Artificial Intelligence and the Great Divergence

The Council of Economic Advisers

January 2026

1 Introduction

For centuries, most of the world's economies grew at a similarly slow rate. However, a "Great Divergence" occurred with the Industrial Revolution, causing industrializing nations to accelerate their growth relative to the rest of the world.[1] Artificial intelligence (AI) is a potentially transformative technology that is often compared to the Industrial Revolution.

However, we are witnessing clear leaders in AI investment, performance, and adoption metrics across different nations. The Trump administration is laying the groundwork for American AI dominance by accelerating innovation, infrastructure development, and deregulation while establishing global dominance through technology exports. If the AI revolution is as transformative as the Industrial Revolution, should we expect this to lead to a second Great Divergence? Of course, the future impact of AI is uncertain, so in this paper we focus on the empirical data that can be seen and measured today.

We begin by reviewing analyses of the potential for AI-led economic growth (Section 2) and then discussing estimates of AI's impact on both GDP and the labor force. Recognizing that these impacts are uncertain and thus need constant monitoring, in Section 3 we highlight metrics for tracking the breakneck pace of investment, performance, and adoption of AI. We then discuss how different countries are faring on these metrics (Section 4). The incredible speed of change cannot be overstated; many of these metrics are doubling every few months and increasing manyfold each year. This means that the AI of the future will likely be very different from the AI of today. We conclude by reviewing the actions President Trump is taking to ensure that America continues to lead on AI (Section 5). As the President said: "America is the country that started the AI race. And as President of the United States, I'm here today to declare that America is going to win it."[2]

2 The Future Outlook

The last 25 years have seen a great convergence as the world's richest nations grew slower than many developing nations. However, the advent of generative artificial intelligence based around large language models (LLMs) will initiate a new wave of profound economic transformation in the United States, promising significant boosts to productivity and growth. As AI technologies become more integrated into the workplace, economists are re-evaluating long-term projections for Gross Domestic Product (GDP).

Yet, this period of innovation is not without its complexities. In this report, we focus on the long-term analysis of structural trends, as of course not every AI-related investment will be profitable, and the short-run always contains the potential for substantial volatility.

[1] Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton University Press, 2000), https://www.jstor.org/stable/j.ctt7sv80
[2] "Trump Advances US Leadership in AI," *Editorials*, 2025, https://editorials.voa.gov/a/trump-advances-us-leadership-in-ai/8050987.html

2.1 Background on Artificial Intelligence

The last few years have seen a rapid explosion in both AI capabilities and jargon, so we begin with a review of several key terms in the AI space.

Artificial intelligence can refer to a wide variety of different computer systems, from chess-playing computers like Deep Blue to generative AI like ChatGPT. For most of AI's history, AI was only capable of making decisions among a relatively small set of options. The recent surge in AI interest has coincided with the rise of "generative" AI, so called because they are able to "generate" text, images, or video. "Large language models" are generative AI that can create text.[3] They are "large" because of their trillions of parameters, and "language" because they are trained on large amounts of text written in natural languages.[4] [5] Agentic AI are a subset of generative AI that go beyond mere content creation and can execute actions in order to accomplish goals.[6]

One framework for understanding the intelligence of an AI looks at that intelligence on two dimensions: (1) its ability to perform different tasks: from writing essays, to identifying objects in pictures, to writing computer code, to solving math problems and (2) how the AI's capabilities on that task compare to human-level intelligence. Today's artificial intelligence systems have "specialized" (or "narrow") intelligence because, although they may be superhuman at a particular task (no human can multiply as fast as a calculator can), AI is not able to perform all the tasks a human can. Humans are capable of performing a wide variety of different tasks. Thus, we say that humans have "general" intelligence while current AI (including both ChatGPT and agentic AI) have "specialized" intelligence.

Artificial general intelligence (AGI) would be a hypothetical AI that can perform all the intellectual tasks that humans can,[7] but the exact definition of AGI is hotly debated, and some definitions only require that AGI perform "many but not all" human tasks. Artificial superintelligence (ASI), sometimes just called "superintelligence," is AI with intelligence that surpasses that of humans.[8] The boundary between AGI and superintelligence is similarly contentious, partly because these terms encompass different aspects of AI: "AGI" and "specialized AI" describe the generality of tasks an AI can perform, while "superintelligence" describes the AI's capabilities on those tasks. However, a "mere" AGI is already superintelligent if it can perform all human tasks, but at computer speeds. But accounting for semantic disagreements, it is worth nothing that OpenAI, Anthropic, xAI, Meta, and Google all aim to create artificial general intelligence or superintelligence.[9] [10] [11] [12] [13]

---

[3] "What is a large language model (LLM)?", *Cloudflare*, https://www.cloudflare.com/learning/ai/what-is-large-language-model/
[4] "What is a large language model (LLM)?", *Cloudflare*, https://www.cloudflare.com/learning/ai/what-is-large-language-model/
[5] "What are large language models (LLMs)?", *IBM*, https://www.ibm.com/think/topics/large-language-models
[6] "What is agentic AI?", *Google Cloud*, https://cloud.google.com/discover/what-is-agentic-ai
[7] "What is artificial general intelligence?", *Google Cloud*, https://cloud.google.com/discover/what-is-artificial-general-intelligence
[8] "What is artificial general intelligence?", *Google Cloud*, https://cloud.google.com/discover/what-is-artificial-general-intelligence
[9] "Planning for AGI and beyond," *OpenAI*, February 24, 2023, https://openai.com/index/planning-for-agi-and-beyond/
[10] Alex Heath, "Mark Zuckerberg's new goal is creating artificial general intelligence," *The Verge*, January 18, 2024, https://www.theverge.com/2024/1/18/24042354/mark-zuckerberg-meta-agi-reorg-interview
[11] Elon Musk (@elonmusk), "I now think @xAI has a chance of reaching AGI with @Grok 5. Never thought that before," *X*, September 17, 2025, https://x.com/elonmusk/status/1968202372276163029
[12] Sarah Perkel, "Anthropic CEO says AGI is a marketing term and the next AI milestone will be like a 'country of geniuses in a data center,'" *Business Insider,* January 22, 2025, https://www.businessinsider.com/anthropic-ceo-calls-agi-marketing-term-2025-1
[13] Anca Dragan et al., "Taking a responsible path to AGI," *Google DeepMind*, April 2, 2025, https://deepmind.google/discover/blog/taking-a-responsible-path-to-agi/

This brings us to an important caveat to this report's analysis: limitations of economic analysis of artificial intelligence. As noted by Hanson (2001), artificial intelligence that could perform all human tasks would lead to absolutely explosive growth and to a very different world than that seen today. Thus, the implications of AGI (both economic and otherwise) are an important topic deserving of further study, but are generally outside the scope of our current analysis, which focuses on "narrow" or "specialized" AI.

2.2 Impact of AI on GDP

Economists often think of the productive power of an economy as coming from three factors: the quantity of labor, the quantity of capital, and total factor productivity (TFP). TFP is a measure of an economy's efficiency and technological progress. A rising TFP indicates that an economy is producing more goods and services from the same amount of labor and capital, or the same output with fewer inputs.[14] This improvement in efficiency is a key driver of long-run economic growth and higher living standards.[15] For rich countries like the United States whose capital stocks are already very high, economic growth mainly comes from increasing total factor productivity.[16] [17] [18]

The productivity gains from TFP are eventually translated into higher overall economic output, or GDP. However, the effect of a new technology occurs with a time lag, as businesses must first successfully adopt the new technology and adapt their operations.[19] Much of the productivity gains in the 1990s emerged from technological investments that occurred in the 1970s and 1980s.[20] Similar technological investments that occurred during the Great Depression bore fruit during the 1950s and 1960s.[21] As a result, while TFP is an important indicator, it is not a leading indicator of AI's impact on the U.S. economy. Instead, R&D spending on AI and the output of AI firms serve as early indicators of technological progress.[22] [23] For example, AI-related R&D occurs well before the resulting innovations are widely adopted and have a macroeconomic effect.

A variety of recent studies have attempted to quantify the impacts of AI on GDP levels. These studies produced a broad range of estimates: AI could increase GDP by 1 percent up to more than 45 percent. The wide range reflects the high degree of uncertainty surrounding the economic characteristics of AI. However,

---

[14] Robert Zymek, "Total Factor Productivity," *IMF*, September 2024, https://www.imf.org/en/Publications/fandd/issues/2024/09/back-to-basics-total-factor-productivity-robert-zymek
[15] Robert Zymek, "Total Factor Productivity," *IMF*, September 2024, https://www.imf.org/en/Publications/fandd/issues/2024/09/back-to-basics-total-factor-productivity-robert-zymek
[16] Robert Shackleton, "Total Factor Productivity Growth in Historical Perspective," *Congressional Budget Office*, March 2013, https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/workingpaper/44002_TFP_Growth_03-18-2013_1.pdf
[17] Edward C. Prescott, "Needed: A Theory of Total Factor Productivity," *International Economic Review*, August 1998, https://www.jstor.org/stable/2527389
[18] Scott A. Wolla, "What Are the 'Ingredients' for Economic Growth?", *Federal Reserve Bank of St. Louis*, September 1, 2013, https://www.stlouisfed.org/publications/page-one-economics/2013/09/01/what-are-the-ingredients-for-economic-growth
[19] Wenjie Tang, Tong Wang, and Wenxin Xu, "Sooner or Later? The Role of Adoption Timing in New Technology Introduction." *Production and Operations Management,* April 2022, https://onlinelibrary.wiley.com/doi/epdf/10.1111/poms.13637?msockid=28439e724fd560f012f588f14e1861b7
[20] Roger W. Ferguson Jr. and William L. Wascher, "Distinguished Lecture on Economics in Government: Lessons from Past Productivity Booms," *Journal of Economic Perspectives*, 2004, https://www.federalreserve.gov/boarddocs/speeches/2004/20040707/attachment.pdf
[21] Roger W. Ferguson Jr. and William L. Wascher, "Distinguished Lecture on Economics in Government: Lessons from Past Productivity Booms," *Journal of Economic Perspectives*, 2004, https://www.federalreserve.gov/boarddocs/speeches/2004/20040707/attachment.pdf
[22] Luisa R. Blanco, Ji Gu, and James E. Prieger. "The Impact of Research and Development on Economic Growth and Productivity in the U.S. States," *Southern Economic Journal, January 2016*, https://onlinelibrary.wiley.com/doi/abs/10.1002/soej.12107
[23] Yen-Chun Chou, Howard Hao-Chun Chuang, and Benjamin B.M. Shao. "The Impacts of Information Technology on Total Factor Productivity: A Look at Externalities and Innovations," *International Journal of Production Economics*, December 2014, https://www.sciencedirect.com/science/article/abs/pii/S0925527314002618

it is worth noting that in the first half of 2025 alone, AI-related investment increased GDP by an annualized rate of 1.3 percent, harkening back to the scale of railroad investment during the Industrial Revolution[24] [25] and seemingly ruling out the lowest few estimates. Mid-range estimates for the effects of AI on GDP include those from a variety of companies such as Oxford Economics (1.8 to 4 percent increase after 8 years), McKinsey (2.4 to 4.1 percent increase in the long run) and Goldman Sachs (7 percent increase after 10 years). High estimates include those by PricewaterhouseCoopers (8 to 15 percent after 10 years) and a BIS Academic Working Paper by Aldasoro et al. (20 to 45 percent after 10 years for their approaches that assume all sectors of the economy will be at least somewhat impacted by AI). Alonso et al. have a wide range of estimates (4.7 to 19.5 percent), reflecting uncertainty over whether AI will substitute more for skilled or unskilled labor (the latter of which would yield the divergence and therefore the high-end growth estimate for the U.S.). For comparison, a 2010 ITIF study indicated that the IT revolution boosted U.S. GDP by about 14 percent.[26] [27] These estimates all assume that AI can partially but not completely substitute for human labor: in the case where AI could do all human tasks, capital becomes a substitute for labor and economic growth increases to 45 percent per year (see Hanson, 2001).

[24] Page 5 of Rui M. Pereria et al., "Railroads and Economic Growth in the Antebellum United States," *College of William and Mary Department of Economics*, December 2014, https://economics.wm.edu/wp/cwm_wp153.pdf
[25] Note that this 1.3 percent value for AI is the impact of AI investment on the level of GDP, even before any productivity gains from that investment are reaped. CEA staff could not locate this exact statistic for railroads during the Industrial Revolution, but U.S. investment in railroads roads grew from 0.2 percent of GDP in 1830, to 0.9 percent in 1839, to a maximum of 2.6 percent of GDP in 1854 (Pereria et al., 2024).
[26] Robert D. Atkinson et al., "The Internet Economy 25 Years After .Com," *The Information Technology and Innovation Foundation*, March 2010, https://www2.itif.org/2010-25-years.pdf
[27] ITIF indicates $2 trillion. The report was published in early 2010. 2009 U.S. GDP was $14.5 trillion, see "Gross Domestic Product," *FRED*, December 23, 2025, https://fred.stlouisfed.org/graph/?g=1Pw1E

Table 1: Estimates of AI Impacts on GDP Level

Study	Impact on GDP Level	Time Horizon	Region
Acemoglu (2024)[28]	0.9 to 1.6%	10 Years	U.S.
Penn Wharton Budget Model (2025)[29]	1.5%	10 Years	U.S.
Oxford Economics (2024)[30]	1.8 to 4%	8 Years	U.S.
McKinsey (2023)[31]	2.4 to 4.1%	Long Run	Global
Alonso et al. (2022)[32]	4.7 to 19.5%	Long Run	U.S.
Goldman Sachs (2023)[33]	7%	10 Years	Global
PricewaterhouseCoopers (2025)[34]	1 to 15%	10 Years	Global
Aldasoro et al. (2024)[35]	20 to 45%	10 Years	U.S.
Hanson (2001)[36]	≥45%	See Notes	Global

Notes: Except for Hanson (2001), these are the impacts of AI on GDP levels, not GDP growth rates.

2.3 International Economic Growth Prior to AI

Even before AI, different countries may be on different growth paths, with the United States exhibiting accelerating growth in potential GDP while growth in Europe and China is slowing.[37] For Europe versus the United States, this is largely due to structural factors such as stronger U.S. productivity growth (especially in tech) and America's better business environment.[38] For China, after decades of rapid growth, growth is now slowing to be more like that of emerging markets.[39]

AI-led growth may be especially important to China, as their once-rapid growth has slowed in recent years to a level much more comparable to that of other emerging markets. Similar to China, AI-led growth may be especially important for Europe. Although the rise of China is one oft-repeated geopolitical story of the 21st

[28] Daron Acemoglu, "The Simple Macroeconomics of AI," *National Bureau of Economic Research*, May 2024, https://www.nber.org/system/files/working_papers/w32487/w32487.pdf
[29] "The Projected Impact of Generative AI on Future Productivity Growth," *Penn Wharton*, September 8, 2025, https://budgetmodel.wharton.upenn.edu/issues/2025/9/8/projected-impact-of-generative-ai-on-future-productivity-growth
[30] "How GenAI will change the world economy," *Oxford Economics*, May 8, 2024, https://www.oxfordeconomics.com/resource/how-genai-will-change-the-world-economy/#:~:text=Generative%20AI%20has%20the%20potential,demand%2C%20adding%20to%20cost%20pressures
[31] "The economic potential of generative AI: The next productivity frontier," *McKinsey*, June 14, 2023, https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier
[32] Cristian Alonso et al., "Will the AI revolution cause a great divergence?", *Journal of Monetary Economics*, April 2022, https://www.sciencedirect.com/science/article/abs/pii/S0304393222000162
[33] "Generative AI could raise global GDP by 7%," *Goldman Sachs*, April 5, 2023, https://www.goldmansachs.com/insights/articles/generative-ai-could-raise-global-gdp-by-7-percent
[34] "Value in motion," *PWC*, April 29, 2025, https://www.pwc.com/bm/en/press-releases/value-in-motion.html
[35] Iñaki Aldasoro et al., "The Impact of artificial intelligence on output and inflation," *Bank for International Settlements*, April 2024, https://www.bis.org/publ/work1179.pdf
[36] Robin Hanson, "Economic Growth Given Machine Intelligence," *George Mason University*, 2001, https://mason.gmu.edu/~rhanson/aigrow.pdf
[37] Pierre-Olivier Gourinchas, "As One Cycle Ends, Another Begins Amid Growing Divergence," *IMF*, January 17, 2025, https://www.imf.org/en/Blogs/Articles/2025/01/17/as-one-cycle-ends-another-begins-amid-growing-divergence
[38] Pierre-Olivier Gourinchas, "As One Cycle Ends, Another Begins Amid Growing Divergence," *IMF*, January 17, 2025, https://www.imf.org/en/Blogs/Articles/2025/01/17/as-one-cycle-ends-another-begins-amid-growing-divergence
[39] Pierre-Olivier Gourinchas, "As One Cycle Ends, Another Begins Amid Growing Divergence," *IMF*, January 17, 2025, https://www.imf.org/en/Blogs/Articles/2025/01/17/as-one-cycle-ends-another-begins-amid-growing-divergence

century, another less discussed, although perhaps no less important one, is the decline of Europe. The EU has fallen from 27 percent of world GDP in 1980 to just 14 percent in 2025.[40] This is not just because of high growth rates in emerging markets, but also because Germany and many other EU countries have a growth rate lower than other advanced economies. This trend continues in AI, where the EU lags behind the U.S. and China on various AI metrics. For example, cumulative private AI investment in the U.S. exceeded $470 billion between 2013 and 2024, compared to roughly $50 billion across all EU countries combined.[41]

Recognizing the critical role AI can play for future growth, the United States and many of our allies have banded together through "Pax Silica," America's international partnership on AI supply chains.[42] Pax Silica members range from major upstream semiconductor equipment manufacturers like Japan, to downstream data center investors like Qatar.[43] This varied group is united by a forward-looking view of AI and technology. Thus, it is not surprising that Pax Silica members are growing more than twice as fast than their peers, with a 2.5 percent average real GDP growth rate between the release of ChatGPT in Q4 2022 and the latest data in Q3 2025, versus 1.1 percent on average for G7 countries.[44]

2.4 Impact of AI on Labor and Jevons' Paradox

Current evidence presents a mixed picture of AI's employment effects. Brynjolfsson et al. (2025) show that employment is falling for early-career workers in AI-exposed occupations like computer coding and customer service.[45] Other studies have found no correlation between AI exposure and current unemployment rates.[46] Still others have found that, while employment fell in sectors where AI can directly substitute for human labor, AI exposure actually increases employment in sectors reliant on AI-capable tasks (Johnston and Makridis, 2025).[47] Notwithstanding the current impact of AI, overall unemployment is currently at a rate of just 4.4 percent in December 2025.[48]

In the short run, if AI increases labor's efficiency, that reduces the amount of labor needed to create a given amount of output, potentially decreasing employment. But historical precedent suggests that efficiency gains can often increase (rather than decrease) total utilization of that resource—a phenomenon known as Jevons' Paradox.[49] Jevons' Paradox occurs if a technological advance reduces the amount of a resource (like labor) needed for a specific application. This actually causes overall usage of that resource to increase as usage expands to new applications. For Jevons' Paradox to occur and thus employment to increase with AI adoption, three conditions must be satisfied: first, AI must meaningfully boost worker productivity; second,

[40] "GDP based on PPP, share of world," *IMF*, 2025, https://www.imf.org/external/datamapper/PPPSH@WEO/EU/CHN
[41] Alex Haag, "The State of AI Competition in Advanced Economies," *Federal Reserve System*, October 6, 2025, https://www.federalreserve.gov/econres/notes/feds-notes/the-state-of-ai-competition-in-advanced-economies-20251006.html#:~:text=US%20private%20investment%20in%20AI,10
[42] "Pax Silica," *U.S. State Department*, 2025, https://www.state.gov/pax-silica
[43] "The United States Welcomes Qatar's Signing of Pax Silica Declaration," *U.S. State Department*, 2025, https://www.state.gov/releases/office-of-the-spokesperson/2026/01/the-united-states-welcomes-qatars-signing-of-pax-silica-declaration
[44] The United Arab Emirates is included in the average for all quarters except the final quarter, as that data has not yet been released.
[45] Erik Brynjolfsson et al., "Canaries in the Coal Mine? Six Facts about the Recent Employment Effects of Artificial Intelligence," August 26, 2025, https://digitaleconomy.stanford.edu/wp-content/uploads/2025/08/Canaries_BrynjolfssonChandarChen.pdf
[46] Martha Gimbel et al., "Evaluating the Impact of AI on the Labor Market: Current State of Affairs," *The Budget Lab*, October 1, 2025, https://budgetlab.yale.edu/research/evaluating-impact-ai-labor-market-current-state-affairs
[47] Andrew C. Johnston and Christos Makridis, "The Labor Market Effects of Generative AI: A Difference-in-Differences Analysis of AI Exposure," *SSRN*, July 31, 2025, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5375017
[48] "Economic News Release," *U.S. Bureau of Labor Statistics*, November 20, 2025, https://www.bls.gov/news.release/empsit.nr0.htm
[49] Blake Alcott, "Jevons' paradox," *Ecological Economics*, July 1, 2005, https://www.sciencedirect.com/science/article/abs/pii/S0921800905001084

the resulting cost savings must translate to lower prices; and, third, the lower prices must increase consumer demand faster than efficiency gains reduce per-unit labor needs.[50]

Although these may seem like strong conditions, Jevons' Paradox has been observed occurring in many different fields. Jevons first described the paradox in 1865 when increasing efficiency in coal in iron engines actually increased the demand for coal, iron, and other resources.[51] In agriculture, increases in irrigation efficiency may increase water consumption.[52] Improvements in energy-efficient lighting have increased both the number of light bulbs demanded and the amount of electricity used in lighting.[53] Jevons' Paradox even occurs in topics seemingly unrelated to production: increases in road capacity will increase the numbers of drivers on the road.[54] [55] [56] And specifically for AI and jobs, a similar situation may be occurring for radiologists, a job once predicted to be replaced by AI,[57] but which is now seeing historically high employment rates.[58]

In the longer term, the key issue is comparing and contrasting AI to prior disruptive technologies. Historical analogies suggest disruptive technologies (steam power, electricity, computers, the internet, etc.) ultimately lead to greater employment and earnings.[59] AI could be the exception if the technology either develops agency (so that it can work as independently as humans do) or if it dramatically increases worker productivity without generating new labor demand (Ayres, 1990; Donaldson, 2018; Feigenbaum and Gross, 2024).[60] [61] [62] [63] But the general precedent of past technological changes is that they create a variety of new fields. In 1860, 43 percent of U.S. employment was in agriculture, compared to 1.2 percent in 2015.[64] In that time, a huge range of new professions have been created, many reliant on the new technology. Now the majority of

---

[50] Greg Rosalsky, "Why the AI world is suddenly obsessed with a 160-year-old economics paradox," *NPR*, February 4, 2025, https://www.npr.org/sections/planet-money/2025/02/04/g-s1-46018/ai-deepseek-economics-jevons-paradox
[51] Blake Alcott, "Jevons' paradox," *Ecological Economics*, July 1, 2005, https://www.sciencedirect.com/science/article/abs/pii/S0921800905001084
[52] Yanyun Wang et al., "The verification of Jevons' paradox of agricultural Water conservation in Tianshan District of China based on Water footprint," *Agricultural Water Management*, September 1, 2020, https://doi.org/10.1016/j.agwat.2020.106163
[53] Deborah Dibal, "Jevons Paradox: The Case of Energy-Efficient Lighting," *Medium*, February 22, 2025. https://medium.com/babson-germany/jevons-paradox-the-case-of-energy-efficient-lighting-1d682483d7ab
[54] Gilles Duranton and Matthew A. Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review*, October 6, 2011, https://www.aeaweb.org/articles?id=10.1257/aer.101.6.2616
[55] Kent Hymel, "If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas," *Transport Policy*, 2019, https://ideas.repec.org/a/eee/trapol/v76y2019icp57-66.html
[56] Wen-Tai Hsu and Hongliang Zhang, "The fundamental law of highway congestion revisited: Evidence from national expressways in Japan," *Journal of Urban Economics*, 2014, https://ideas.repec.org/a/eee/juecon/v81y2014icp65-76.html
[57] Heathcote Ruthven and Christoph Agten, "Perspective: AI productivity will not benefit employed radiologists," *European Journal of Radiology Artificial Intelligence*, September 2025, https://www.sciencedirect.com/science/article/pii/S3050577125000313
[58] Deena Mousa, "AI isn't replacing radiologists," *Understanding AI*, October 1, 2025, https://www.understandingai.org/p/ai-isnt-replacing-radiologists
[59] Kerstin Hötte et al., "Technology and jobs: A systematic literature review," *Technological Forecasting and Social Change*, September 2023, https://www.sciencedirect.com/science/article/pii/S0040162523004353
[60] Robert U. Ayres, "Technological transformations and long waves. Part I," *Technological Forecasting and Social Change*, March 1990, https://www.sciencedirect.com/science/article/abs/pii/004016259090057З
[61] Peter Gumbel et al., "What can history teach us about technology and jobs?", *McKinsey Global Institute*, February 16, 2018, https://www.mckinsey.com/featured-insights/future-of-work/what-can-history-teach-us-about-technology-and-jobs
[62] Dave Donaldson, "Railroads of the Raj: Estimating the Impact of Transportation Infrastructure," *American Economic Review*, April 2018, https://www.aeaweb.org/articles?id=10.1257/aer.20101199
[63] James Feigenbaum and Daniel P Gross, "Answering the Call of Automation: How the Labor Market Adjusted to Mechanizing Telephone Operation," *The Quarterly Journal of Economics*, February 26, 2024, https://academic.oup.com/qje/article/139/3/1879/7614605
[64] Joel A. Elvery, "Changes in the Occupational Structure of the United States: 1860 to 2015," *Federal Reserve Bank of Cleveland*, June 26, 2019, https://www.clevelandfed.org/publications/economic-commentary/2019/ec-201909-changes-in-us-occupational-structure

current workers are in jobs created since 1940, ranging from "wind turbine technician" to "software developer" to "textile chemist" to "mental-health counselor."[65]

3 Key Metrics to Track

One of the most important points to focus on, in order to understand AI, is the speed of progress and change. The amount of computer power spent to train an AI model is not merely doubling every year: since 2010 it has increased at an average of about 4-fold per year.[66] Similarly, top AI companies are seeing revenues triple each year and are projecting future growth more rapid than that seen in the rapid-growth phases of Google, Amazon, or Microsoft (see Figures 5 and 7). Because many of these metrics are doubling every few months and increasing manyfold each year, this means that change from AI can be very rapid.

Similar to how market analysts monitor housing starts or manufacturing output to predict broader economic health, a specific set of indicators can reveal AI's growing influence in the U.S. economy. AI's impact on GDP materializes in changes in total factor productivity, so we highlight that measure first. But, because total factor productivity is a lagging indicator, we consider other metrics that serve as leading indicators of AI's impacts. These metrics, which track the expanding scale of AI-related investment, the accelerating capabilities of AI, and the rising adoption of AI, collectively serve as economic barometers for the AI revolution.[67] These metrics are interrelated: investment is a direct signal that companies are pouring resources into advancing the technology, which results in increased model performance and lower unit costs. Better capabilities at lower costs spur AI usage, which is reflected in the revenues of AI firms.

We begin by discussing these metrics in the United States and then turn to a cross-country analysis.

3.1 Total Factor Productivity

AI is so important for growth because of its potential impact on total factor productivity. But previous technological revolutions have had a complicated relationship with productivity. Computers were once only mainframes that took up entire rooms, but now can fit in your pocket. In 1987, economist Robert Solow famously quipped "You can see the computer age everywhere but in the productivity statistics."[68] Explanations for the apparent lack of impact of computers ranged from time lag, to the inability of economists to measure their real benefits, to claims that computers don't actually increase productivity.[69] As a result, while the impact of AI on total factor productivity may be the key question, we need to rely on other metrics as well.

---

[65] David Autor et al., "New Frontiers: The Origins and Content of New Work, 1940–2018," *The Quarterly Journal of Economics*, March 15, 2024, https://academic.oup.com/qje/article/139/3/1399/7630187
[66] Jaime Sevilla and Edu Roldán, "Training compute of frontier AI models grows by 4-5x per year," *Epoch AI*, May 28, 2024, https://epoch.ai/blog/training-compute-of-frontier-ai-models-grows-by-4-5x-per-year
[67] For other lists of leading indicators for AI, see https://epoch.ai/blog/what-will-ai-look-like-in-2030 or the Appendix on page 19 of https://www.nber.org/system/files/working_papers/w34256/w34256.pdf
[68] Robert M. Solow, "We'd Better Watch Out," *New York Times Book Review*, July 12, 1987, http://digamo.free.fr/solow87.pdf
[69] Jack E. Triplett, "The Solow Productivity Paradox: What Do Computers Do to Productivity?", *Brookings Institution*, March 1, 1999, https://www.brookings.edu/articles/the-solow-productivity-paradox-what-do-computers-do-to-productivity/

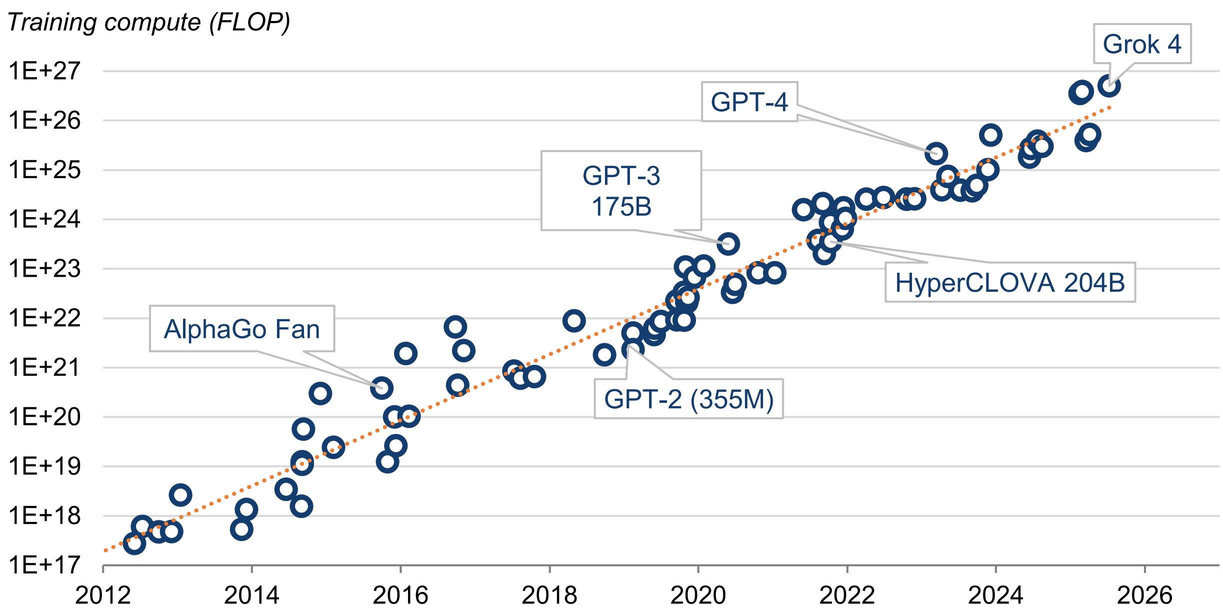
3.2 Investment

Investment in the AI ecosystem has been massive, both for the models themselves and for the surrounding infrastructure.

3.2.1 AI Models

AI models exhibit a predictable tendency for model performance to increase as developers increase the number of parameters in the model, the size of the training dataset, and the amount of computer power used to train the model. Known as "scaling laws," these empirical relationships have enabled model developers to increase the performance of their AI models not solely by relying on fundamental scientific breakthroughs, but simply by throwing more resources at the problem. Similar empirical relationships are seen in other fields, such as Moore's Law in which the number of transistors on an integrated circuit doubles every two years. As scaling laws are not laws of nature, but observed empirical relationships, they could someday end. But they have characterized the current deep-learning era, where the amount of compute spent on training computer models has increased by more than 1 billion-fold since 2012 (see Figure 1).[70]

Figure 1: The Amount of Computing Power used to Train AI Models



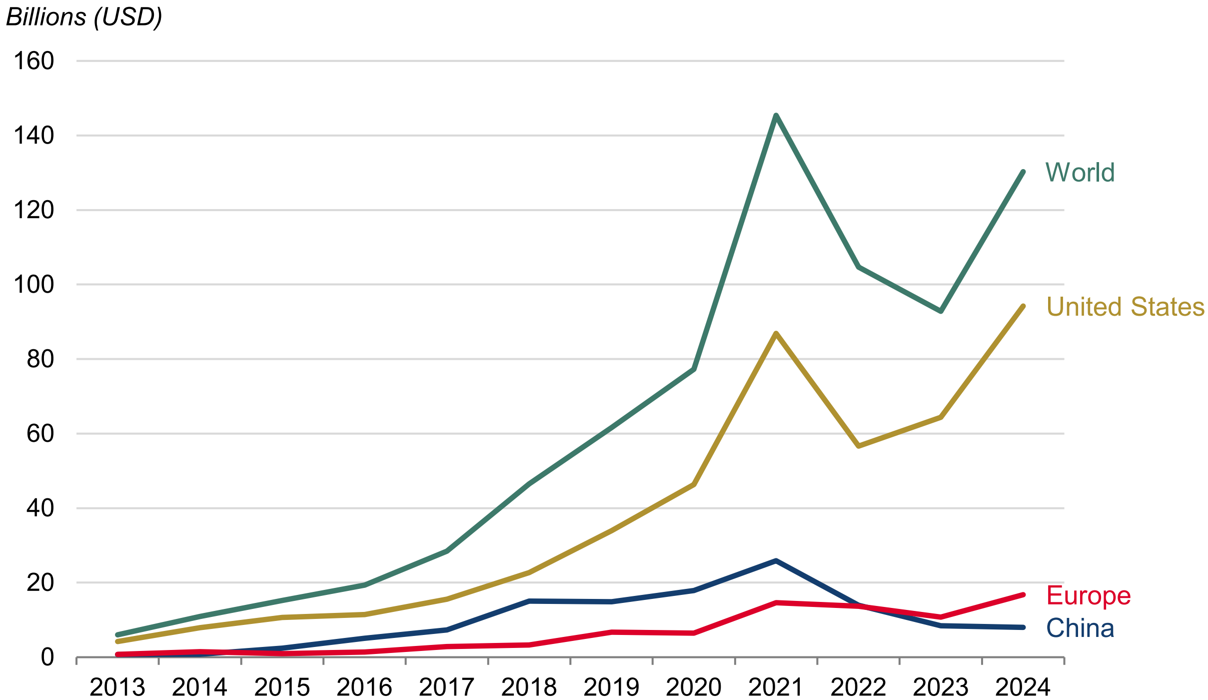
Source: Epoch AI.
Note: Training compute (FLOP) refers to the number of floating point operations used to train an AI model.

A staggering amount of investment has been required to meet these needs. Global corporate AI investment reached $252 billion in 2024. Generative AI alone is up 19 percent year over year, reaching $34 billion.[71] This

[70] "AI Models," *Epoch AI*, January 6, 2026, https://epoch.ai/data/ai-models
[71] "Global private AI investment hits record high with 26% growth," *Stanford Institute for Human-Centered Artificial Intelligence*, 2025, https://hai.stanford.edu/ai-index/2025-ai-index-report/economy

investment has been concentrated in the U.S., which had $94 billion of private-sector AI investment in 2024 (see Figure 2).[72]

Figure 2. External Funding for Privately Held AI Companies



Sources: Quid; U.S. Bureau of Labor Statistics; Our World in Data.
Note: The chart only includes private companies where private funding is above $1.5 million.

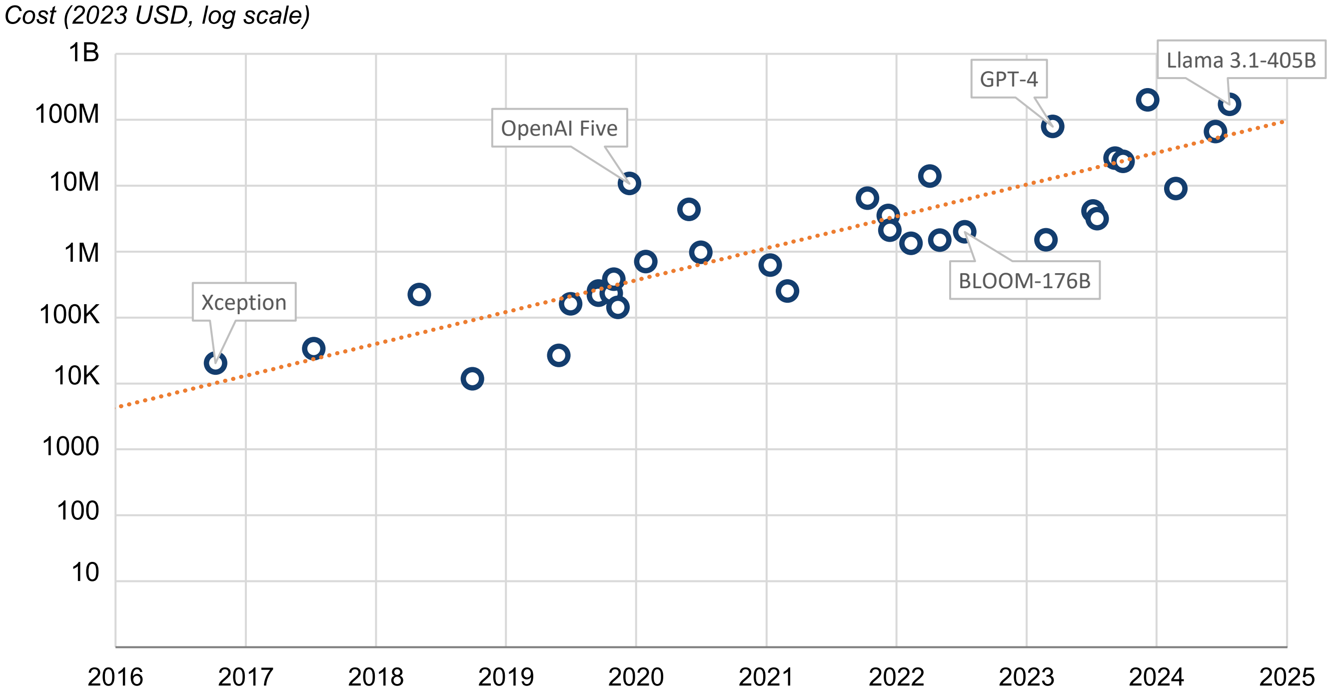
From 2016 to 2024, the energy and amortized hardware costs to train (build) an AI model have grown at an average rate of 2.4x per year, while cloud compute costs (see Figure 3) have grown at an average rate of 2.5x per year.[73] As a result of almost a decade of annually doubling costs, Grok 4, an AI model published in July 2025, cost about $490 million to train.[74]

[72] External funding for privately held AI companies raising above $1.5 million," *Our World in Data,* 2025, https://ourworldindata.org/grapher/private-investment-in-artificial-intelligence?time=earliest..2024

[73] Ben Cottier et al., "How much does it cost to train frontier AI models?", *Epoch AI*, June 3, 2024, https://epoch.ai/blog/how-much-does-it-cost-to-train-frontier-ai-models

[74] James Sanders et al., "What did it take to train Grok 4?", *Epoch AI*, September 12, 2025, https://epoch.ai/data-insights/grok-4-training-resources

Figure 3. Cloud Compute Cost to Train AI Models



Source: Epoch AI.
Notes: Estimated cloud compute costs are the product of a historical cloud rental cost and the number of training chip-hours. These costs are for the final training run of models.

Sustained investment in model training despite increasing costs indicates a commitment to developing more capable and complex AI systems. Many investment indicators are available globally, so for additional discussion of investment, see the cross-country comparisons in Section 4.1.

3.2.2 AI Infrastructure

Beyond just investment in model training, investment in data centers and related equipment has surged in 2025 due to increasing proliferation of AI technology. Investment in information processing equipment and software in the U.S. increased at an annual rate of 28 percent during the first half of 2025, up from 5.5 percent annual growth in 2024.[75] Alternatively put, in Q2 of 2025, this investment was already more than $125 billion higher (in annual terms) than it was at the end of 2024.[76] Information processing equipment and software comprise one quarter of all U.S. investment.[77] The fact that an already-large category is growing at a very rapid rate means that AI is now driving an investment-based surge in U.S. GDP (as opposed to a surge driven by consumption or unsustainable government spending).

[75] "Real Private Fixed Investment: Private Fixed Investment in Information Processing Equipment and Software," *FRED*, December 23, 2025, https://fred.stlouisfed.org/series/A679RL1Q225SBEA
[76] "Private fixed investment in information processing equipment and software," *FRED*, December 23, 2025, https://fred.stlouisfed.org/series/A679RC1Q027SBEA
[77] "Fixed Private Investment," *FRED*, December 23, 2025, https://fred.stlouisfed.org/series/FPI

3.3 Performance

Continuous investment in AI has increased the performance of AI models, both in terms of their capabilities to solve different tasks, the length of tasks they can successfully perform, and reducing the cost per "token"[78] produced by an AI model. We consider two measures of performance: benchmark scores and cost per token.

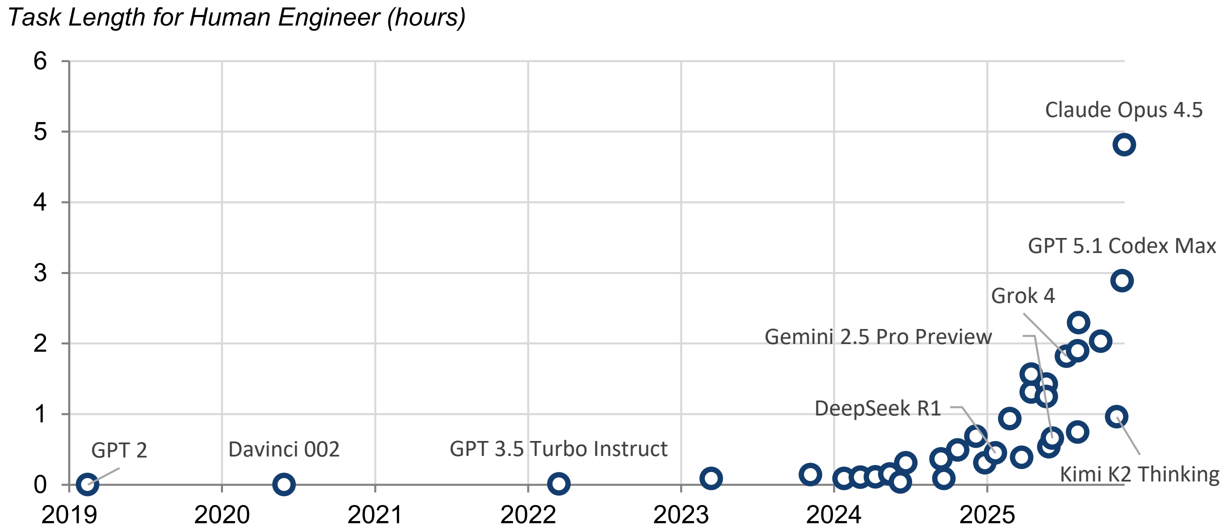
3.3.1 Improving benchmark scores

Benchmarks are sets of standardized tasks designed to evaluate specific AI capabilities, such as reasoning, coding, or language understanding. As LLMs become more powerful, they achieve near-perfect scores on older benchmarks, a phenomenon known as "benchmark saturation."[79] For example, from 2023 to 2024, AI performance on the computer coding benchmark SWE-bench jumped from 4 percent to 72 percent.[80] Similar phenomena have occurred in benchmarks for graduate-level question answering, advanced math, and a variety of other academic subjects.[81]

However, while frontier AI are vastly better than humans at many exams and tasks, the best current AI agents often struggle with stringing together longer sequences of actions. As a result, they are currently unable to carry out substantive projects by themselves and are unable to fully substitute even for low-skill computer-based work like a remote executive assistant.[82] But this means that the length of tasks that models can complete is a helpful lens for understanding AI capabilities.[83] The length of tasks that AI are able to successfully complete is also increasing, doubling every 7 months for the past 6 years.[84] This means that AI is becoming better able to manage larger and larger projects on its own and thus complete increasingly more complicated tasks.

[78] AI models break the text you give them down into individual tokens, so tokens are a measure of the amount of data processed by AI models.
[79] Douwe Kiela et al., "Dynabench: Rethinking Benchmarking in NLP," *Association for Computational Linguistics*, April 2021, https://www.researchgate.net/figure/Benchmark-saturation-over-time-for-popular-benchmarks-normalized-with-initial_fig1_351221914
[80] "AI Index Report 2025," *Stanford Institute for Human-Centered Artificial Intelligence*, 2025, https://hai.stanford.edu/ai-index/2025-ai-index-report/technical-performance
[81] "AI Index Report 2025," *Stanford Institute for Human-Centered Artificial Intelligence*, 2025, https://hai.stanford.edu/ai-index/2025-ai-index-report/technical-performance
[82] "Measuring AI Ability to Complete Long Tasks," *METR*, March 19, 2025, https://metr.org/blog/2025-03-19-measuring-ai-ability-to-complete-long-tasks/?_hsenc=p2ANqtz-9DUIqNn6Sek19FuCpx_RpDPVQ1MzwEpE1LBhfSBDbnvo0IK4U1jwTw9gyqXi8HIAeXmW0X
[83] "Measuring AI Ability to Complete Long Tasks," *METR*, March 19, 2025, https://metr.org/blog/2025-03-19-measuring-ai-ability-to-complete-long-tasks/?_hsenc=p2ANqtz-9DUIqNn6Sek19FuCpx_RpDPVQ1MzwEpE1LBhfSBDbnvo0IK4U1jwTw9gyqXi8HIAeXmW0X
[84] "Measuring AI Ability to Complete Long Tasks," *METR*, March 19, 2025, https://metr.org/blog/2025-03-19-measuring-ai-ability-to-complete-long-tasks/?_hsenc=p2ANqtz-9DUIqNn6Sek19FuCpx_RpDPVQ1MzwEpE1LBhfSBDbnvo0IK4U1jwTw9gyqXi8HIAeXmW0X

Figure 4. Lengths of Software Engineering Tasks that AI Can Complete with 50% Success Rate



Source: METR.

3.3.2 Falling cost per token

A “token” is the basic unit of input to an LLM, for example, a single word or number. A decrease in the cost per token makes AI more affordable. This can occur because of smaller, more efficient models (software) or better hardware.[85] Depending on the model, prices are falling at least 9x per year, and up to 900x per year.[86]

3.4 Adoption and Usage

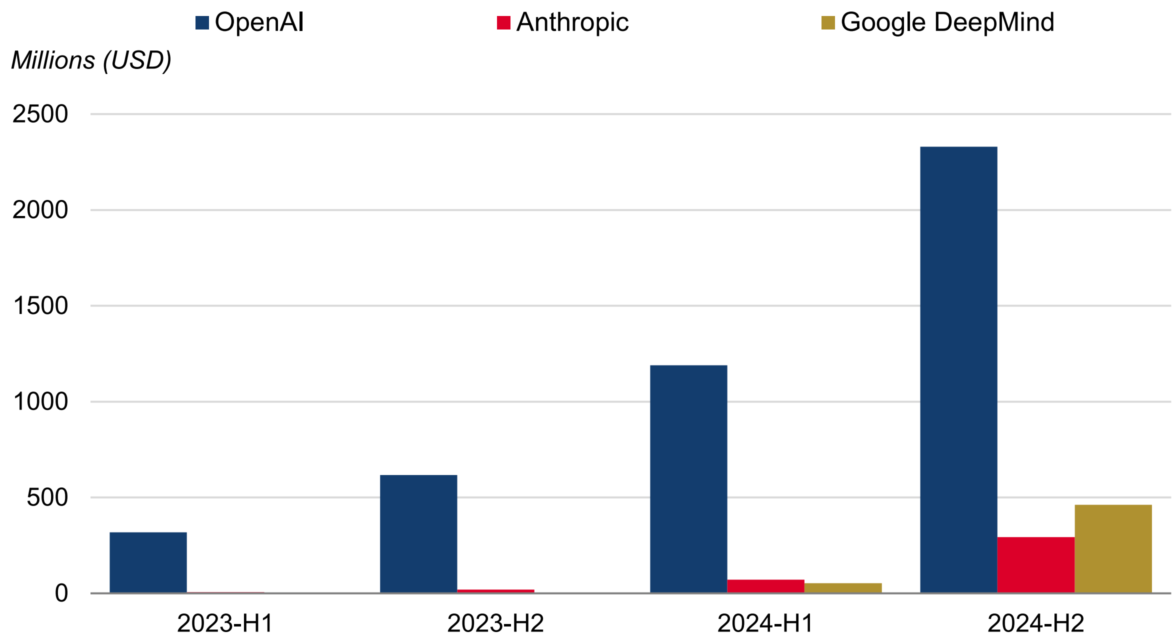
As a result of improved AI capabilities and falling costs, the use of AI has spread throughout the economy. This can be tracked through revenues of frontier AI companies, the use of AI in the production of goods and services, and an increasing share of Americans using AI in the workplace.

3.4.1 Revenue

AI companies have seen rapid, but not unprecedented, growth, but their future growth could exceed all historical examples. Startups can often see explosive growth, and OpenAI, Anthropic, and Google DeepMind each had over 3x annualized revenue growth as of the second half of 2024 (see Figure 5).[87]

[85] Ben Cottier et al., “LLM inference prices have fallen rapidly but unequally across tasks,” *Epoch AI*, March 12, 2025, https://epoch.ai/data-insights/llm-inference-price-trends
[86] Ben Cottier et al., “LLM inference prices have fallen rapidly but unequally across tasks,” *Epoch AI*, March 12, 2025, https://epoch.ai/data-insights/llm-inference-price-trends
[87] Ben Snodin et al., “The combined revenues of leading AI companies grew by over 9x in 2023-2024,” *Epoch AI*, April 3, 2025, https://epoch.ai/data-insights/ai-companies-revenue

Figure 5. Revenue from Sales of AI Products to the Public, by Company

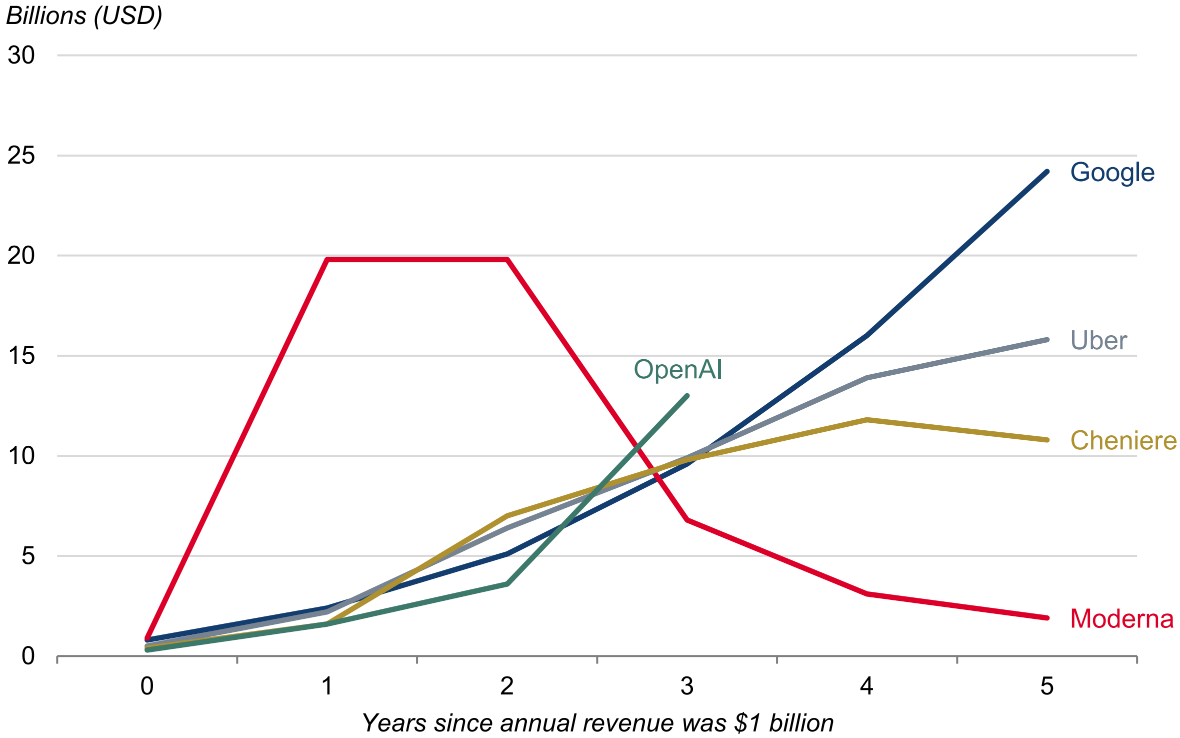


Sources: Epoch AI; The Information; Business Insider; The New York Times; The Wall Street Journal.
Note: Google DeepMind revenue data are estimates based on mobile app usage and web traffic.

This is much faster than the market average: S&P 500 companies had a blended year-over-year earnings growth rate of 10.3 percent in the last quarter of 2024.[88] But AI company growth so far is comparable to that of top tech unicorns like Google and Uber during their initial high-growth phases (see Figure 6).[89] So, while this growth is impressive (Amazon only had two years of this level of revenue growth),[90] it is not unprecedented.

[88] "S&P Q4 '24 Earnings Analysis," *Consello*, 2025, https://consello.com/reports/sp-q4-24-earnings-analysis/
[89] Greg Burnham, "OpenAI is projecting unprecedented revenue growth," *Epoch AI*, October 15, 2025, https://epoch.ai/gradient-updates/openai-is-projecting-unprecedented-revenue-growth
[90] "Revenue for Amazon (AMZN), *Companies Market Cap*, 2025, https://companiesmarketcap.com/amazon/revenue/#:~:text=companiesmarketcap.com-,Annual%20revenue,-Year

Figure 6. Actual Revenue of OpenAI vs. Other Historically Rapid Revenue Increases



Source: Epoch AI.

However, what may be unprecedented is the future growth of AI companies. For example, despite skepticism, OpenAI claims that it will roughly double its revenue in each year from 2026-2028.[91] [92] In order to try and understand this claim, it is helpful to compare this growth to the historical growth of previous big tech unicorns; such revenue growth from OpenAI would be far higher than the growth rate seen by these previous big tech unicorns (see Figure 7).[93]

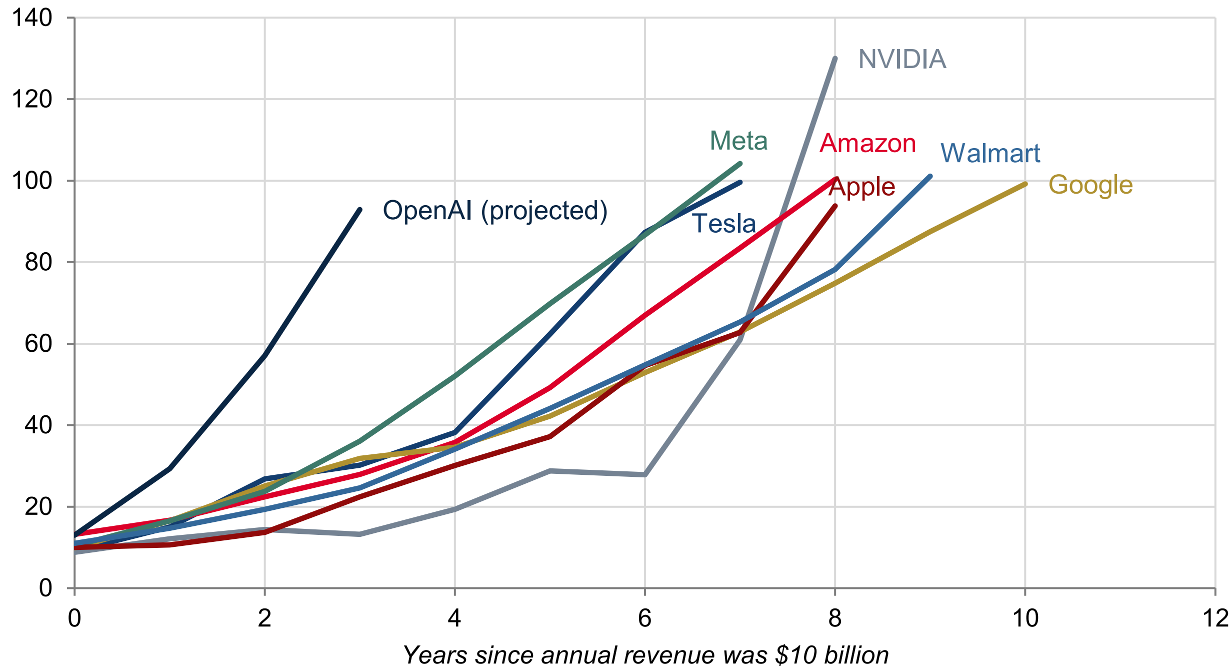
[91] Sri Muppidi, "Nvidia becomes first company to reach $5 trillion valuation, fueled by AI boom," *The Information*, September 5, 2025, https://www.theinformation.com/articles/openai-says-business-will-burn-115-billion-2029

[92] Greg Burnham, "OpenAI is projecting unprecedented revenue growth," *Epoch AI*, October 15, 2025, https://epoch.ai/gradient-updates/openai-is-projecting-unprecedented-revenue-growth

[93] Greg Burnham, "OpenAI is projecting unprecedented revenue growth," *Epoch AI*, October 15, 2025, https://epoch.ai/gradient-updates/openai-is-projecting-unprecedented-revenue-growth

Figure 7. Projected Revenue of OpenAI vs. Other Historically Rapid Revenue Increases

Billions (USD)



Source: Epoch AI.

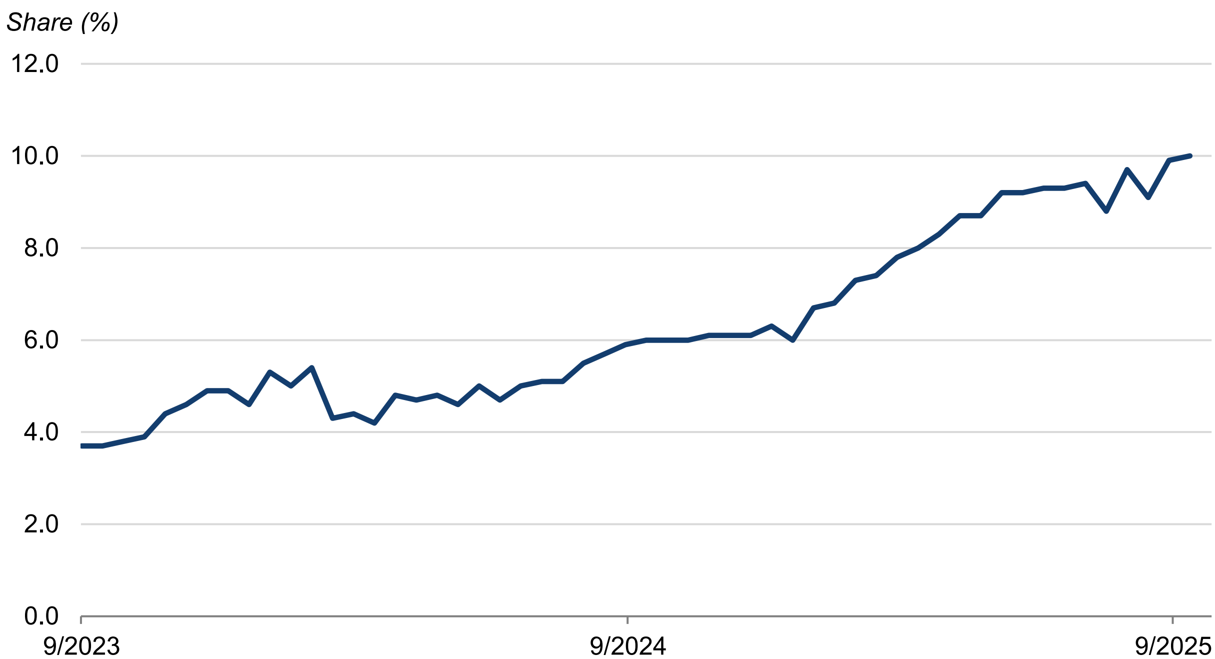
3.4.2 Business Usage

Use of AI by organizations jumped from 55 percent in 2023 to 78 percent in 2024.[94] In particular, the use of AI in the production of goods and services has increased from less than 4 percent of firms in 2023 to about 10 percent of firms in September 2025 (see Figure 8).[95]

[94] "Artificial Intelligence Index Report 2025," *Stanford Institute for Human-Centered Artificial Intelligence*, 2025, https://hai.stanford.edu/ai-index/2025-ai-index-report/economy

[95] "Business Trends and Outlook Survey," *United States Census*, December 4, 2025, https://www.census.gov/hfp/btos/data_downloads

Figure 8. Share of U.S. Firms Using AI in the Production of Goods and Services

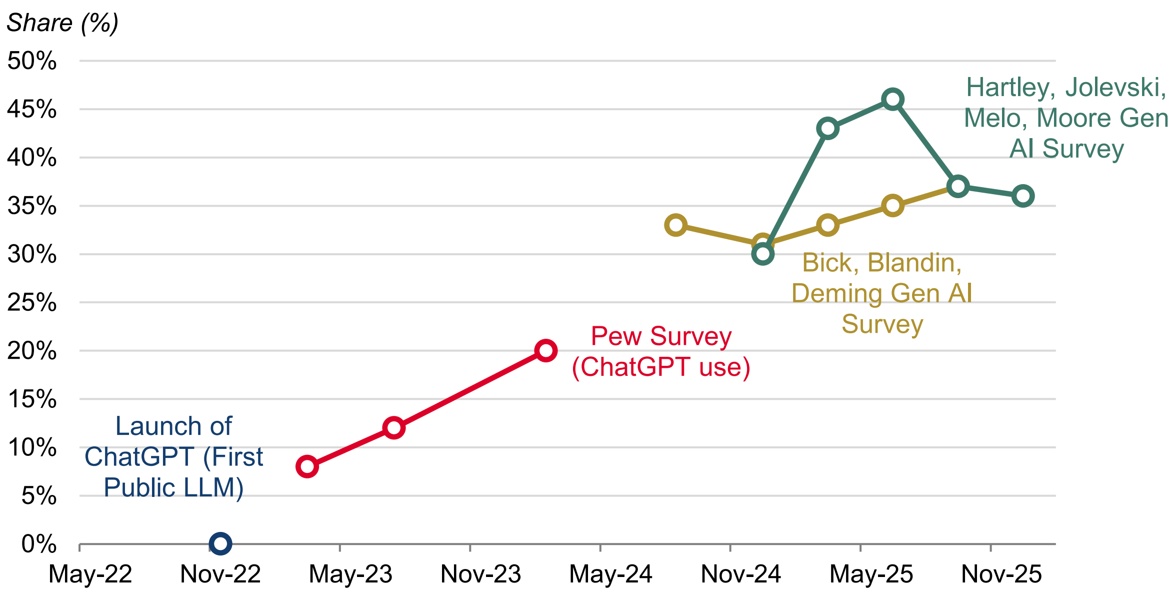


Sources: U.S. Census Business Trends and Outlook Survey (BTOS); Haver data.
Note: BTOS data are released biweekly.

The share of businesses with paid subscriptions to AI has grown at an even faster rate, from 7 percent of companies in January 2023 to 45 percent today.[96] A similar story occurs with U.S. workers, about 40 percent of whom are now using generative AI at work (see Figure 9).[97]

[96] Ara Kharazian, "Ramp AI Index," *RAMP*, https://ramp.com/data/ai-index
[97] Jonathan Hartley et al., "The Labor Market Effects of Generative Artificial Intelligence," *SSRN*, April 10, 2025, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5136877

Figure 9. Share of U.S. Workers Using Generative AI at Work



Sources: Pew Survey; Bick et al. (2024); Harley et al. (2025).

3.4.3 Critical Minerals

Many minerals are critical parts of the AI supply chain. Silicon is the main building block for most semiconductor chips, while Gallium and Germanium are two other key components.[98] The International Energy Agency estimates that by 2030, data centers alone could demand over 10 percent of today's world supply of gallium.[99]

4 Cross-Country Comparisons

There are many ways to rank countries on AI, with many groups developing their own indices.[100] [101] [102] Using the lens of investment, performance, and adoption of AI, we compare countries to determine which is leading in AI. We find that, in general, the U.S. ranks first in most metrics, with China second, and the EU third.

4.1 Investment

Tracking overall AI investment is difficult, because it is split across a variety of companies throughout the AI supply chain, from chips to data centers to AI labs, and over a variety of public and private sources.

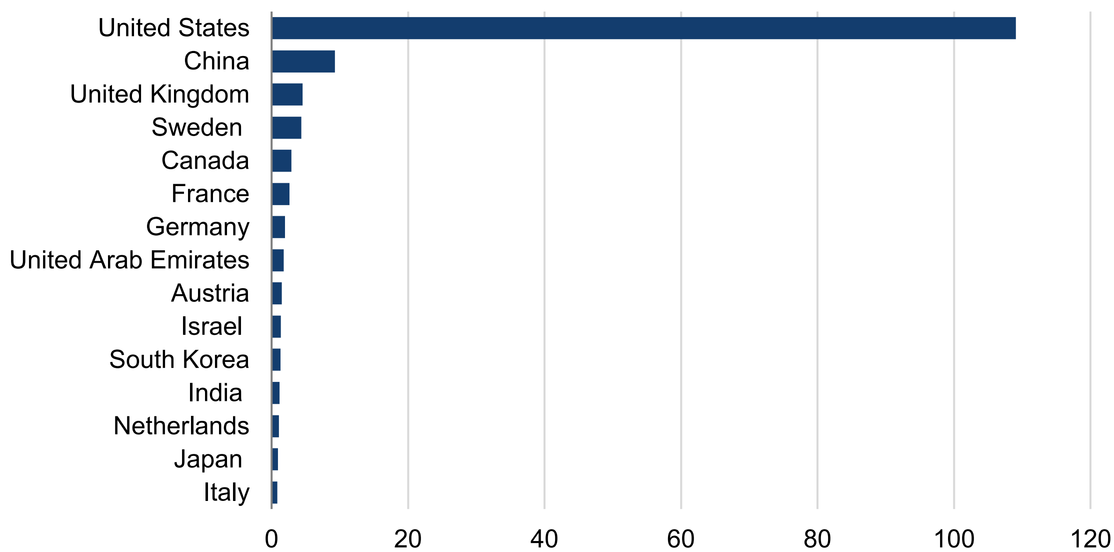
[98] Jocelyn Hong, "Access to Critical Minerals is the Achilles' Heel of Trump's AI Ambitions," *Tech Policy Press*, September 5, 2025, https://www.techpolicy.press/access-to-critical-minerals-is-the-achilles-heel-of-trumps-ai-ambitions/
[99] "World Energy Outlook Special Report," *International Energy Association*, https://www.iea.org/reports/energy-and-ai/executive-summary
[100] Amit Misra et al., "Measuring AI Diffusion: A Population-Normalized Metric for Tracking Global AI Usage," *Microsoft AI for Good Lab*, October 2025, https://aka.ms/AI_Diffusion_Technical_Report
[101] "The 2025 AI Index Report," *Stanford Institute for Human-Centered Artificial Intelligence,* 2025, https://hai.stanford.edu/ai-index/2025-ai-index-report
[102] AI Preparedness Index," *International Monetary Fund*, https://www.imf.org/external/datamapper/datasets/AIPI

Looking at total R&D spending, in 2022, Israel's R&D spending equaled 6.0 percent of its GDP, a higher share than any other country in the world. Israel was immediately followed by South Korea (5.2 percent), Taiwan (4.0 percent), the U.S. (3.6 percent) and Japan (3.4 percent).[103] By comparison, China spent 2.6 percent, and the EU spent 2.1 percent.[104]

For private investment, America's private companies are leading in AI R&D. The United States had $109 billion in private AI investment in 2024, compared with just $9 billion of private investment for second-place China, with the UK, Sweden, and Canada rounding out the top 5 (see Figure 10).[105] Unsurprisingly then, the U.S. has about 75 percent of reported venture funding in generative AI startups.[106]

Figure 10. Private Investment in AI, by Country, 2024

Billions (USD)



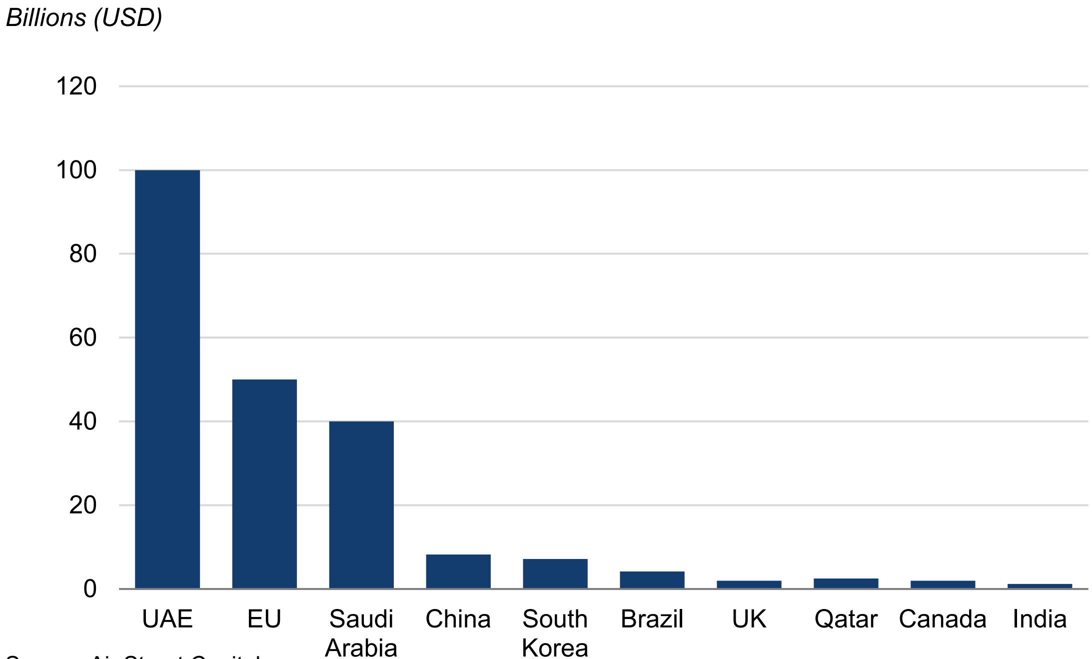
Sources: Quid; Stanford HAI Artificial Intelligence Index Report 2025.

However, private investment in private AI companies is not the only type of investment. Other countries have sought to catch up, with a variety of special AI investments by governments or sovereign wealth funds (see Figure 11 for a list of a few select major announcements).[107] In addition to expected players like the EU and China, several Middle Eastern countries are investing heavily in AI. China has a large amount of public sector AI spending, with an estimated $56 billion in 2025.[108] Saudi Arabia's Public Investment Fund established a

[103] "Overall R&D Scale and Growth," *National Science Foundation*, July 23, 2025, https://ncses.nsf.gov/pubs/nsb20257
[104] "Overall R&D Scale and Growth," *National Science Foundation*, July 23, 2025, https://ncses.nsf.gov/pubs/nsb20257
[105] "Artificial Intelligence Index Report 2025," *Stanford Institute for Human-Centered Artificial Intelligence*, 2025, https://hai.stanford.edu/assets/files/hai_ai_index_report_2025.pdf
[106] "The State of AI Competition in Advanced Economics," *Federal Reserve*, October 6, 2025, https://www.federalreserve.gov/econres/notes/feds-notes/the-state-of-ai-competition-in-advanced-economies-20251006.html#:~:text=US%20private%20investment%20in%20AI,10
[107] Air Street Press and Nathan Benaich, "The State of AI Report 2025," *Air Street Press*, October 9, 2025, https://press.airstreet.com/p/the-state-of-ai-2025
[108] Dashveenjit Kaur, "China to deploy $98bn in AI investment this year amid US tech rivalry," *Tech Wire Asia*, June 26, 2025, https://techwireasia.com/2025/06/china-ai-investment-98-billion-2025-us-rivalry/

new AI company, Humain, with a $10 billion venture fund.[109] [110] Likewise, the United Arab Emirates are partnering with OpenAI, NVIDIA, and other U.S. companies to build a variety of data centers as part of the Stargate project.[111]

Figure 11. Notable Announcements of Direct AI Spending by States and Sovereign Wealth Funds



Source: Air Street Capital.
Notes: This graph focuses on spending from direct government investment and sovereign wealth funds and thus does not include many other traditional sources of AI funding, such as from government funding of general R&D. These totals include target spending amounts for future years. This list of AI spending announcements is not exhaustive.

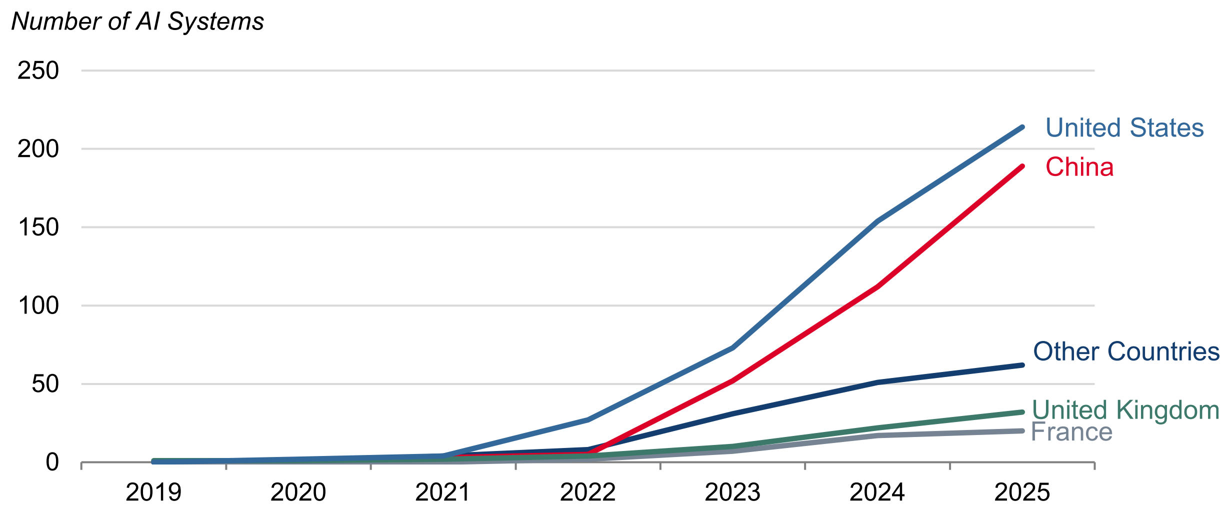
The nature of AI investment could look very different outside the United States, especially in developing countries. For example, when these countries created national telephone networks, many leapfrogged landlines and went straight to mobile phones.[112] A similar phenomenon could occur in developing countries and their use of AI, where datacenters might face electrical reliability concerns, and the main AI interaction platform could be smartphones.

[109] "HRH Crown Prince launches HUMAIN as global AI powerhouse," *Public Investment Fund of Saudi Arabia*, May 12, 2025, https://www.pif.gov.sa/en/news-and-insights/press-releases/2025/hrh-crown-prince-launches-humain-as-global-ai-powerhouse/
[110] Natasha Turak, "Saudi AI firm Humain is pouring billions into data centers. Will it pay off?", *CNBC*, August 27, 2025, https://www.cnbc.com/2025/08/27/saudi-arabia-wants-to-be-worlds-third-largest-ai-provider-humain.html
[111] "Introducing Stargate UAE," *OpenAI*, May 22, 2025, https://openai.com/index/introducing-stargate-uae/
[112] Hannah Ritchie, "Many countries are 'leapfrogging' landlines and going straight to mobile phones," *Our World in Data*, June 6, 2024, https://ourworldindata.org/data-insights/many-countries-are-leapfrogging-landlines-and-going-straight-to-mobile-phones

4.2 Performance

Given the large investments in AI in the United States, it is unsurprising that the U.S. leads with 154 AI systems of size about equal to GPT-3, about half of the world total of 331 in 2024.[113] However, due to the rapid speed of AI advancement, the performance gap between the best models of each country is relatively small. According to a report by Microsoft, "Only seven countries—the U.S., China, France, South Korea, the U.K., Canada, and Israel—rank among the top 200 models, and the distance between the frontier (U.S.) and the last of these (Israel) is now just 11 months."[114]

Figure 12. Cumulative Number of Large-Scale AI Systems by Country



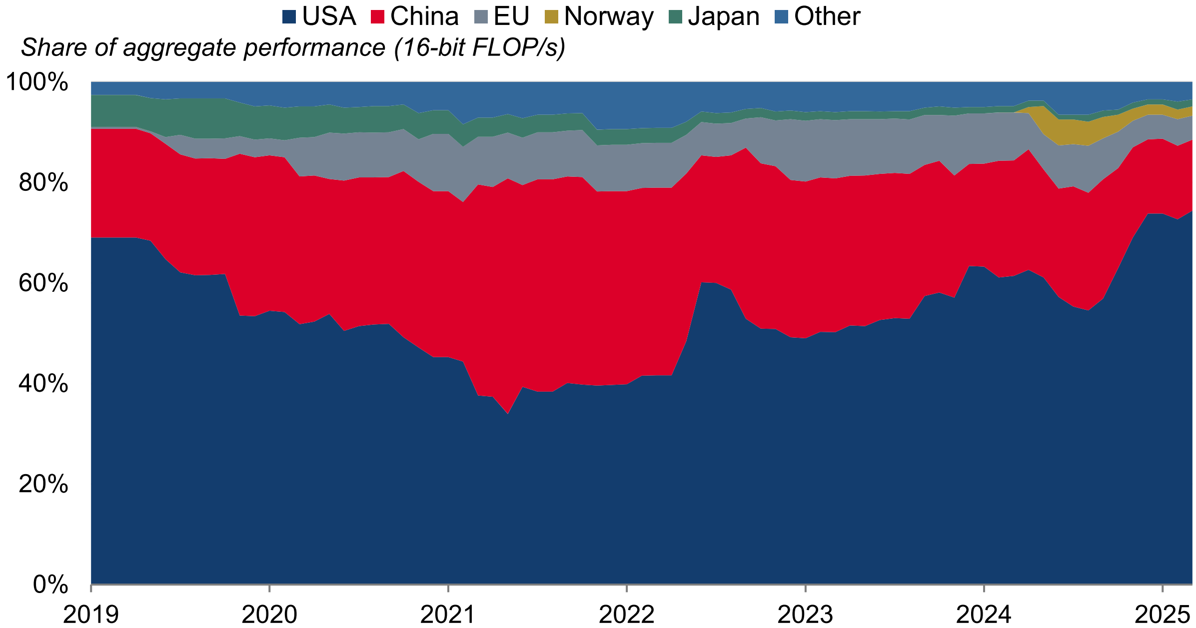
Sources: Epoch AI; Our World in Data.
Notes: This graph lists AI systems with training compute exceeding 10^23 FLOPs of compute. The "Other Countries" category includes Australia, Canada, Finland, Germany, Hong Kong, Israel, Japan, Russia, Saudi Arabia, Singapore, South Korea, Switzerland, and the United Arab Emirates.

[113] "Cumulative Number of Large-Scale AI Systems by Country Since 2017," *Our World in Data*, 2025, https://ourworldindata.org/grapher/cumulative-number-of-large-scale-ai-systems-by-country
[114] "AI Diffusion Report: Mapping Global AI Adoption and Innovation," *Microsoft*, November 2025, https://news.microsoft.com/source/emea/features/ai-diffusion-report-mapping-global-ai-adoption-and-innovation-3/

4.3 Adoption and Usage

As a result of heavy investment, as of May 2025, the United States has about 74 percent of the world's compute capacity for AI (see Figure 13),[115] [116] and much of the foreign AI hardware was originally made by U.S. companies. For example, almost all Chinese AI models are trained on U.S. hardware (see Figure 14).[117]

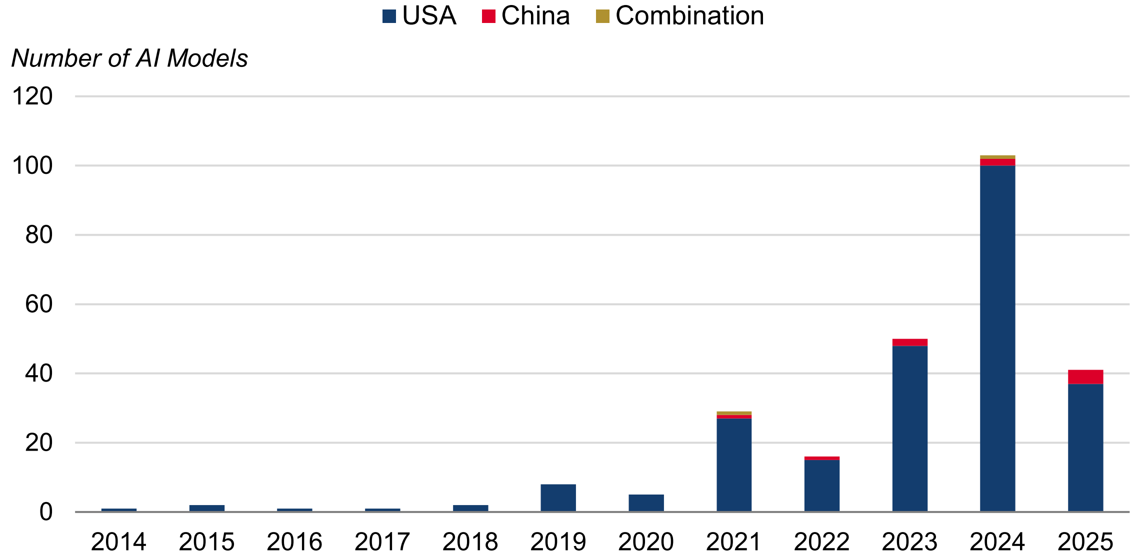
Figure 13. Share of GPU Clusters (Weighted by Cluster Performance) by Country



Source: Epoch AI.
Notes: The U.S. introduced export controls on key equipment and AI chips to China in October 2022, and strengthened these controls in October 2023 and December 2024 (Pilz et al., 2025). As of March 2025, this dataset represents approximately 10 to 20 percent of global GPU cluster performance.

[115] Konstantin F. Pilz et al., "The US hosts the majority of GPU cluster performance, followed by China," *Epoch AI*, June 5, 2025, https://epoch.ai/data-insights/ai-supercomputers-performance-share-by-country
[116] Konstantin F. Pilz et al., "Trends in AI Supercomputers," *Epoch AI*, April 23, 2025, https://epoch.ai/blog/trends-in-ai-supercomputers
[117] Georgia Adamson et al., "Should the US Sell Blackwell Chips to China," *IFP*, October 25, 2025, https://ifp.org/the-b30a-decision/

Figure 14. Chinese AI Models by Hardware Origin



Sources: Institute for Progress; Epoch AI.
Note: Chinese AI models refer to models whose developers included a Chinese organization.

Usage is more broadly distributed, with Israel and Singapore showing the highest per capita usage of the Claude AI model.[118] OpenAI shows similar trends, with the U.S. representing only 19 percent of ChatGPT traffic.[119] In general, middle-income economies have disproportionately high usage of generative AI relative to their size of their economy, and, in aggregate, accounted for 50 percent of global AI usage in 2024, while low-income economies accounted for less than 1 percent,[120] partially due to a lack of electricity.[121] In general, AI adoption is highly correlated with GDP, with significantly higher uptake in developed countries as opposed to developing countries.[122] Key factors driving this divergence are differential access to "building blocks" of AI including electricity, data centers, internet access, language, and digital skills.[123]

5 The Trump Revolution

The Trump administration is pursuing a number of policies to improve America's position on each of these indicators (investment, performance, adoption), with many policies improving multiple at the same time. Deregulation reduces the cost of constructing data center infrastructure, incentivizing AI investment. The One Big Beautiful Bill Act makes it easier for Americans to invest, and trade agreements are attracting foreign

[118] "The Anthropic Economic Index report," *Anthropic*, 2025, https://assets.anthropic.com/m/218c82b858610fac/original/Economic-Index.pdf
[119] "chatgpt.com Website Analysis for November 2025," *Similarweb*, 2025, https://www.similarweb.com/website/chatgpt.com/#traffic
[120] Yan Liu and He Wang, "Who on Earth Is Using Generative AI? (English)," *World Bank*, August 19, 2024, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099720008192430535
[121] Gabriel Demombynes et al., "Publication: The Exposure of Workers to Artificial Intelligence in Low- and Middle-Income Countries," *World Bank*, February 2, 2025, https://openknowledge.worldbank.org/entities/publication/4a11a37d-149a-44fb-a941-100065ff5eb8
[122] "AI Diffusion Report: Where AI is most used, developed and built," *Microsoft*, 2025, https://www.microsoft.com/en-us/research/group/aiei/ai-diffusion/
[123] "AI Diffusion Report: Where AI is most used, developed and built," *Microsoft*, 2025, https://www.microsoft.com/en-us/research/group/aiei/ai-diffusion/

investment. All this investment leads to the AI performance necessary for American AI to dominate, while American energy dominance provides the electricity to meet the increasing demand from AI.

5.1 Investment

One Big Beautiful Bill. The One Big Beautiful Bill Act (Public Law 119-21, signed July 4, 2025) restored and expanded full, immediate expensing for qualified investment and extended pro-investment business provisions, shifting after-tax hurdle rates in favor of building now.[124] The federal corporate income tax rate remains at 21 percent,[125] the law preserves and refines a range of internationally focused provisions,[126] and it invested more than a billion dollars across a variety of AI initiatives.[127] CEA analysis predicts OBBB will increase GDP growth by more than 1 percent per year over the four years after its passage, and raise real wages by $4,000 to $7,200 per worker.[128]

Of particular relevance to the AI boom, the One Big Beautiful Bill brings back 100 percent bonus depreciation for IT infrastructure and data center equipment.[129] CEA estimates that, altogether, OBBB will lead to a 7-10 percent increase in investment, incentivizing the building of data centers, power infrastructure, and chip manufacturing.[130]

Trade Deals. As part of trade deals and other agreements, President Trump has secured trillions of dollars of investment commitments from foreign countries. The European Union, in its trade agreement, specifically committed to buying $40 billion of U.S. AI chips, and the United Arab Emirates specifically mentioned AI as one of the key sectors that its $1.4 trillion in U.S. investment will be directed toward.

5.2 Performance

The AI Action Plan. The Trump administration's AI policy is outlined in its 2025 AI Action Plan and several related executive orders. The policy focuses on attaining American international dominance in AI through rapidly building data centers, enabling and accelerating innovation, and upholding free speech in AI models.[131]

To reach these goals, the action plan outlines concrete steps. For example, regarding the rapid buildout of data centers, the plan recommends establishing new categorical exclusions under NEPA for data centers in

---

[124] Agustin Ceballos et al., "Key Tax Changes in Public Law 119-21: What Individuals and Businesses Need to Know," *JD Supra*, July 29, 2025, https://www.jdsupra.com/legalnews/key-tax-changes-in-public-law-119-21-9564817/
[125] Amanda Pedvin Varma and Lauren Azebu, "International Tax Changes in the One Big Beautiful Bill Act," *Steptoe*, July 10, 2025, https://www.steptoe.com/en/news-publications/international-tax-changes-in-the-one-big-beautiful-bill-act.html
[126] Agustin Ceballos et al., "Key Tax Changes in Public Law 119-21: What Individuals and Businesses Need to Know," *JD Supra*, July 29, 2025, https://www.jdsupra.com/legalnews/key-tax-changes-in-public-law-119-21-9564817/
[127] "How the One Big Beautiful Bill Act reshapes the tax landscape for technology companies," *BPM*, August 15, 2025, https://www.bpm.com/insights/obbba-tech-companies/
[128] "The One Big Beautiful Bill: Legislation for Historic Prosperity and Deficit Reduction," *The White House*, June 25, 2025, https://www.whitehouse.gov/research/2025/06/the-one-big-beautiful-bill-legislation-for-historic-prosperity-and-deficit-reduction/
[129] "How the One Big Beautiful Bill Act reshapes the tax landscape for technology companies," *BPM*, August 15, 2025, https://www.bpm.com/insights/obbba-tech-companies/
[130] "The One Big Beautiful Bill: Legislation for Historic Prosperity and Deficit Reduction," *The White House*, June 25, 2025, https://www.whitehouse.gov/research/2025/06/the-one-big-beautiful-bill-legislation-for-historic-prosperity-and-deficit-reduction/
[131] "White House Unveils America's AI Action Plan," *The White House*, July 23, 2025, https://www.whitehouse.gov/articles/2025/07/white-house-unveils-americas-ai-action-plan/

order to fast track the permitting process.[132] To enable and accelerate innovation, the plan recommends direct investment in AI technology by various federal agencies along with the establishment of AI Centers of Excellence where researchers and startups are incentivized to rapidly deploy and test AI tools in contexts committed to the open sharing of data and results.[133] Regarding the upholding of free speech, the plan recommends that federal procurement guidelines be updated to mandate that the government only contracts with AI developers who ensure that their systems are objective and free from top-down ideological bias.[134]

Deregulation. Excessive regulation harms economic activity by increasing costs,[135] stifling competition[136] and innovation,[137] and raising consumer prices.[138] This can reduce growth,[139] startup activity and job formation,[140] and increase the poverty rate,[141] with a disproportionate impact on small businesses.[142]

On July 23, President Trump signed an executive order to accelerate permitting for data centers as well as their underlying energy and manufacturing infrastructure.[143] Then, on December 11, President Trump signed an executive order to reduce barriers at the state level as well.[144]

As previously studied by CEA, deregulatory efforts by the Trump Administration aim to ameliorate these issues and deliver benefits to the AI sector along with other sectors throughout the economy. CEA estimates that these deregulatory efforts are capable of delivering meaningful productivity gains that translate into an extra 0.3 to 0.8 percentage points of GDP growth each year for two decades—a cumulative increase of approximately 6 to 17 percent by 2045.[145]

---

[132] "Winning the Race: America's AI Action Plan," *The White House*, July 2025, https://www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf

[133] "Winning the Race: America's AI Action Plan," *The White House*, July 2025, https://www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf

[134] "White House Unveils America's AI Action Plan," *The White House*, July 23, 2025, https://www.whitehouse.gov/articles/2025/07/white-house-unveils-americas-ai-action-plan/

[135] W. Mark Crain and Nicole V. Crain, "The Cost of Federal Regulation to the U.S. Economy, Manufacturing, and Small Businesses," *National Association of Manufacturers*, September 10, 2014, https://www.nam.org/wp-content/uploads/2019/05/Federal-Regulation-Full-Study.pdf

[136] Fred Ashton, "Excessively Burdensome Regulation Negatively Impacts Competition," *American Action Forum*, May 9, 2023, https://www.americanactionforum.org/insight/excessively-burdensome-regulation-negatively-impacts-competition/

[137] Philippe Aghion et al., "The Impact of Regulation on Innovation," *American Economic Review*, 2023, https://www.aeaweb.org/articles?id=10.1257/aer.20210107

[138] Dustin Chambers et al., "How do federal regulations affect consumer prices? An analysis of the regressive effects of regulation," *Springer*, July 2019, https://www.jstor.org/stable/pdf/48704154.pdf

[139] Bentley Coffey et al., "The cumulative cost of regulations," *Review of Economic Dynamics*, October 2020, https://www.sciencedirect.com/science/article/abs/pii/S1094202520300223

[140] James B. Bailey and Diana Weinert Thomas, "Regulating Away Competition: The Effect of Regulation on Entrepreneurship and Employment," *SSRN*, June 7, 2018, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3191318

[141] Dustin Chambers et al., "Regulation and poverty: an empirical examination of the relationship between the incidence of federal regulation and the occurrence of poverty across the US states," *Springer Nature*, September 24, 2018, https://link.springer.com/article/10.1007/s11127-018-0603-8

[142] W. Mark Crain and Nicole V. Crain, "The Cost of Federal Regulation to the U.S. Economy, Manufacturing, and Small Businesses," *National Association of Manufacturers*, September 10, 2014, https://www.nam.org/wp-content/uploads/2019/05/Federal-Regulation-Full-Study.pdf

[143] "Accelerating Federal Permitting of Data Center Infrastructure," *Federal Register*, July 28, 2025, https://www.federalregister.gov/documents/2025/07/28/2025-14212/accelerating-federal-permitting-of-data-center-infrastructure

[144] "Ensuring a National Policy Framework for Artificial Intelligence" *Federal Register*, December 16, 2025. https://www.federalregister.gov/documents/2025/12/16/2025-23092/ensuring-a-national-policy-framework-for-artificial-intelligence

[145] "The Economic Benefits of Current Deregulatory Policies," *The White House*, June 2025, https://www.whitehouse.gov/wp-content/uploads/2025/03/The-Economic-Benefits-of-Current-Deregulatory-Efforts.pdf

5.3 Adoption and Usage

Energy Dominance. President Trump has made energy dominance one of the priorities of his administration.[146] The administration has already taken important actions to stimulate domestic production and reduce costs by resuming federal leasing for energy development, issuing new permits for liquified natural gas export terminals, and supporting advanced nuclear development, among others.[147] Not counting deregulation, CEA estimates that policies that support American energy dominance could raise U.S. GDP by at least 0.3 percent to 1.2 percent by 2035, without accounting for synergies with AI.[148]

Even more so than traditional data centers, generative AI data centers are especially electricity-hungry, and AI data centers are forecast to grow from 4 percent of U.S. electricity demand in 2023 to 7 to 12 percent by 2028.[149] To accommodate this increase in demand, the AI Action Plan includes concrete policy actions relating to building up the energy grid. In particular, it recommends exploring grid management technologies and upgrades to power lines in order to optimize and stabilize the existing grid, in tandem with prioritizing the construction and connection of new power plants using a variety of energy sources to the grid. By April 2025, the Department of Energy has already identified 16 potential sites with the energy infrastructure that positions them for rapid data center construction.[150]

6 Conclusion

The AI revolution, with its parallels to the Industrial Revolution, presents a profound economic inflection point with the potential to significantly increase the GDP of countries that embrace it. We are witnessing clear leaders in AI investment, performance, and adoption metrics across different nations. The United States, as demonstrated by the comprehensive AI Action Plan and related executive orders from the Trump administration, is pursuing a strategy focused on accelerated innovation, infrastructure development, and establishing global dominance through technology exports and deregulation in order to lay the groundwork for American AI dominance.

---

[146] "The Economic Benefits of Unleashing American Energy," *The White House*, July 12, 2025, https://www.whitehouse.gov/research/2025/07/the-economic-benefits-of-unleashing-american-energy/

[147] "The Economic Benefits of Unleashing American Energy," *The White House*, July 12, 2025, https://www.whitehouse.gov/research/2025/07/the-economic-benefits-of-unleashing-american-energy/

[148] "The Economic Benefits of Unleashing American Energy," *The White House*, July 12, 2025, https://www.whitehouse.gov/research/2025/07/the-economic-benefits-of-unleashing-american-energy/

[149] Shuting Pomerleau and Angela Luna, "AI Data Centers: Why Are They So Energy Hungry?", *American Action Forum*, July 15, 2025, https://www.americanactionforum.org/insight/ai-data-centers-why-are-they-so-energy-hungry/

[150] "DOE Identifies 16 Federal Sites Across the Country for Data Center and AI Infrastructure Development," *U.S. Department of Energy*, April 3, 2025, https://www.energy.gov/articles/doe-identifies-16-federal-sites-across-country-data-center-and-ai-infrastructure