crosswalk available for the transformation into the newest ISCO classification, only into an older version. To avoid the loss of occupations that have recently developed and may be particularly close to the development or application of GenAI, I am in the process of discussing the possibilities and limitations of transformations with the Bureau of Labor Statistics. The best approach will be applied to relate the score data to the German recruitment data.

There is no alternative to using American score data, as a comparably detailed and GenAI-related calculation for occupations on the German labor market is not yet available. Transforming the American score data to the German labor market means some limitations regarding the occupations to observe and regarding the interpretation of results. Nevertheless, the approach is promising. From my perspective, the use of existing scores currently is the only way to make a link between GenAI and changes in recruitment at the German labor market, strongly focusing on GenAI and going beyond individual examples. In addition, the German and the American markets are not too different in terms of their technological development. So, companies' expectations on changes in occupations and activities are likely to be similar in many fields, especially in those that are expected to be strongly affected by GenAI.

Secondly, Grienberger et al. 2024 have very recently provided data on the automation potential for occupations in Germany, also considering actual changes resulting from the application of GenAI. They follow their more "traditional" approach to calculate the automation potential for German occupations. As described above, automation is only one part of the labor market effects of GenAI. Augmenting processes are the other part that might be underestimated in their calculations.

However, there is the chance to compare both approaches: the score calculation by Felten et al. 2023 and the calculation of the automation potential by Grienberger et al. 2024, both related with the same data on hires. Expectations regarding the employment effects of GenAI, expressed in the Felten-scores at occupational level and expressed with the automation potential, should be – at least partially – apparent in the hiring processes of the year 2023.

Empirical Work in Details

Three approaches will be taken:

1) Based on the recruitment data for the year 2023, recruitment processes are differentiated between occupations/sectors, for which strong change effects are expected by GenAI, slight changes are expected, little changes are expected, firstly calculated in categories on the base of score data, secondly based on automation potential data. With logistic and other regression models the hypothesis is tested whether there are significantly different probabilities for specific characteristics of the recruitment process and the hired persons.
2) Those occupations/sectors in which strong effects from GenAI are expected, are compared between the year 2023 and the year 2019. In 2019, GenAI was not yet specifically expected, and unlike in the two following years, the labor market was not strongly affected by COVID-19. A comparison between both years allows a second perspective on the question, if and how the expectations surrounding GenAI result in changes in hiring practices and hiring results. Again, score data for GenAI and the more general automation potential data will be used in the regression models.
3) The third approach concerns the employment fluctuations. The literature has found, that the dynamics of new hires and layoffs significantly increase with the (expected) use of digitalization (Warning/Weber 2018). This dynamic is likely to increase further in the course of the rapid introduction of GenAI. Current media news points to significant layoffs in the course of increasing AI investments, at least in large companies. At the same time, many new hires are announced by these companies to secure the specific skills needed for AI development and application. The IAB database also contains data on the number of hires and layoffs at the company level and can be used to analyze fluctuations in the context of GenAI exposure.

Contribution

On the one hand, the aim of this project is to investigate to what extent the changes expected from the increasing spread of GenAI in the individual occupational fields lead to different hiring behavior and different hiring outcomes. This will lead to important implications for both employers and employees in terms of search behavior and search success. The public

employment services can derive insights for the support of job-seekers, especially in any occupational field, which is subject to significant changes due to GenAI.

On the other hand, the comparison of score data and automation potential data will bring insights regarding the measurement of changes in occupations by GenAI. Both the score data and the automation data express expectations regarding changes in occupations. They do not reflect reality, as empirical data on the employment effects of GenAI are not yet available at a representative level. They express expectations and are the result of specific data bases, considerations and calculations of researchers.

With regard to the potentials of GenAI, companies also form expectations about the change of activities and professions. Do they form expectations that correspond to the calculations of the score data, or do they form expectations that have a strong focus on the classic automation potential? What insights can be drawn from the interplay of differently calculated expectations data with the data on actual recruitment processes?

Literature

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