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OUTFRONT

GENERATIVE AI:
FINDING THE COMPETITIVE EDGE AMID CREATIVE DESTRUCTION

Fall 2023

$15.7 TRILLION

THE AMOUNT OF VALUE THAT GENERATIVE AI COULD ADD TO THE GLOBAL ECONOMY BY 2030

Source: PwC, July 2023

The rapid explosion of generative AI for general use has captured the global imagination with what the technology might enable.

It's expected to have a profound impact on economic growth by exponentially increasing productivity. That's because everything today – from culture to consumer products – is a product of intelligence.

If the excitement around generative AI proves justified, it may unleash the biggest wave yet of what Joseph Schumpeter, the famed Austrian economist, termed "creative destruction." AI innovation will refresh the economy by destroying traditional businesses, replacing them with something more productive.

For investors, though, the key question is: If generative AI chatbots quickly commoditize intelligence, where will competitive advantage lie in a world of endemic generative AI?

2023'S AI RALLY ANTICIPATES A RAPIDLY APPROACHING FUTURE

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When ChatGPT-3, the first generative AI chatbot, was launched by Microsoft-backed OpenAI in November 2022, it quickly became the fastest-growing app ever, attracting an estimated 100 million users within two months.

*Meta's Threads microblogging app has since surpassed it by reaching 100 million users in five days.

Accelerated Adoption - Number of Days to Reach 100 Million Users

ChatGPT **61**

Instagram **854**

Facebook **1608**

Twitter **1903**

Netflix **7337**

■ Days to 1M ■ Days to 10M ■ Days to 100M
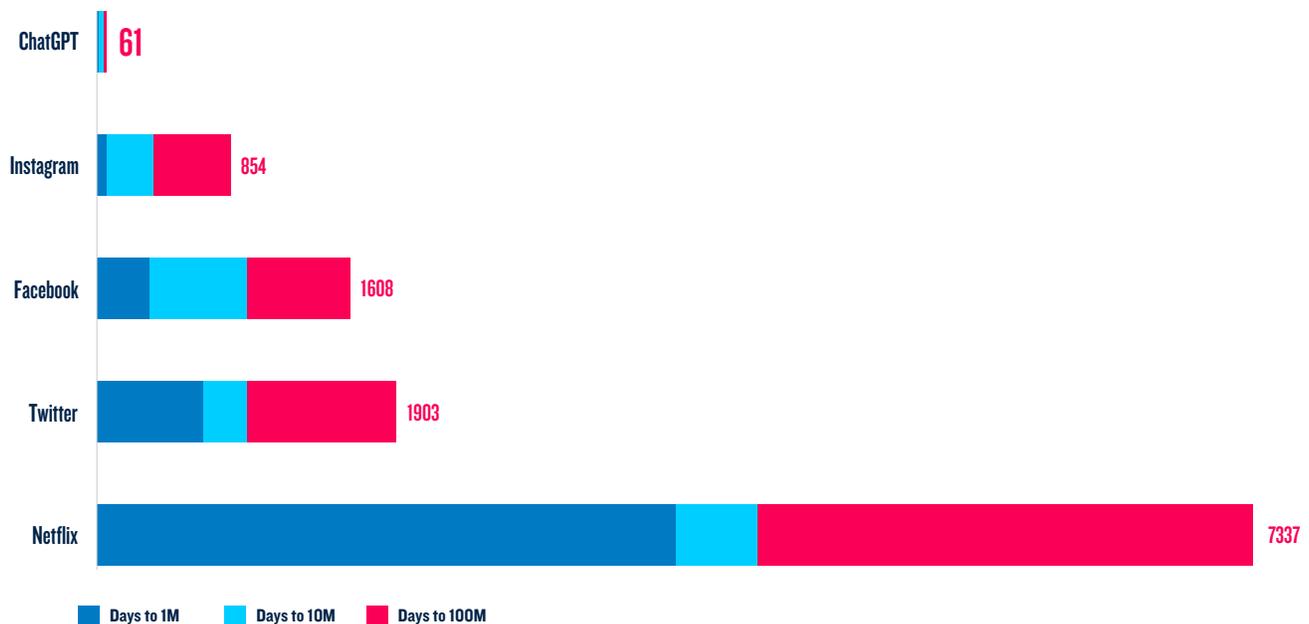
Source: Reuters, July 2023

OpenAI expects this growth to drive rapid financial gains; in a 2022 pitch to its private investors, it estimated reaching $200 million of revenue in 2023, rising to $1 billion in 2024.

With rapid adoption across sectors and use cases, the technology is improving exponentially faster at a rate not previously seen.

Indeed, a new wave of AI helpers, or agents, like the Microsoft 365 Copilot are being developed to perform complex personal and work tasks without needing close supervision.

Source: Reuters, December 2022

Rapid Growth of GPT Models

Parameters are one of the defining characteristics of AI models. They determine how the model processes the data and how it generates predictions.
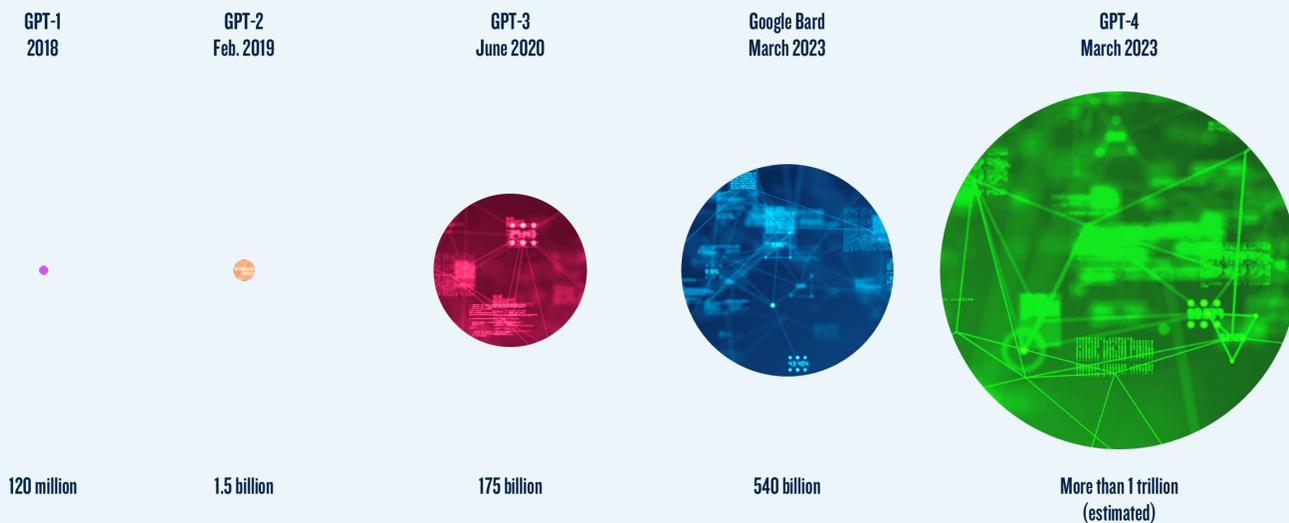
GPT-1 2018	GPT-2 Feb. 2019	GPT-3 June 2020	Google Bard March 2023	GPT-4 March 2023
120 million	1.5 billion	175 billion	540 billion	More than 1 trillion (estimated)

But rather than just incorporating more and more data, can generative AI autonomously outperform humans at the most economically valuable work, as outlined in the OpenAI charter? And when? Researchers have put GPT to the test, literally, to measure performance against prospective lawyers.

**How GPT Models Performed on the Multiple-Choice Multistate Bar Examination (MBE)**

Correct Rate

- 80%
- 70%
- 60% — Average MBE Passing Range
- 50% — Q1 2019 · Q4 2022 · Q1 2023
- 40%
- 30% — Random Guessing
- 20%
- 10%
- 0%

GPT-2 | ada 001 | babbage 001 | curie 001 | davinci 001 | GPT-3.5 | ChatGPT | GPT-4 | Student Avg. (NCBE BarNow)

Legend:
- GPT <=3.5
- GPT-4
- NCBE

Source: "GPT-4 Passes the Bar Exam," Katz, Bommarito, Gao, Arredondo. March 2023

Generative AI quickly became 2023's stock market sensation, sparking a huge rally mainly in the U.S. for shares in Microsoft and other tech companies poised to benefit.

Despite a bleak backdrop of rising interest rates and possible recession, the price of big U.S. tech companies leapt in the first six months of 2023.
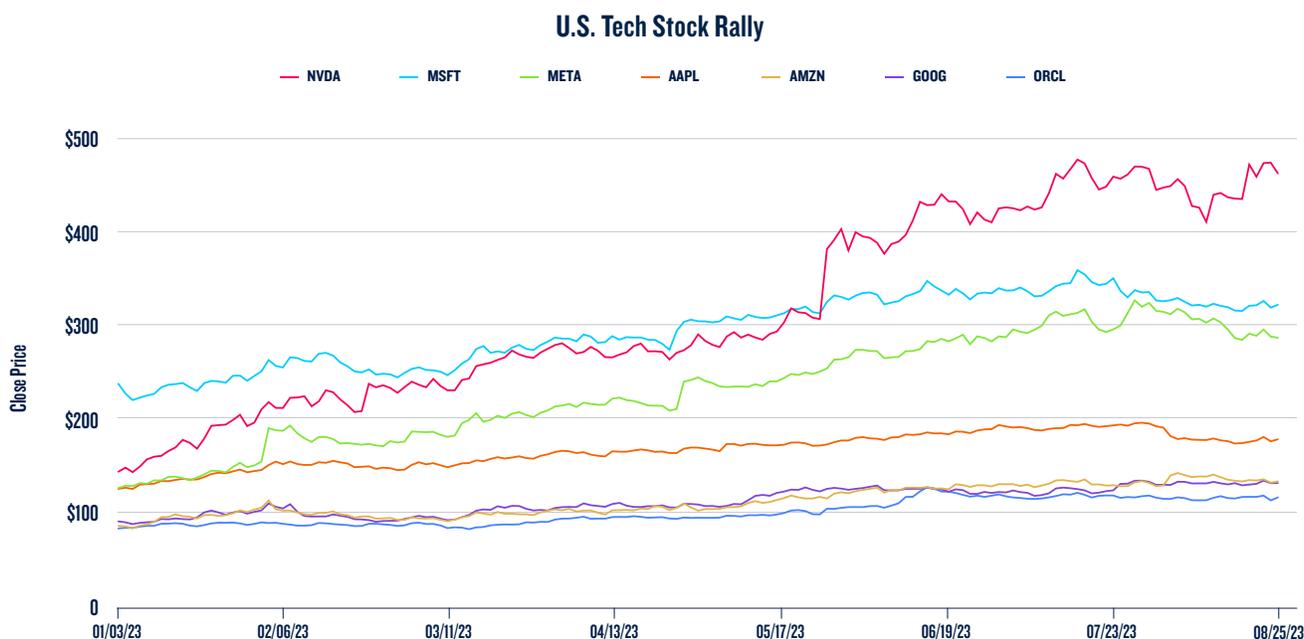
U.S. Tech Stock Rally

— NVDA   — MSFT   — META   — AAPL   — AMZN   — GOOG   — ORCL

For illustration purpose only. All investments involve risk, including the possible loss of capital.   Source: Refinitiv

So, too, has the price of the Netherlands' ASML, a leading supplier of the equipment needed for making the semiconductor chips that generative AI requires, as well as the price of Taiwan Semiconductor.
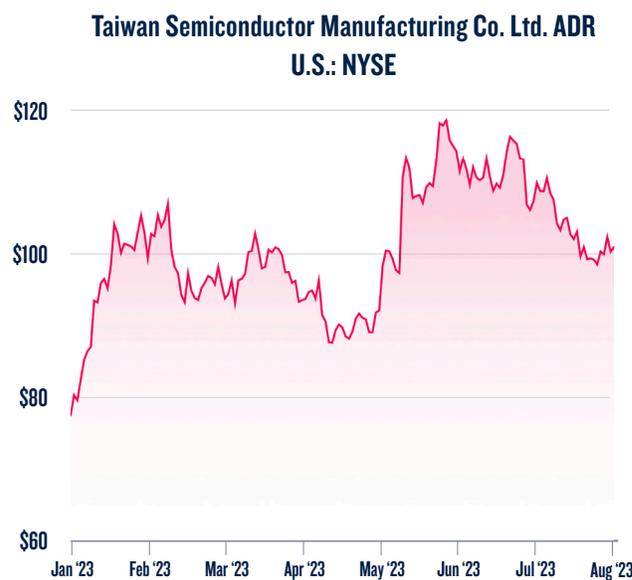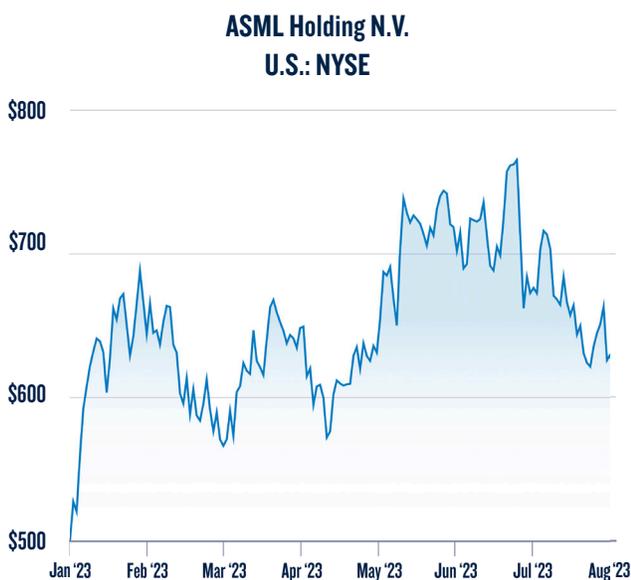
ASML Holding N.V.
U.S.: NYSE

Taiwan Semiconductor Manufacturing Co. Ltd. ADR
U.S.: NYSE

For illustration purpose only. All investments involve risk, including the possible loss of capital.   Source: Refinitiv

THE RALLY'S FLIPSIDE

Beyond the big tech companies, there are already signs of companies being disrupted. For instance, the share price of Chegg, the U.S. edtech company, has fallen by two thirds in the first six months of 2023.

It fell by 50% in one day during May after reporting a hit to its business from generative AI, as some students turned to chatbots for answers rather than subscribing to its services.

Chegg's AI Reckoning
U.S.: NYSE

For illustration purpose only. All investments involve risk, including the possible loss of capital.

Source: Refinitiv

The sectors most at risk of having work tasks automated could also be those most at risk of losing their competitive advantages.

That puts asset-light intelligence-based businesses like law firms, architecture and engineering at the top of the list, according to Goldman Sachs' insights into where work is most likely to be automated. Similar businesses to education technology – such as translation and financial advice companies – might also prove to be at risk.

Share of Industry Employment Exposed to Automation by AI in the U.S.

Industry	Share
Office & admin support	46
Legal	44
Architecture & engineering	37
Life, physical, social sci	36
Business & financial ops	35
Community & social service	33
Management	32
Sales & related	31
Computer & mathematical	29
Farming, fishing, forestry	28
Protective service	28
HC practitioners & technical	28
Edu instruction & library	27
Healthcare support	26
Art, dsgn, ent, sport, media	26
Personal care & service	19
Food prep & serving	12
Transport & material moving	11
Production	9
Construction & extraction	6
Installation, maint, repair	4
Bldg & grounds clean/maint	1

All industries (reference line at ~26%)

Source: Goldman Sachs GIR, April 2023

SUSTAINABLE COMPETITIVE ADVANTAGE IN AN AI WORLD

CHAPTER 2
SUSTAINABLE COMPETITIVE ADVANTAGE IN AN AI WORLD

In a world where all businesses have access to generative AI, how do you sustain competitive advantage? The technology looks likely to disrupt, or at least dilute, many existing economic moats – the characteristics of a business that protect it from competition and maintain its profit margins. AI could reshape entire industries and create completely new ones.

Some investors argue that the big tech companies' generative AI models are becoming increasingly commoditized and may be outcompeted by smaller open-source models – and the first quasi-autonomous agents may be developed by nimble start-ups. After all, the large language models used by chatbots like ChatGPT are available to everyone.

In a generative AI world, two new sources of competitive advantage are emerging – the quality of your data and the quality of your people, especially those with advanced AI skills.

Turning first to data, long-term advantages can come from how a business fine-tunes its large language models.

"

One of the reasons that data is very critical to artificial intelligence, and machine learning in general, is that the models themselves are useless without data. There are sometimes trillions of parameters that need to be estimated, and unless you have enough data to train the models, the output is not going to be useful at all. So data is really critical and people and firms that have large amounts of proprietary data are going to be at a clear advantage in this space. "

GEORGE PATTERSON
Chief Investment Officer, PGIM Quantitative Solutions

Fine-tuning data for an existing open-source or paid model is inexpensive.

$1,915 - $7,418

Cost to fine-tune a large language model to complete a complex legal classification according to a model by Snorkel AI that equips organizations to build AI models. Such an application could save hours of a lawyer's time, which can cost up to $500 per hour.

Source: Boston Consulting Group, March 2023

Sometimes the data doesn't need to be proprietary— just very hard to gather.

If, for example, you wanted to use an AI program to automatically identify building materials from photographic images, you would need to take photos of hundreds of thousands of structures and map those structures to the relevant building materials, according to Deloitte.

Most of the work in building the AI program would go into gathering and organizing the data. It's not proprietary but the scale of the effort involved acts as a barrier to entry.

Source: Deloitte, 2023
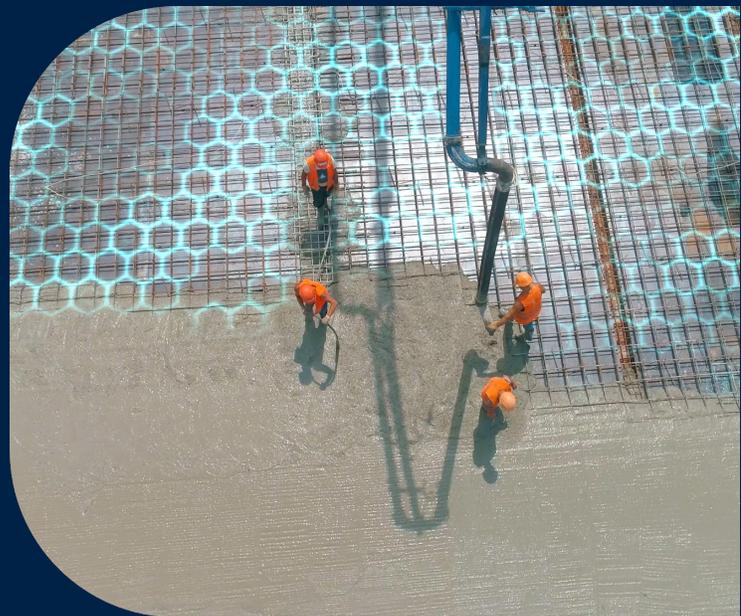
Turning to people, employees with AI skills who can help a business fine-tune data or integrate AI into its processes can also create a competitive advantage.

The U.S. saw nearly 800,000 AI-related job openings in 2022, according to the Stanford Institute for Human-Centered Artificial Intelligence's 2023 AI Index Report.

And in March 2023, LinkedIn reported that there were just over 100,000 jobs on its site that mentioned artificial intelligence in the job description.

AI Job Postings (% of All Job Postings) by Geographic Area, 2014-22

AI Job Postings (% of All Job Postings)

- 2.05%, United States
- 1.45%, Canada
- 1.33%, Spain
- 1.23%, Australia
- 1.20%, Sweden
- 1.16%, Switzerland
- 1.14%, United Kingdom
- 1.01%, Netherlands
- 0.98%, Germany
- 0.89%, Austria
- 0.86%, Belgium
- 0.84%, France
- 0.72%, Italy
- 0.45%, New Zealand
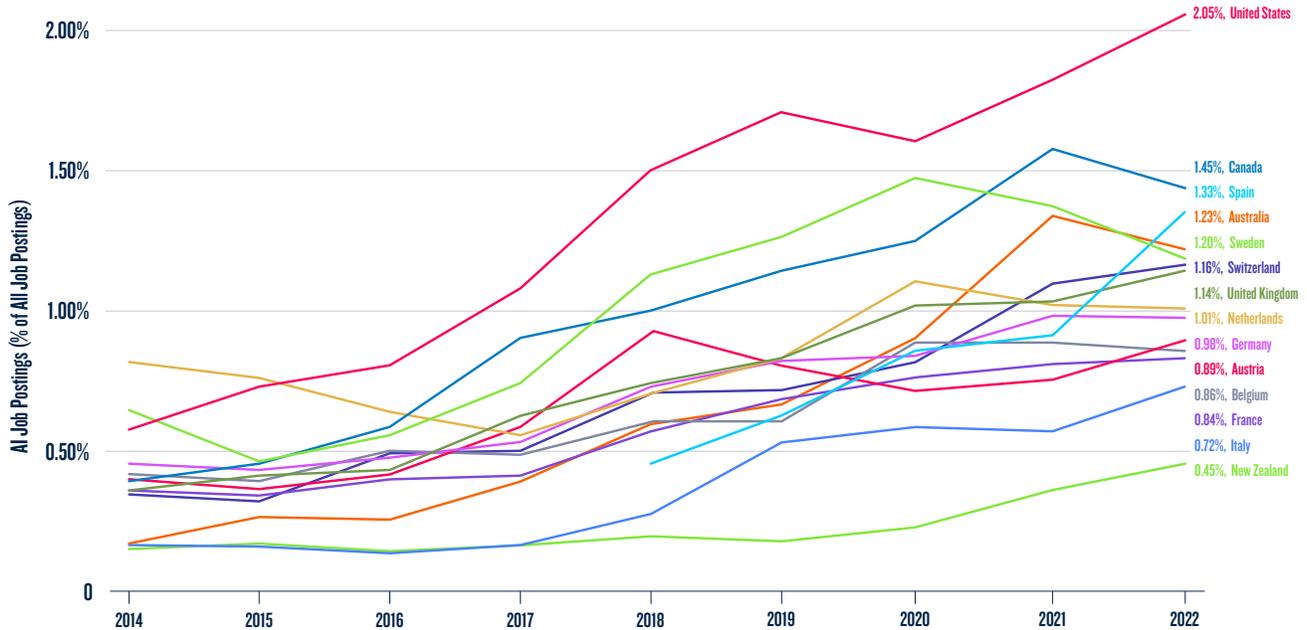
Source: Lightcast, 2022 | Chart: 2023 AI Index Report

Of course, AI will not breach all traditional economic moats.

For example, a company that exists in a business where the start-up costs are prohibitive for new entrants would have a formidable competitive advantage.

Similarly, a pharmaceutical company with a patent for a miracle drug would still benefit from the exclusive right to market the drug.

"

The big companies who are already very, very powerful, who also have access to a lot of data, it's likely that these big tech firms will only grow bigger, more powerful with fewer employees. They can do the same work with fewer employees because they use the same technology... So they will become leaner and smaller, but also a lot more powerful. And then on the other end, we have the open-source approach. That might also be a company coming from left field. So it's very difficult to see where this will go."

MARK VAN RIJMENAM
Strategic futurist

WHICH COUNTRIES ARE GAINING COMPETITIVE ADVANTAGE?

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If investment in AI leads to competitive advantage, then the U.S. is far ahead of even China, its nearest rival in the race to become leader.

In 2022, the $47.4 billion invested by the U.S. was roughly 3.5 times the amount invested by the next highest country, China, and 11 times the amount invested by the U.K. Notably, all of the big generative AI releases have come from the U.S.

Private Investment in AI by Geographic Area, 2022

Country	Investment
United States	47.36
China	13.41
United Kingdom	4.37
Israel	3.24
India	3.24
South Korea	3.10
Germany	2.35
Canada	1.83
France	1.77
Argentina	1.52
Australia	1.35
Singapore	1.13
Switzerland	1.04
Japan	0.72
Finland	0.61

Total Investment (in Billions of U.S. Dollars)
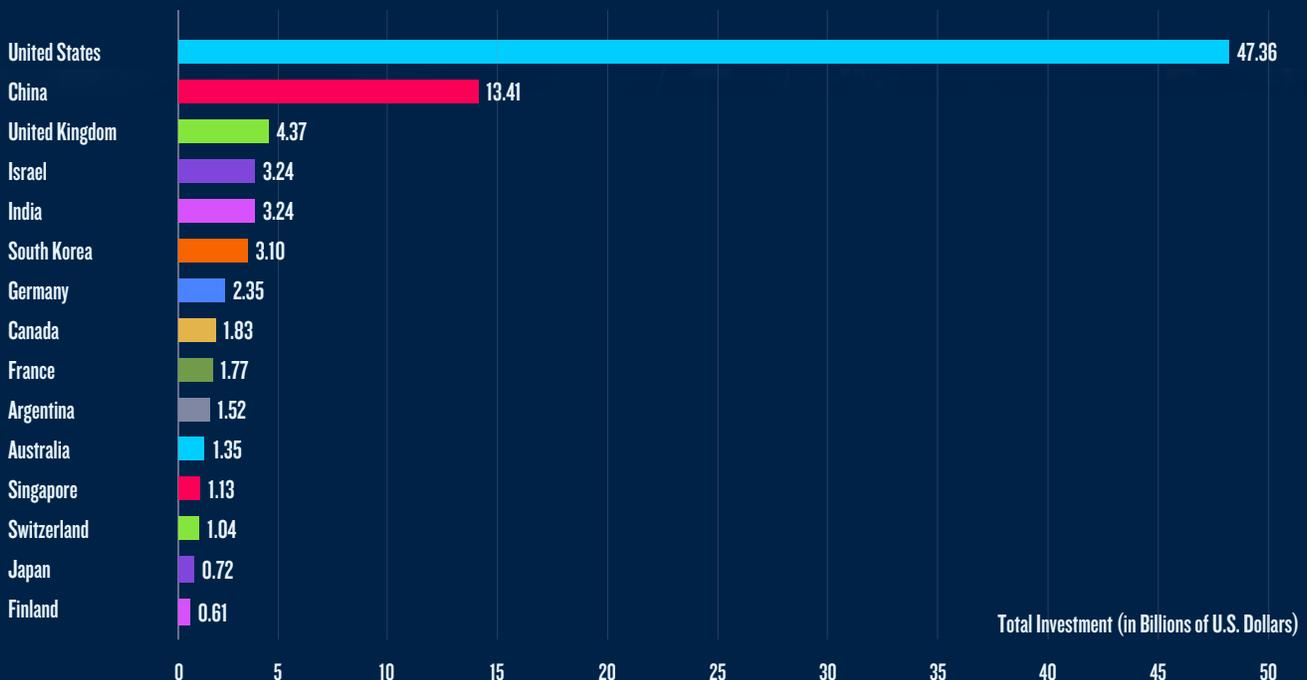
Source: NetBase Quid, 2022 | Chart: 2023 AI Index Report

"

There's no question that the initial breakthroughs and the current leadership as of 2023 in generative AI technology is really with the U.S. Why? In part, when you look at some of the other biggest players in the world that are trying to compete, for instance, for some of the Chinese launch language models, there is far less Internet data in Chinese language. So unless they want to build their launch language models in English, they're starting off with a linguistical disadvantage and a volume disadvantage in the amount of data available to train their models.

"And then there is more likelihood of intrusion and heavy-handed regulation in a country like China than there would be in the U.S. But of course, it's contingent on regulation being able to strike a good balance between protecting the public but allowing the development of this very powerful new technology."

RAJ SHANT
Managing Director, Jennison Associates

However, there are areas where China pulls ahead. For instance, China dominates industrial robot installations, enabled by AI to collaborate with humans in factories. In 2021, China installed more industrial robots than the rest of the world combined.

What's more, its citizens are among those who feel most positively about AI products and services.

A 2022 IPSOS survey found that 78% of Chinese respondents agreed with the statement that products and services using AI have more benefits than drawbacks. By contrast, only 35% of Americans agreed that products and services using AI have more benefits than drawbacks.

Source: Ipsos, January 2022

Positive Sentiment Toward Products and Services Using AI by Country

Germany 37%

UK 38%

Japan 42%

U.S. 35%

China 78%

Italy 50%

Spain 53%

Saudi Arabia 76%

India 71%

Australia 37%
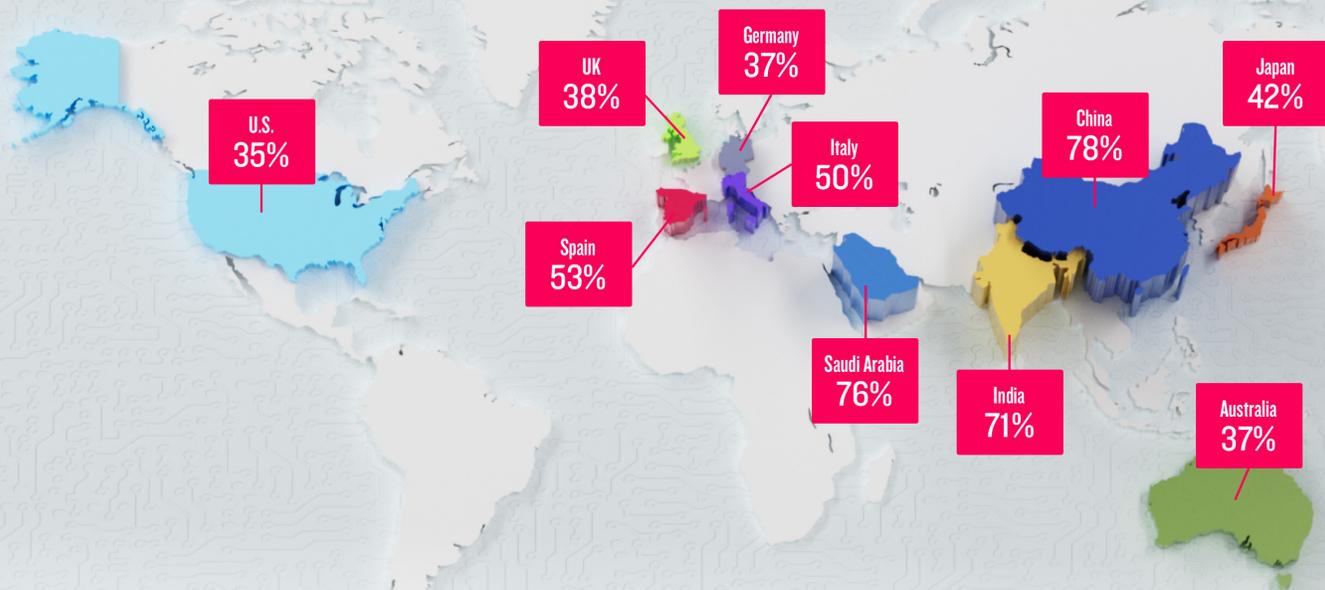
Source: Ipsos

Developed countries are likely to adopt generative AI fastest because wages are highest and so they have most incentive, according to McKinsey. But this will only feed into productivity gains if displaced workers find new activities with at least the same economic output.

300 MILLION

Estimated number of jobs lost to AI over a 10-year period

Source: Goldman Sachs, April 2023

The potential for AI to replace humans in the workforce inspired a UK-based think tank called Onward to advocate for a shift in the burden of taxation from labor to capital.

Source: ONWARD, May 2023

POSSIBLE DRAGS TO DISRUPTION

CHAPTER 4
POSSIBLE DRAGS TO DISRUPTION

Of course, the huge excitement around generative AI's potential is as yet untested. There are many reasons why the future of generative AI may not prove as revolutionary as supposed.

Most important is the technology's limitations.
Ask ChatGPT what its IQ is and it answers the following:

What is your IQ?

"

ChatGPT does not have an IQ in the traditional sense. IQ is a measure of human intelligence, which is assessed through various tests that evaluate cognitive abilities such as reasoning, problem-solving and critical thinking. As an AI language model, ChatGPT doesn't possess human-like intelligence or consciousness. Its performance is primarily based on pattern recognition and statistical analysis of text data from a wide range of sources. While ChatGPT can generate responses that may appear intelligent, it does not have a personal IQ score as it lacks subjective experience and self-awareness."

CHATGPT
Chat Generative Pre-Trained Transformer

Turning to specific problems, it's fair to say that generative AI has an intellectual property problem.

There's a flurry of lawsuits accusing generative AI companies of breaching copyright. Among them, three artists have sued Stability AI, Midjourney and DeviantArt in San Francisco for alleged unauthorized copying of their work to train their systems.

What's more, amid existential fears about machine super-intelligence and job losses, there is regulation looming in the U.S., EU and China.

A record 37 AI-related laws were passed in 2022, according to Stanford University. The EU's AI Act aims to be the first comprehensive regulatory scheme.

Source: Reuters, April 2023
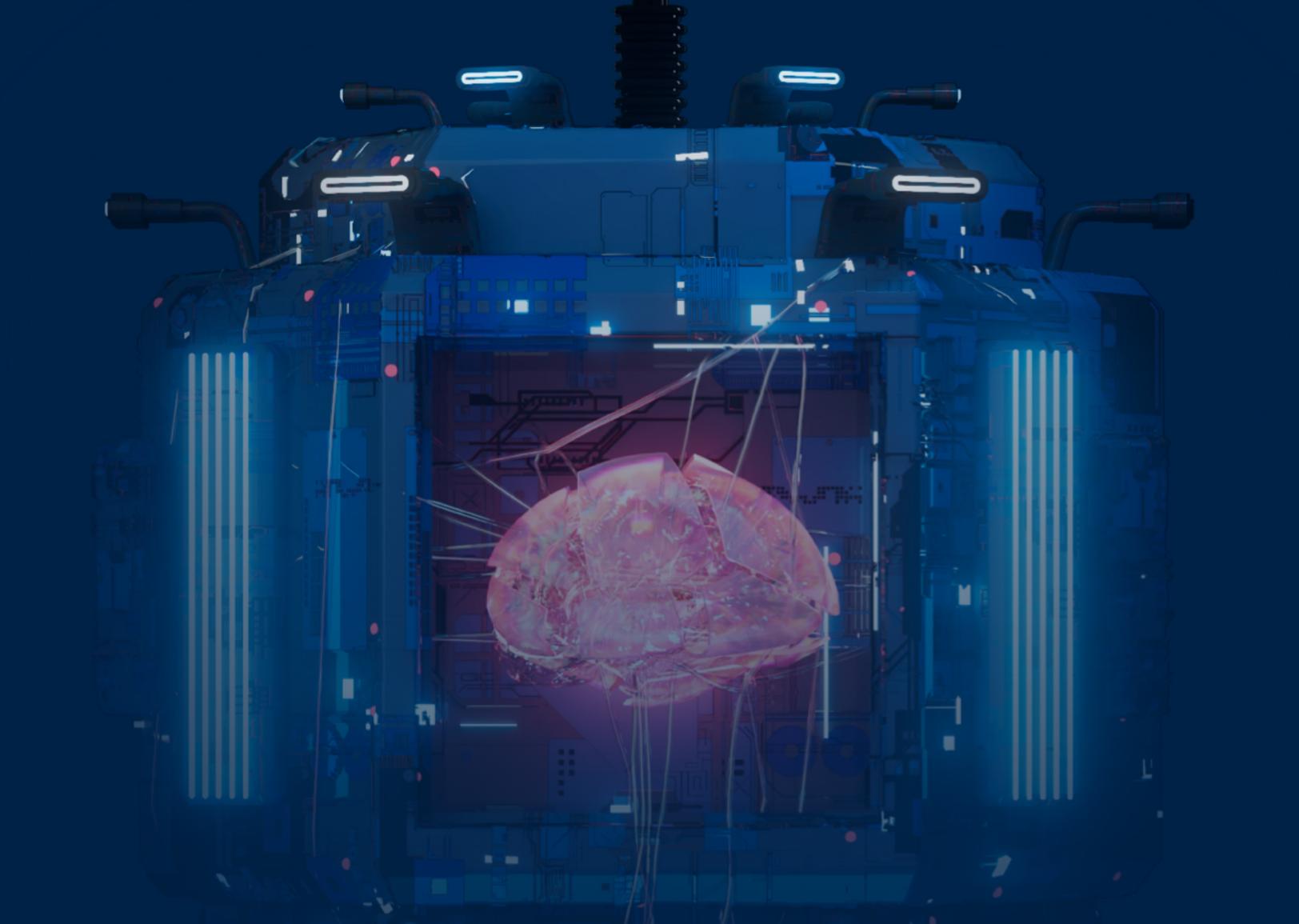
CONCLUSION

Looking to the future, companies with a combination of high-quality proprietary data, and with people with advanced AI skills who can fine-tune data or integrate it into business processes, are likely to gain a competitive advantage.

By contrast, the asset-light business sectors where there are predictions of job losses such as law firms, architecture or engineering may prove most at risk.

Yet there are possible hurdles that could slow the growth of AI. Firstly, regulation is even now being crafted but its eventual shape is unclear. And, secondly, there are battles underway over the ownership of intellectual property scraped by AI companies to train their models.

2023's rapid share price rallies signal the excitement about generative AI. It's a fast-moving business revolution that looks sure to breach some economic moats while creating an opening for building others.

Important Information

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