Parthenon

The impact of GenAI on the labor market

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17 minute read
14 Feb 2024

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Economic impact of AI: This EY-Parthenon macroeconomic article series provides insights on the economic potential of GenAI and actionable considerations. **Discover more**.

> "GenAI in this early stage is boosting productivity, but the use cases are expansive. It has the potential to spur new business models that will give rise to new products, new ways to engage customers and new ways to get these products in the hands of these customers. As has been the case in the past, transformative business models require both different and new ways of working."

Dr. Khalid A. Khan
EY Americas Strategy and Transactions AI Leader

Technological progress has long sparked fears of machines making human labor redundant. Throughout history, technology has transformed work, replacing some jobs while creating new ones, yet widespread unemployment due to technology has not materialized.

The rapid development of generative artificial intelligence (GenAI), capable of automating tasks across various industries, has reignited these concerns. However, as we illustrated in the **first article** of our

series, employment levels have consistently risen over the last century, as new technologies often create more jobs than they eliminate.

What will the impact of GenAI on the labor market entail? Indeed, technological innovation affects labor via:

- Job creation, where emerging technologies can seed new roles and job opportunities
- Job displacement, where some jobs or functions become obsolete due to automation
- Job transformation, where the nature of a function or task is augmented

Four key findings of GenAI's potential impact on the labor market

1. Ubiquitous impact: We believe the GenAI labor transformation will be universal in that it will affect nearly all functions over the coming decade, but the degree to which functions will be affected will vary greatly across sectors and geographies. Across the US, 66% of employment (or the equivalent of 104 million jobs) is highly or moderately exposed to GenAI. The remaining 34% of occupations has low AI-exposure but will likely still be affected by AI via some secondary tasks. Globally, we find that 59% of occupations have a high to moderate exposure, with 67% in advanced economies and 57% in emerging markets.

2. Plenty of skills in the game: GenAI's ability to perform complex cognitive tasks means that AI taking over and rendering low-skilled jobs obsolete will most likely turn

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out to be a myth, and advanced economies may initially see a greater labor augmentation potential. Mathematical and programming skills have the highest GenAI exposure scores, while active listening and learning have the lowest, as these are tasks involving complex human interaction, creativity and emotional understanding.

3. Sector exposure varies: Engineering, life sciences, computer and mathematical, and legal sectors are the most highly exposed to GenAI, while the social, education, food services and personal care services sectors are least exposed. GenAI is transforming the workforce by enabling workers to delegate routine, data-heavy tasks to GenAI.

4. More money, more exposure: Higher AI exposure scores are generally correlated with occupations generating higher wages, but the widespread diffusion of functions across sectors means the relation is nuanced.

To jump to a specific chapter, click one of the links below:

- **Chapter 1: AI job augmentation potential: ubiquitous but heterogenous**
- **Chapter 2: Plenty of skills in the game across sectors**
- **Chapter 3: AI's influence across wage brackets**
- **Chapter 4: Business implications of AI integration**

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Chapter 1

AI job augmentation potential: ubiquitous but heterogenous

Research shows most US jobs could have moderate to high exposure to AI, with high or very high augmentation for roughly a third of those.

To estimate the potential impact of GenAI across occupations, we leveraged research from Michael Webb at Stanford.1 The analysis uses a verb-noun pairing framework covering over 800 occupations and their task descriptions from O*NET. Using the description of each occupation, the approach consists of isolating the verb-noun pairs that best describe the different job tasks along with the frequency and importance of each task.

The verb-noun pairs are then compared to patents filed for AI technology, including patent titles, descriptions and abstracts, to see how exposed they are to AI. The sum product of each task's exposure score and the frequency of tasks in every occupation is then used to

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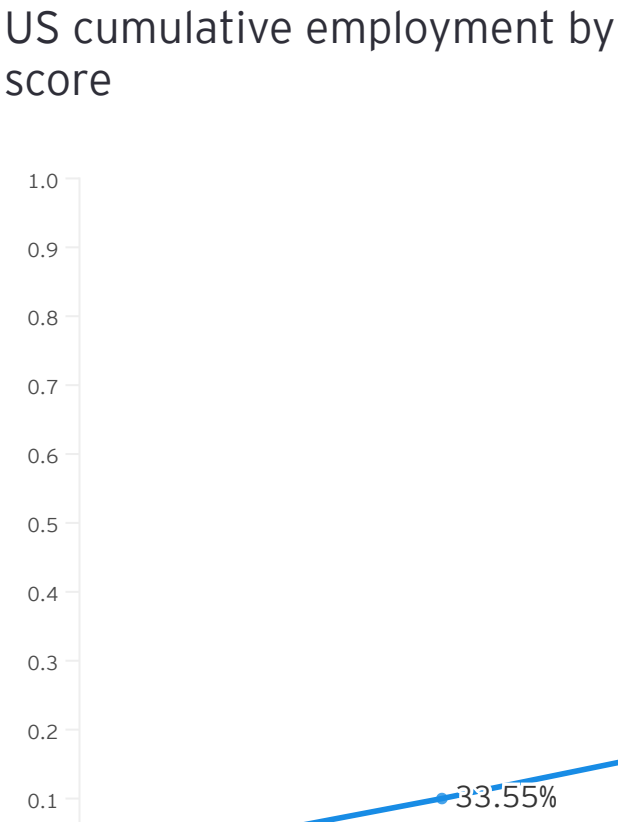
estimate an aggregate raw AI impact score per occupation. These are then normalized to a 0 to 1 scale. Using the Bureau of Labor Statistics data, we then regrouped these 800 occupations' scores into 94 minor occupational subcategories, 22 major occupational subcategories, and 20 sectoral and industry groupings.

For example, the role of an agricultural technician includes a task for "developing soil sampling grids," which has an associated verb-noun pair of "develop grid" representing 5% of an agricultural technicians' functions. In turn, the verb-noun pair represents 0.05% of verb-noun pairs found in AI patent titles, descriptions and abstracts. The sum-product of all verb-noun pairs describing the agricultural technicians' functions and their individual tasks' AI exposure yields the raw AI augmentation score.

Our findings are quite striking, with 66% of US employment with moderate to high GenAI exposure, or the equivalent of 104 million jobs across the country (Chart 1). Within those, roughly 18% of total employment, or 28 million jobs, would have a high AI augmentation score, and 5% of employment, or 8 million jobs, would have a very high augmentation score. Importantly, the remaining 34%, which have the lowest AI-exposure score, could still be marginally affected by AI via some secondary tasks.

Chart 1: US cumulative employment by rescaled AI augmentation score



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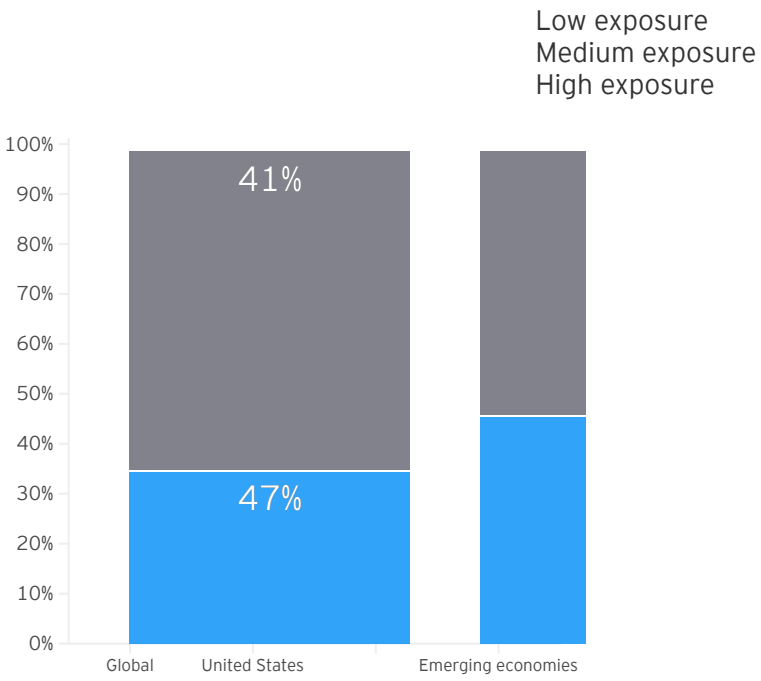
Using the International Labor Organization's International Standard Industrial Classification of all economic activities, we then applied the raw AI augmentation scores across industries in 80 economies worldwide. We assumed that in emerging markets the agriculture, forestry and fishing sector had a low AI exposure score. Our findings show that globally about 59% of the workforce is highly or moderately exposed to GenAI, with 67% in developed economies and 57% across emerging economies.

Chart 2: Share of employment by AI augmentation score

Share of employment by AI augmentation score



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Chapter 2

Plenty of skills in the game across sectors

With GenAI improving efficiency and accuracy, workers can transform their roles by focusing on what humans do best.

Departing from the low-skill obsolescence myth

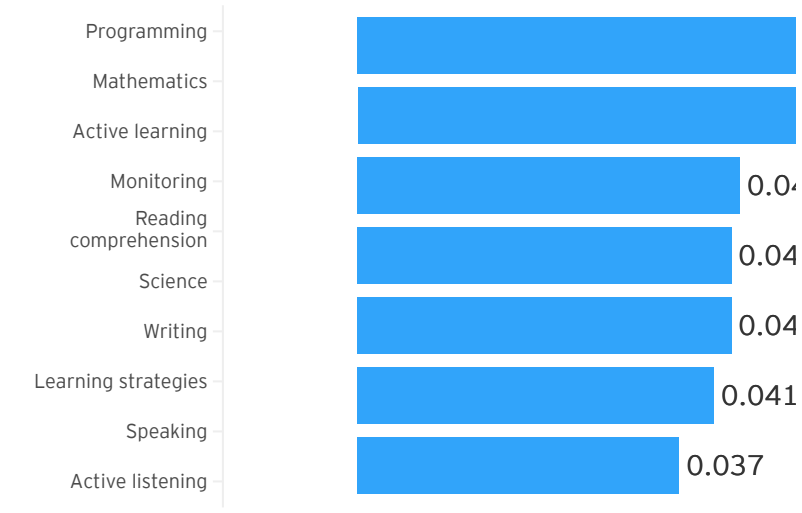
The role of GenAI in augmenting human skills varies significantly across different domains, reflecting the diverse capabilities and limitations of AI technologies. Unsurprisingly, looking at a subset of 10 human skills, we find that programming and mathematics present the highest correlation with our GenAI augmentation score, while active listening and speaking rank the lowest (Chart 3).

GenAI's ability to automate coding tasks, such as debugging and writing simple code, enhances productivity and allows programmers to concentrate on complex, creative aspects of software development. Similarly, in mathematics, AI excels in performing complex

calculations quickly and accurately, proving invaluable in data-intensive tasks.

Conversely, areas such as learning strategies, speaking and active listening exhibit lower AI augmentation scores. While AI can support learning and communication processes, it still requires significant human input and oversight, particularly in tasks involving complex human interaction, creativity and emotional understanding. These scores underline the ongoing potential of AI technologies and their varying degrees of impact across the skills spectrum.

Chart 3: Regression coefficients of labor skills contributing to AI augmentation scores



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AI exposure scores vary greatly across sectors

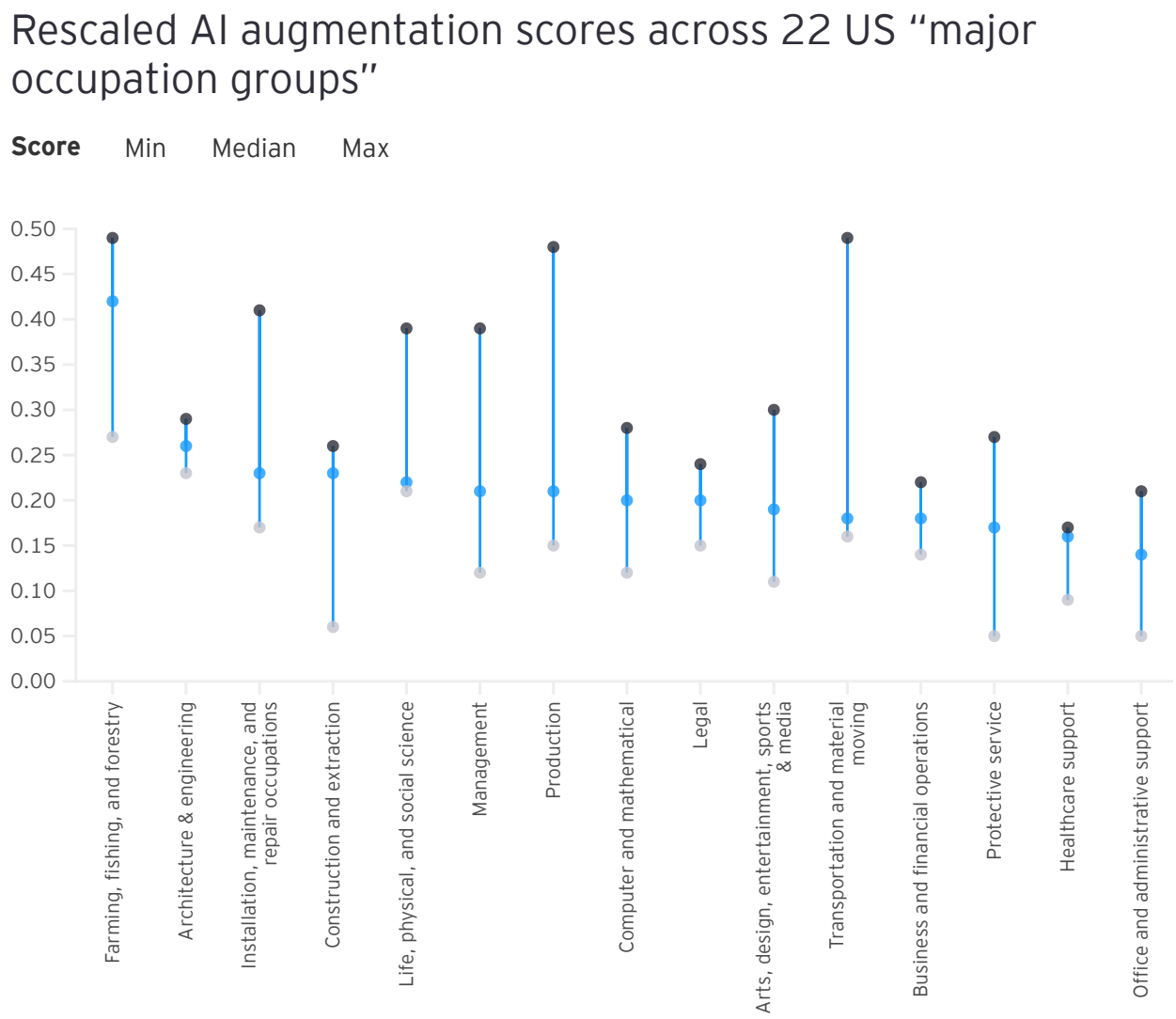
Rather than replacing human workers, GenAI will serve as a powerful tool to augment and evolve roles, enhancing the productivity and capabilities of employees across various sectors. In our second and third articles of our "Economic impact of AI" series, we showed that the **capital investment** and **productivity benefits** from AI could be significant: totaling between $1 trillion and $2 trillion in additional gross domestic output (GDP) over the next decade in the US, and between $2 trillion and $3.5 trillion in additional global output.

At the micro level, we used the US Bureau of Labor Statistics (BLS) occupational hierarchy data to categorize 800 occupations into 22 different major occupational groupings (Chart 4). We found that GenAI is transforming the workforce by enabling workers to delegate routine, data-heavy tasks to GenAI systems, thereby enhancing their focus on areas where human skills like strategic thinking, empathy and creativity are paramount. This evolution signifies an elevation and enrichment of human intervention.

For roles that involve repetitive, data-intensive tasks, such as scheduling, reviewing, designing, inspecting, debugging and coding, GenAI could have a significant impact. By automating these processes, AI enables workers to focus on more complex, strategic aspects of their roles. For example, in plant and system operations, AI can monitor system status and operational data, automating routine tasks and allowing human operators to concentrate on critical decision-making and problem-solving. This shift not only improves efficiency and

accuracy but also allows workers to upskill and engage in more fulfilling and intellectually stimulating tasks.

Chart 4: Median, max and min rescaled AI augmentation scores across 22 US “major occupation groups”



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On the other hand, roles that require a high degree of human interaction, empathy, creativity and judgment are less likely to be impacted by GenAI at first. Tasks that involve management oversight,

strategic decision-making, interpersonal care, emotional perception and relationship building remain predominantly human-driven. For instance, in education, while GenAI can assist in creating and organizing teaching materials, the “personal touch” of teachers remains irreplaceable. Teachers and instructors tailor their teaching to individual student styles and needs, drive classroom engagement and provide the emotional and empathetic support that GenAI is less adapted to do. Similarly, functions in health care could benefit from the augmentation of GenAI, which can handle administrative or analytical tasks, allowing professionals more time and energy to focus on the high-value, human-centric aspects of their work.

Most and least exposed occupations

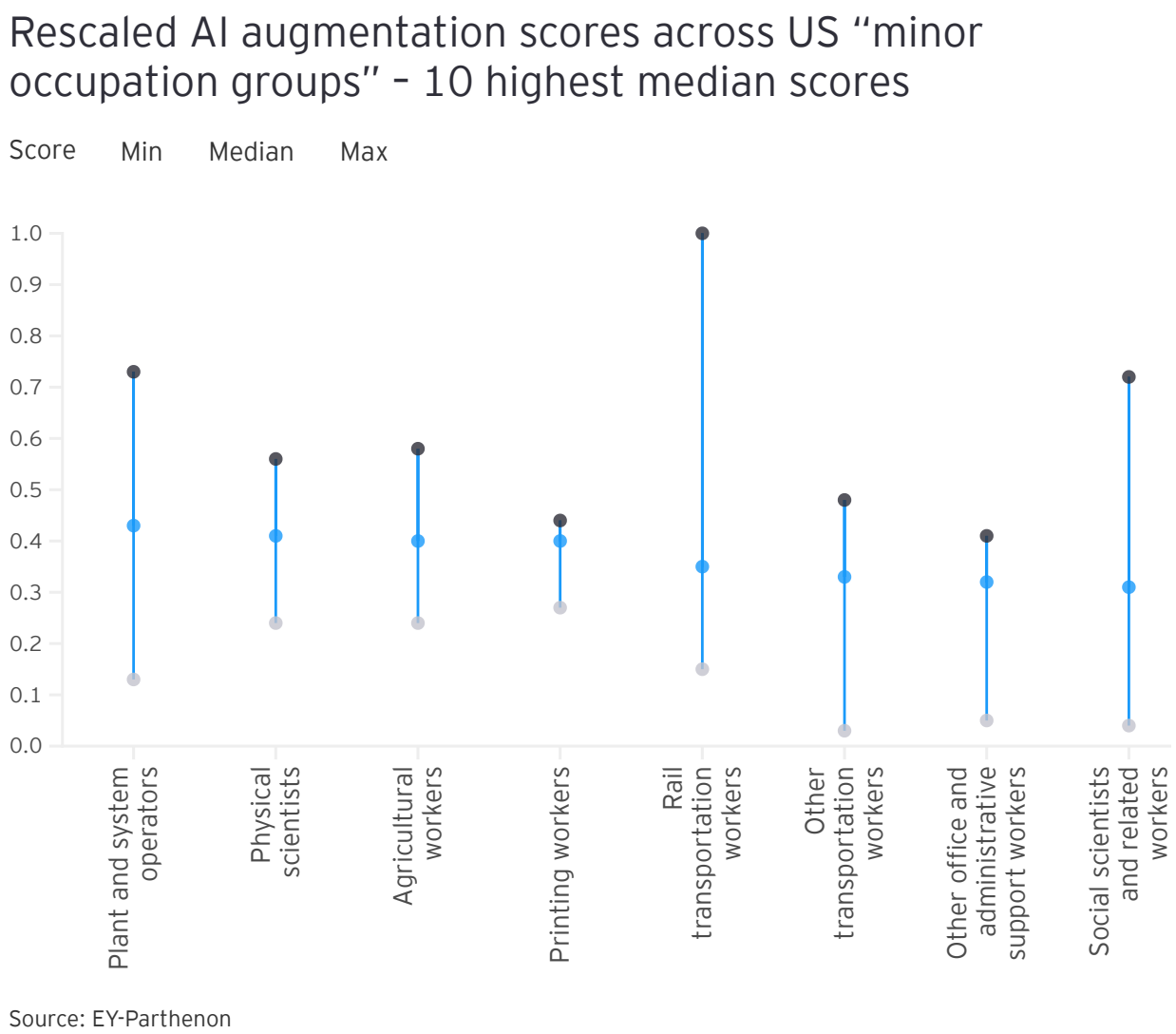
The breakdown across sectors shows that major industries with limited differences in AI augmentation scores can still display a wide range in the augmentation scores across sub-occupations. This is more evident when looking at the top and bottom 10 occupations among the more detailed categorization of 94 minor occupation groups (Chart 5 and Chart 6).

Looking at the top 10 occupations with the highest AI augmentation scores, professions like plant and system operators, physical scientists, agricultural workers, drafters, programmers, engineers, and architects involve a high degree of repetitive and data-driven tasks that AI can automate. These include data analysis and monitoring, operations scheduling, document review, design work, and safety inspection processes.

Although these occupations are significantly exposed to AI, total automation is unlikely as workers remain indispensable for overseeing

processes, strategic decision-making and tasks requiring nuanced judgment. Indeed, the wide dispersion of AI augmentation scores for the top 10 of the 94 minor occupations group illustrates the importance of human intervention.

Chart 5: Median, max and min rescaled AI augmentation scores across US “minor occupation groups” – ten highest median scores



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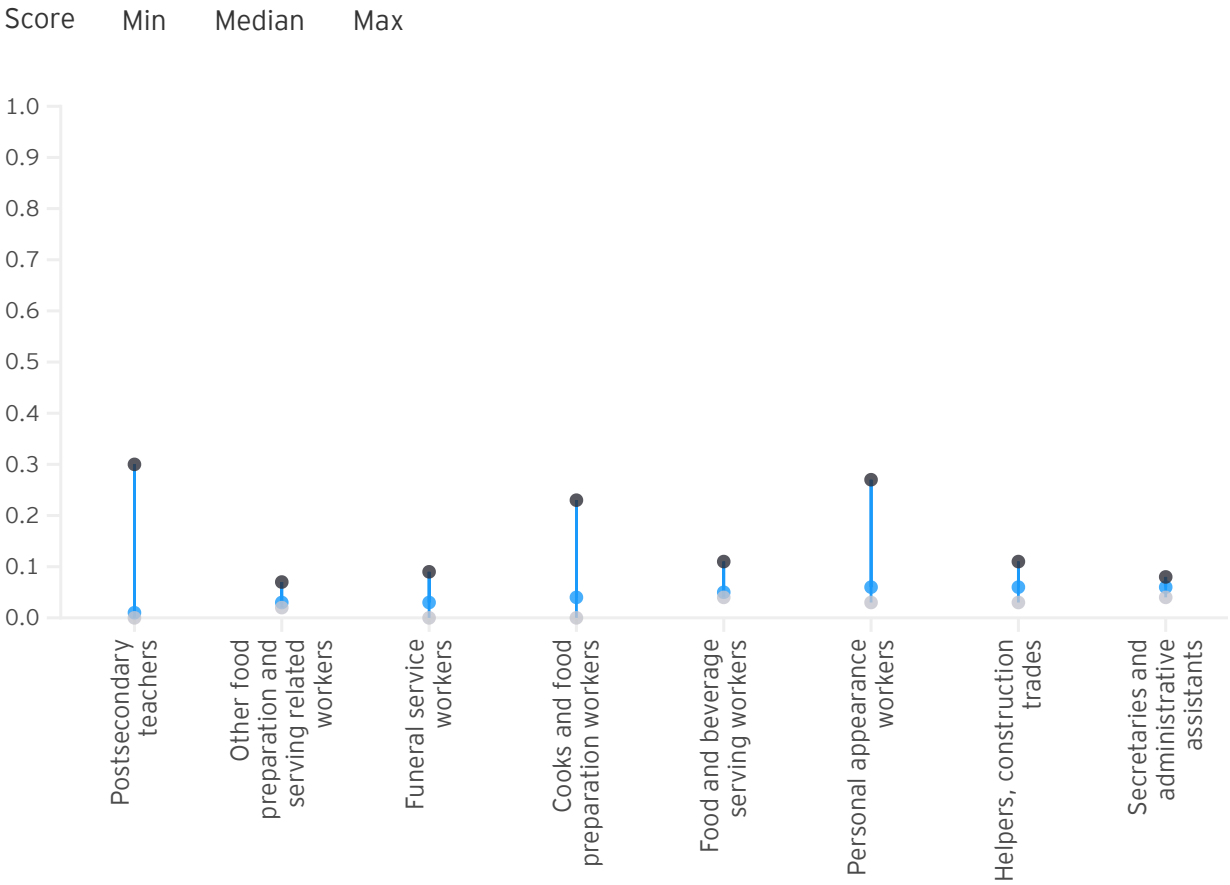
The 10 minor occupations with the lowest AI augmentation scores (Chart 6) have the highest intrinsic human elements needed for their functions. For example, roles like postsecondary teachers require human interaction and ability to customize learning. Occupations such as health care practitioners demand personalized care and critical decisions that AI currently can't provide. Roles such as cooks and firefighters necessitate precise physical intervention and high-stakes decision-making in unpredictable situations. Other roles, like sales representatives and administrative assistants, require relationship building and human judgment. Consequently, these roles, which require human interaction, decision-making, physical intervention and personalization, face lower risk from AI exposure at first.

Still, as is the case for major occupations with high AI exposure scores, there is wide dispersion across the low-AI-exposure occupations. Even occupations that require human interaction have some sub-functions that can be augmented via GenAI. Think of grading or course material preparation for a teacher, or prevention, monitoring and early risk detection for firefighters, or even email programming for sales representatives.

Chart 6: Median, max and min rescaled AI augmentation scores across US "minor occupation groups" – ten lowest median scores

Rescaled AI augmentation scores across US “minor occupation groups” – 10 lowest median scores



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Chapter 3

AI's influence across wage brackets

Do jobs that necessitate more advanced skills and pay larger salaries have higher exposure to AI?

The relationship between GenAI exposure and wage levels in various occupations appears to exhibit a slight positive correlation, albeit with some nuances. An analysis of the 20 major industry sectors based on two-digit North American Industry Classification System (NAICS) structure and their respective average wages shows that higher AI exposure scores are generally correlated with higher wages (Chart 7 and Chart 8).

Sectors such as information; finance and insurance; utilities; and professional, scientific and technical services report higher yearly wages (in the range of $85,000 to $92,000) and show slightly higher AI exposure scores. This could suggest that sectors requiring more advanced skills and therefore having higher salaries have greater exposure to AI. On the other hand, sectors like retail trade, accommodation and food services, and arts and entertainment report

lower yearly wages (in the range of $35,000 to $50,000) and are associated with lower GenAI exposure scores.

Still, it's important to stress the widespread diffusion of occupations across these major sector groupings both in terms of AI exposure and salaries. Health care is a prime example where both high-skill/high-salary functions and low-skill/low-salary functions have high AI exposure. For instance, a radiologist (higher skill/higher salary) is highly exposed to AI for detection and diagnostics, just like a nurse (lower skill/lower salary) is for administrative tasks.

Chart 7: US annual wages and occupation share by AI augmentation score

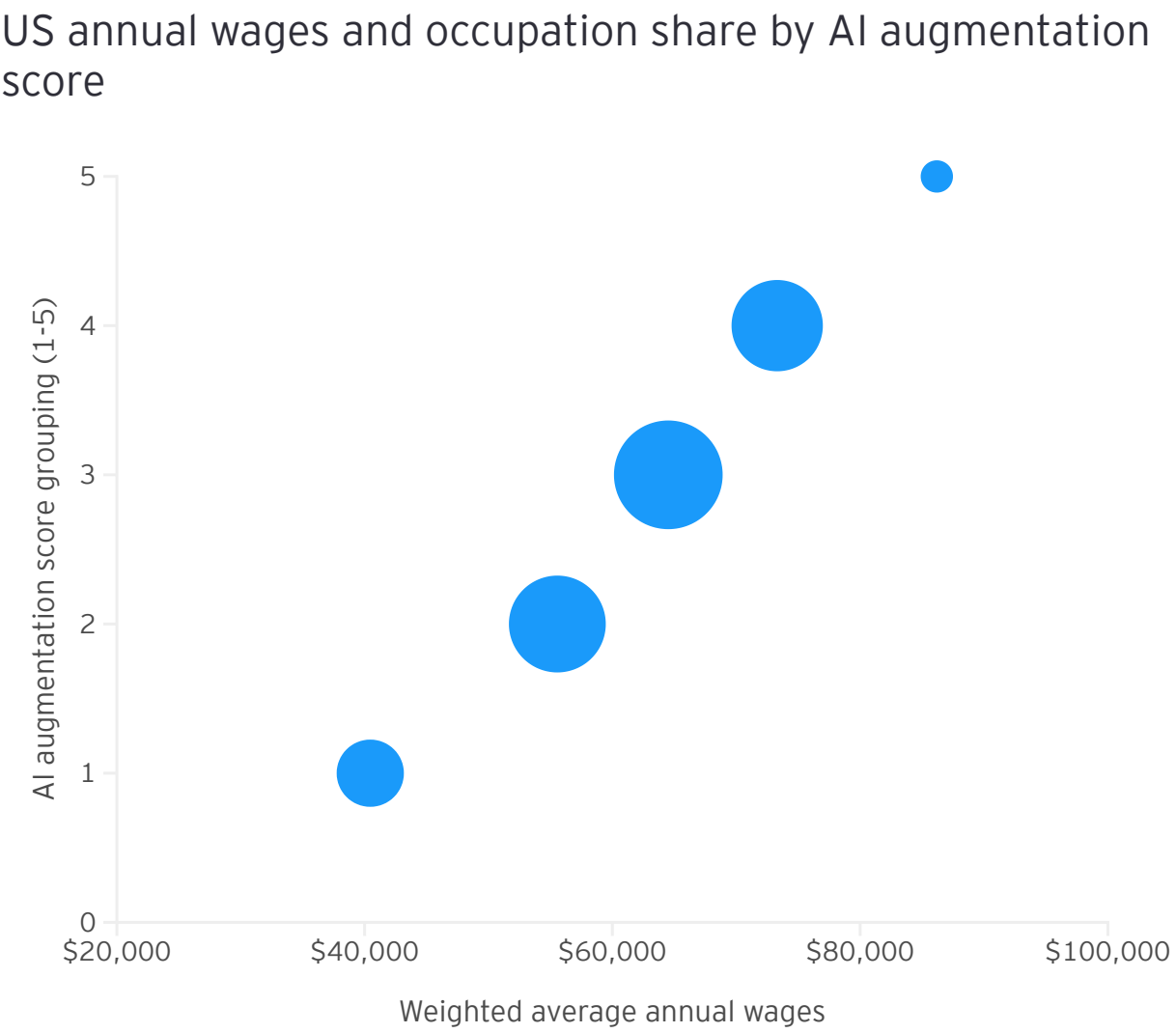

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Chart 8: US weighted average annual wages and rescaled AI augmentation by industry

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Chapter 4

Business implications of AI integration

Finally, we outline how to execute a customized GenAI strategy for long-term growth by following the guidance of two pillars.

Business leaders can effectively implement GenAI in a manner that not only aligns with their immediate operational needs but also positions their organizations at the forefront of technological advancement. Using a proactive approach helps ensure that AI serves as a catalyst for workforce enhancement, operational optimization and sustainable growth, preparing the organization for the challenges and opportunities of an AI-driven future.

Pillar 1: Developing a tailored AI utilization and deployment plan

- Understand labor composition and tasks: Initiate a detailed analysis of your workforce, mapping out the various roles and responsibilities across all departments. This granular understanding is vital for pinpointing areas where AI can bring

about transformative changes, help optimize operations and enhance task efficiency.

- Customize AI application: Recognize the diversity in AI applicability. AI deployment is not a one-size-fits-all solution; it varies drastically across different industries and even within the same business sector. A meticulously crafted AI strategy, therefore, should be rooted in a comprehensive understanding of your organization's specific workforce dynamics and how various AI tools can be leveraged to streamline and enhance these unique operational aspects.

- Focus on enhancement, not replacement: Aim to integrate AI in a way that complements and elevates human work. The objective is to harness AI's capabilities to bolster job performance, allowing employees to shift their focus to aspects of their roles that necessitate human insight, creativity and decision-making.

Pillar 2: Developing and maintaining AI resources

- Strategic planning for AI evolution: Develop a forward-thinking strategy for the adoption and ongoing evolution of AI within your organization. This strategy should be agile, capable of adapting to rapid technological advancements, shifts in company operations and the evolving landscape of AI. It's about creating an ecosystem where AI and human intelligence coalesce to drive innovation and efficiency.

- Investment in resources and expertise: Commit to investing in the essential resources and knowledge required for effective AI integration. This commitment extends beyond financial

investment; it encompasses dedicating time and effort to developing and training AI models, procuring the latest software and hardware, and establishing a robust infrastructure. This infrastructure should include advanced computational power, as well as secure data centers and comprehensive support services, to help make sure that the AI experience is seamless.

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Summary

This is the fourth installment of the EY-Parthenon macroeconomic **article series on the economic impact of AI**. The series aims to provide insights on the economic potential of generative AI (GenAI), including new developments and actionable insights to arm companies' decision-makers. The fourth article in this series covers our four key findings regarding the use of GenAI and the potential impact of GenAI on the labor market.

About this article

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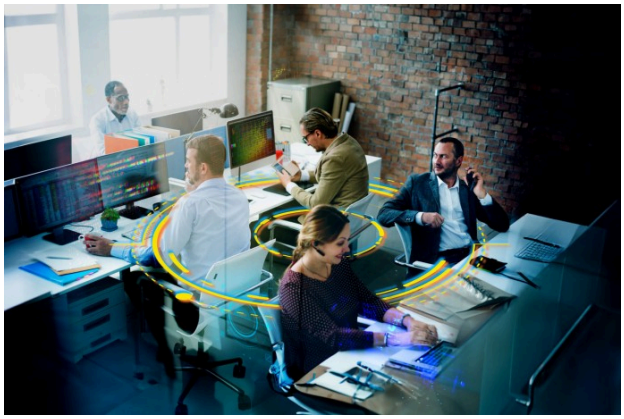

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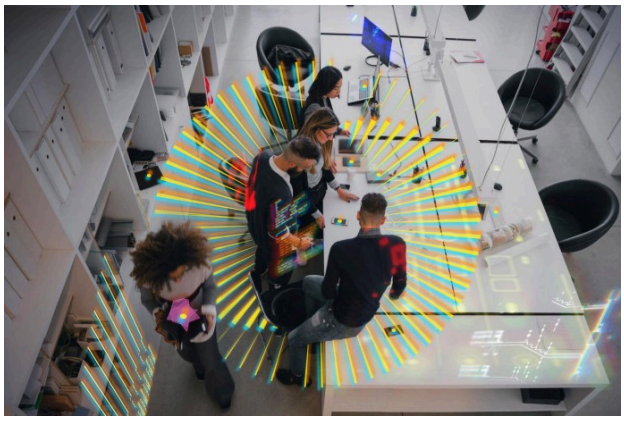

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