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GNPJE Special Issue on Economic Impacts of Generative AI

Wydanie specjalne GNPJE na temat ekonomicznych konsekwencji generatywnej AI

Abstract

This Special Issue of GNPJE features three empirical studies examining the economic impacts of contemporary generative artificial intelligence (GenAI) tools, such as chatbots and copilots, from a global perspective. Gmyrek et al. [2025] quantify the potential effects of GenAI on global employment. Venturini [2025] estimates the impact of GenAI innovation on economic growth across a panel of countries. Parteka [2025] investigates automation technologies complementary to GenAI through the lens of international trade.

Keywords:
generative AI, technological progress, employment, economic growth, international trade

JEL classification codes:
J23, O33, O40

Streszczenie

W wydaniu specjalnym GNPJE opisano trzy badania empiryczne dotyczące globalnych konsekwencji gospodarczych wykorzystania współczesnych narzędzi generatywnej sztucznej inteligencji (GenAI), takich jak czatboty i copiloty. Gmyrek i in. [2025] kwantyfikują skalę potencjalnych efektów oddziaływania GenAI na zatrudnienie w ujęciu globalnym. Venturini [2025] szacuje wpływ innowacji w obszarze GenAI na wzrost gospodarczy w panelu krajów. Parteka [2025] patrzy natomiast na technologie automatyzacji, komplementarne względem GenAI, przez pryzmat handlu międzynarodowego.

Słowa kluczowe:
generatywna AI, postęp technologiczny, zatrudnienie, wzrost gospodarczy, handel międzynarodowy

Kody klasyfikacji JEL:
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Background: rapid progress in GenAI

Generative artificial intelligence (GenAI) is advancing at an unprecedented pace. In the near future, AI agents emerging from today's GenAI systems may revolutionise labour markets and drastically change the division of output between capital and labour. They are also expected to accelerate economic growth, and even disrupt democracies and the global order [see e.g. **Tegmark, 2017**; **Davidson, 2021**; **Korinek, Suh, 2024**]. However, such bold predictions have not materialised so far as they are based on forecasts of future AI capabilities that do not yet exist.

The defining exponential trend of the digital economy has been Moore's Law in its broad sense. Since the 1980s, "general-purpose computing capacity grew at an annual rate of 58%. The world's capacity for bidirectional telecommunication grew at 28% per year, closely followed by the increase in globally stored information (23%)" [**Hilbert and López, 2011**, p. 60]. Meanwhile, standardised computation costs have been declining by 53% annually since the 1940s [**Nordhaus, 2021**].

Over the past decade, the AI sector has been growing even faster than Moore's Law. Two trends stand out. First, an increasing share of global compute now consists of AI-specialised graphics processing units (GPUs) allocated to running AI models for both training and inference. The compute used to train large language models (LLMs) doubles roughly every six months [**Sevilla et al., 2022**], compared with a doubling time of about 1.5–2 years for general-purpose compute. Second, AI experiences rapid gains in algorithmic efficiency. While the average efficiency of computer algorithms in general has been improving steadily since the 1980s, at rates comparable to hardware growth [**Grace, 2013**; **Hernandez, Brown, 2020**], progress in AI has been even faster. Since 2012, LLMs "require 2x less compute roughly every eight months" [**Ho et al., 2024**, p. 5] to produce the same quality of output. At the same time, AI performance has been closely following *scaling laws*, with training loss functions predictably declining with model size (number of parameters) and training compute [**Branwen, 2022**].

In GenAI, quantity begets quality. As shown by progress in AI performance across a variety of benchmarks,[1] and historical evidence on early AI models utilising the deep learning methodology [**Tegmark, 2017**], scaling laws translate into extremely rapid growth in frontier AI capabilities. Since the public launch of OpenAI's ChatGPT on November 30, 2022, GenAI models have come a long way—from simple language models accessible through a chat interface to multimodal models capable of mathematical and logical reasoning, coding across multiple programming languages, generating high-quality video content, and conducting sophisticated web searches. Recent models have also been endowed with long context memory and—with applications such as DeepResearch—demonstrated early forms of agentic capability.

GenAI and the economy: a forecaster's dilemma

We are now confronted with a reality in which frontier AI capabilities are advancing at extraordinary speed, yet adoption, integration into workflows, and even the statistical measurement of their aggregate economic effects lag behind. This produces an apparent paradox—a "clash of expectations and statistics" [**Brynjolfsson et al., 2019**] —that makes predicting AI's economic impacts particularly challenging. As a result, commentators—technologists and economists alike—are strongly divided. Some base their forecasts solely on existing AI capabilities, while others predict future capabilities expected to emerge as the observed scaling laws as extrapolated. The former camp is able to pursue empirical research firmly grounded in available data, but risks being backward-looking, falling for conservatism bias and underestimating the impacts of the unfolding technological revolution. The latter camp avoids these pitfalls, but only at the cost of being speculative and potentially falling for exaggerated expectations, hype, and utopian or dystopian thinking.

1 https://ourworldindata.org/grapher/test-scores-ai-capabilities-relative-human-performance (accessed on 14.04.2025).

When future progress in AI capabilities is not considered, only modest effects of AI adoption on productivity and employment can be identified [see, e.g., **Acemoglu, 2025**]. In effect, declining global population growth and the evidence that research ideas may be becoming harder to find [**Bloom et al., 2020**] suggest a trajectory of secular stagnation in economic growth throughout the 21st century [**OECD, 2025**]. By contrast, extrapolating from the explosive growth of frontier AI capabilities yields radically different forecasts: the arrival of human-level AI as early as 2027 [**Kokotajlo et al., 2025**], GDP growth rates of the order of 30% annually in the following decade [**Davidson, 2021**], or even a "technological singularity" in the 2040s [**Kurzweil, 2005**; **Roodman, 2020**].

Of particular importance is the potential emergence of highly agentic artificial general intelligence (AGI), or transformative AI, capable of superhuman performance across all essential and economically valuable tasks [**Korinek, Suh, 2024**]. Such systems could fully automate production and R&D [**Growiec, 2022**], and further elevate their own capabilities through a cascade of recursive self-improvements [**Davidson, 2023**]. AGI could accelerate global economic growth to rates comparable with Moore's Law [**Growiec, 2023**], but might also seize control of key global decision-making processes and pose an existential threat to humanity [**Jones, 2024**; **Growiec, Prettner, 2025**]. The more aggressive forecasts expect AGI to arrive within years or decades: if not by 2027 [**Kokotajlo et al., 2025**], then by 2032[2] or 2047 [**Grace et al., 2024**]. By contrast, more conservative empirical research tends to defer such transformative changes beyond the forecasting horizon [**Filippucci et al., 2024**; **Acemoglu, 2025**].

Past GNPJE articles on the economic impacts of AI

The GNPJE has recently published two research papers on the economic impacts of AI. In **Growiec [2023]**, I argued—based on a theoretical model—that the key channel through which transformative AI could affect labour markets and long-term economic growth prospects is the full automation of production. Full automation is disruptive because it renders human labour inessential for production. In effect, growth would no longer be bottlenecked by the scarce supply of effective human labour, particularly cognitive work. Instead, balanced growth could be sustained solely by the accumulation of AI-capable digital compute, robots, and other programmable or numerically controllable machines. Growth could be further strengthened by the application of advanced AI in R&D. On the flipside, the expected inessentiality of human labour poses fundamental societal challenges, including widespread technological unemployment, a steep decline in labour's share of output, and the erosion of wages as a key distributive device.

In turn, the discussion paper by **Sharma et al. [2024]** explored the ramifications of AI-driven technological singularity and its economic implications. Referring to **Tegmark's [2017]** scenarios of human life in a world with AGI and **Giddens' [1995]** structuration theory, applied here to highlight the prominent role of AI-based "authoritative resources," the authors put forward a positive vision of a techno-utopian society. Assuming that future AGI aligns perfectly with long-run human flourishing, they argued that achieving such a technological utopia essentially becomes a mechanism design problem.

In contrast to these two theoretical, forward-looking contributions, the three studies featured in this Special Issue are firmly empirical and grounded in global data on GenAI technologies that already exist. They provide robust estimates of the economic impacts of generative AI from a global perspective. However, while these studies offer reliable accounts of past effects, they are not forward-looking. By keeping AI capabilities fixed at their current (or already somewhat historical) level and avoiding speculation about the future path of AI development—through the "clash of expectations and statistics" [**Brynjolfsson et al., 2019**] —they are bound to obtain relatively modest effects. By design, these three studies do not anticipate the possible shift from labour augmentation to automation, from AI as a complement to AI as a substitute for human cognitive work, or from AI tools to AI agents.

2 https://www.metaculus.com/questions/5121/date-of-artificial-general-intelligence/ (accessed on 15.04.2025).

Introducing the GNPJE Special Issue on the economic impacts of generative AI

The three papers included in this Special Issue are written by established scholars with strong research records. They explore the economic impacts of GenAI and related technologies through the lens of employment, economic growth, and international trade.

Gmyrek et al. [2025] focus on the potential effects of GenAI on global employment. Building on detailed task-level data and employing a novel identification technique that uses application programming interface (API) calls to a GenAI model, they carefully estimate the exposure of ISCO-08 occupations to present-day GenAI tools such as chatbots and copilots. They find that only clerical jobs are highly exposed, with 82% of clerical tasks affected at an above-average level. They argue that most of the GenAI effects will play out as labour augmentation rather than direct replacement. Their estimates are disaggregated by job category, country income group (low-, lower-middle-, upper-middle-, and high-income), and gender. The headline figures suggest that about 2.3% of global employment (75 million jobs) could be directly automated with GenAI, while about 13% of employment (427 million jobs) is expected to be augmented. GenAI automation is more likely in high-income countries (5.5% of jobs) than in low-income countries (only 0.4% of jobs), and among women compared to men. Augmentation, in turn, is found to be more uniform across country income levels, and concentrated in male-dominated jobs.

Venturini [2025] investigates the impact of GenAI innovation on economic growth. Using highly disaggregated data on patents filed with the US Patent and Trademark Office (USPTO) from 1990 to 2022 across a global sample of countries, he provides the first empirical evidence on whether innovation in GenAI (and AI more broadly) fosters growth. Based on a binary indicator of nonzero GenAI patenting, he identifies a modest growth premium of about 0.02 percentage points over a decade. Using exact patent counts, he calculates a year-on-year growth contribution of about 0.01 p.p. As the author himself acknowledges, these estimates are conservative. This is not surprising given that the bulk of GenAI's growth impact may come not from patented innovation, but from widespread adoption and integration of GenAI tools in corporate workflows. Due to the non-rival, informational nature of AI algorithms, these effects may easily outpace those from AI innovation.

Parteka [2025] analyses trade specialisation in products embedding automation technologies, such as "industrial robots, dedicated machinery, numerically controlled machines, and several other automated intermediate goods." These technologies can be viewed as complementary to GenAI and, in the future, as a potential deployment channel for AGI, which could remotely control such machines to perform physical tasks in the real world. Using highly disaggregated trade data, **Parteka [2025]** shows that these products account for a small and declining proportion of global exports (<1% in low-income countries; 2.5% in high-income countries). Against this downward trend, some converging economies, such as China and Poland, have increased their export shares of products embedding automation technologies over the past two decades. She further finds that automation-related exports, unlike hi-tech trade in the broad sense, have so far played an insignificant role in economic convergence.

On behalf of the entire GNPJE Editorial Board and myself, I am pleased to invite you to explore the three excellent articles featured in this Special Issue on the economic impacts of generative AI.

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