

The Impact of Artificial Intelligence on Denmark's Labor Market

Théodore Renault

SIP/2025/119

IMF Selected Issues Papers are prepared by IMF staff as background documentation for periodic consultations with member countries. It is based on the information available at the time it was completed on June 18, 2025. This paper is also published separately as IMF Country Report No 25/166.

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Prepared by Théodore Renault

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ABSTRACT: Artificial Intelligence (AI) has significantly advanced in recent years. As a result, it has the potential to reshape the job landscape across a broad range of skills and sectors. By mapping occupational labor market micro data with a measure of exposure and complementary to AI, our analysis suggests that most Danes will benefit from AI adoption, but around one fifth of the workforce is at risk of job displacement. Vulnerable groups include private sector employees, women, and tertiary-educated workers. In contrast, men, low-educated people, and immigrants face a lower risk, primarily because they occupy jobs with low exposure.

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SELECTED ISSUES PAPERS

The Impact of Artificial Intelligence on Denmark's Labor Market

Denmark

Prepared by Théodore Renault



DENMARK

SELECTED ISSUES

June 18, 2025

Approved By
European Department

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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON DENMARK'S LABOR MARKET¹

Artificial Intelligence (AI) and Generative AI models and their use have significantly advanced in recent years, evolving from automating routine tasks to now performing complex cognitive functions. As a result, it has the potential to reshape the job landscape across a broad range of skills and sectors. By mapping occupational labor market micro data from the EU Labor Force Survey with a measure of exposure and complementarity to AI, our analysis suggests most Danes are likely to benefit from AI adoption, but around one fifth of the Danish workforce has high exposure and low complementarity, putting them at greater risk of job displacement. The groups most vulnerable include private sector employees, women, and workers with tertiary education. In contrast, men, low-educated people, and immigrants face a lower risk, primarily because they are more likely to occupy jobs with low exposure.

A. Context

1. Artificial Intelligence (AI) and Generative AI models have made significant advances in recent years. These models have evolved from traditional machine learning frameworks to performing advanced cognitive functions, processing vast amounts of data, identifying patterns, and making decisions. Compared to previous technological innovations, the speed of AI adoption by workers and firms is unprecedented (Mish et al., 2025), and companies are in a competitive race to develop AI-driven products. As a result, AI has the potential to significantly enhance productivity across various sectors and occupations, potentially reshaping the job landscape. However, it remains uncertain whether AI technologies will complement or substitute specific occupations, and at what pace this will unfold.

2. The structure of this chapter is as follows. Section B assesses Denmark's digital preparedness and potential to harness the benefits of AI, using the IMF's AI Preparedness Index (APII) and other indicators of digital skills, perception, and AI use by companies. Section C examines the characteristics of the Danish labor market by mapping an index of exposure and complementarity onto occupational microdata. Section D concludes and discusses policy implications.

B. Infrastructure, Human Capital, and Digital Preparedness in Denmark

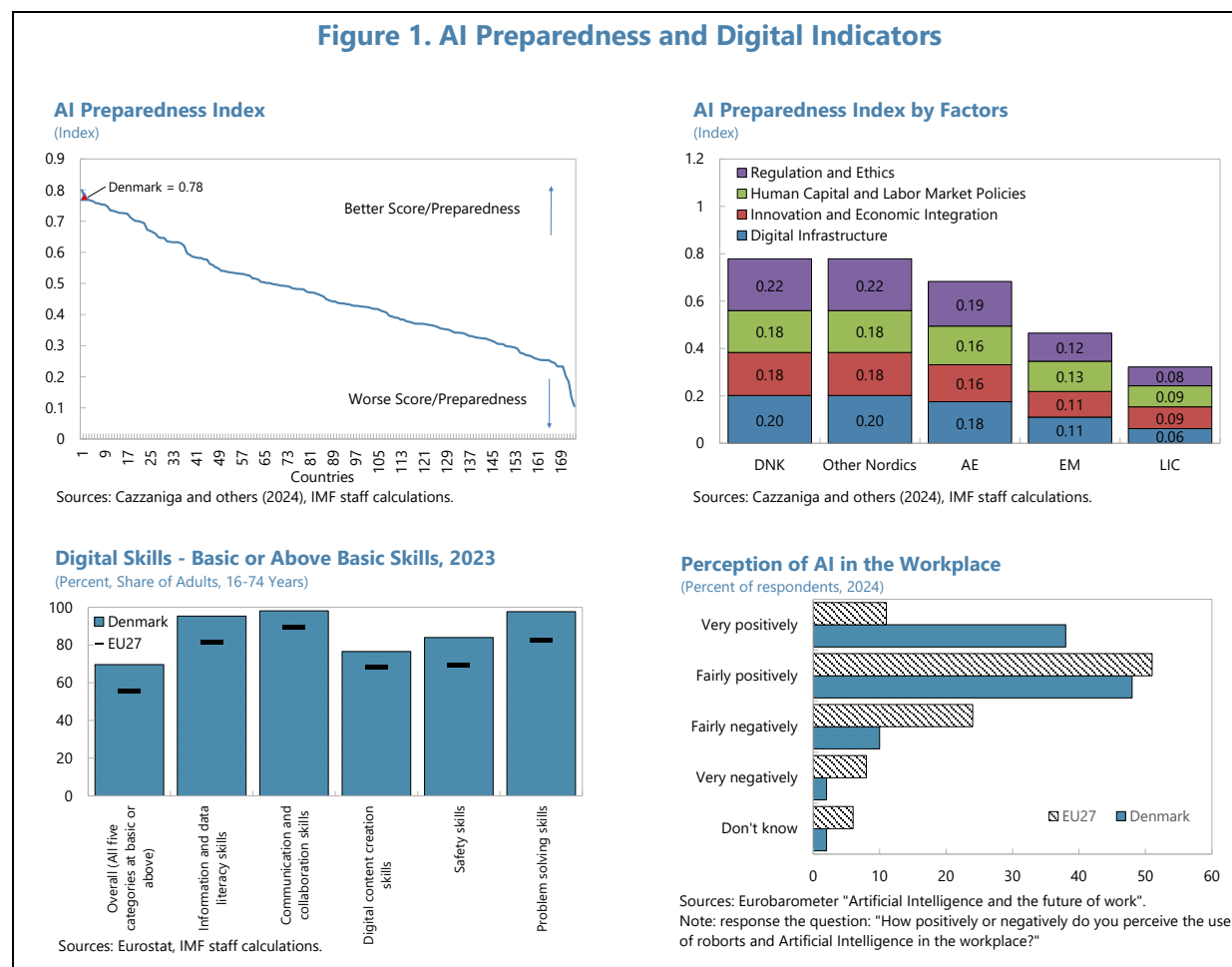
3. The government has launched a new strategic initiative to promote the responsible development and use of AI in both the public and private sectors. Published in December 2024, the *Strategic Approach to AI* outlines four initiatives.² The first initiative creates a *Digital Taskforce* to promote the use of AI in the public sector, aiming to reduce administrative burdens and improve

¹ Prepared by Théodore Renault (EUR).

² See Ministry of Digital Affairs' [Strategic Approach to Artificial Intelligence, which](#) builds upon the earlier [National Strategy for Artificial Intelligence](#), published in 2019.

public service quality. Additionally, this initiative seeks to help “free up” labor in the public sector, addressing anticipated labor shortages, and will be implemented in coordination with the municipalities and the regions. The second initiative creates a *Center for Artificial Intelligence in Society* to guide businesses and government agencies on the responsible use of AI. The remaining initiatives aim to facilitate the development of AI models that align with Danish norms and principles, such as transparency and accountability, using Danish text data that will be made freely accessible to companies.

Figure 1. AI Preparedness and Digital Indicators

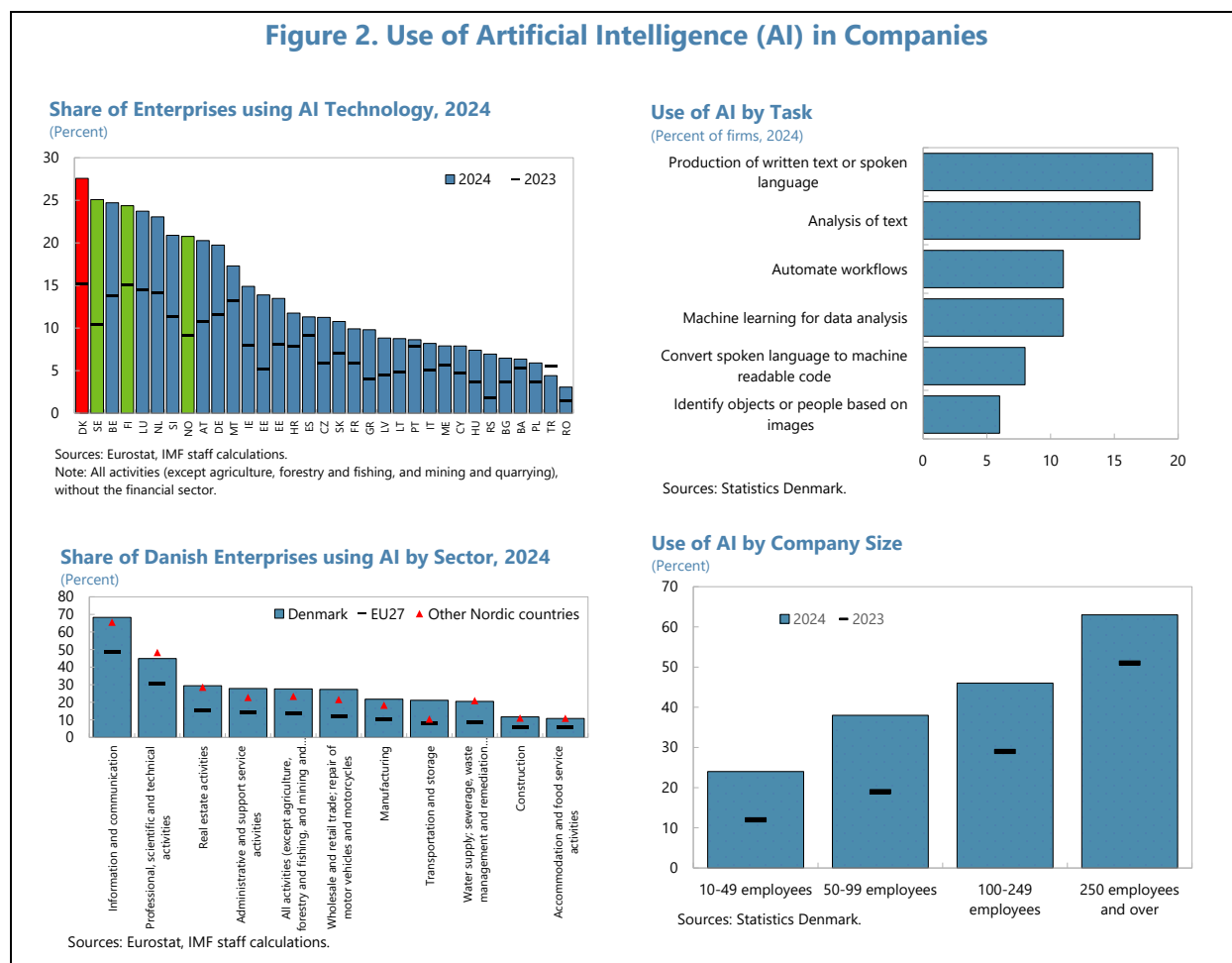


4. Denmark is well-prepared to benefit from AI. The IMF’s AI Preparedness Index (AIPI) ranks Denmark second worldwide, indicating its strong position to harness the benefits and mitigate the risks of AI.³ This preparedness, shared with other Nordic countries, is characterized by a robust digital infrastructure, well-educated labor force, and adequate innovation and legal frameworks (see Figure 1). Digital skills in Denmark, for example, are higher than in other European countries for both

³ The IMF’s AIPI (Cazzaniga et al., 2024) assesses AI preparedness as of 2023 across 174 countries, based on a comprehensive set of macro-structural indicators that cover digital infrastructure; innovation and economic integration; human capital and labor market policies; and regulation and ethics. The index incorporates several perceptions-based indicators, reflecting individuals’ subjective assessment and experiences. Therefore, the index should be seen as an indicative measure.

simple and complex tasks. Additionally, a survey conducted by the Eurobarometer shows that most Danes view positively the use of AI in the workplace, which will facilitate its adoption by workers and firms. However, a recent public consultation on AI revealed that while most Danes think that AI will benefit companies (78 percent of respondents) or the society as a whole (55 percent), only 45 percent believe that the technology will benefit Danish employees.⁴

Figure 2. Use of Artificial Intelligence (AI) in Companies

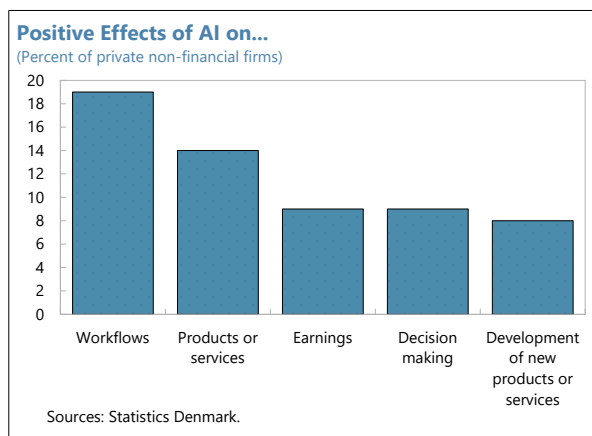


5. AI usage in Danish companies is the highest in Europe. In 2024, about 25 percent of Danish companies with 10 or more employees were using at least one AI technology (see Figure 2). This figure nearly doubled in one year, indicating a rapid pace of adoption among firms. Danish companies were primarily using AI technologies for natural language generation (18 percent) and text mining (17 percent), along with workflow automation, machine learning for data analysis, and image recognition and processing. The highest adoption rate is in the information and communication sector (70 percent), followed by professional, scientific, and technical activities (45 percent). Other sectors, such as manufacturing (22 percent) and transport (21 percent), also show significant AI usage compared to other European countries.

⁴ See [Strategic Approach to Artificial Intelligence](#).

6. The use of AI increases with firms' size.

In 2024, over 60 percent of firms with 250 or more employees were using AI, compared to only 20 percent of small firms with less than 50 employees, and about 40 percent of medium-sized firms (50–249 employees) adopted at least one AI technology. This difference might be explained, for example, by the complexity of implementing AI technologies (i.e., large firms have more IT-related resources), economies of scale (given the initial fixed costs of AI investment), and costs. Danish firms that have adopted AI technologies are already experiencing positive effects on their workflows, products and services, and earnings.



C. Labor Market Exposure and Complementary to AI

7. We measure exposure and complementarity to AI of different job types. Felten et al. (2021) developed a measure of occupational exposure to AI, linking AI applications to workplace skills and occupations using U.S. data. Pizzinelli et al. (2023) expanded on this by considering the social, ethical, and physical contexts of occupations, introducing the concept of complementarity to determine whether AI may complement or replace jobs. We categorize these measures into three dimensions: “High Exposure and High Complementarity” (HEHC), “High Exposure and Low Complementarity” (HELC), and “Low Exposure” (see Annex 1).⁵ These measures are applied to the 2023 EU Labor Force Survey, allowing an assessment of AI exposure and complementarity within the Danish workforce and comparisons with other European countries, across 119 occupations, 19 economic activities, 3 age groups, gender, 3 educational attainment groups, 3 income groups, and 2 ‘country of birth’ groupings.

8. The results suggest that the Danish labor force faces a higher level of exposure to AI compared to other European countries. Over 60 percent of Danish workers face high exposure to AI, comparable to Nordic countries with similar labor force composition (see Annex 2), but 9 percentage points higher than in other European countries (see Figure 4).⁶ Among those with high exposure, two-thirds hold jobs that are complementary to AI, such as teaching, science and engineering, or health professionals. Despite the exposure, these workers are likely to benefit from AI integration. The remaining one-third has low complementarity, largely due to the high share of business and administration professionals.⁷ Consequently, around 20 percent of the labor market is

⁵ Cazzaniga et al. (2024) apply these measures in a cross-country comparison.

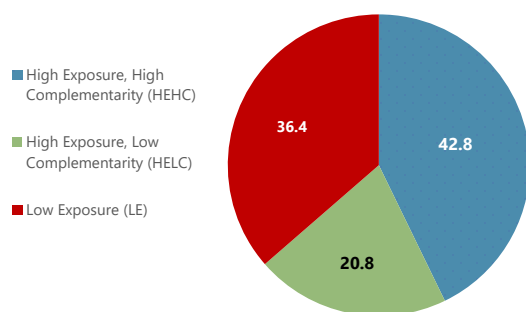
⁶ The term “highly exposed” should be used with caution. It refers to job occupations with an exposure score higher than the median across occupations, based on the Felten et al. (2021) occupational exposure index. It therefore measures exposure in a relative sense against all other occupations, rather than absolute terms.

⁷ Business and administrative professionals encompass a wide range of roles that support organizations’ operations and management. These professionals typically perform tasks related to planning, organizing, and coordinating business activities (e.g., administrative, financial, marketing and sales).

at risk of job displacement, similar to other European countries. Finally, 36 percent of the Danish workforce is unlikely to be affected by AI, primarily working in personal care, personal services or as laborers.

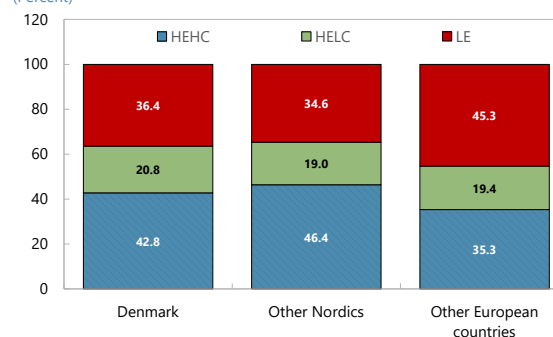
Figure 3. Exposure and Complementarity to AI

Employment Exposure and Complementarity to AI
(Percent)



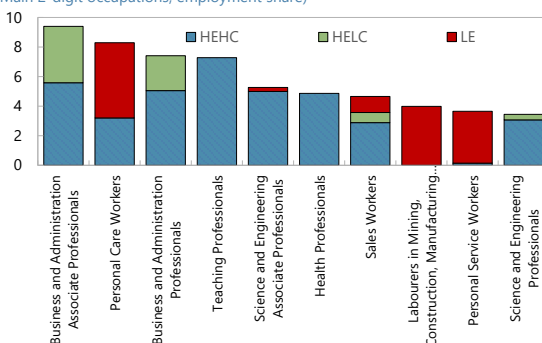
Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Comparison with Other European Countries
(Percent)



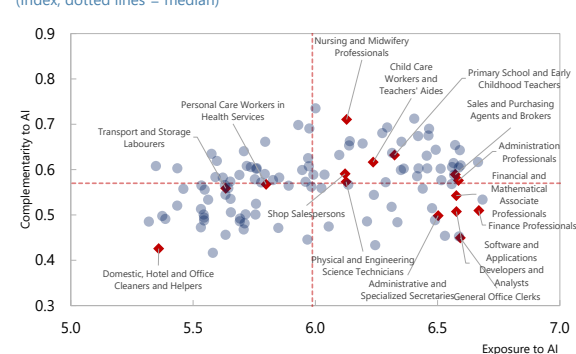
Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Employment Exposure and Compl. to AI by Occupation
(Main 2-digit occupations, employment share)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Exposure and Complementarity to AI
(Index, dotted lines = median)



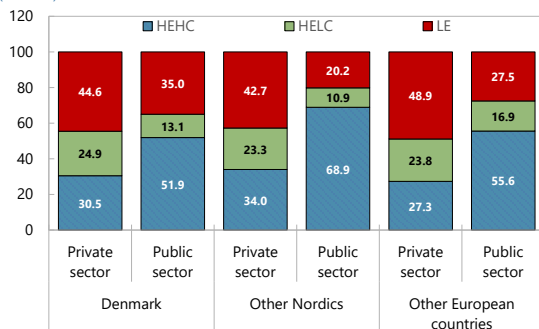
Sources: Eurostat Labor Force Survey; and IMF staff estimates.

9. Private sector workers are more vulnerable to job displacement than those in the public sector. Approximately 25 percent of the Danish private sector workforce faces a risk of job displacement, in contrast to only 13 percent of the public sector workforce. The most at-risk private sector jobs, characterized by high exposure and low complementarity to AI, include business and administration professionals, sales, and information and communication technology specialists. On the other hand, more than half of public sector employees are anticipated to benefit from AI advancements, particularly those in education and healthcare. However, AI may also allow for the reallocation of labor resources within public administration, particularly for jobs like business and administration professionals or general clerks. Compared to its European peers, potential job displacement in the public sector is higher than in other Nordics, but lower than in the rest of Europe.

Figure 4. Sectoral Differences

Exposure and Complementarity to AI by Broad Sectors

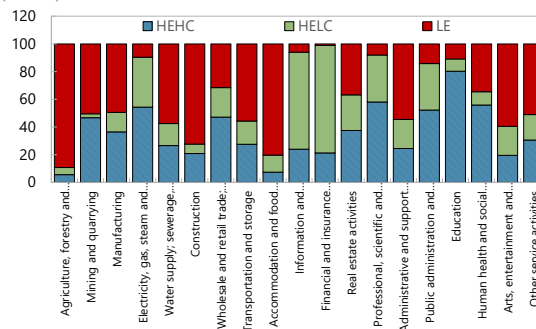
(Percent)



Sources: Eurostat; and IMF staff estimates.

Exposure and Complementarity to AI by Sector

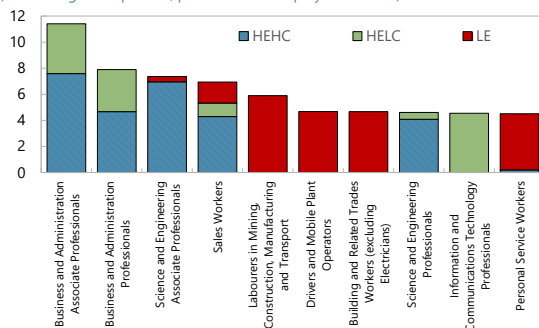
(Percent)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Private Sector - Employment Exposure and Compl. to AI

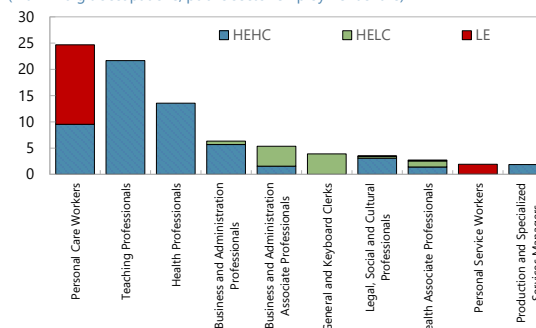
(Main 2-digit occupations, private sector employment share)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Public Sector - Employment Exposure and Compl. to AI

(Main 2-digit occupations, public sector employment share)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

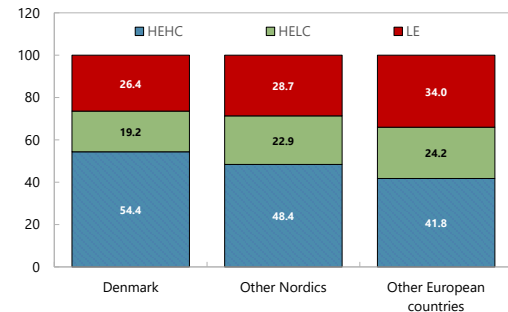
10. Women, highly educated workers, high-income earners, and natives are expected to significantly benefit from AI.

- Nearly 75 percent of the female workforce is highly exposed to AI, but a substantial majority are in jobs with high complementarity, largely due to women's predominance in education or healthcare. Furthermore, women in Denmark are expected to gain more from AI adoption compared those in other European countries. In contrast, over 50 percent of the male workforce has low exposure to AI, which is higher than in other European countries, as men are more likely to work in roles such as laborers or drivers.
- Highly-educated workers and high-income earners are anticipated to benefit the most from AI technologies, although an estimated 20 and 25 percent of high-educated and high-income workers, respectively, could be at risk of job displacement—in contrast, the risk of job displacement for low-educated workers and low-income earners is low.
- The impact of AI is not expected to differ significantly across age groups. Finally, natives are anticipated to benefit more than immigrants, as immigrants tend to occupy jobs with low exposure to AI.

Figure 5. Gender Differences

Exposure and Complementarity to AI for Women

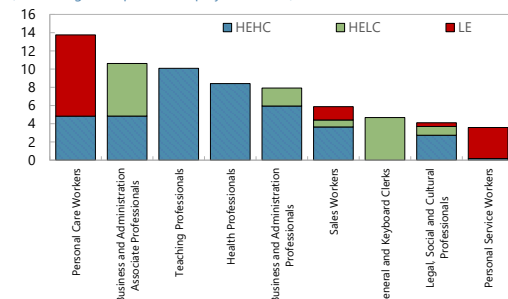
(Percent)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Main Occupations for Women

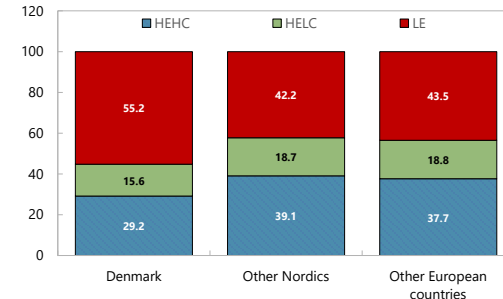
(Main 2-digit occupations, employment share)



Sources: Eurostat; and IMF staff estimates.

Exposure and Complementarity to AI for Men

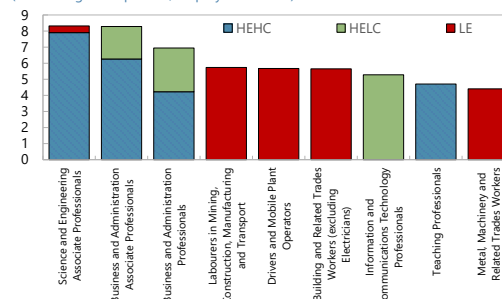
(Percent)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Main Occupations for Men

(Main 2-digit occupations, employment share)

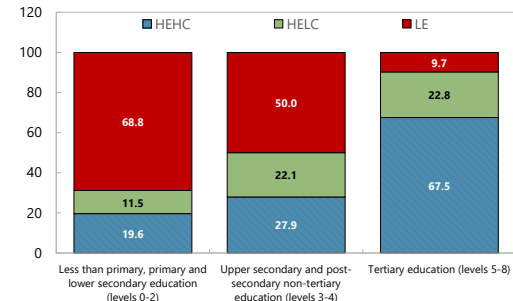


Sources: Eurostat; and IMF staff estimates.

Figure 6. Education, Income, and Age

Education - Employment Exposure and Compl. to AI

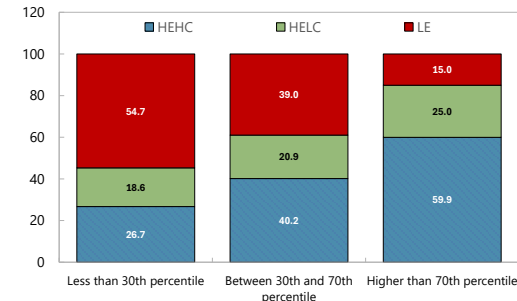
(Percent)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Income - Employment Exposure and Compl. to AI

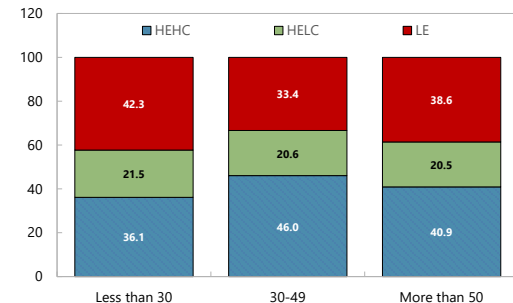
(Percent)



Sources: Eurostat Labor Survey; and IMF staff estimates.

Age - Employment Exposure and Compl. to AI

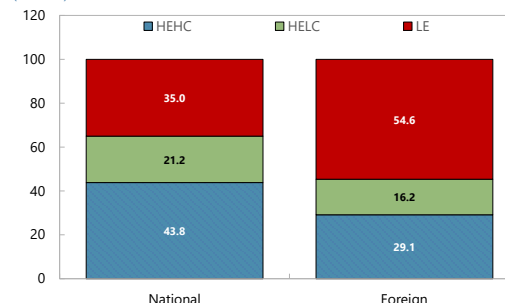
(Percent)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Immigrant - Employment Exposure and Compl. to AI

(Percent)



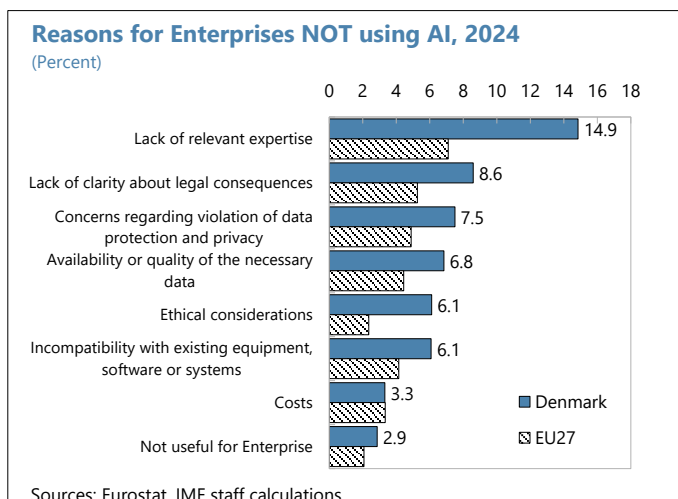
Sources: Eurostat Labor Force Survey; and IMF staff estimates.

D. Conclusions and Policy Considerations

11. Denmark is well-prepared to reap the benefits of AI. Denmark is digitally equipped to harness the potential of AI. Its digital infrastructure is advanced, AI usage in companies is high, and Danes have strong digital skills. Compared to other European countries, Denmark has a higher share of workers with high-complementarity occupations and a lower share of low-exposed workers. Nevertheless, Denmark faces similar vulnerabilities as other European nations regarding adverse labor market impacts, with approximately one-fifth of its workforce at risk of job displacement.

12. AI represents an opportunity to free up resources in the public sector. While private sector workers are expected to be the most affected by AI, 13 percent of public sector employees hold low-complementarity positions. Given the anticipated labor supply shortages, in particular for health and personal care professionals, this presents an opportunity for efficiency gains in public administration. Therefore, accelerating the adoption of AI in the public sector is essential to free up resources, reduce administrative costs, and enhance public services. In this regard, the authorities should continue reviewing the legal and technical barriers to AI adoption, while ensuring sound ethical principles.

13. While Denmark's flexicurity model effectively facilitates labor reallocation across sectors, the impact of digital technologies on labor markets should be closely monitored. The combination of labor market flexibility, strong social security measures, active training programs, and a highly educated workforce makes Denmark resilient to the challenges posed by AI adoption. Nevertheless, the unprecedented rapid adoption of AI may lead to faster- and larger-than-expected job displacement. In addition, a lack of relevant skills is identified as an important reason for which companies are not using AI. Therefore, efforts should continue to increase the supply of workers with relevant skills. In this context, the new reform in general school education aimed at strengthening digital literacy at school, including AI, is welcome. Furthermore, as AI technologies continue to evolve rapidly, it is equally important for high-complementarity workers to keep their digital skills up to date.



14. Supporting the adoption the AI technologies in the private sector, especially in SMEs, is necessary to fully harness the benefits of AI. The authorities have launched an initiative, *SME:Digital*, aimed at assisting SMEs in digitally enhancing their operations. The program offers grants for private consulting to assess the potential of digitalization, identify suitable solution

providers, and support implementation.⁸ This initiative is commendable. In addition, Danish companies often encounter complex regulations and administrative burdens, often at the EU level, when implementing new technologies, which could hinder AI adoption. Therefore, it is essential to ensure a clear and updated legal framework while seeking the scope to ease regulatory burdens.

⁸ See [SME:Digital](#).

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Annex I. Measuring Exposure and Complementarity to AI

1. **Measuring Exposure to AI.** Felten et al. (2021) develop a measure of occupational exposure to AI, linking 10 applications of AI (e.g., image recognition, text creation) to 52 occupational abilities (e.g., oral comprehension, inductive reasoning), using U.S. occupational characteristics from the O*NET database. Each occupation can be seen as a combination of the 52 abilities, weighted by the degree of importance and complexity of such skills in each job.
2. **Measuring complementary to AI.** Pizzinelli et al. (2023) develop an index of complementarity by using two additional dimensions from the O*NET database: ‘work contexts’ and ‘job zones.’ They identify 11 contexts relevant work contexts for AI, which they group, together with the job zones, into six components: communication, responsibility, physical conditions, criticality, routine, and skills. This framework helps to determine how AI can complement or substitute specific occupations.
3. **Bringing exposure and complementary together conceptually.** The measures of exposure and complementarity can conceptually be thought of as a matrix of three dimensions: ‘High Exposure and High Complementarity’ (HEHC), ‘High Exposure and Low Complementarity’ (HELC), ‘Low Exposure’ (LE), using the medians across all exposure and complementarity values as thresholds. The measure of High Exposure and Low Complementarity can be interpreted as occupations which are at higher risk of job displacement.

Annex II. Employment by Occupation and by Sector

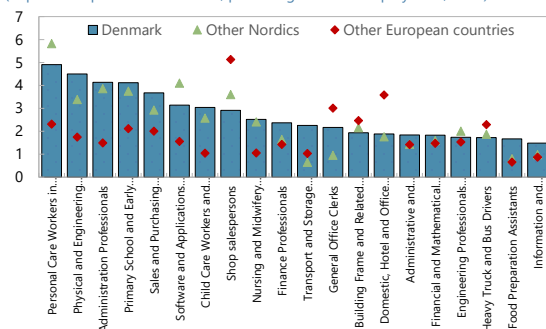
1. The public sector accounts for a significant share of employment in Denmark.

Approximately 1/3 of Danish employees work in the public sector, namely in public administration (6 percent of total employment), education (9 percent), and healthcare (19 percent). The share of workers in the health sector is higher than in other European countries, including the Nordics. This trend is reflected in the types of jobs held by workers, with many Danish employees serving as personal care workers, primary school teachers, or childcare workers. Manufacturing is another important sector, representing 12 percent of total employment, with physical and engineering science technicians being Denmark's second-largest occupation. Lastly, administrative professionals, who work in both the private and public sectors, constitute a significant share of the workforce.

Annex II. Figure 1. Employment by Occupation and by Sector

Main Occupations in Denmark

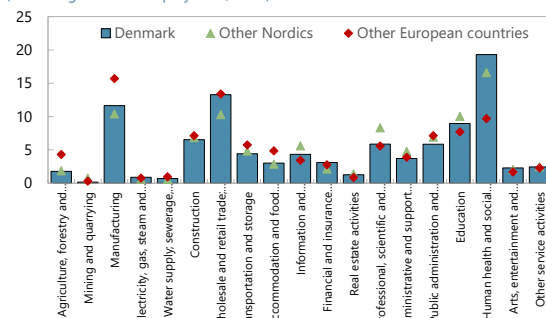
(Top 20 occupations in Denmark, percentage of total employment, 2023)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.

Employment by Sector

(Percentage of total employment, 2023)



Sources: Eurostat Labor Force Survey; and IMF staff estimates.