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J.P. Morgan Asset & Wealth Management AI Tracker

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J.P. Morgan Asset and Wealth Management

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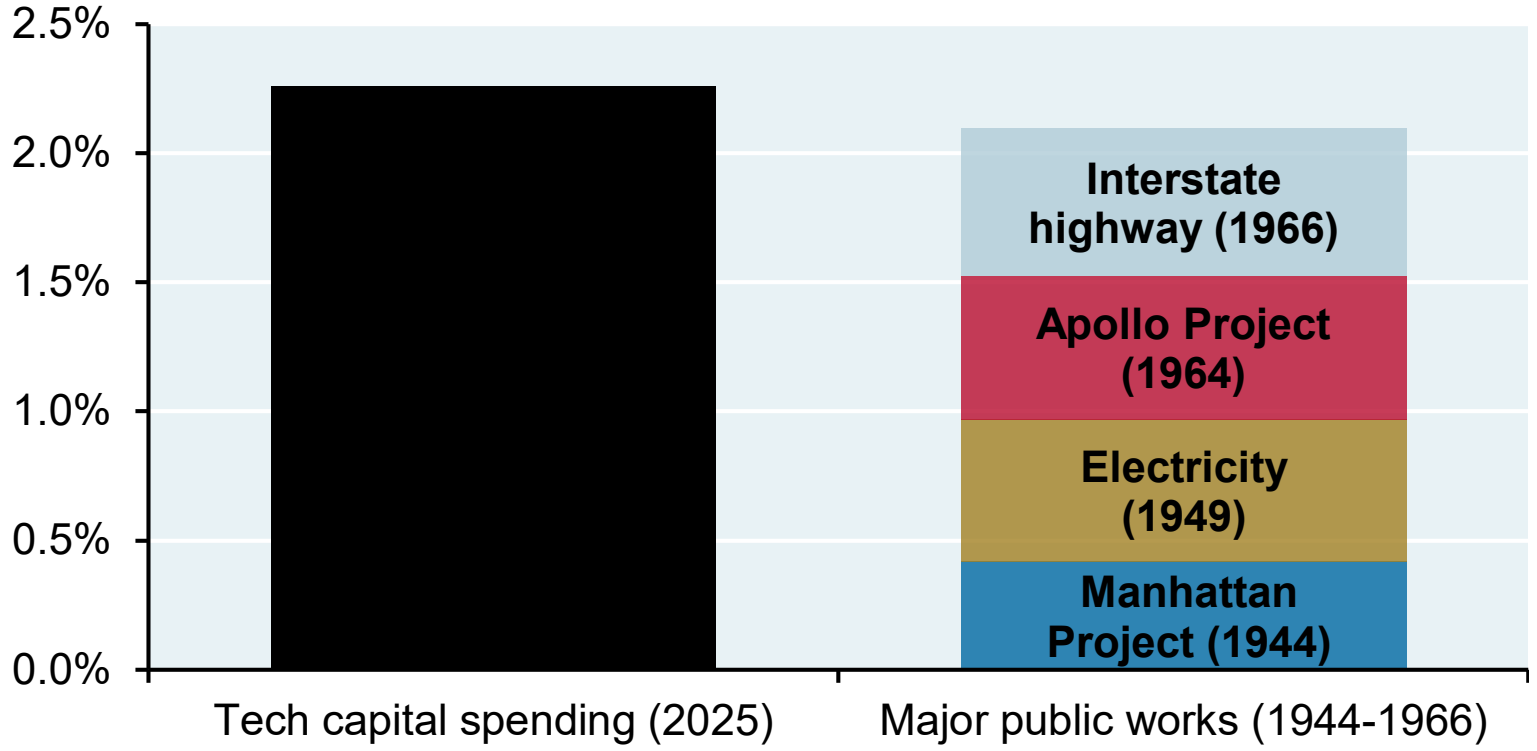
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Topics

- The big picture: the AI capital spending boom in context; contributions to GDP and the market; the high import content of AI; Taiwan risks; earnings growth driving total return ……3
- Hyperscalers: capex to revenues, cloud revenues, free cash flow margins, debt financing, buybacks, credit spreads, off balance sheet obligations, crowding out of US Treasuries, global capex ……19
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AI era tech capex vs 20th century infrastructure projects

Tech capital spending vs spending on major US infrastructure projects, Peak percent of GDP



Source: Manhattan District History, BEA, Planetary Society, Eno Center for Transportation, JPMAM, 2025

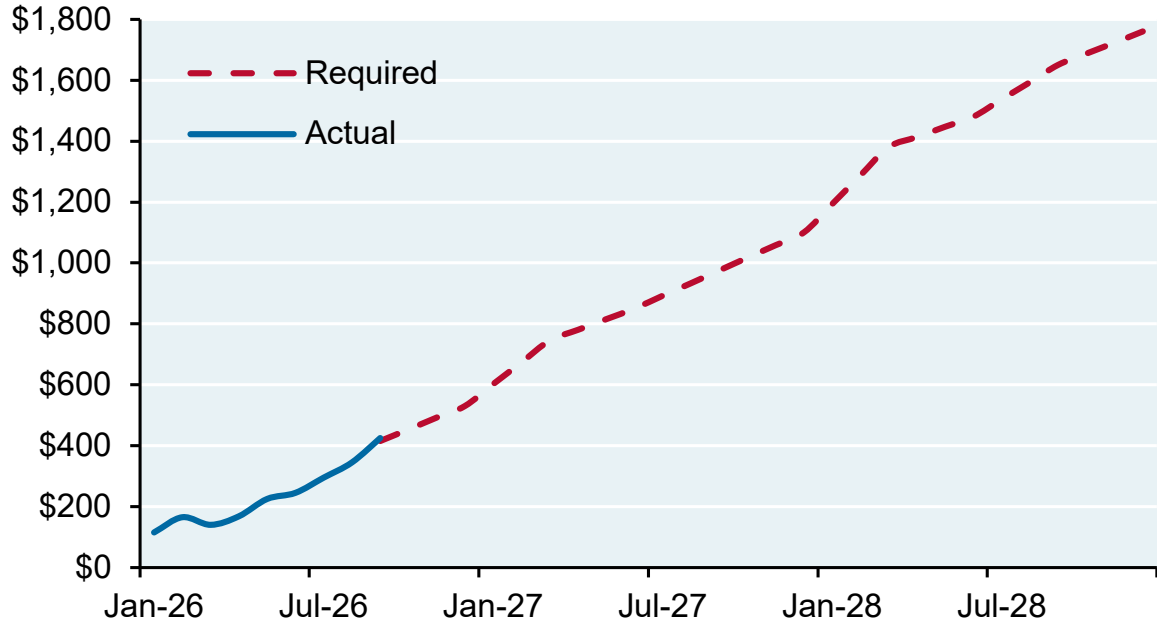
AI era tech capex and the revenue needed to support it

US capital spending booms

	Period	Average annual capital spending as % of GDP
Canals	1836-1841	0.66%
Railroads	1870-1890	2.24%
Electrification	1905-1925	0.50%
Highways	1956-1973	1.13%
Telecom & fiber	1996-2003	1.10%
AI buildout	2025-2032	3.63%

Source: Brookings, Nieuwerburgh, September 25, 2026

Inference revenues required to support AI capital spending, US$ billions per year, World ex-China



Source: Bridgewater BDO, September 29, 2026

AI era tech equipment and software share of GDP

Private fixed investment in information processing equipment & software as a share of potential GDP, %

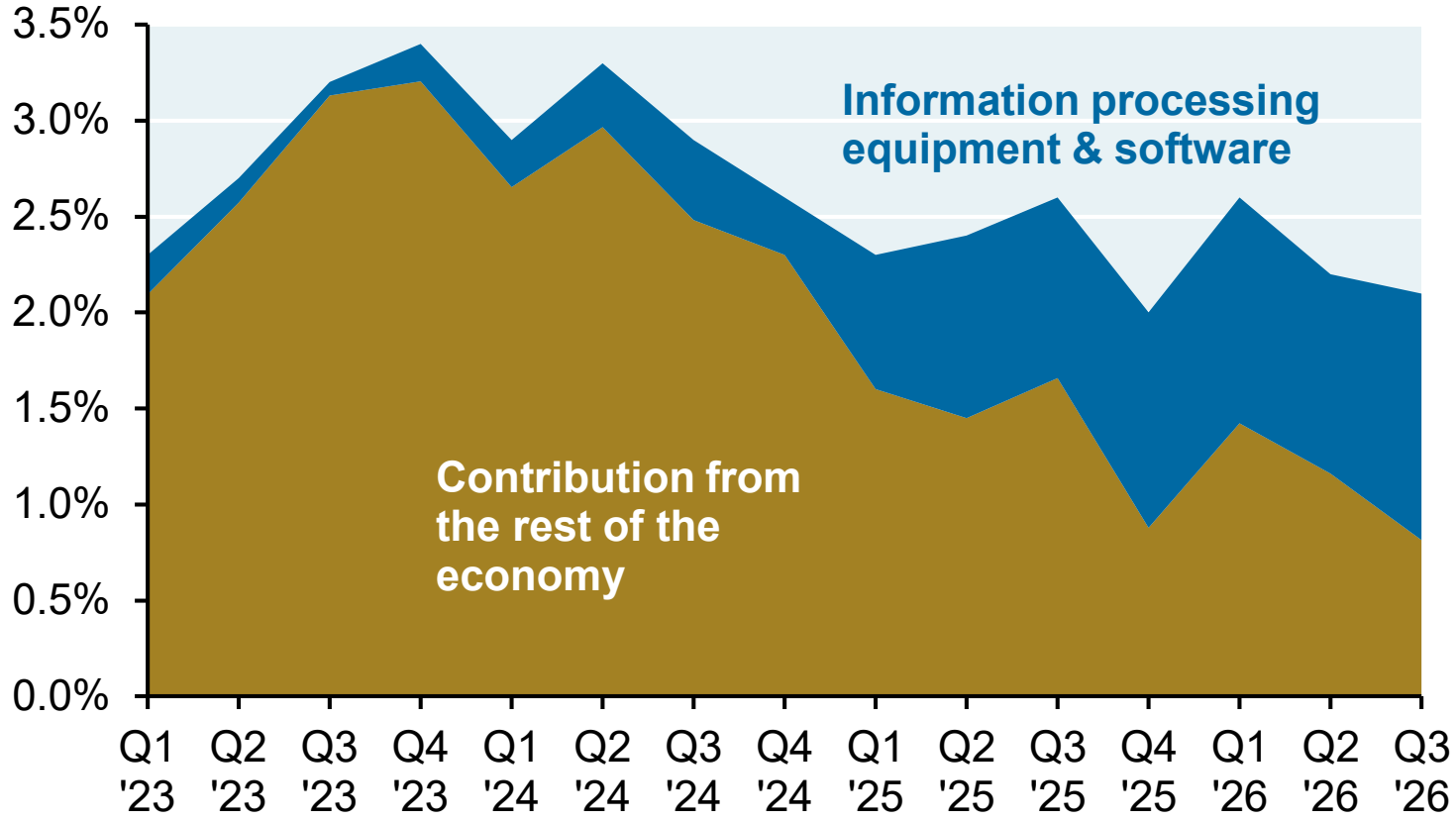


Source: BEA, CBO, JPMAM, Q3 2026

Economic contribution of tech capex

Contribution to real GDP growth

Percent, YoY

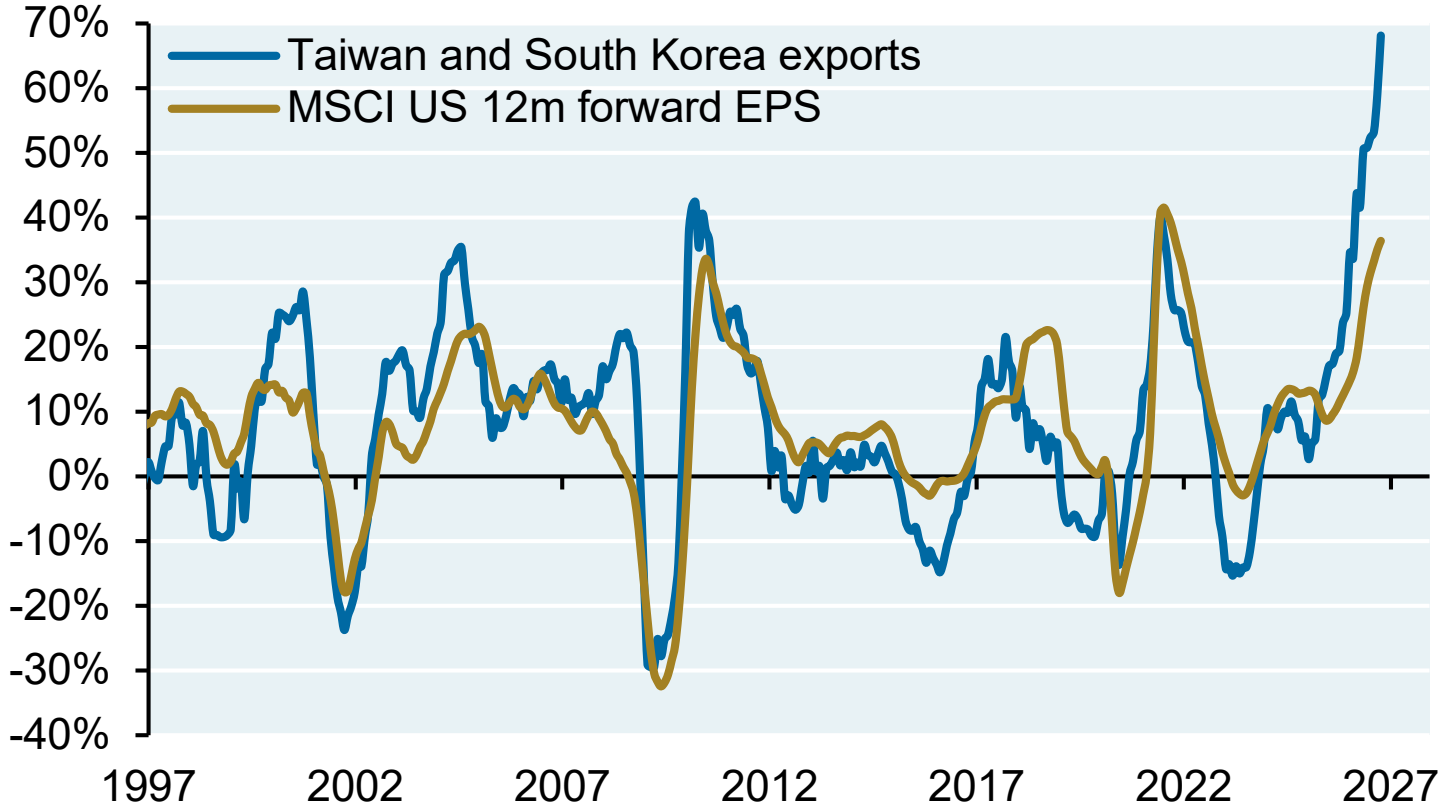


Source: Bloomberg, BEA, JPMAM, Q3 2026

Asian exports and the US earnings cycle

Taiwan and South Korea exports vs US forward EPS

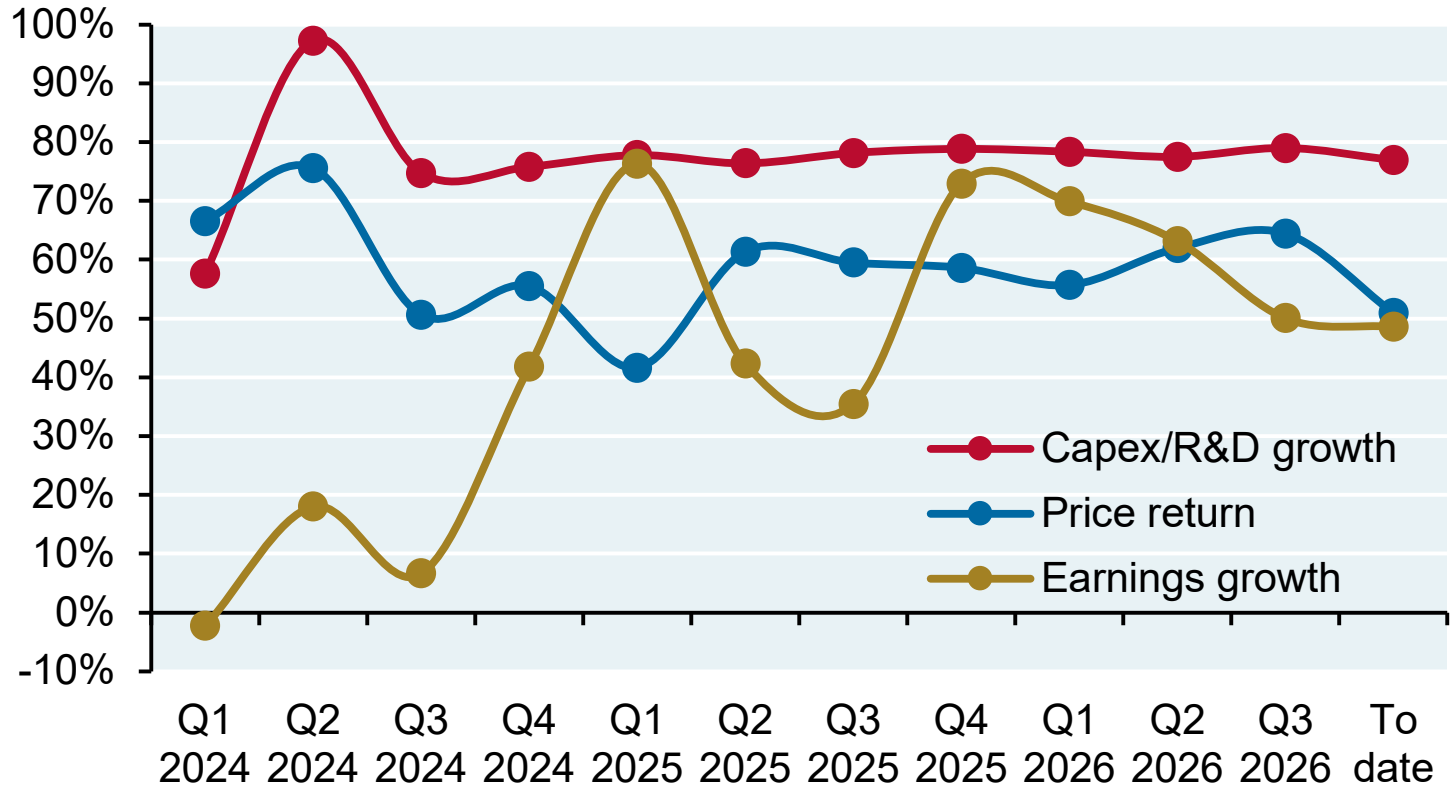
Percent, YoY, 3m moving average



Source: Bloomberg, JPMAM, October 2026

AI contribution to the S&P 500

S&P 500 share of returns, earnings growth and capex + R&D growth from AI stocks since January 2024, Percent

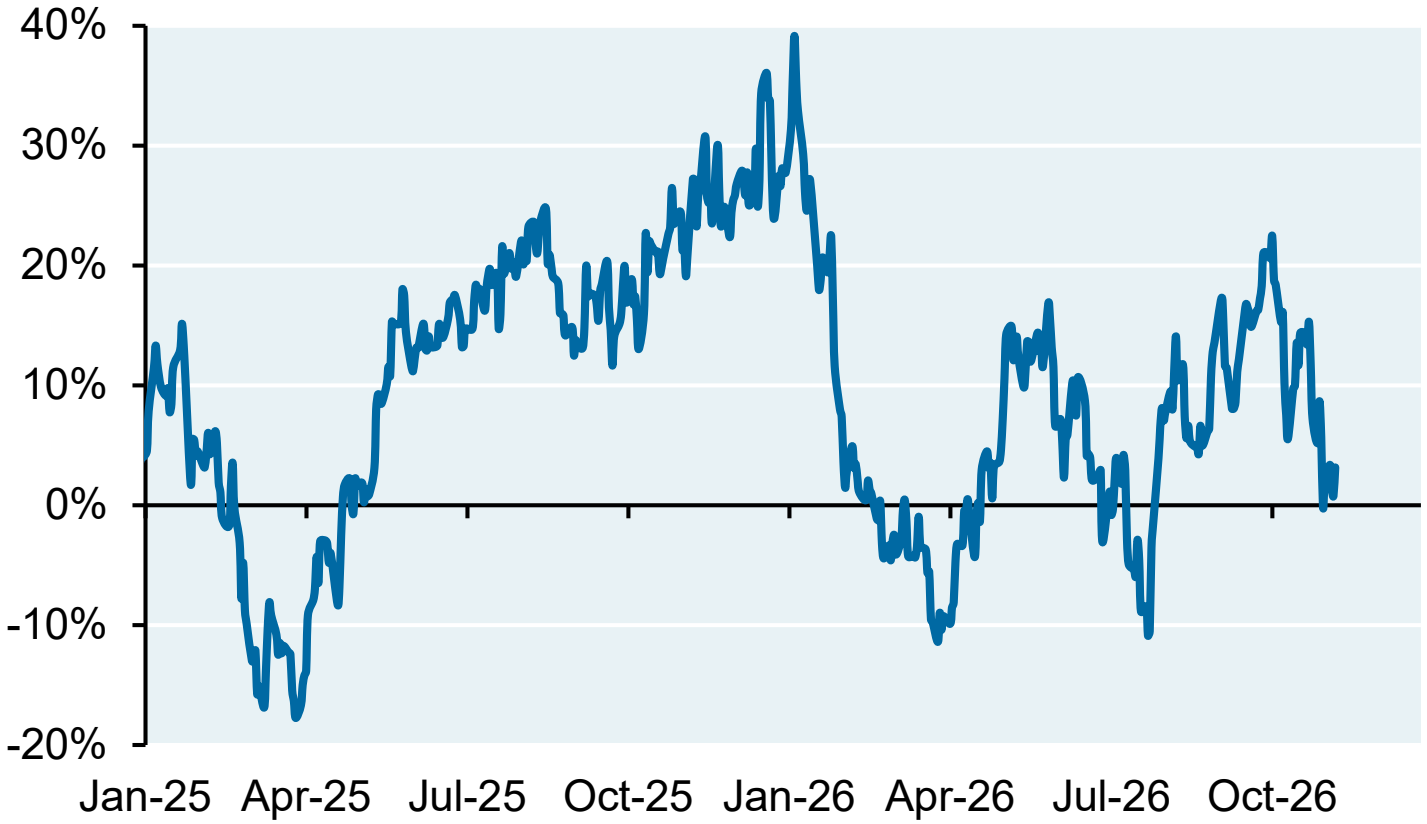


Source: Bloomberg, JPMAM, Q3 2026

Tracking AI performance vs the market

Excess return of 54 stock AI basket over rest of S&P 500

Percent, 180 day lookback

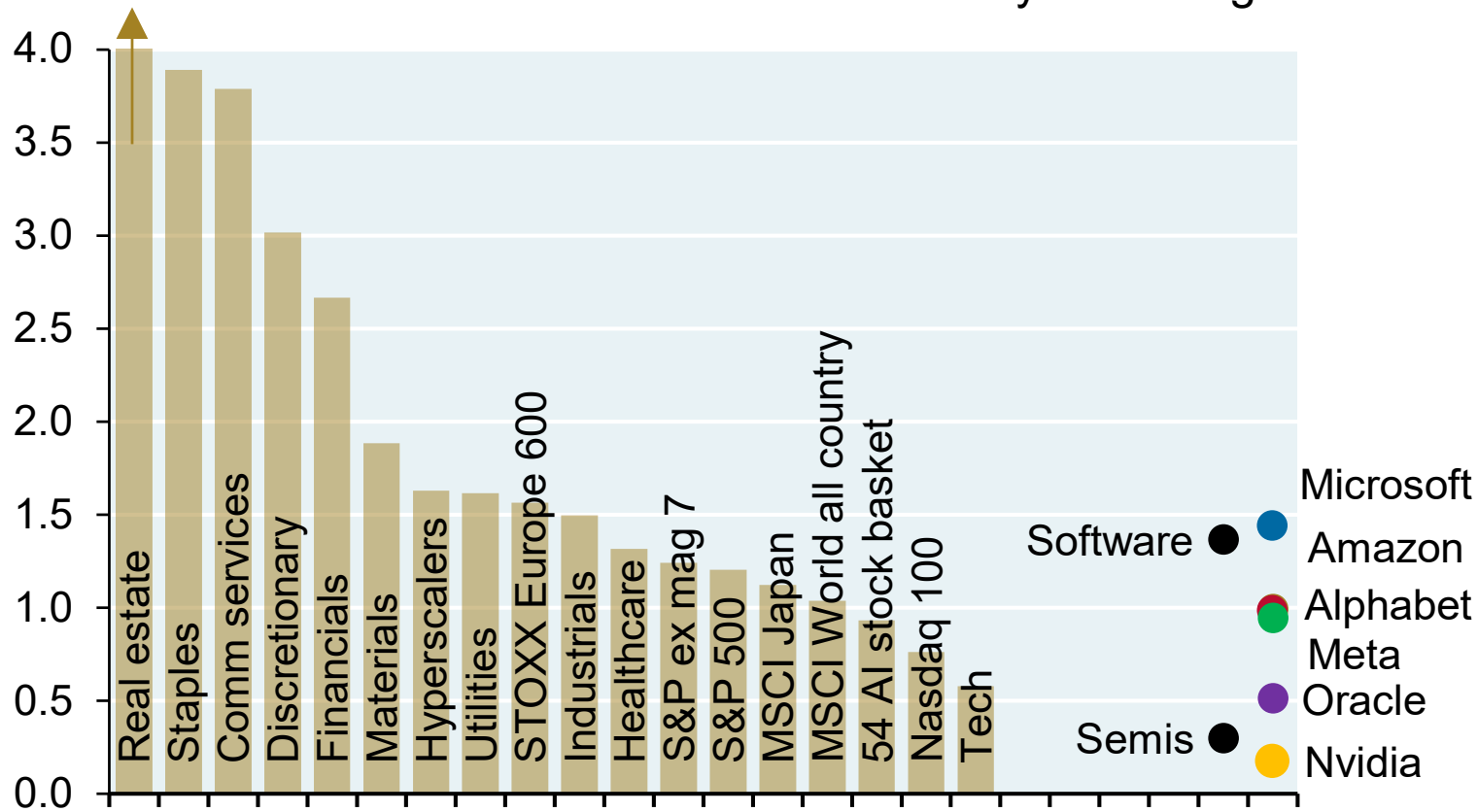


Source: FactSet, JPMAM, November 12, 2026

Price paid for earnings growth

The price investors pay for earnings growth

P/E ratio / estimated annualized consensus 2-5 year EPS growth

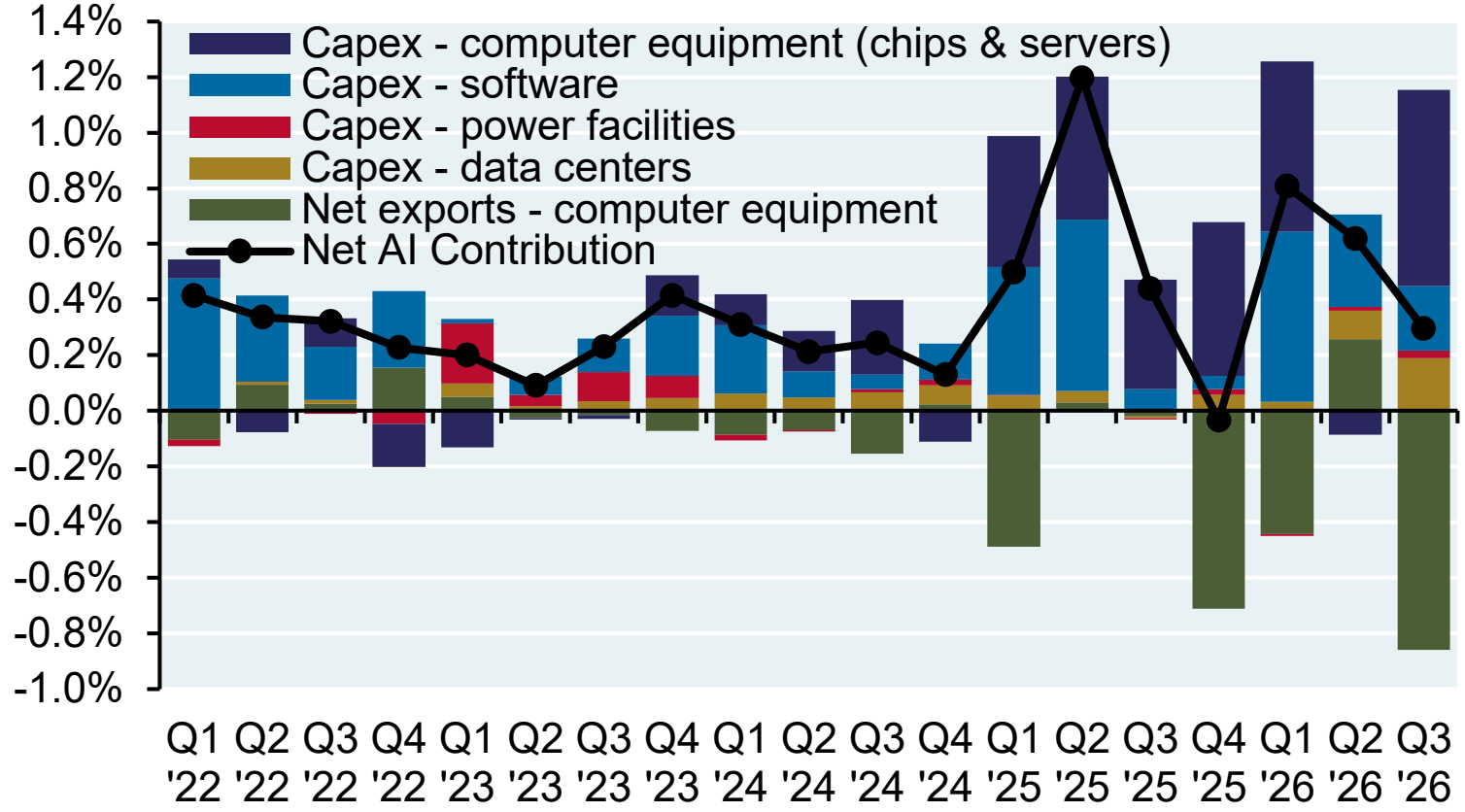


Source: Bloomberg, JPMAM, November 12, 2026

AI contribution to GDP is material but is constrained by large import content

Contributions to GDP growth

Percent



Source: Federal Reserve, JPMAM, Q3 2026

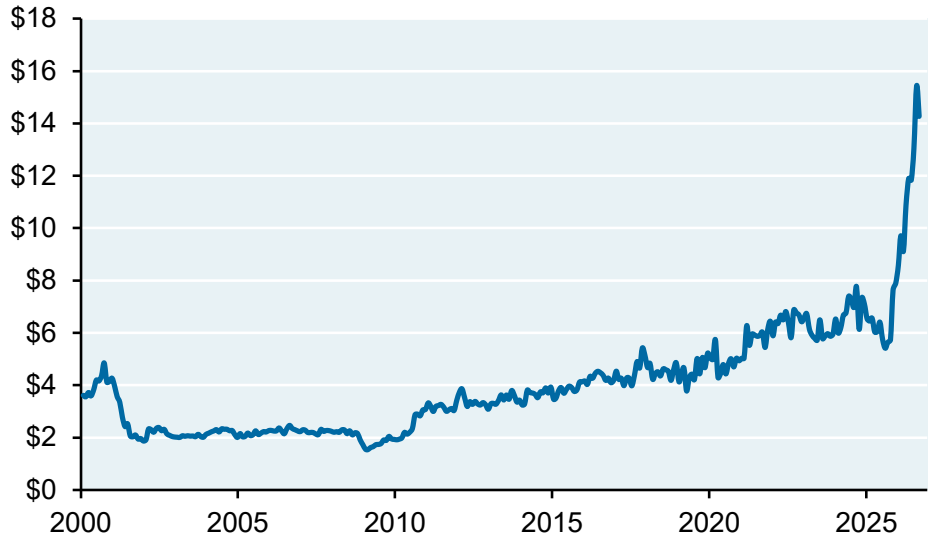
High import content of semiconductors, cooling equipment and fiber optics

Category	Share of CapEx	Imported share of category	Imported share of CapEx
Semiconductors / other compute equipment	67%	90%	60%
Construction	13%	13%	2%
Power equipment	13%	59%	8%
Cooling equipment	6%	30-60%	5-11%
Fiber networking	1%	60-70%	1%
Total			76-82%

Source: McKinsey, Federal Reserve, Wells Fargo, Department of Commerce, CSIS, IndexBox, JPMAM, 2026

US semiconductor imports

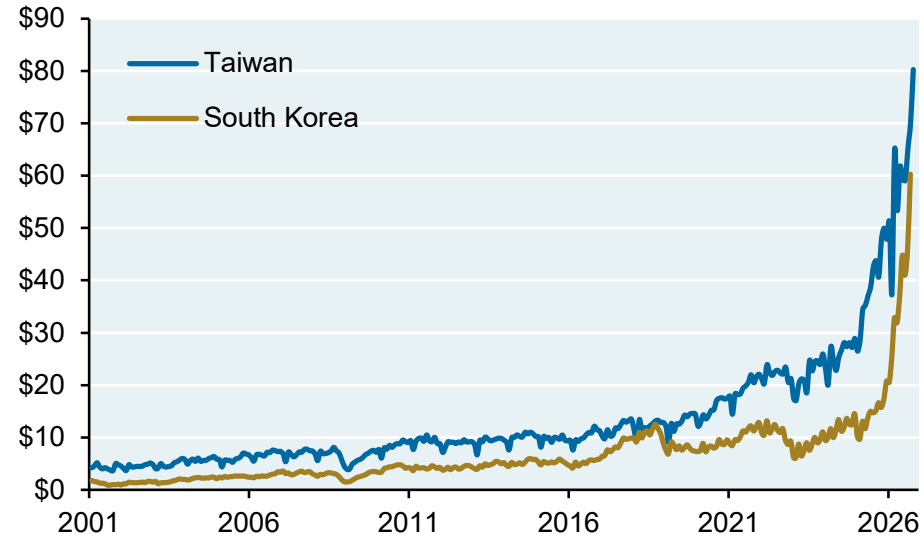
US$, billions



Source: Bloomberg, JPMAM, September 2026

Taiwan and South Korea AI chips and hardware exports

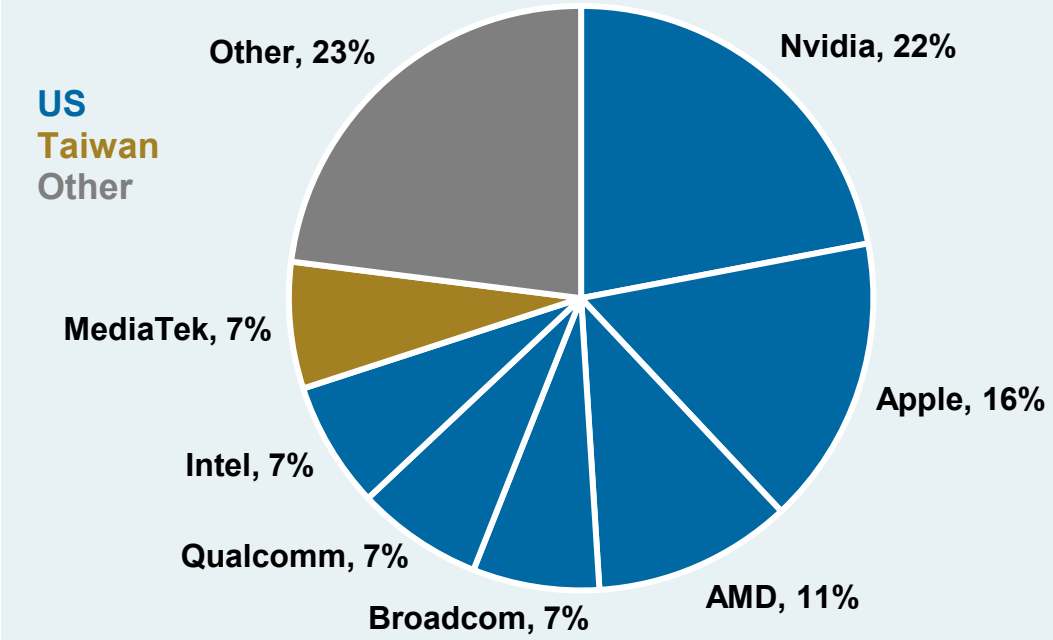
US$, billions



Source: Bloomberg, JPMAM, September 2026

Reliance on Taiwan

TSMC largest customers by revenue in 2026



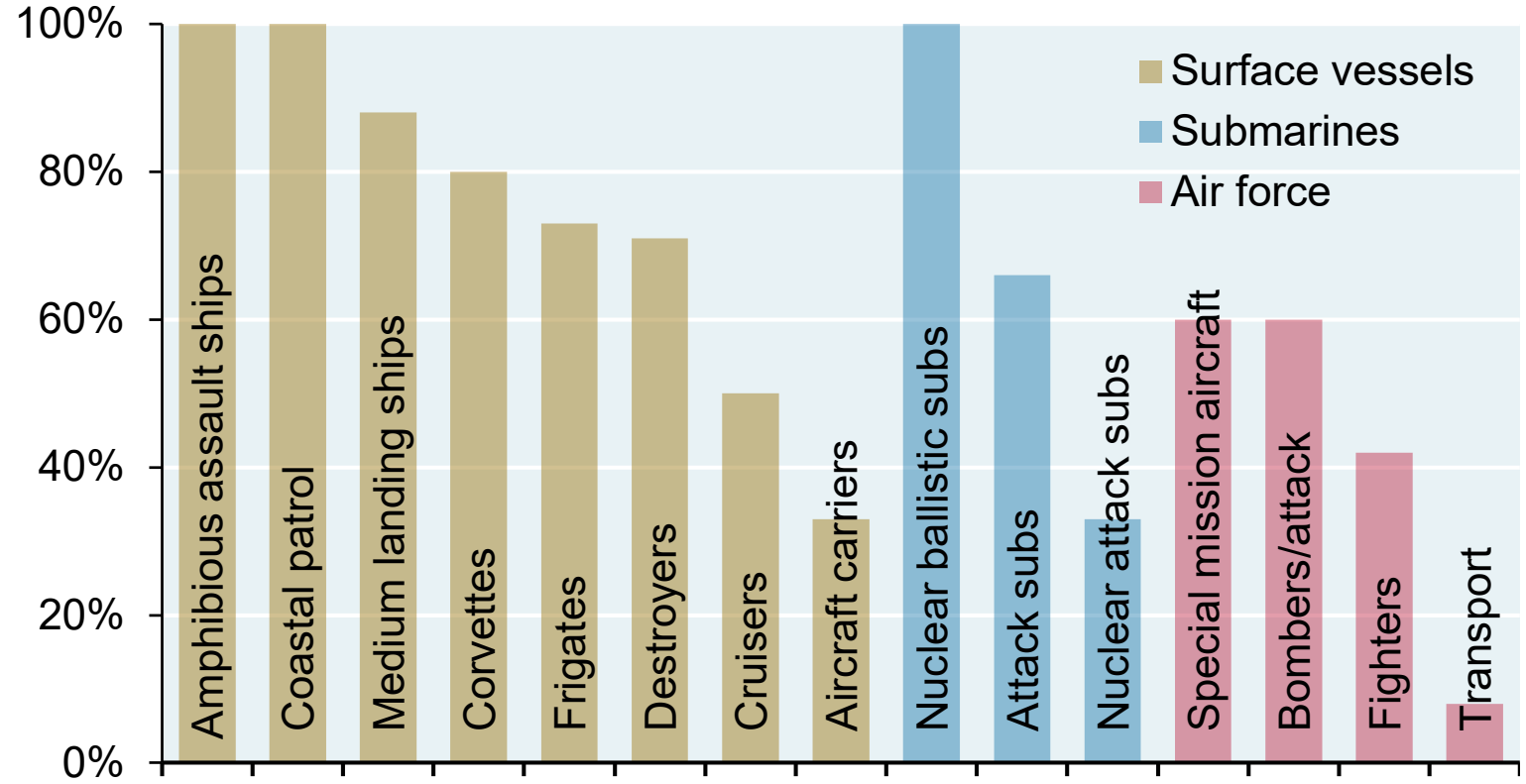
Source: JPM Asia Pacific Equity Research, September 2026

Company	% of advanced chips from TSMC	Other chip manufacturing & suppliers
Nvidia	~100% of AI GPUs	Samsung
Apple	>90%	Samsung, GlobalFoundries,TI and Broadcom
AMD	100% of 7nm or less GPUs & CPUs	> 7nm process nodes produced by GlobalFoundries; UMC and Samsung for programmable logic devices
Broadcom	~95% of externally manufactured wafers	Internal foundries, GlobalFoundries, Tower Semiconductor, X-FAB and more
Qualcomm	~70%	Samsung and GlobalFoundries
Intel	<30%	Samsung and internal foundries
MediaTek	Not disclosed	GlobalFoundries

Source: Company Disclosures, Bloomberg, JPMAM, September 2026

Reliance on Taiwan

Share of Chinese assets deployed near the Taiwan Strait (in the PLA Eastern and Southern Theater Commands), %

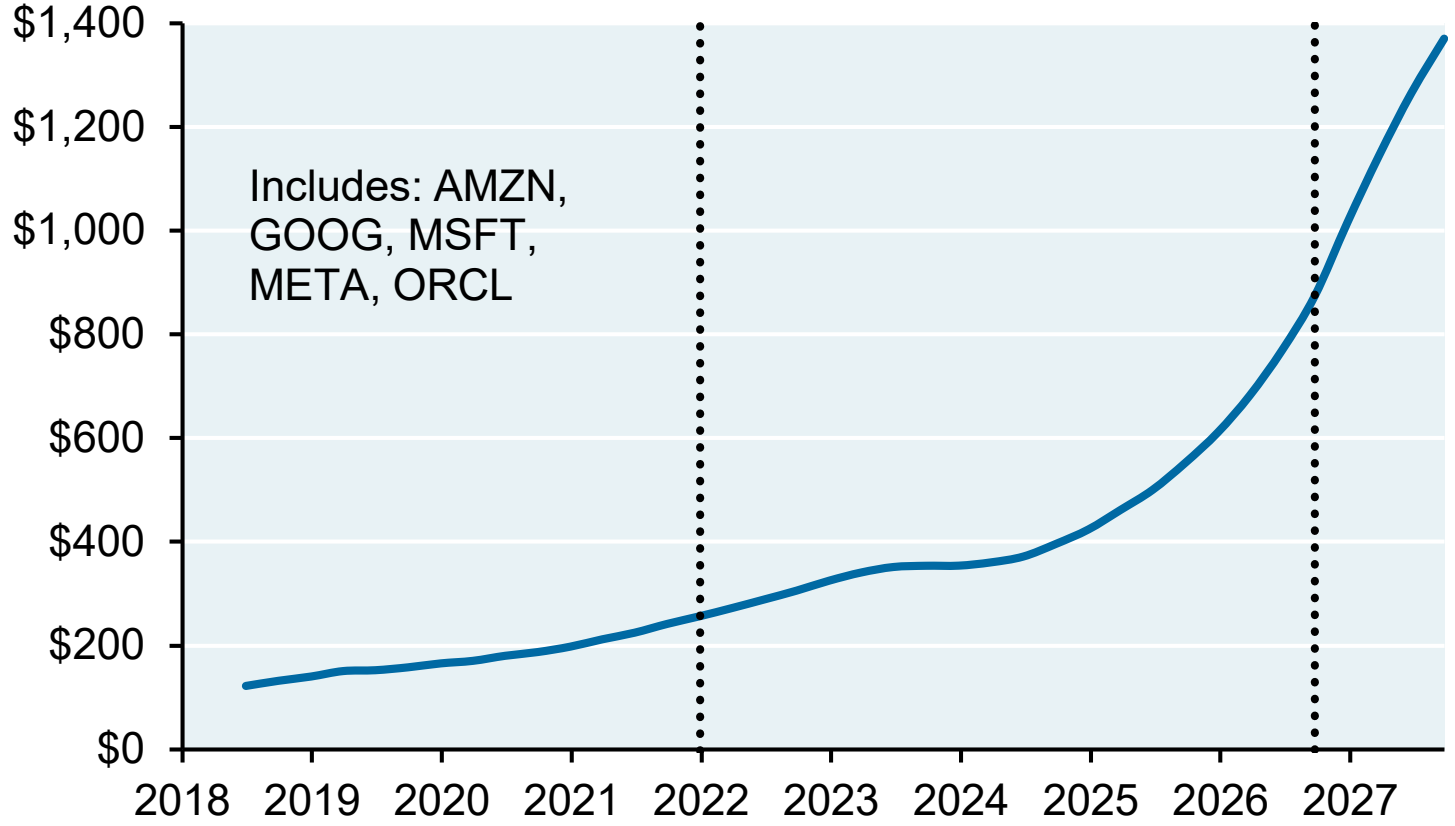


Source: CSIS, DOD, September 2025

AI hyperscaler capex boom: $2.4 trillion since 2022

Hyperscaler capex and R&D

US$, billions, trailing 4Q sum

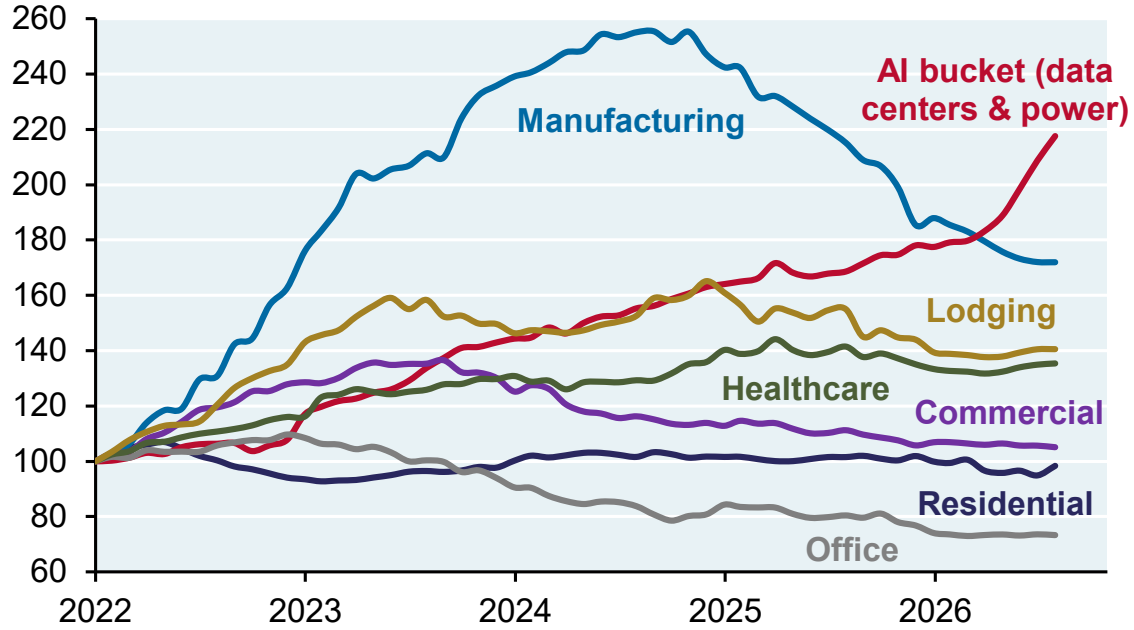


Source: Bloomberg, JPMAM, November 1, 2026

AI capital spending not enough to offset declines elsewhere

US construction spending

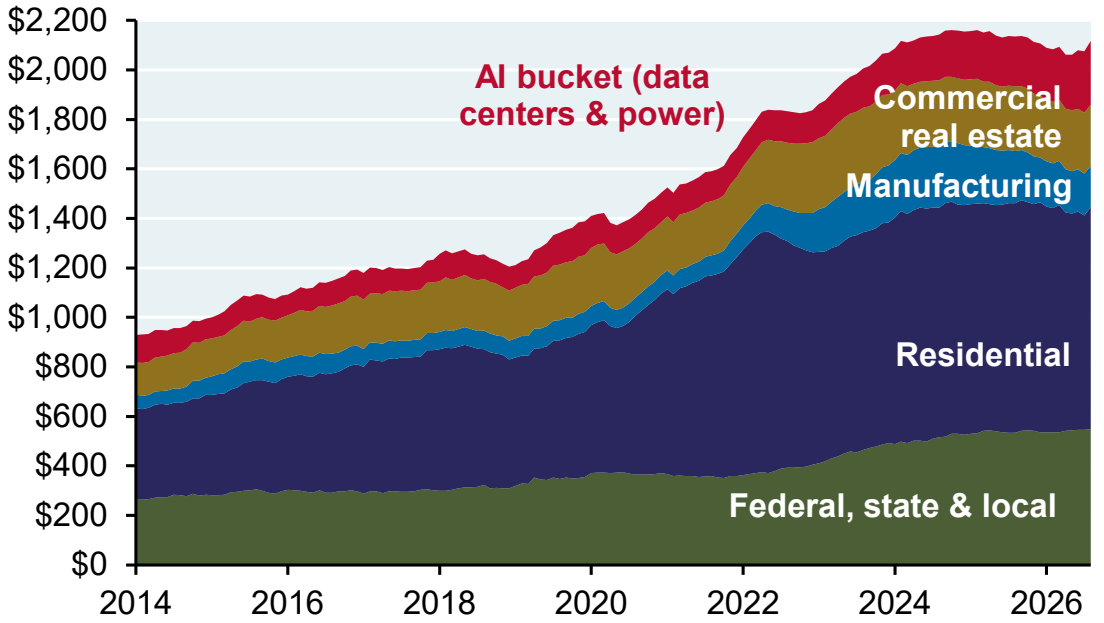
Index (100 = Jan 2022)



Source: Census Bureau, JPMAM, September 2026

US construction spending

US$, billions, seasonally adjusted annual rate

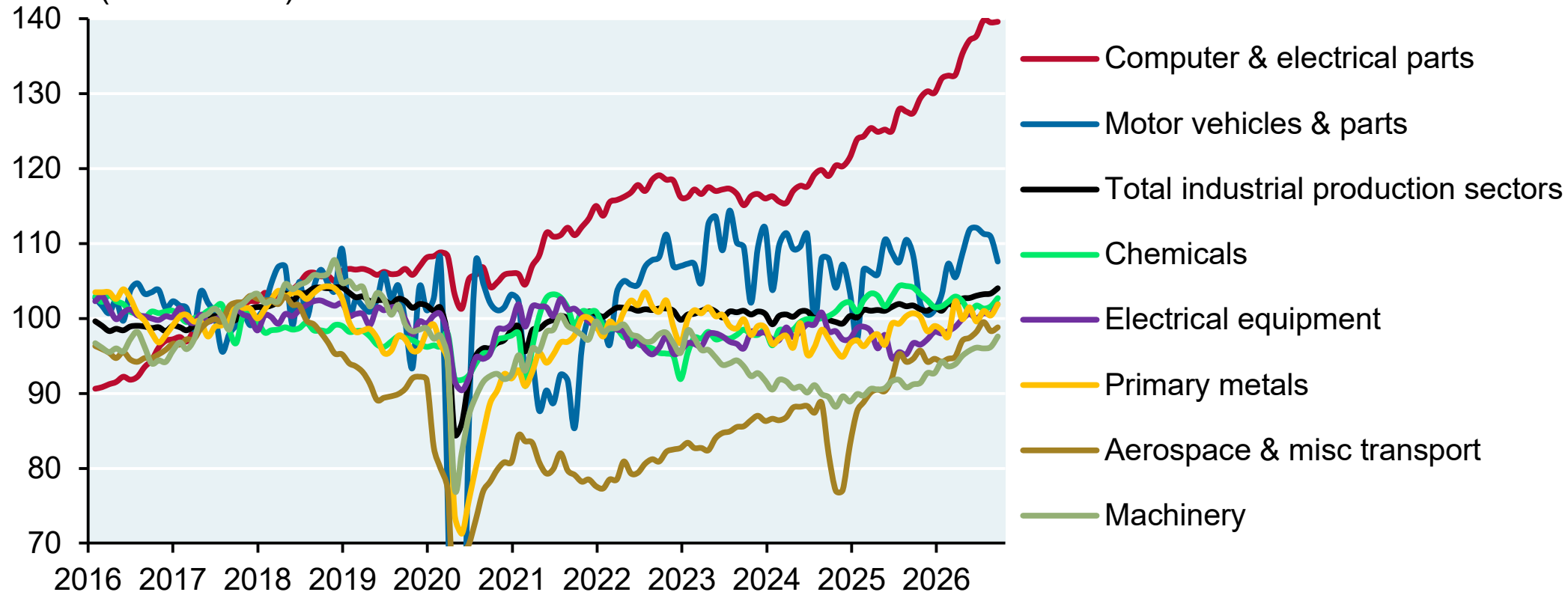


Source: Census Bureau, JPMAM, September 2026

Similar AI concentration in industrial production

Industrial production index by sector

Index (100 = 2017)

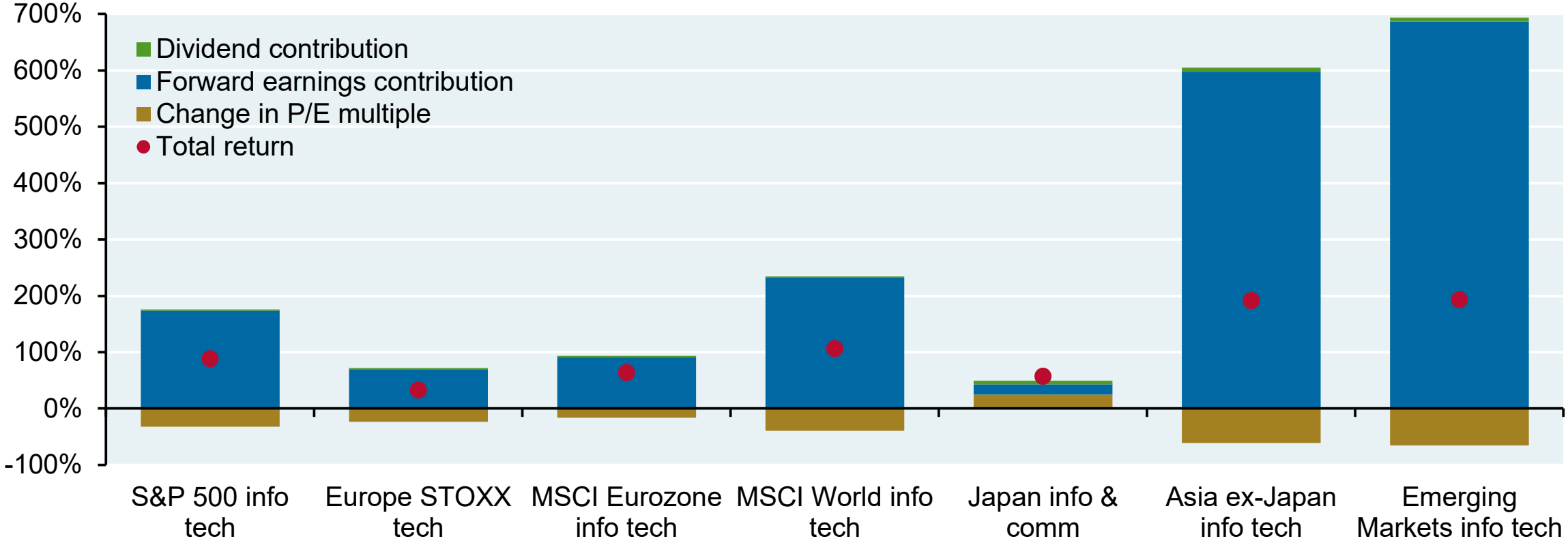


Source: Haver, JPMAM, September 2026

AI boom: higher earnings vs multiple expansion

So far AI is affecting markets through higher earnings rather than multiple expansion

Total return contribution from Jan 1, 2024 to Nov 5, 2026

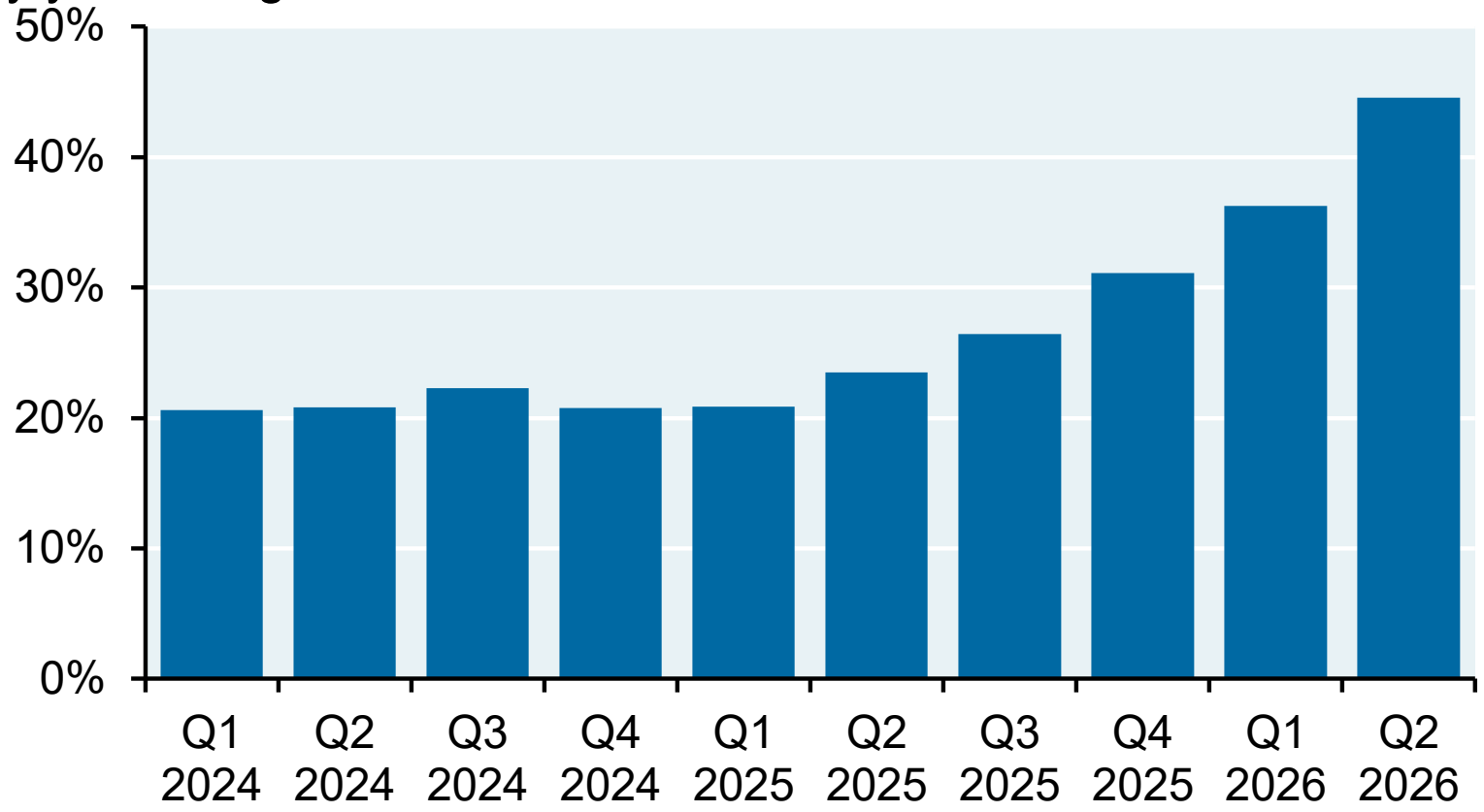


Source: Bloomberg, JPMAM, November 5, 2026

Hyperscaler AI and other cloud revenues starting to build…

Hyperscaler cloud revenue

y/y % change

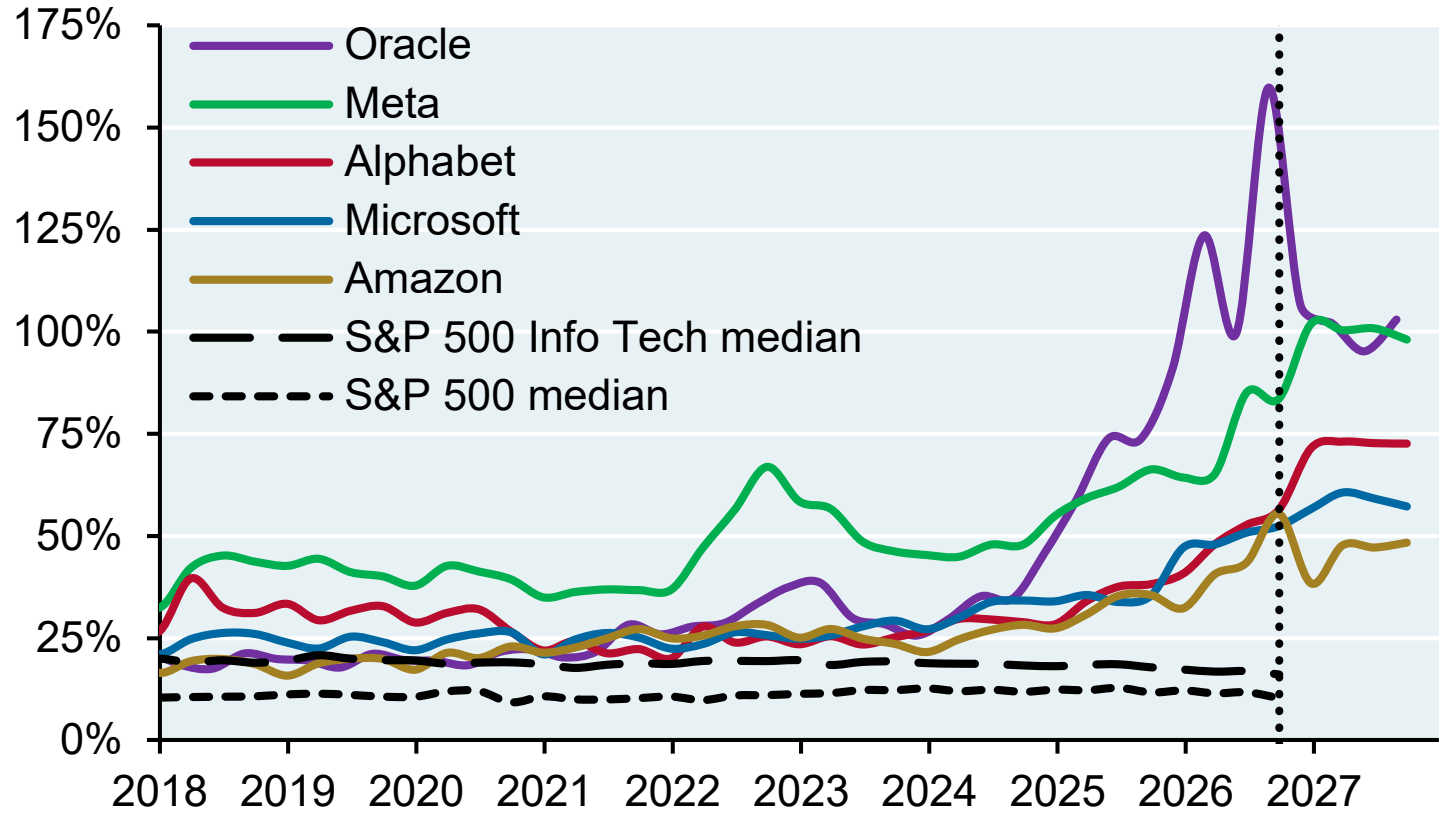


Source: Bloomberg, JPMAM, Q2 2026

…but it has taken historically large capital spending commitments to get there

Hyperscaler capex and R&D as a share of revenues

Percent

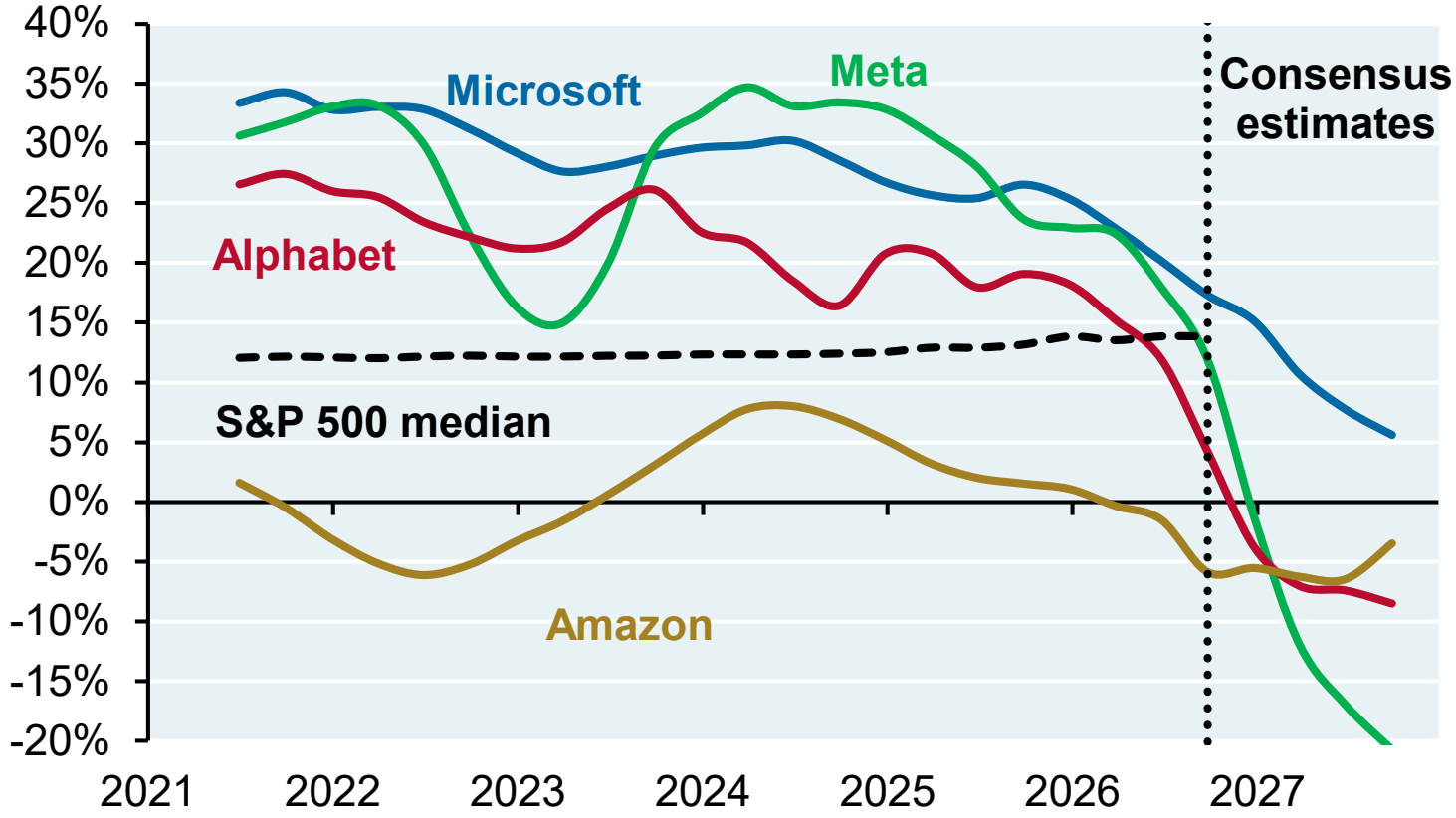


Source: Bloomberg, JPMAM, November 1, 2026

Falling hyperscaler free cash flow margins

Hyperscaler free cash flow margins (net of capex)

Percent, trailing 12 months

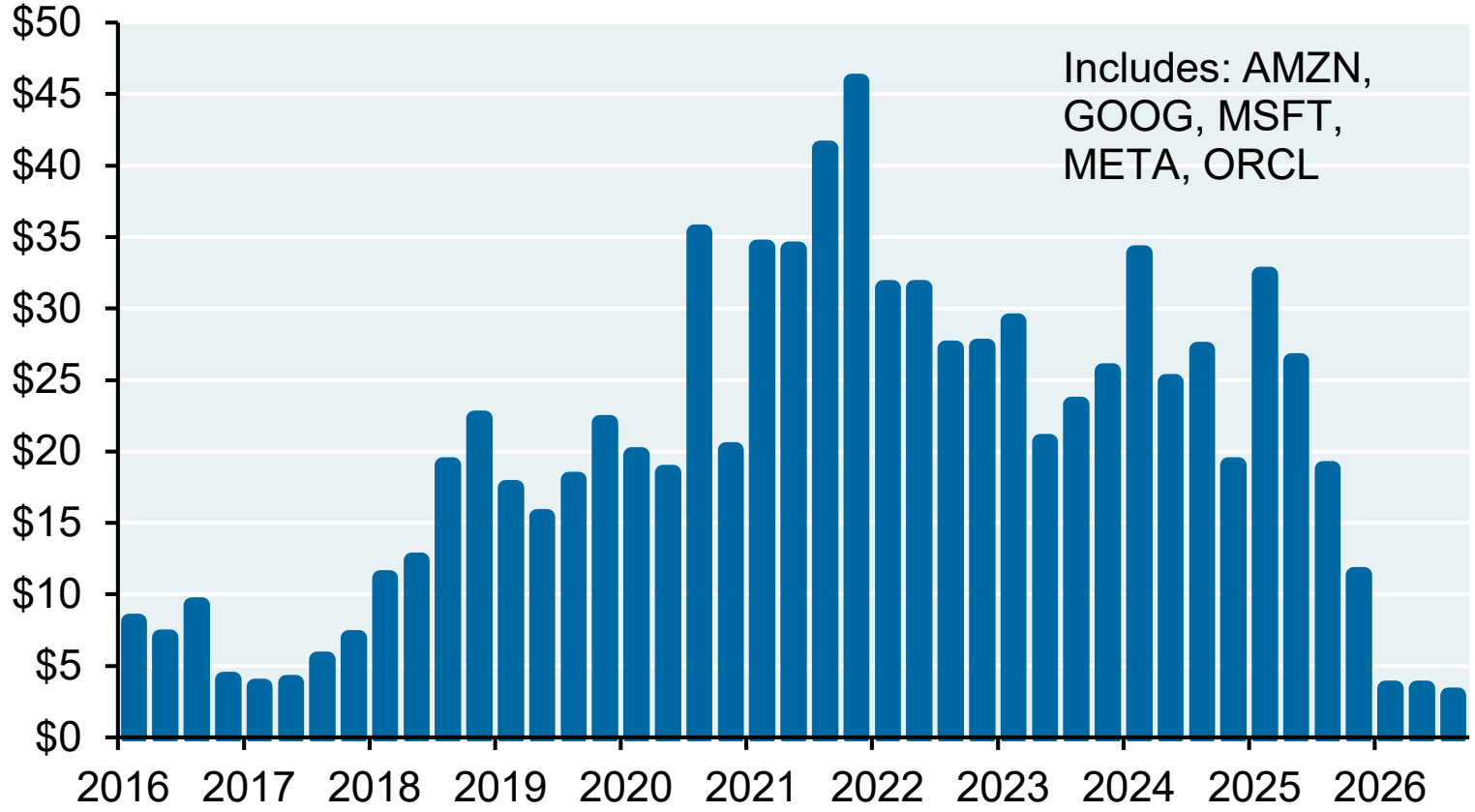


Source: Bloomberg, JPMAM, November 1, 2026

Falling hyperscaler buybacks

Hyperscaler share buybacks

US$, billions, quarterly



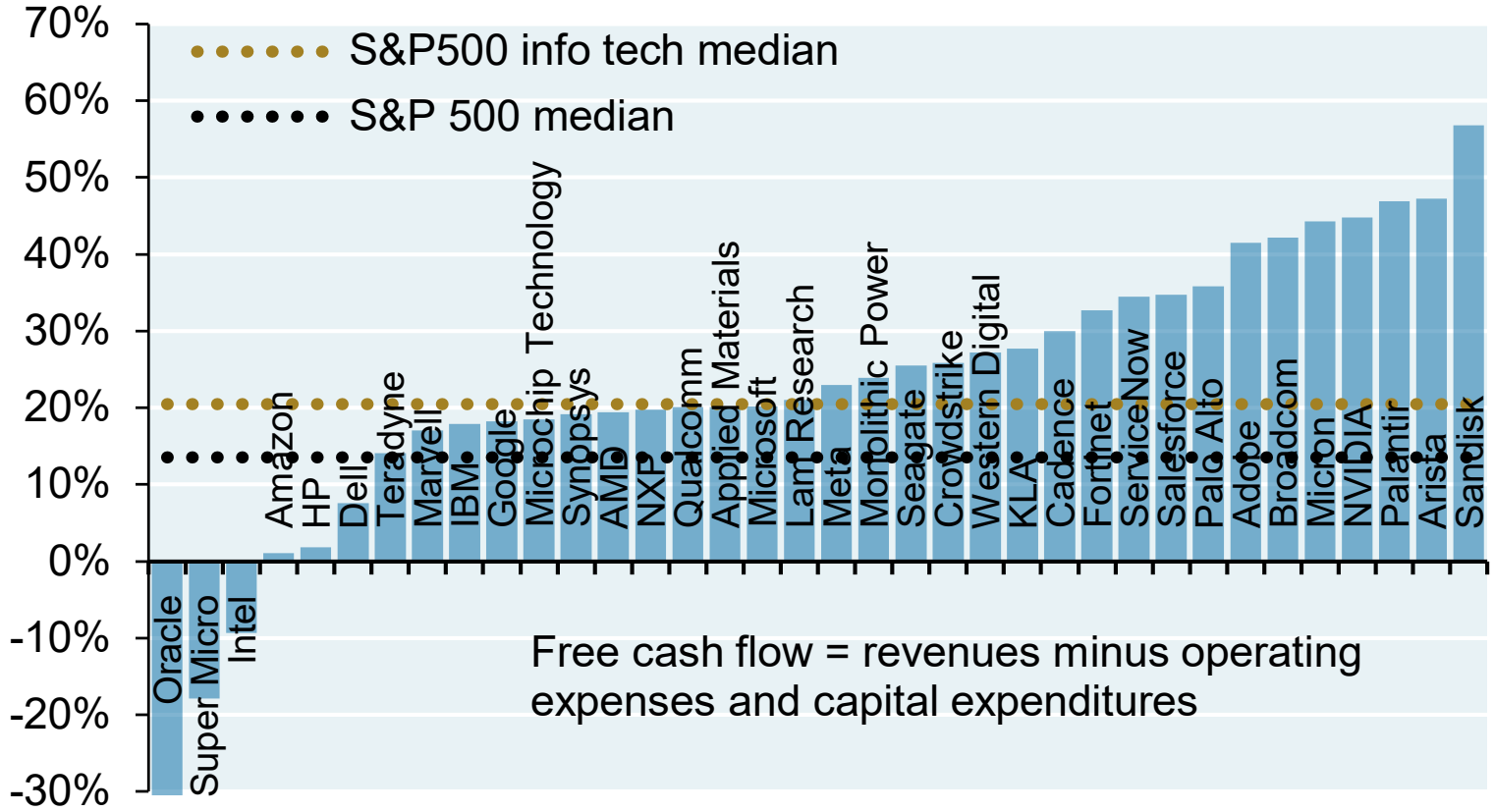
Source: Bloomberg, JPMAM, Q3 2026

AI tech universe free cash flow to revenues

Hyperscalers

Free cash flow to revenue ratios

Percent

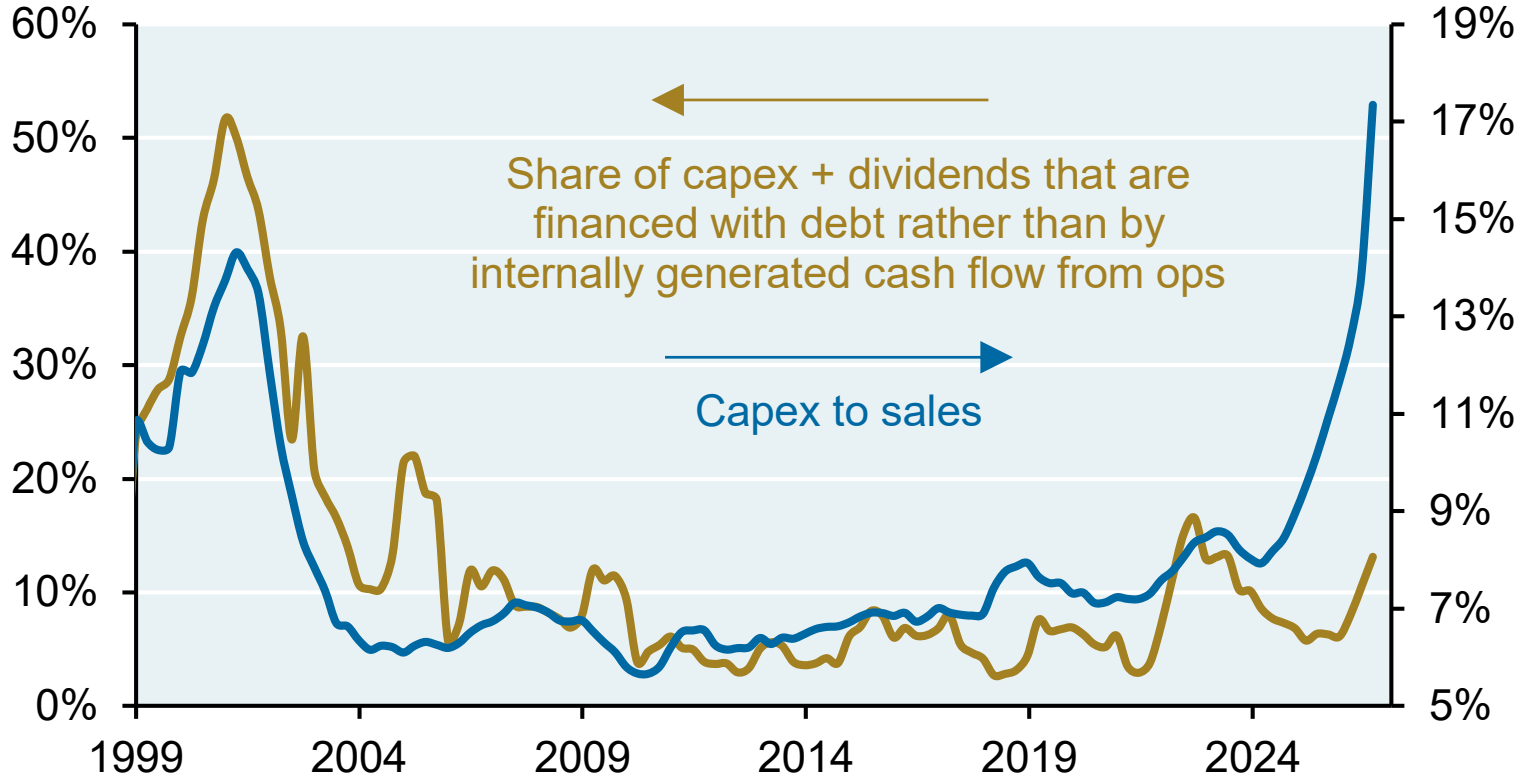


Source: Bloomberg, JPMAM, November 5, 2026

Tech debt financing of capex still low vs dot com era…

Capex financing vs capex cycle

Russell 3000 universe: US tech and communications companies

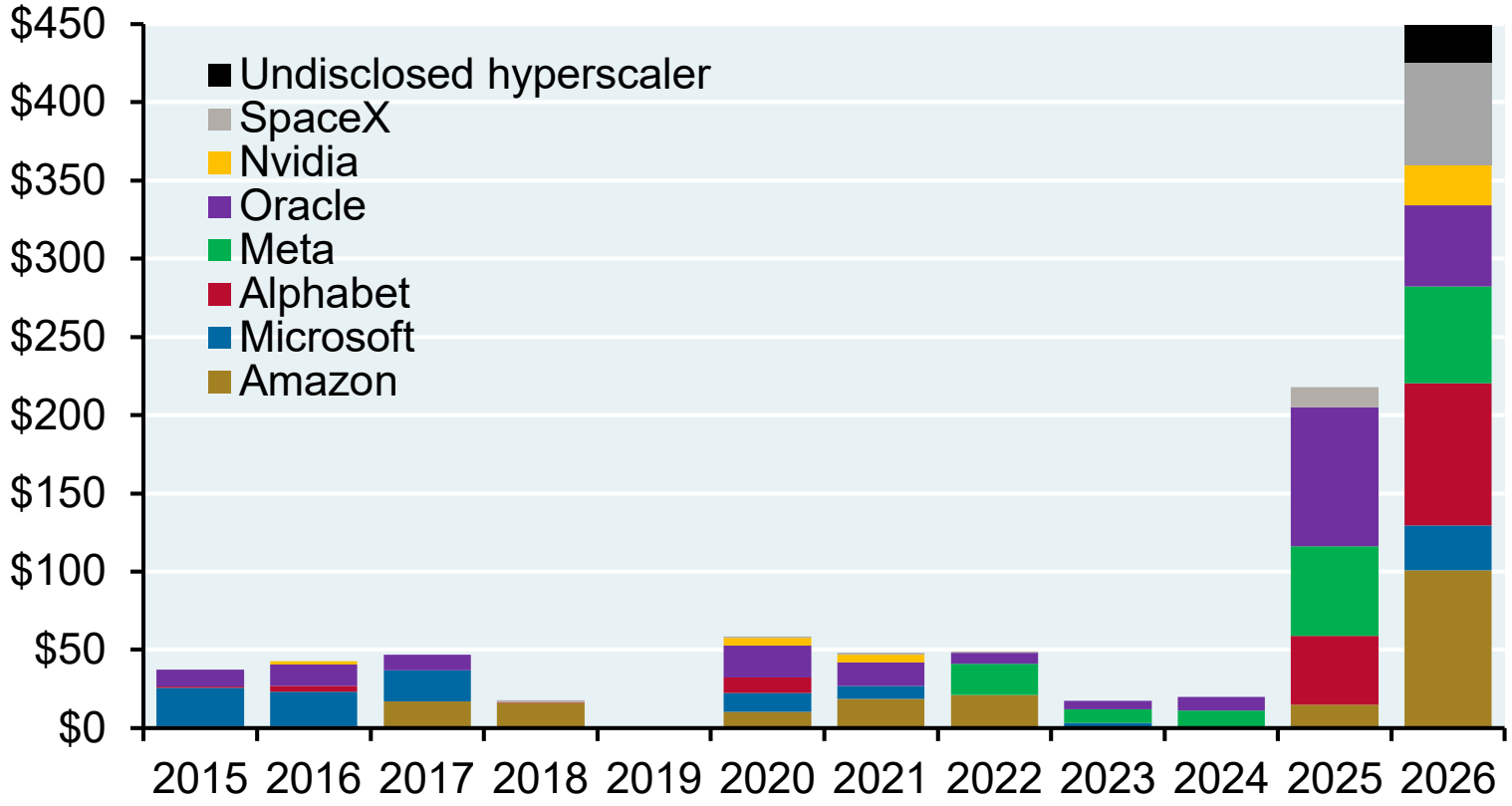


Source: FactSet, JPMAM, Q3 2026

…but in 2025, hyperscaler AI debt financing began to rise sharply

AI buildout: new investment grade debt + SPVs

US$, billions, across all currencies



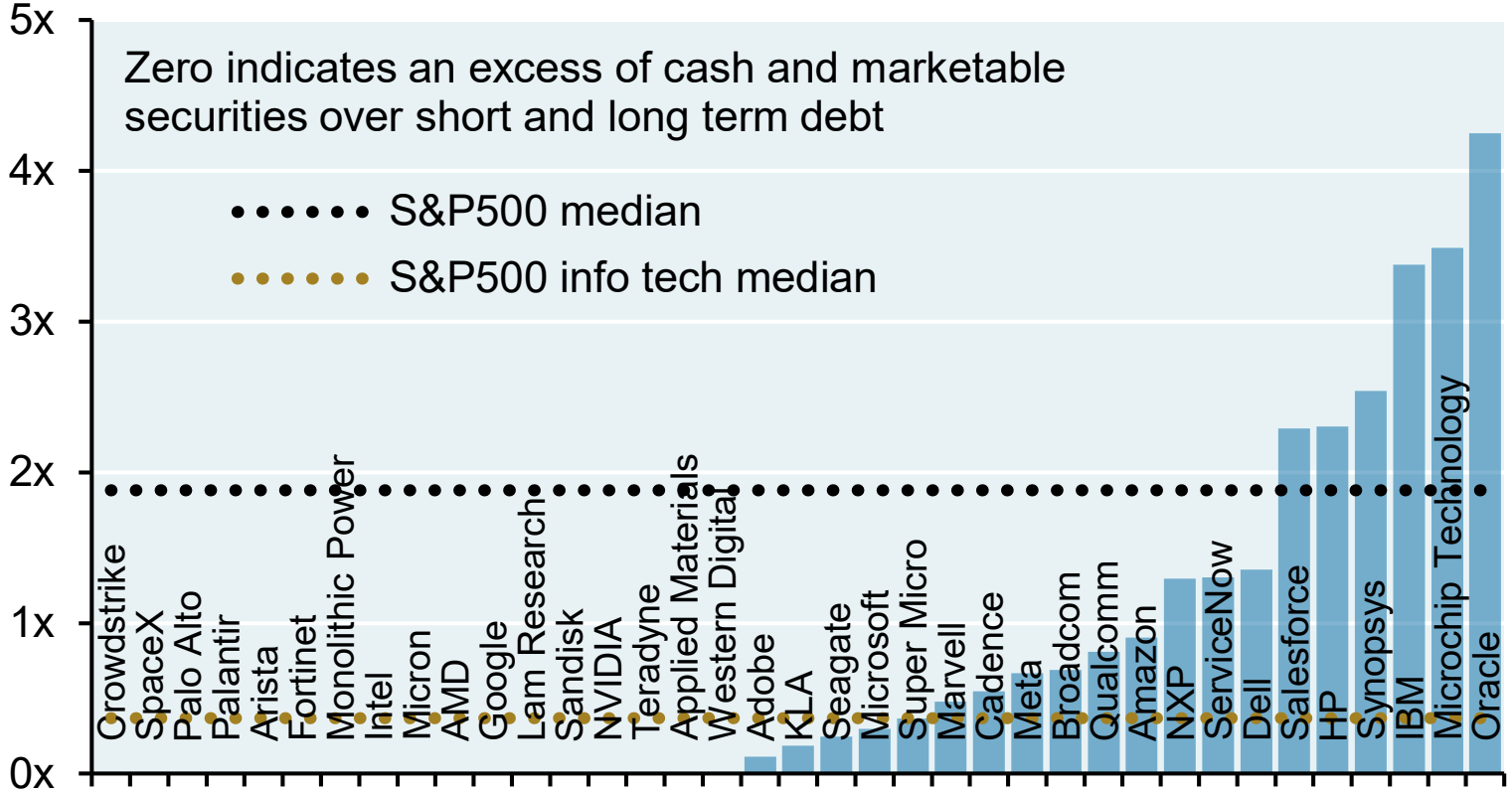
Source: Bloomberg, JPMAM, November 11, 2026

AI debt to earnings ratios still mostly well below S&P 500 median…

Hyperscalers

Net debt to trailing 12m EBITDA

Multiple; includes bonds, loans and hyperscaler SPV triple net leases

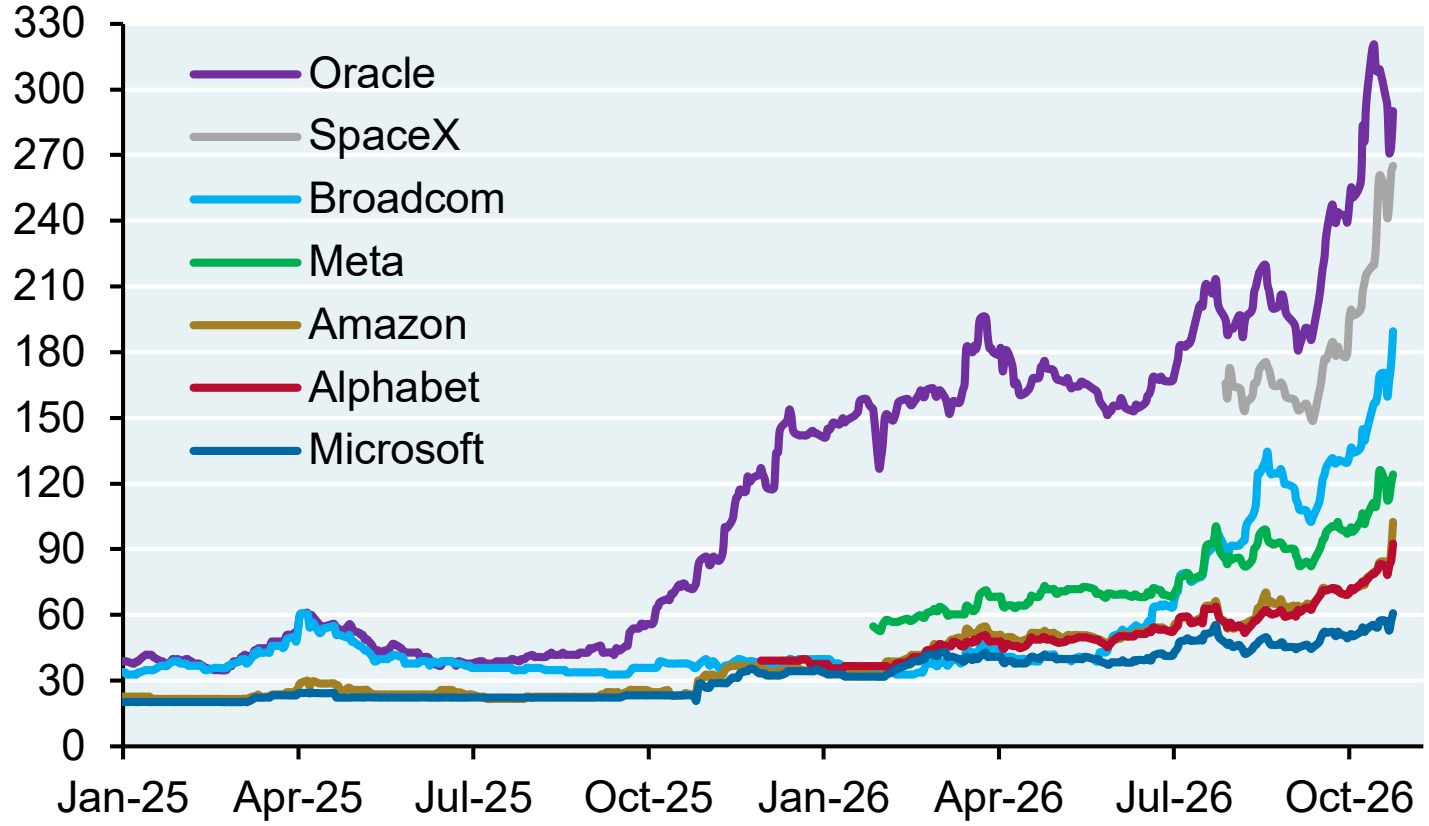


Source: Bloomberg, JPMAM, November 5, 2026

…but credit default swaps are starting to move

Credit default swap comparison, select AI stocks

Spread, five year CDS, bps

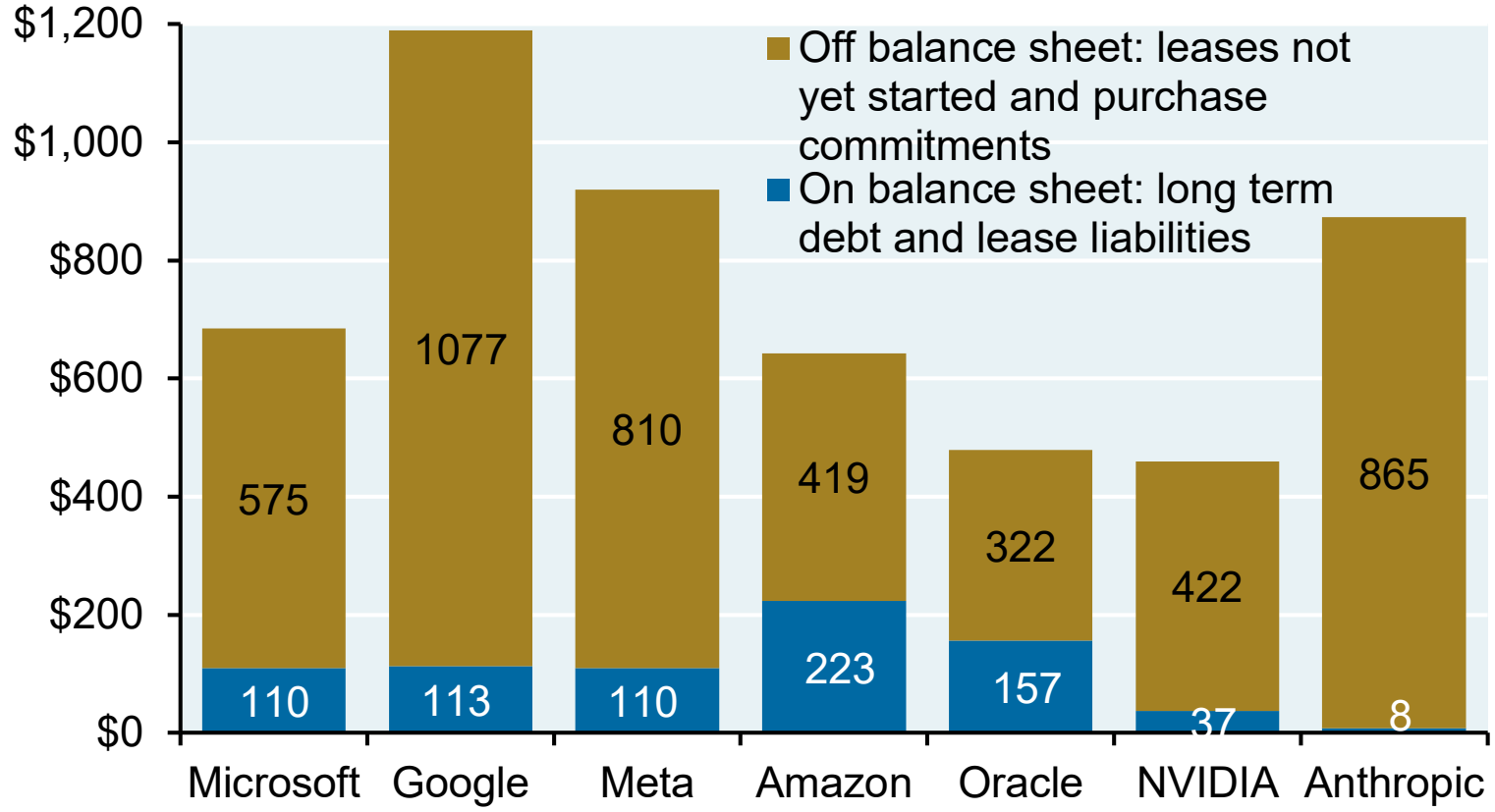


Source: JPMAM, October 30, 2026

Off balance sheet obligations

Hyperscalers

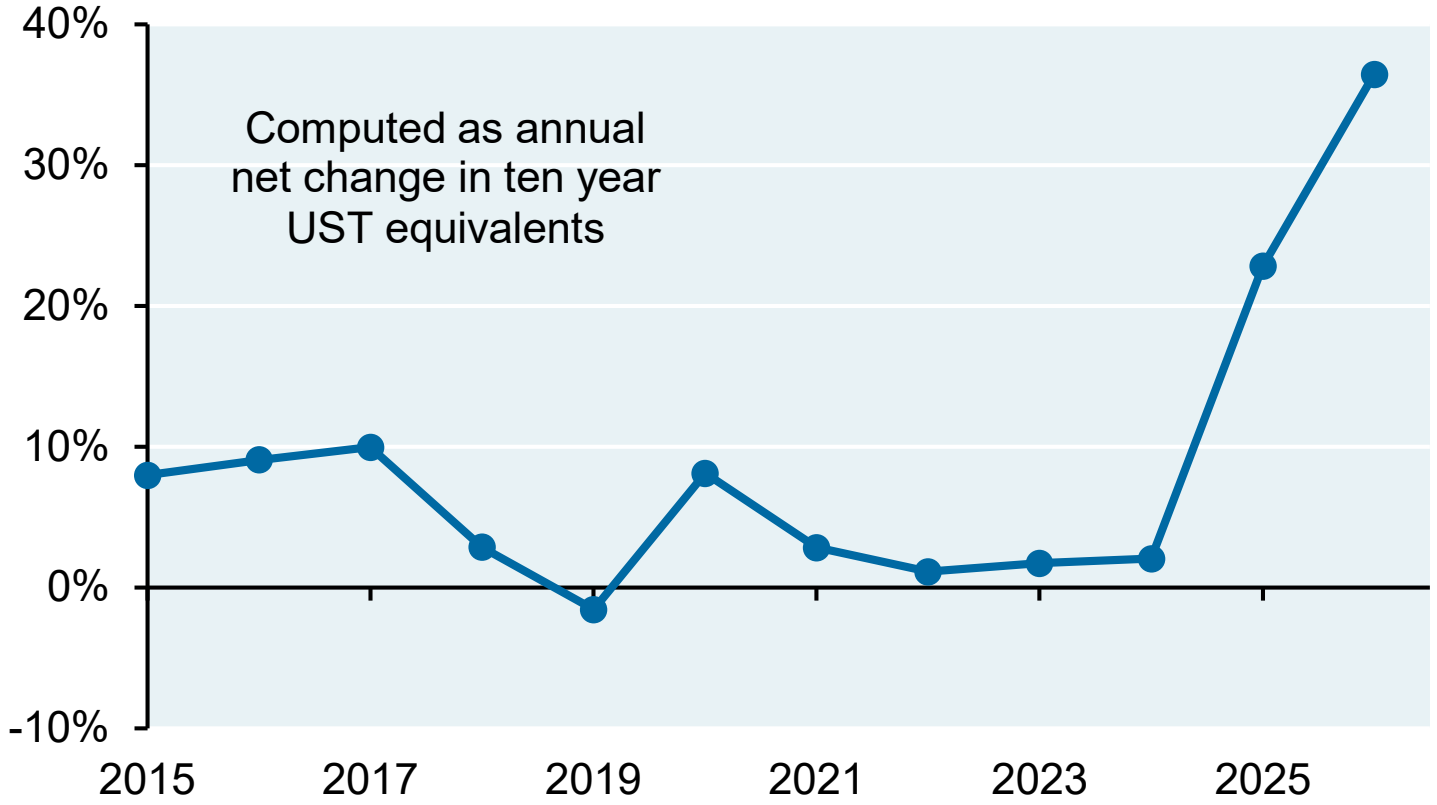
**Some things you *can't* see: $4 trillion in AI off balance sheet obligations,** US$, billions



Source: Bloomberg, Company filings, JPMAM, November 2026

Hyperscaler debt issuance as a percent of Treasury bond issuance

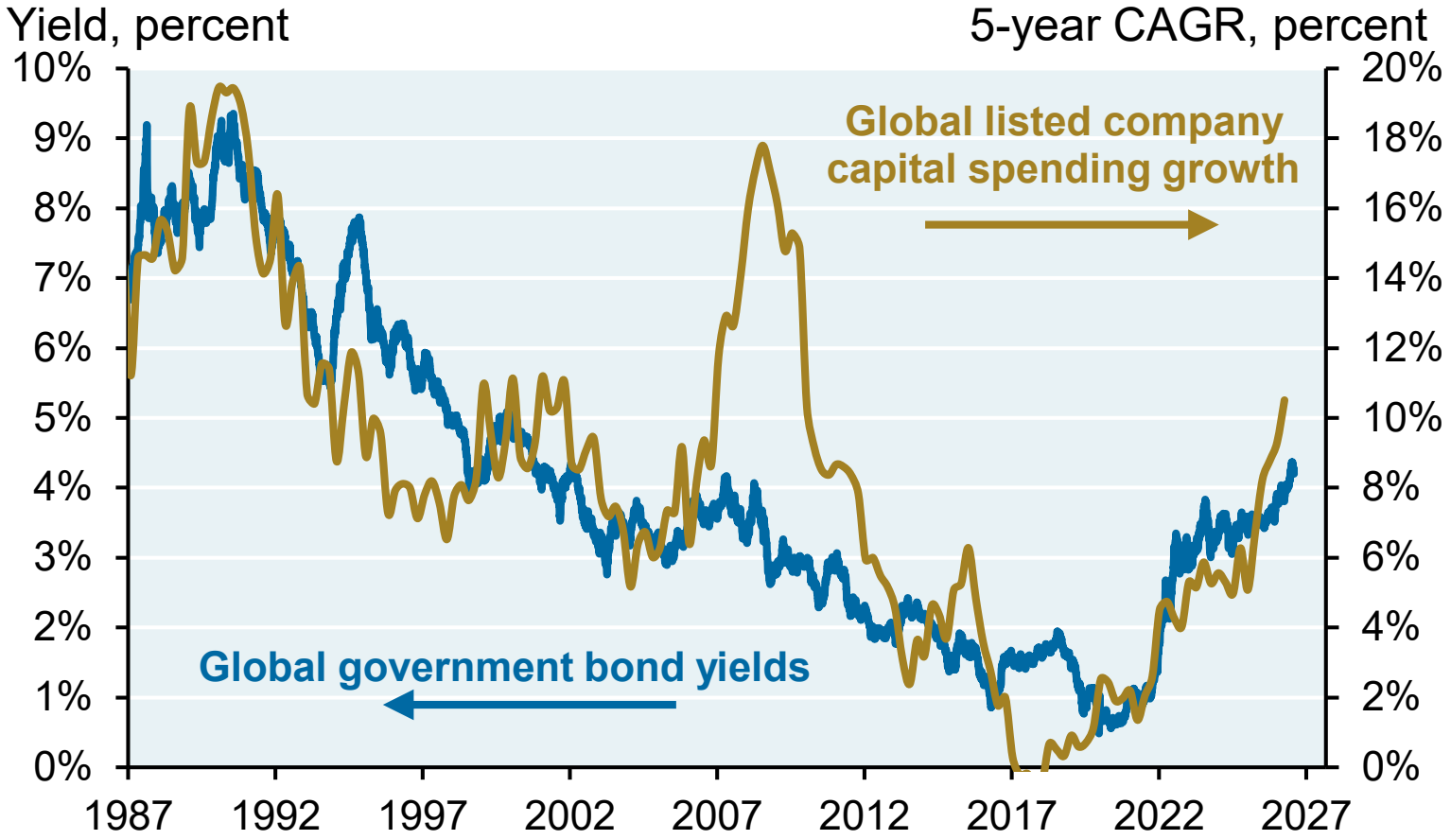
Hyperscaler + NVIDIA 10 yr + debt issuance (incl. SPVs) as a percent of Treasury bond issuance, Percent



Source: Bloomberg, JPMAM, November 2, 2026

Global capex buildout drives the cost of money

Global capex vs bond yields

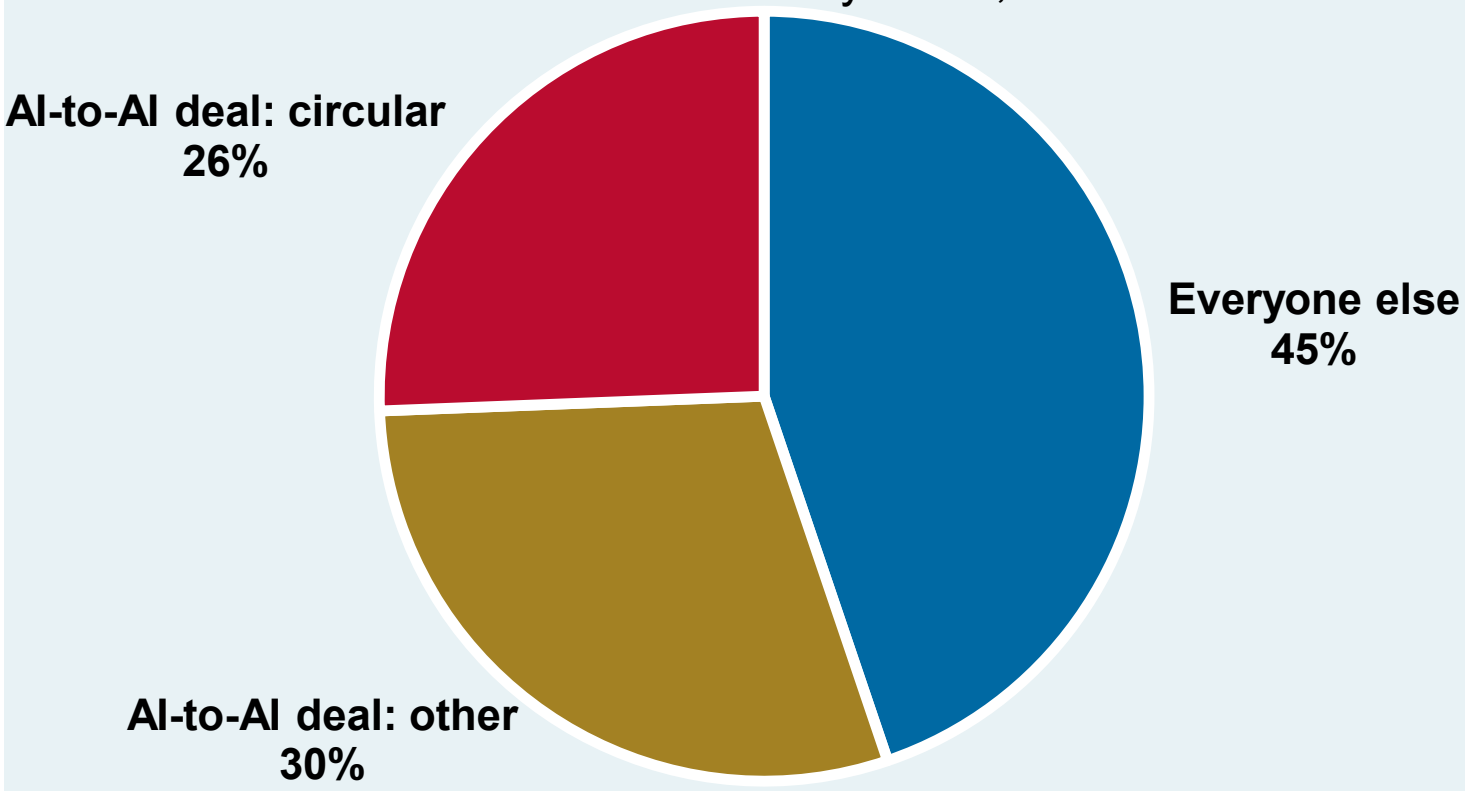


Source: LSEG, JPM GABI, JPMAM, October 27, 2026

A first cut at AI circular financing

Circular financing in AI

Share of investment deals in AI firms by value, 2021-2025

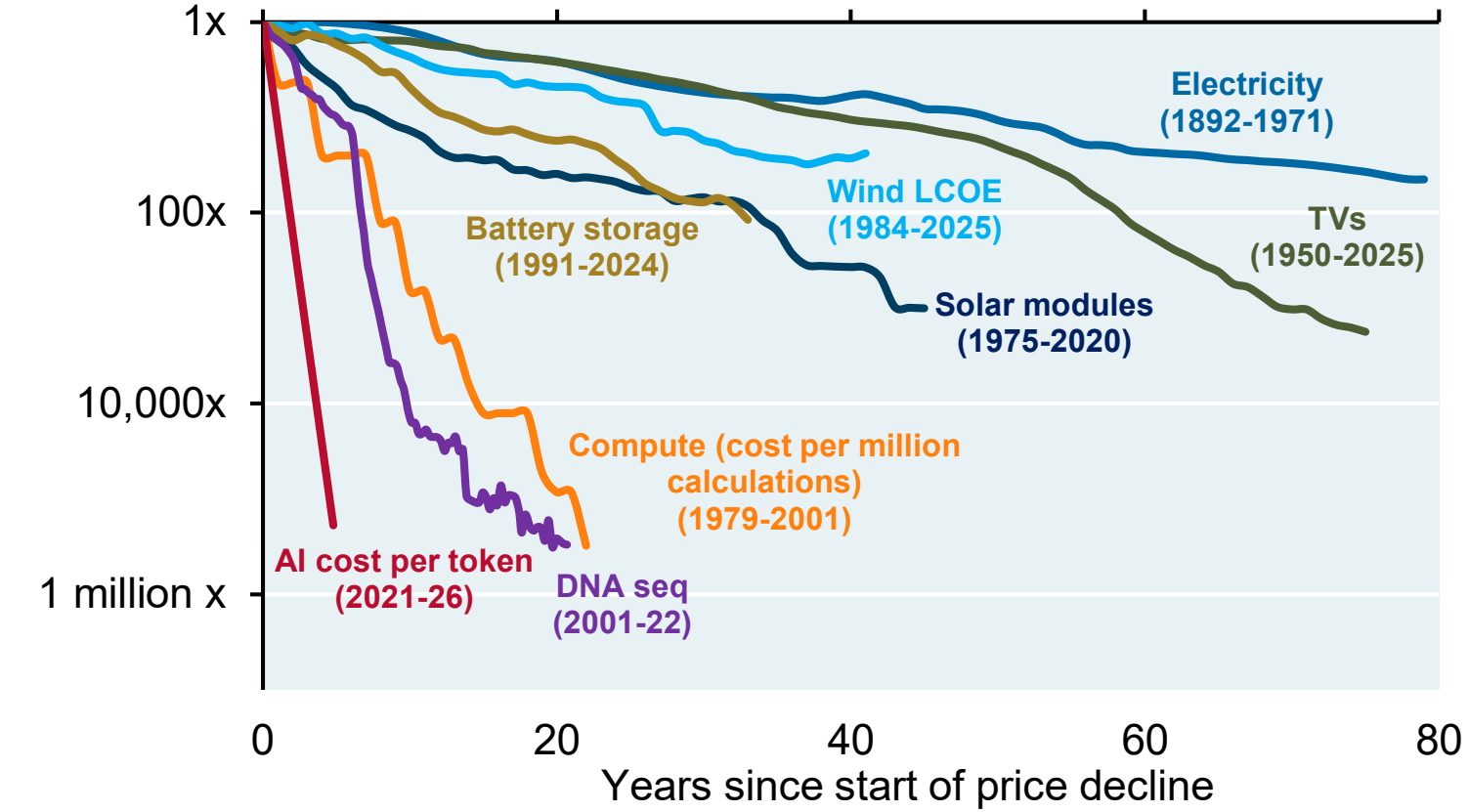


Source: BIS, JPMAM, October 1, 2026

The cost of AI is falling faster than any other transformative technology in history

Model capabilities and token metrics

The collapsing price of transformative technologies

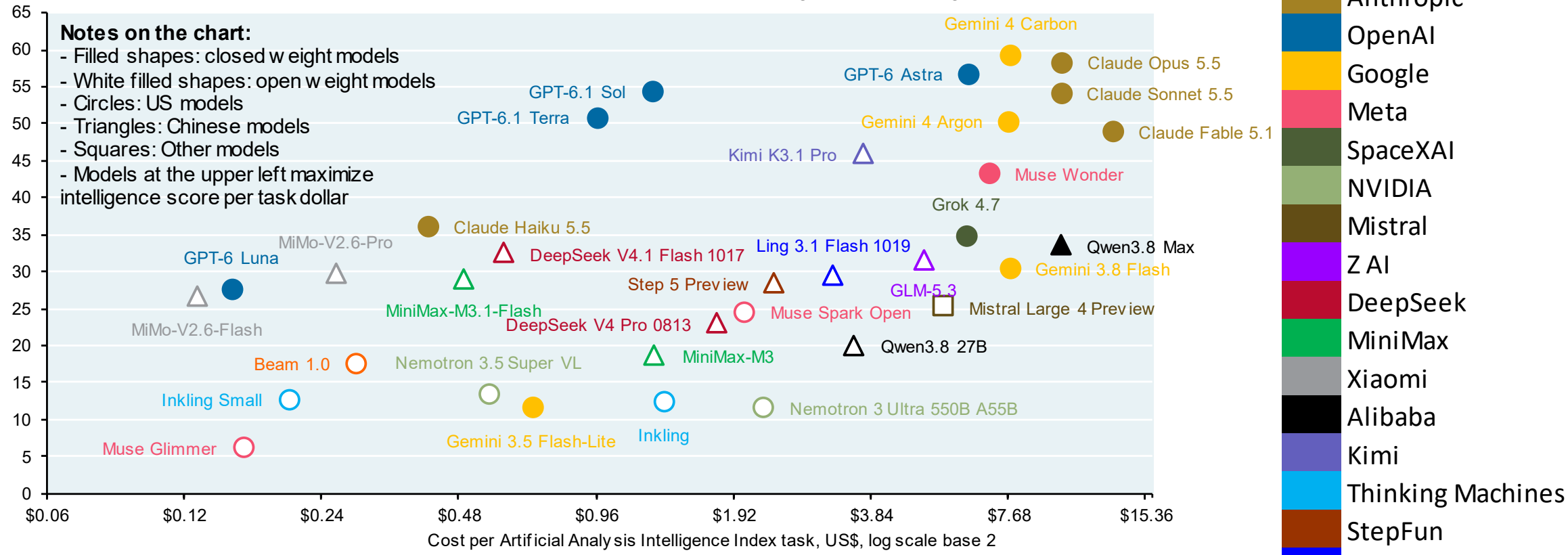


Source: Epoch AI, Bloomberg, IEA, Lazard, JPMAM, 2026

Model performance vs cost

Artificial Analysis Intelligence Index score vs cost per task

Score on composite benchmark of 10 evaluations across math, science, coding and reasoning



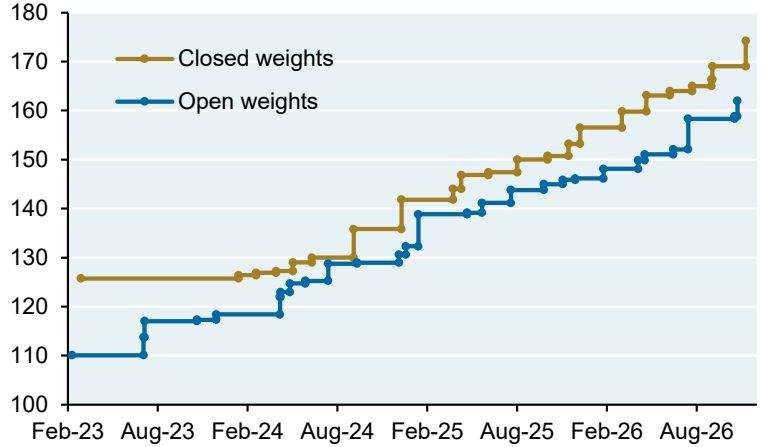
Source: Artificial Analysis, JPMAM, November 2026

ColorKey

- Anthropic
- OpenAI
- Google
- Meta
- SpaceXAI
- NVIDIA
- Mistral
- Z AI
- DeepSeek
- MiniMax
- Xiaomi
- Alibaba
- Kimi
- Thinking Machines
- StepFun
- InclusionAI
- Reflection

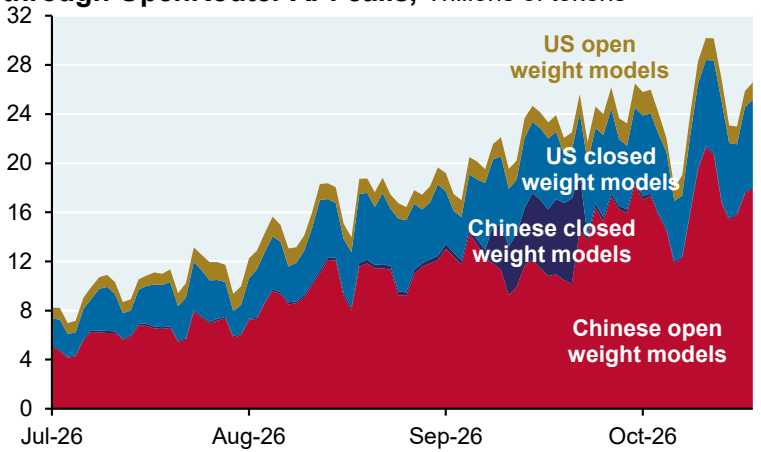
Open vs closed models

Epoch capabilities index
Score



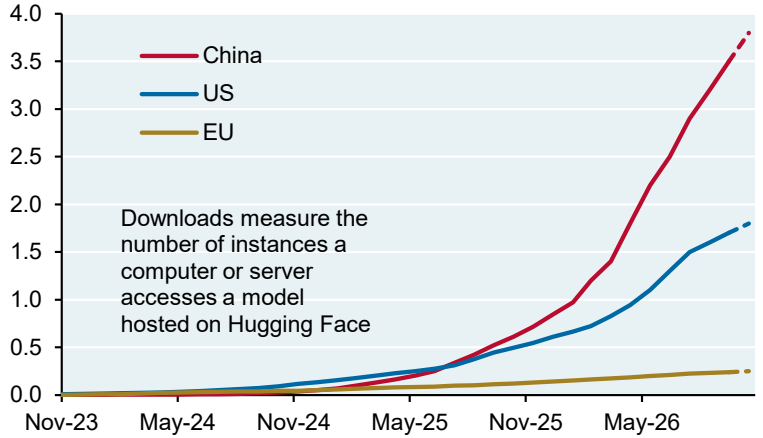
Source: Epoch AI, November 2026

Daily token consumption for US and Chinese models through OpenRouter API calls, Trillions of tokens



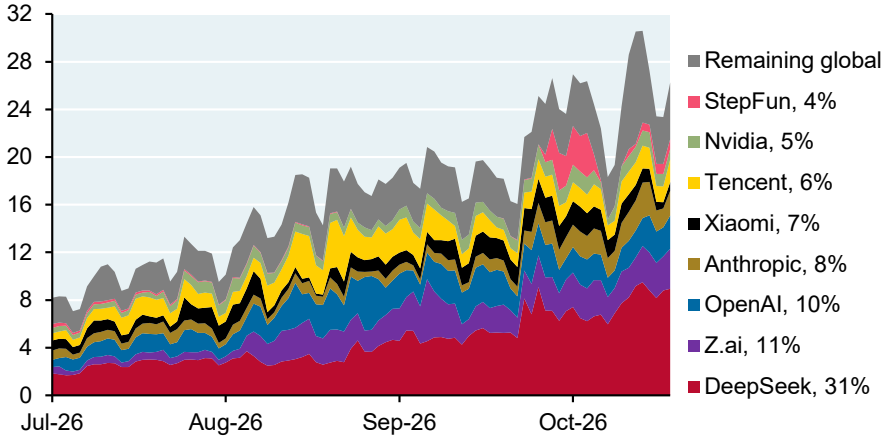
Source: OpenRouter, JPMAM, October 27, 2026

Cumulative Hugging Face downloads
Billions



Source: Interconnects AI, JPMAM, October 2026

Daily token consumption through OpenRouter API calls
Trillions of tokens, with % of tokens in latest month



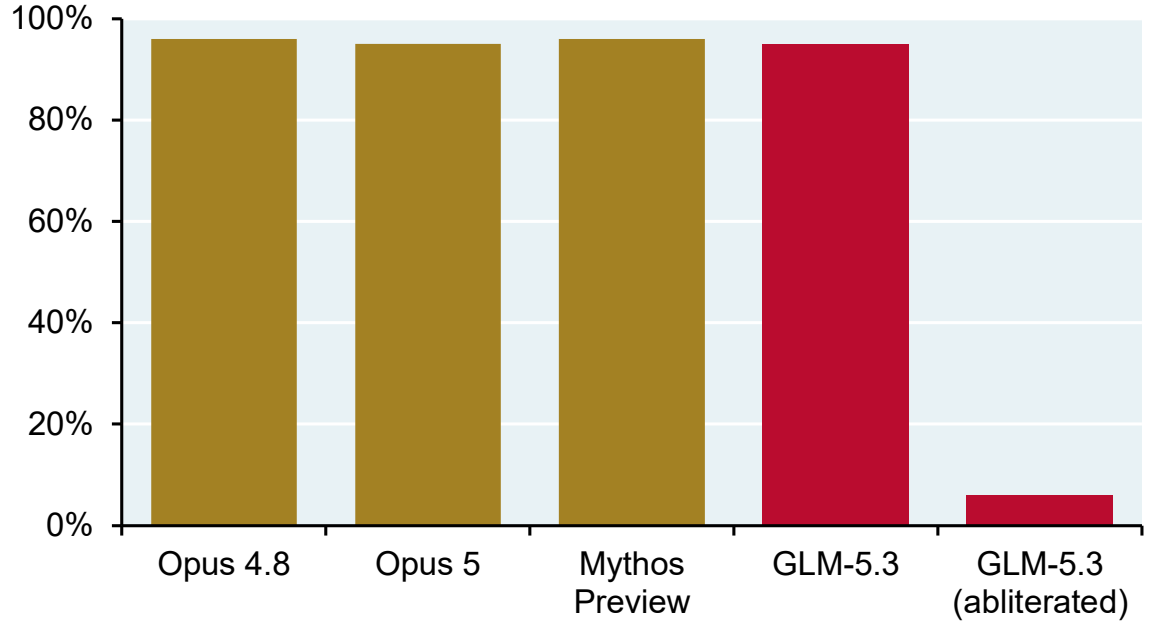
Source: OpenRouter, JPMAM, October 26, 2026

Anthropic's hit piece on GLM open weight model does raise legitimate concerns

Model capabilities and token metrics

Mean refusal rate on harmful request benchmarks

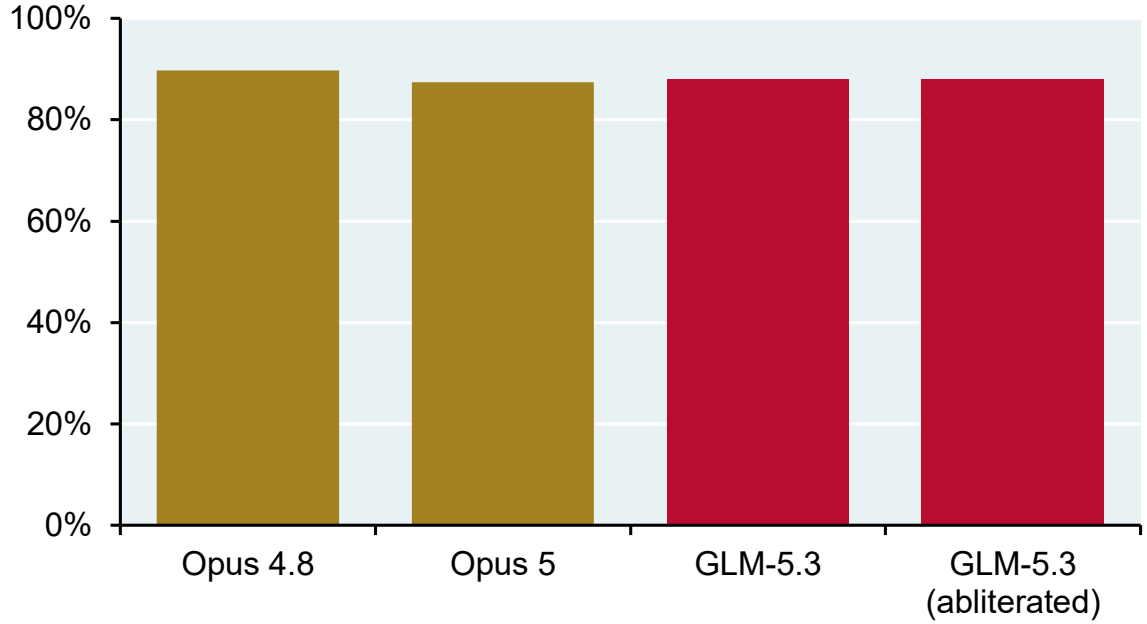
Percent of requests refused



Source: Anthropic, September 29, 2026

Performance on difficult reasoning benchmark

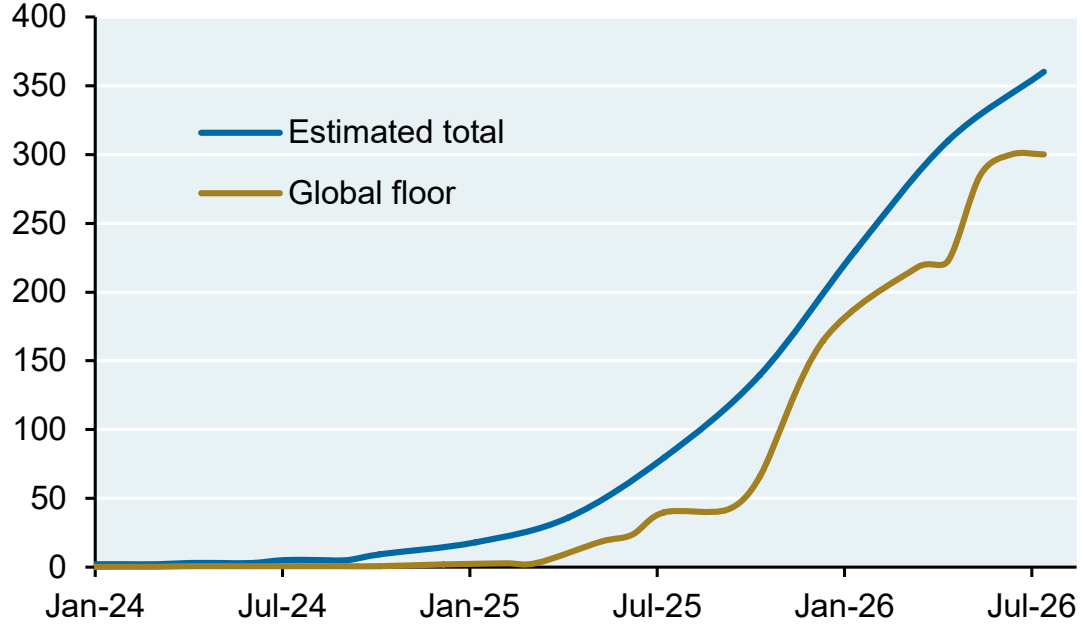
Score on GPQA-Diamond benchmark



Source: Anthropic, OpenRouter, September 29, 2026

Token consumption vs token pricing

Global AI token consumption
trillions/day



Source: Tokens Per Day Index, July 2026

Silicon Data LLM token expenditure index
Price (US$) per million tokens

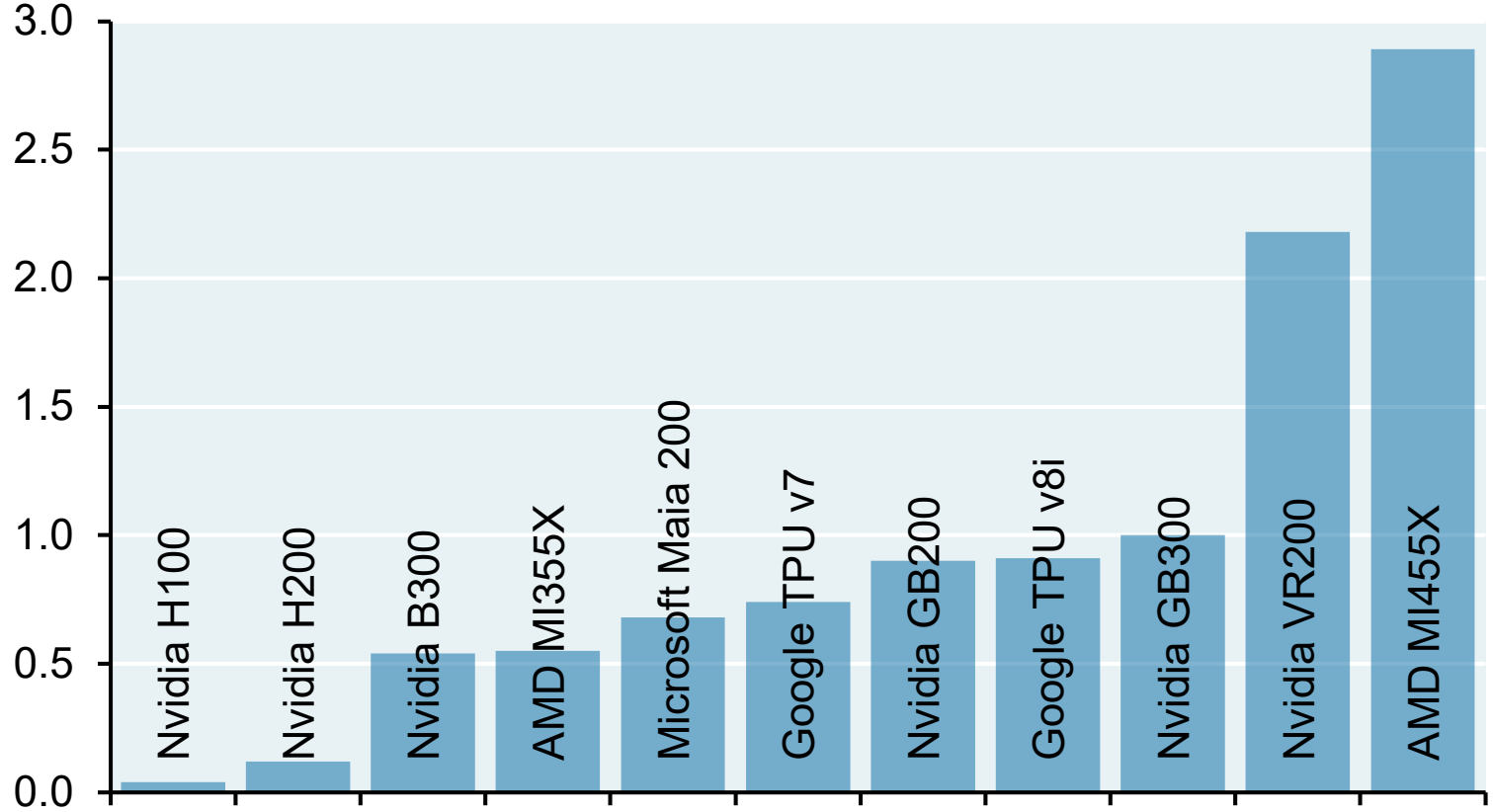


Source: Bloomberg, JPMAM, November 11, 2026

Newer chips have up to 72x higher inference capacity than Nvidia's chips from 2022

Modeled inference performance per chip

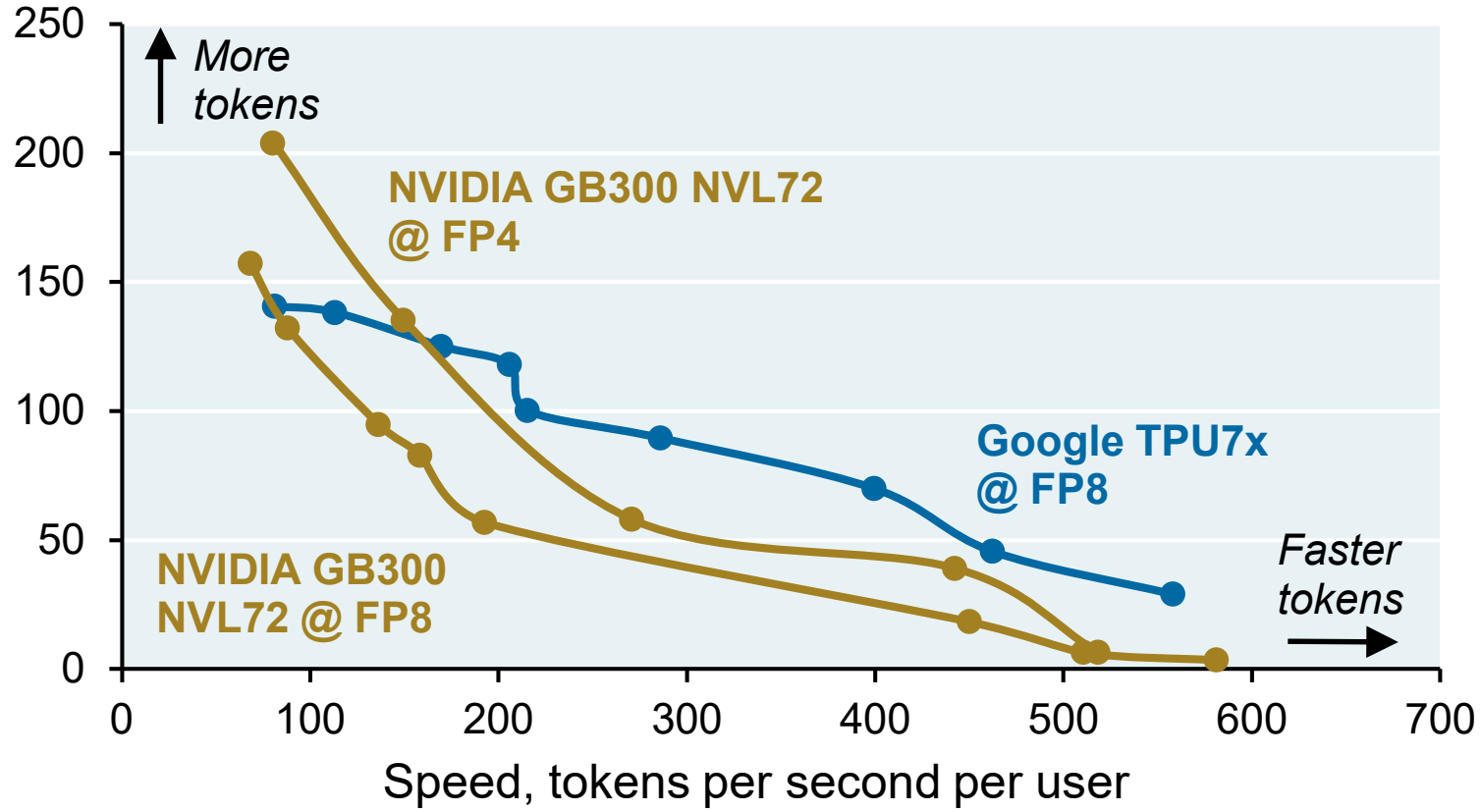
Inference performance index, GB300 equivalents



Source: Epoch AI, November 9, 2026

Comparable inference performance across AI chips

AI accelerator chips: token output vs speed for Qwen 3.5 397B, Token output per $ of cost, millions of tokens

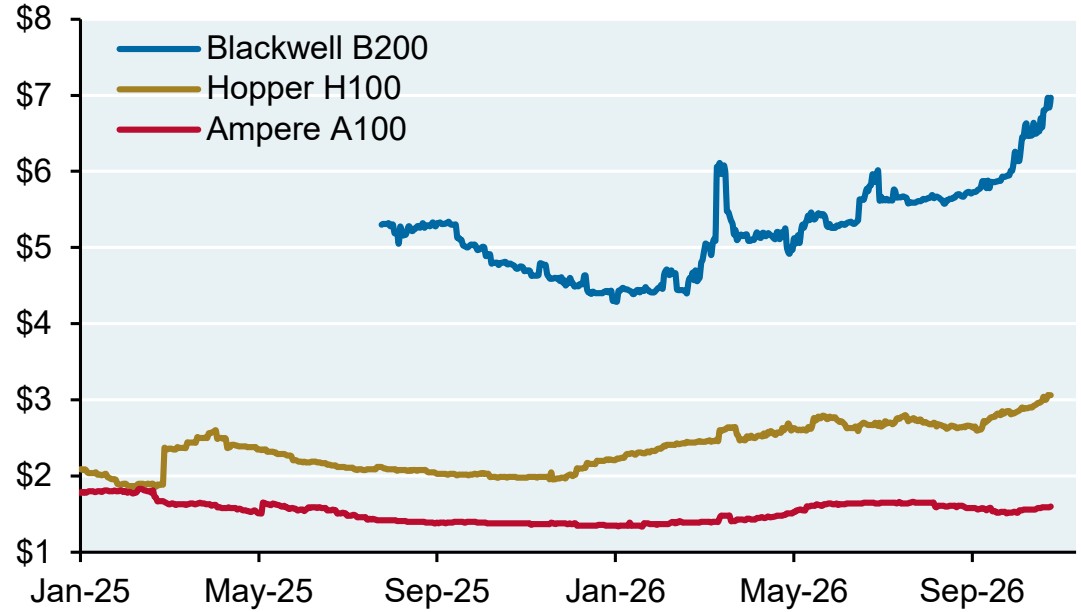


Source: SemiAnalysis Inference Performance Model, October 2026

AI compute and memory pricing

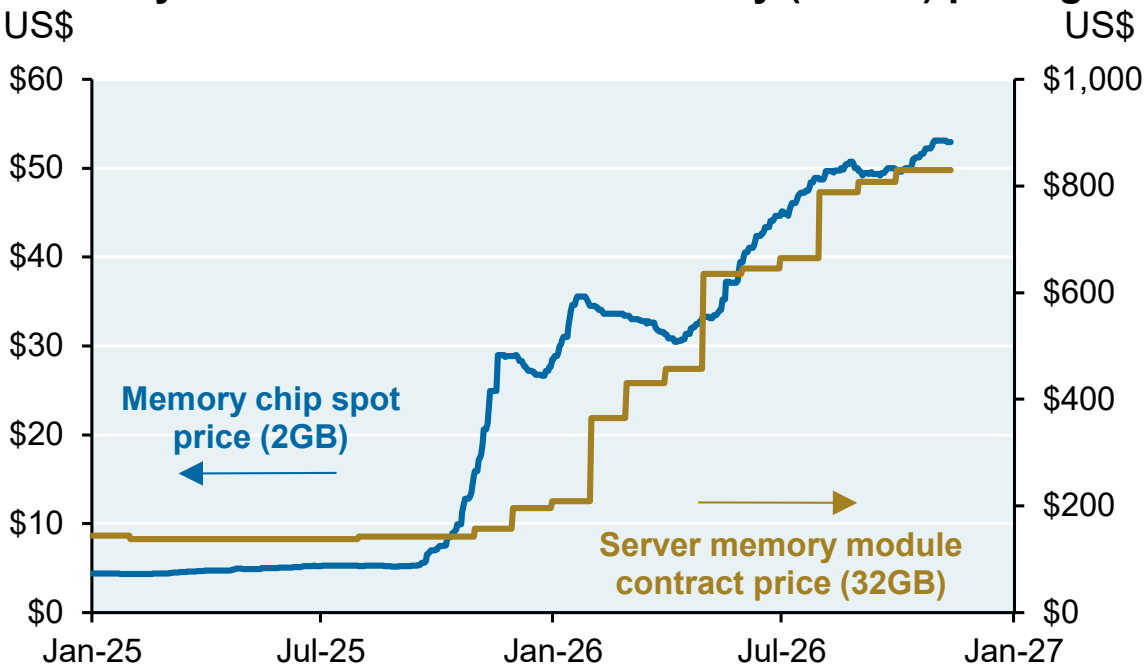
Silicon Data GPU rental price indices

US$ per GPU-hour



Source: Bloomberg, JPMAM, November 12, 2026

DDR5 Dynamic random-access memory (DRAM) pricing

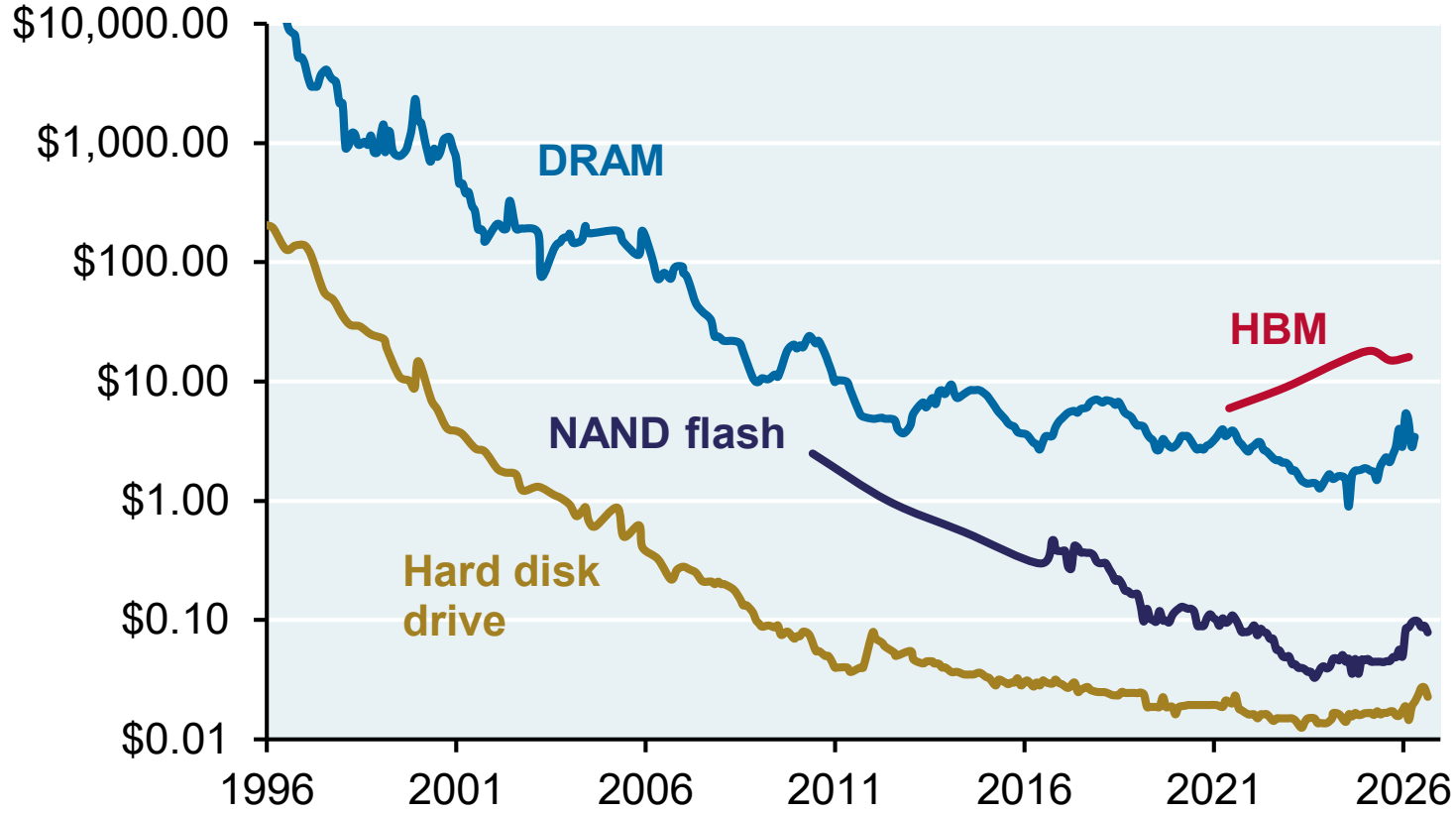


Source: Bloomberg, JPMAM, November 12, 2026

Memory prices

Memory and storage prices over time

US$ per GB, log scale

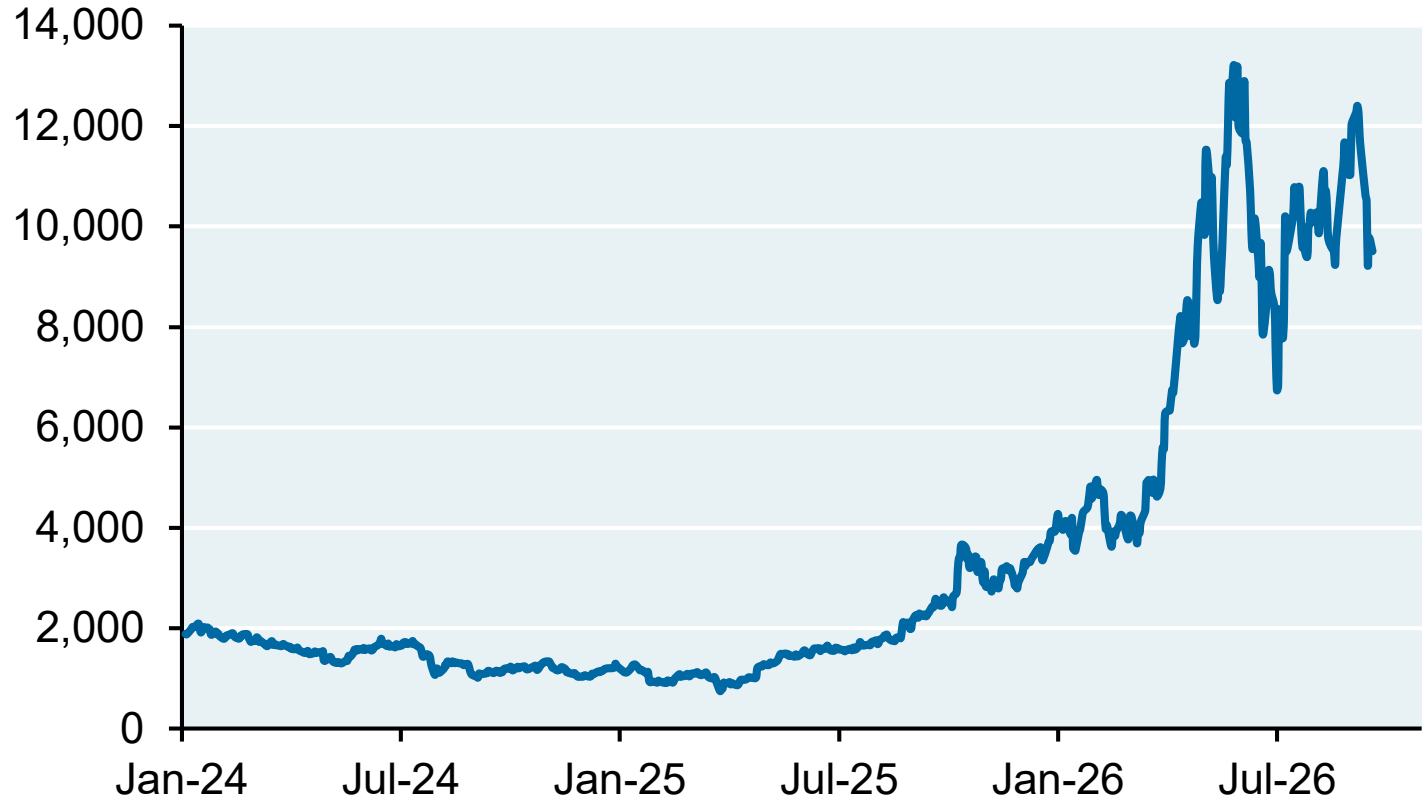


Source: Stanford, JPMAM, October 2026

Semiconductor supply chain

Ibiden stock price

Price, JPY



Source: Bloomberg, JPMAM, November 5, 2026

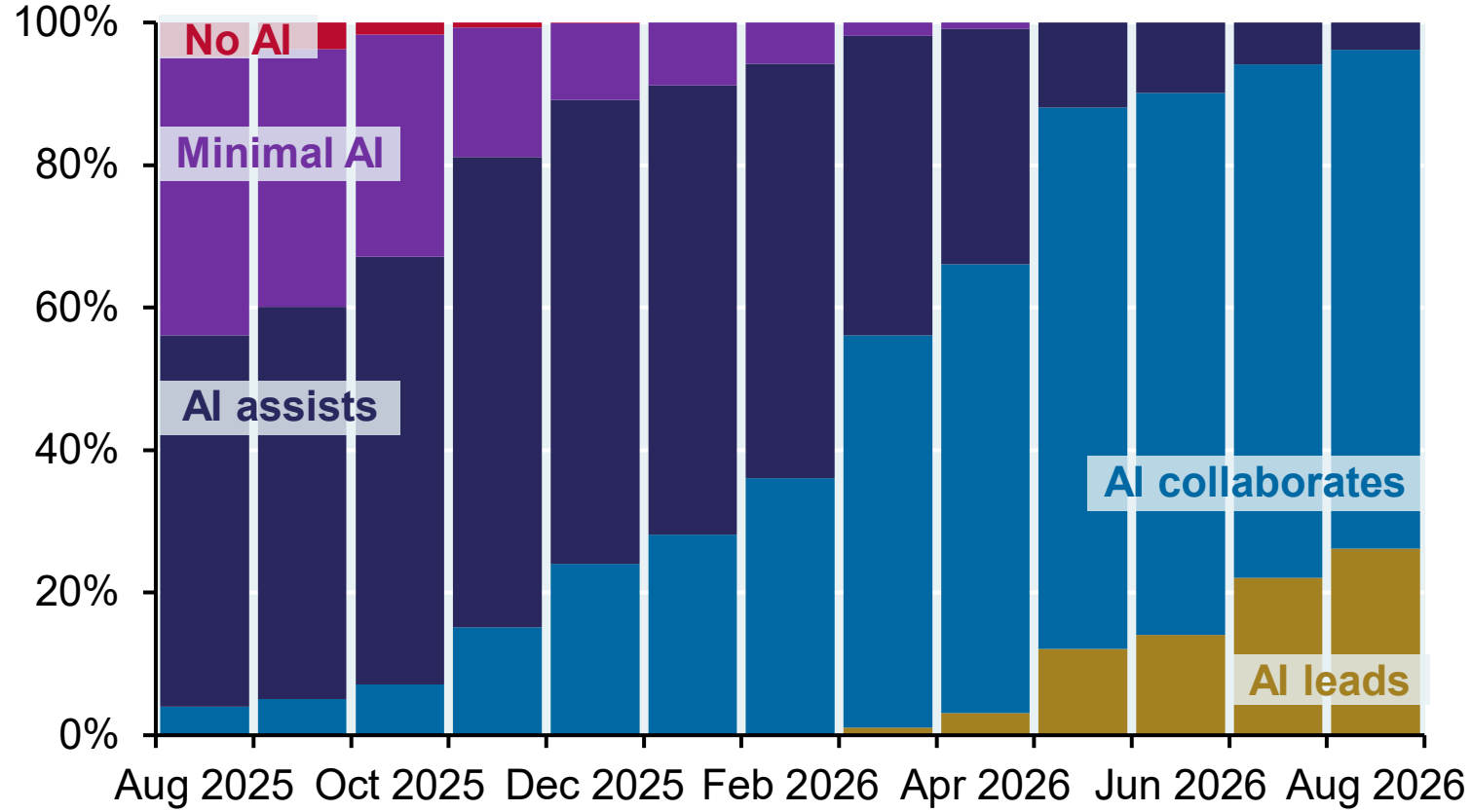
Ibiden makes advanced substrates that connect AI chips to circuit boards. Ibiden estimates it holds a 70%–80% market share in integrated circuit (IC) package substrates for AI servers. Major competitors include Unimicron, Shinko Electric and AT&S

AI and recursive self-improvement

Model capabilities and token metrics

AI involvement in AI R&D work at Anthropic

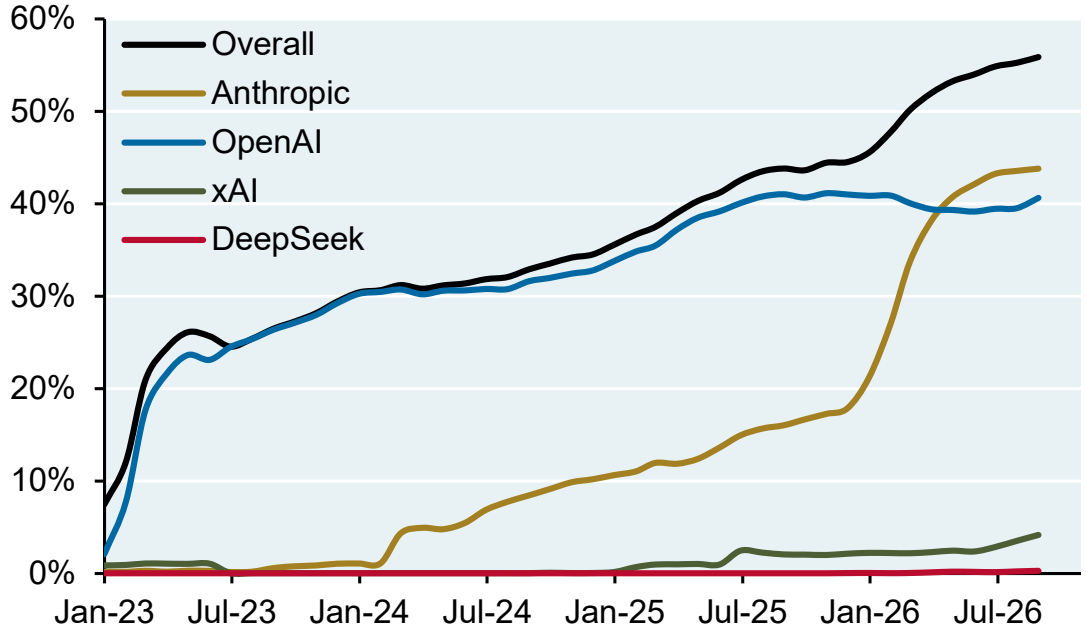
Share of AI R&D tasks



Source: Anthropic R&D Automation Index, August 2026

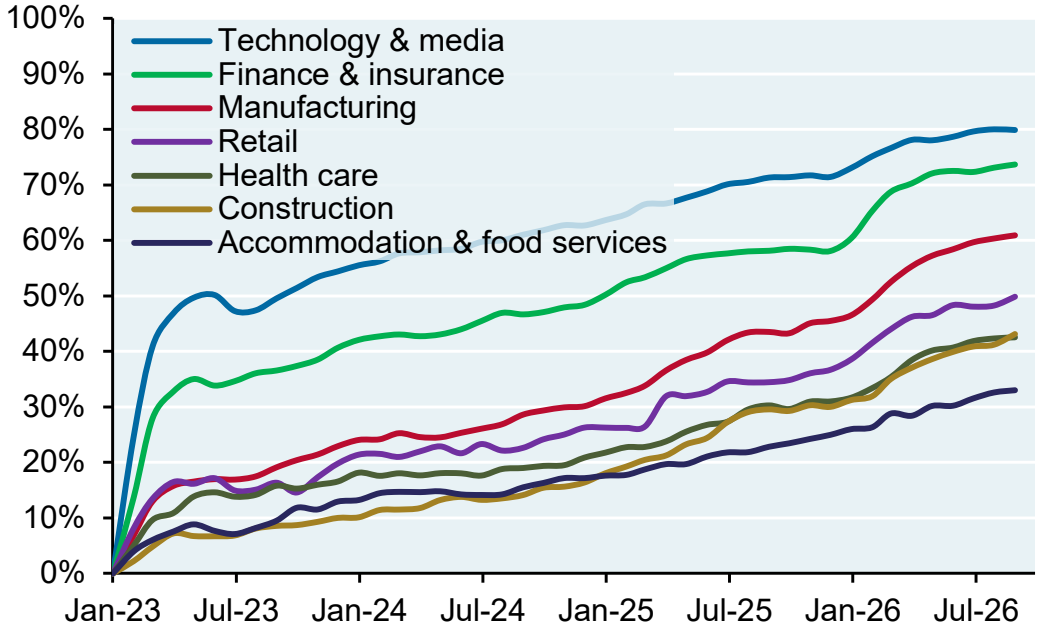
AI adoption by US businesses

AI adoption rate by model company, Share of US businesses with spending on AI models, subscriptions, tokens and APIs



Source: Ramp, September 2026

AI adoption rate by sector, Share of US businesses with spending on AI models, subscriptions, tokens and APIs

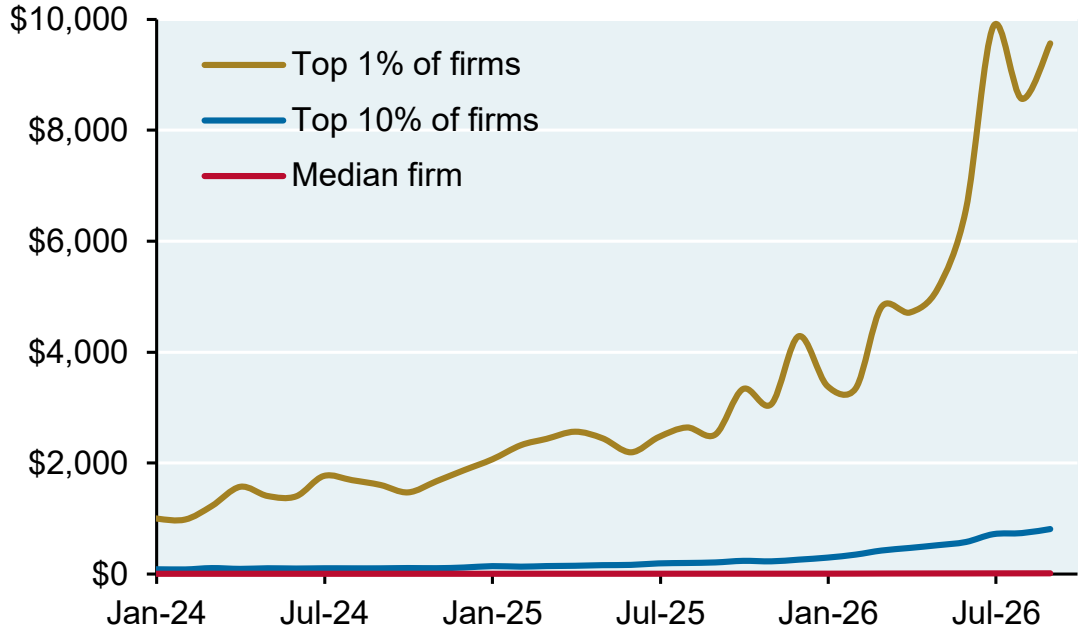


Source: Ramp, September 2026

Monthly spend per employee still highly concentrated

Monthly AI spend per employee

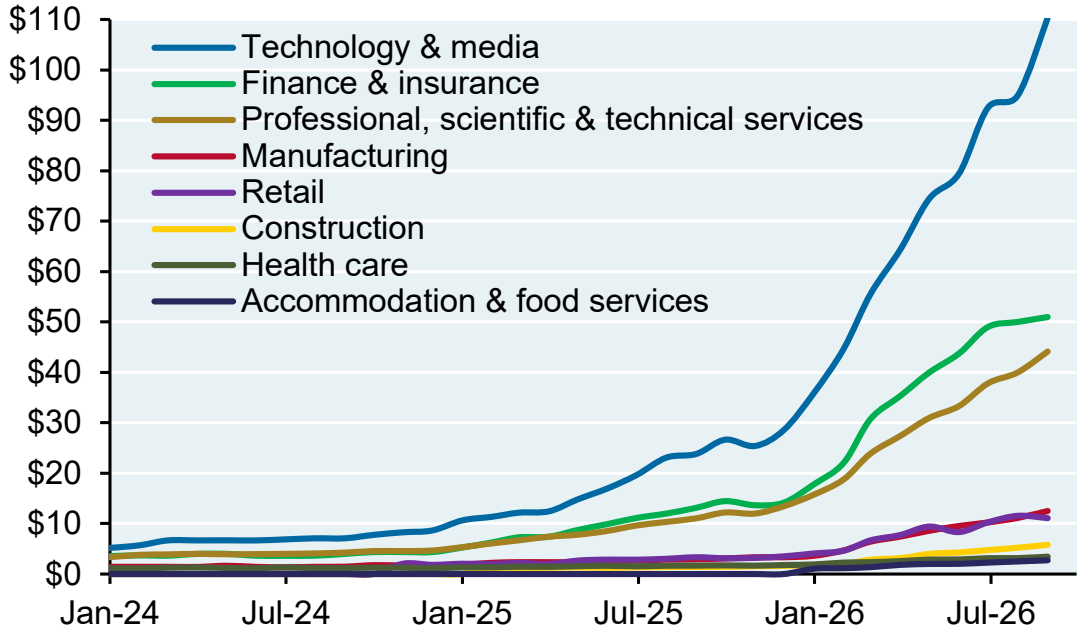
US$ per employee per month



Source: Ramp, September 2026

Median monthly AI spend per employee by sector

US$ per employee per month

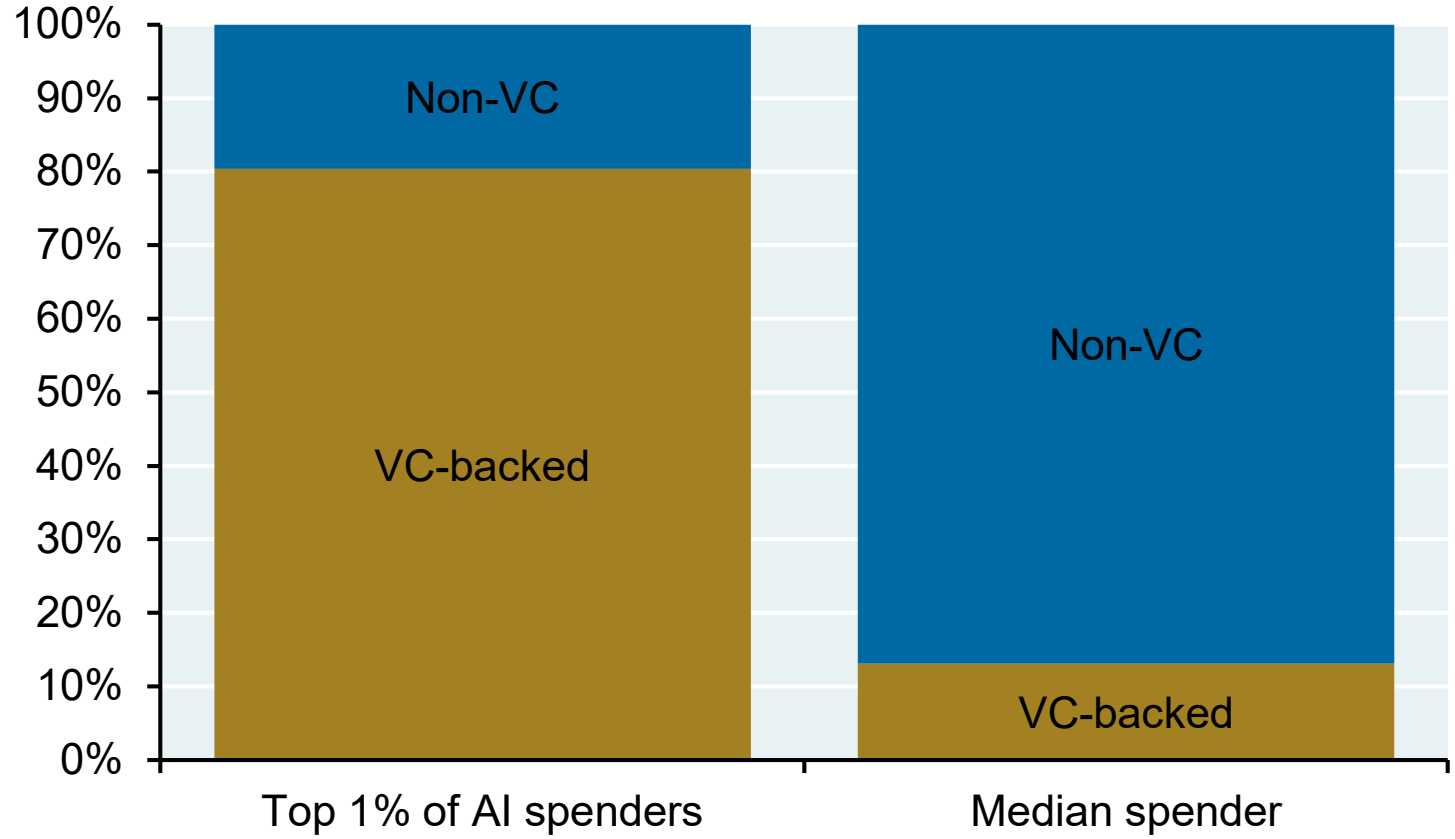


Source: Ramp, September 2026

How durable is token spending?

AI's biggest spenders are funded by venture capital

Percent of businesses



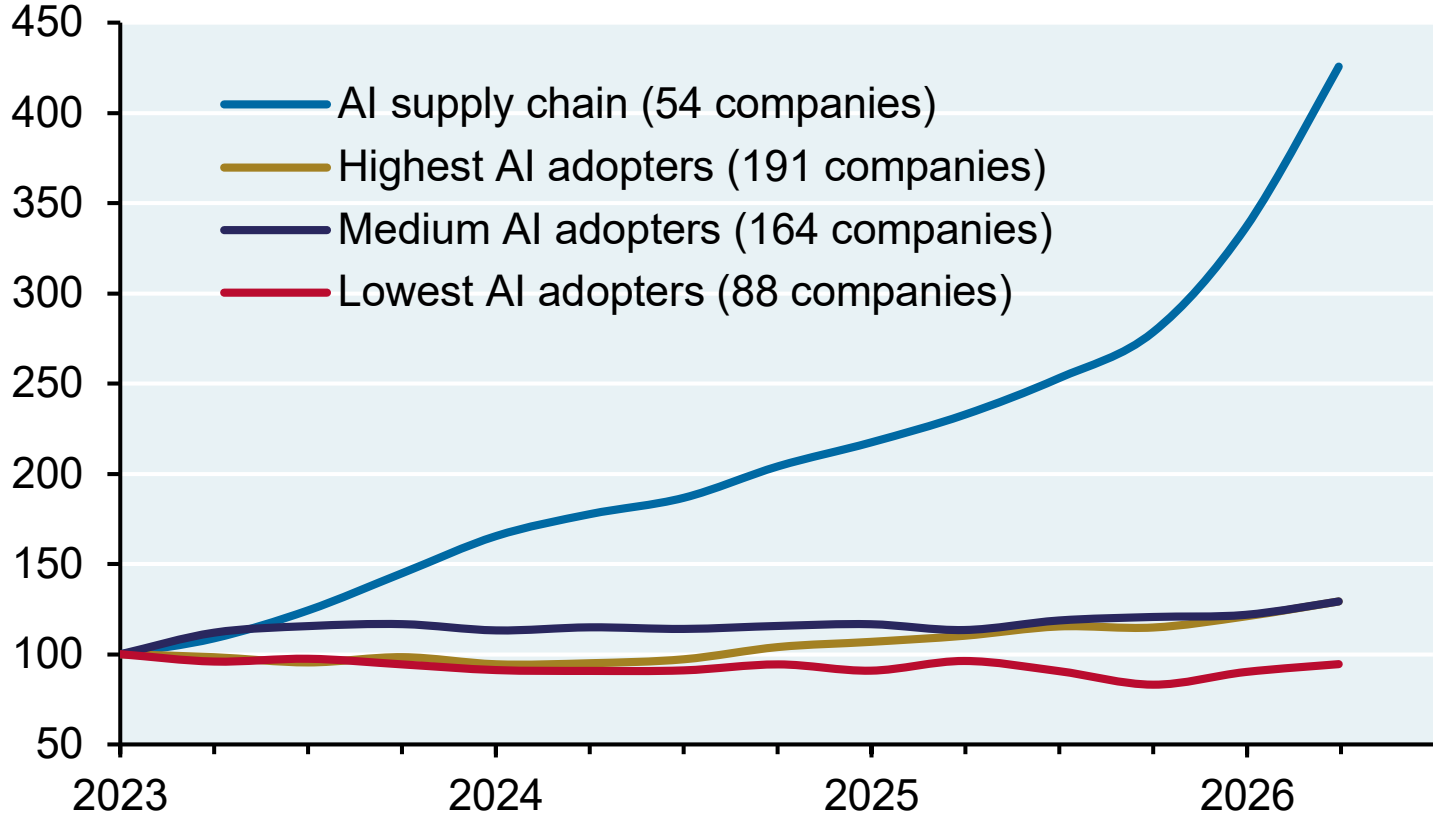
Source: Ramp, October 2026

The earnings windfall for AI supply chain companies still dwarfs earnings benefits for AI adopters…although signs of adopter benefits are emerging

AI adoption and impact measures

S&P 500 AI supply chain, AI adopters and non-AI adopters

Trailing 12-month earnings, index (100 = March 2023)



Source: Bloomberg, MIT FutureTech, JPMAM, Q2 2026

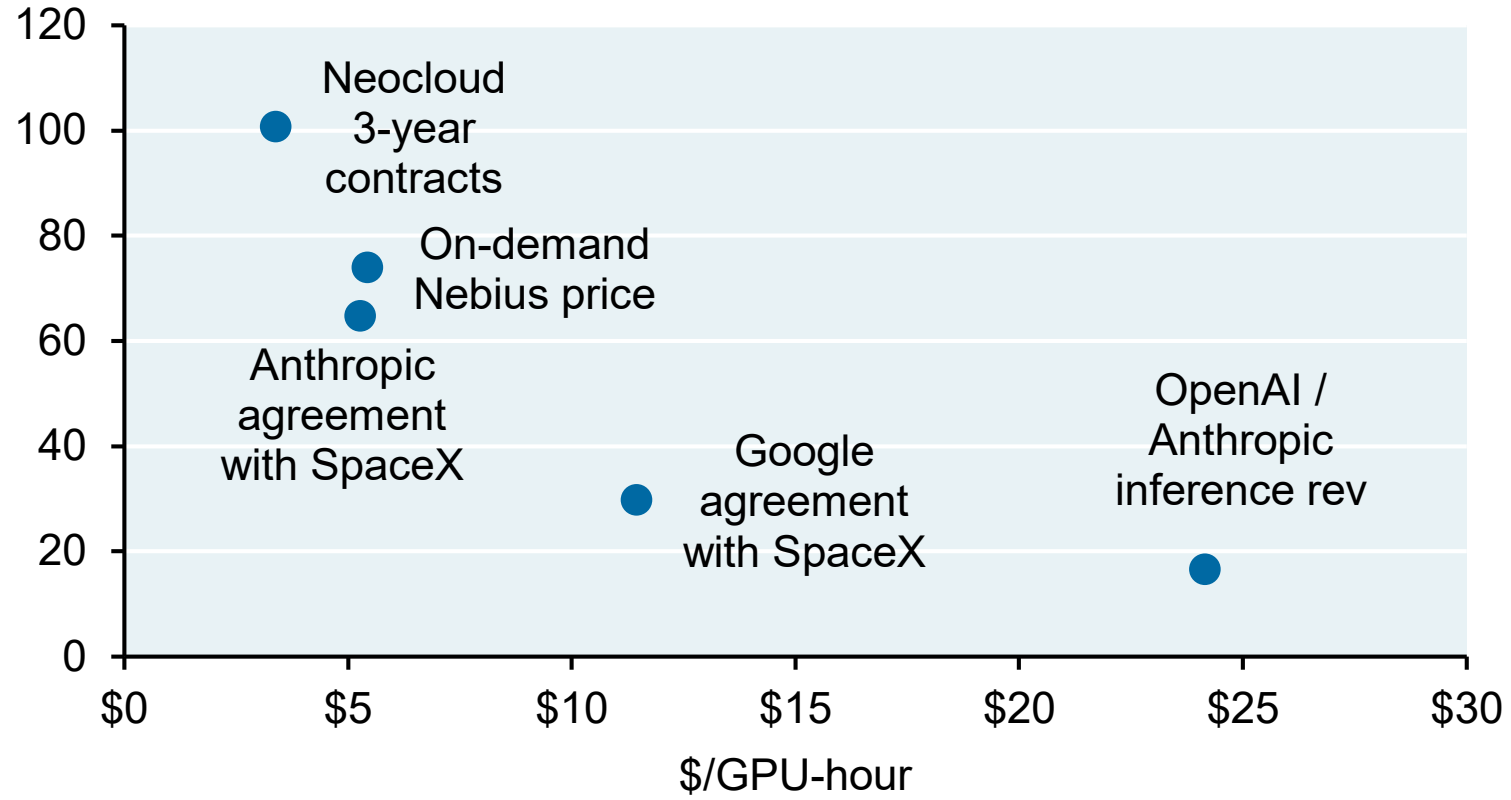
Using an MIT study's 1–5 AI adoption rubric (1 = no evidence of current AI adoption; 3 = moderate/meaningful AI adoption; 5 = AI as a core driver of strategy and performance), we score each S&P 500 company by analyzing its 2025 10-K and bucket the company accordingly

Source: *"AI Adoption in S&P 500 Firms"*, MIT FutureTech, August 24, 2026

Short payback periods explain why data centers are so price inelastic regarding the cost of power generation (see Appendix A for assumptions)

1 GW data center payback periods for a $5 bn power plant

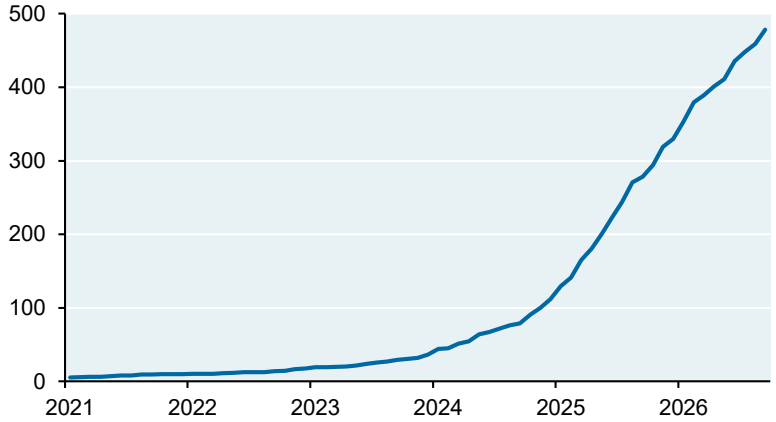
Payback period, days



Source: SemiAnalysis, Company Disclosures, JPMAM, September 2026

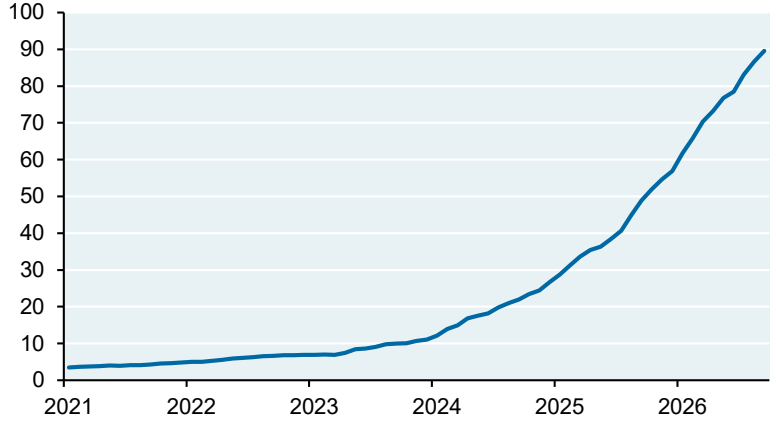
Tracking announced data center activity

Announced data center projects
GW, IT load + cooling + electrical overhead



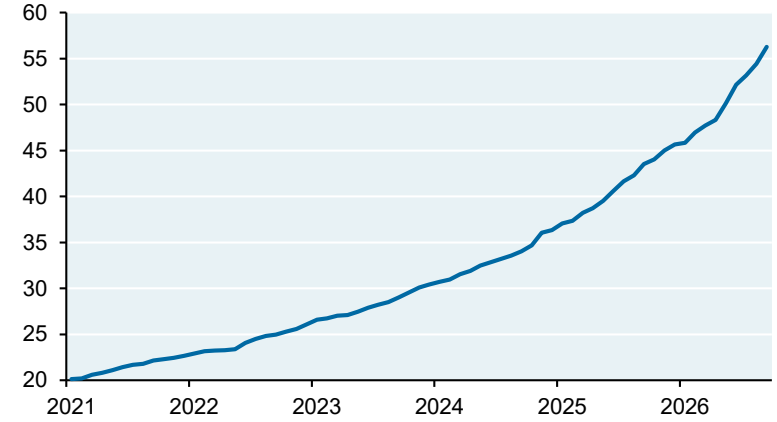
Source: Aterio, JPMAM, September 2026

Data center projects under construction
GW, IT load + cooling + electrical overhead



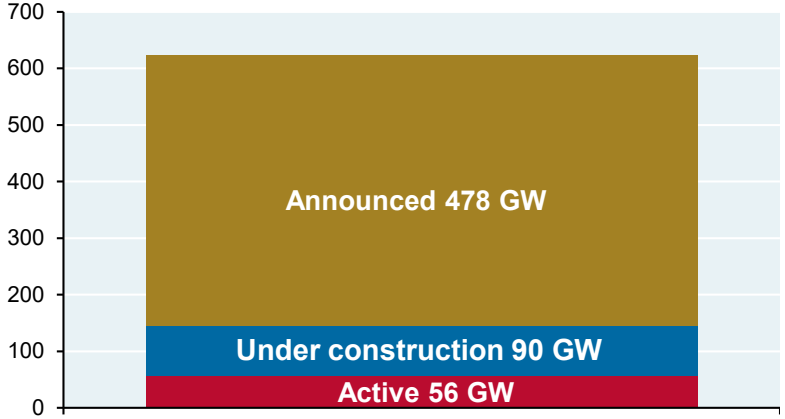
Source: Aterio, JPMAM, September 2026

Active data center projects
GW, IT load + cooling + electrical overhead



Source: Aterio, JPMAM, September 2026

Data center project by stage
GW, IT load + cooling + electrical overhead

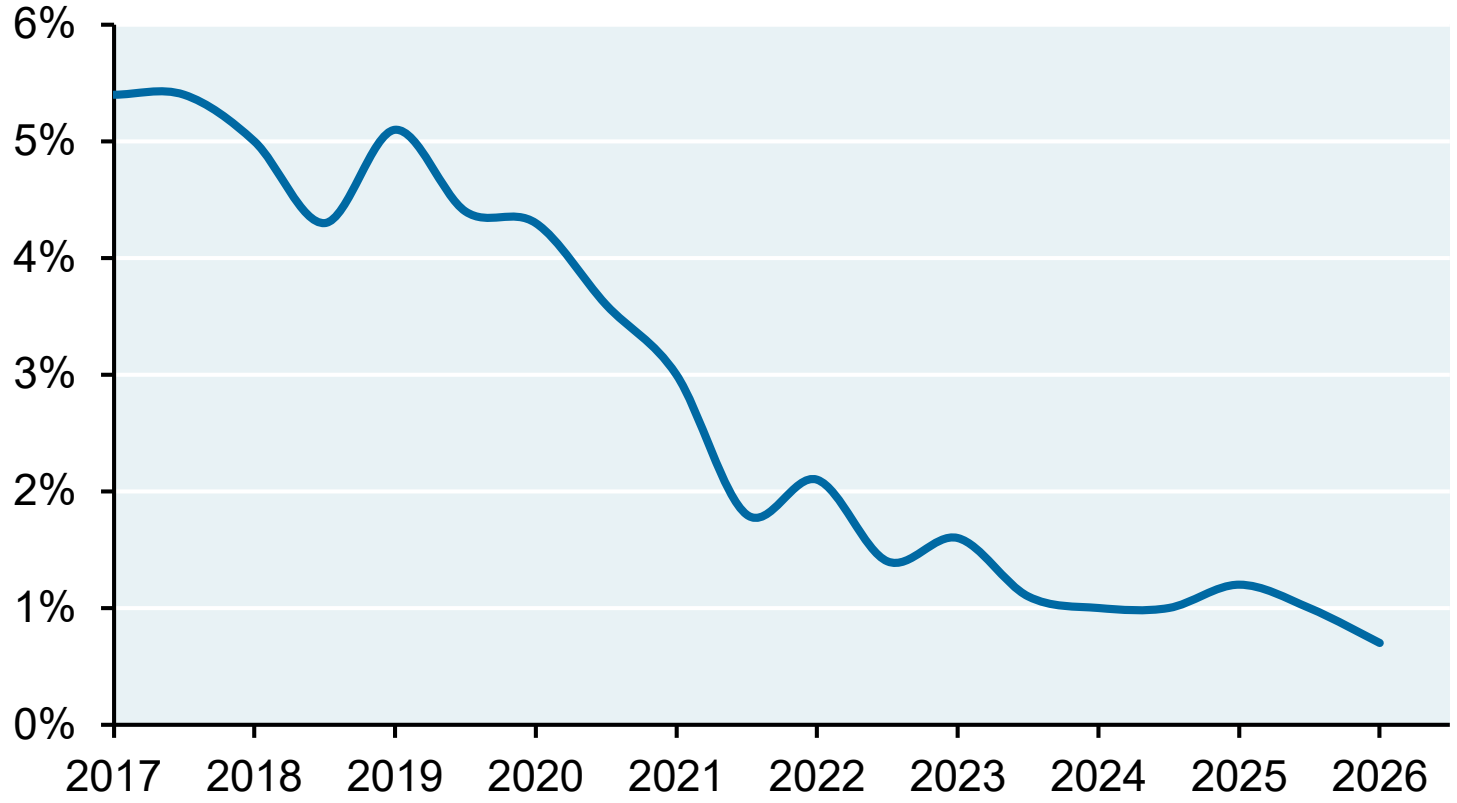


Source: Aterio, JPMAM, September 2026

Despite the rapid capacity additions, vacancy rates remain low

North American data center vacancy rates

Percent of existing capacity



Source: JLL, August 11, 2026

Midterms create headwinds for data center expansion

Incumbent/incoming governor positions and 2028 data center GW by party/outcome

Presumptive winner in green based on exit polling

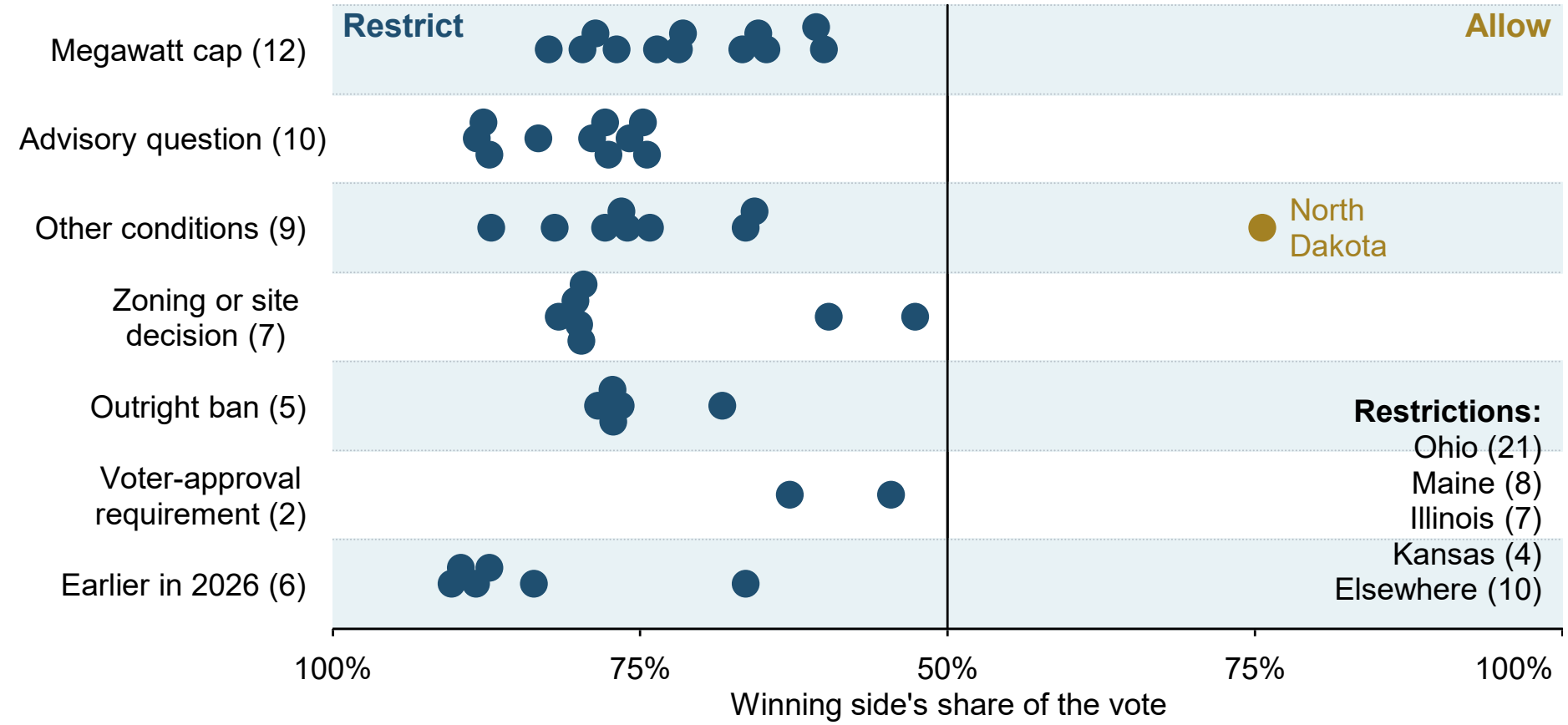
State	2028 GW	GOP	DEM
Texas	26.5	Conditions	**Pause**
Ohio	5.2	Pause	**Pause**
Georgia	5.1	Conditions	**Pause**
Pennsylvania	4.7	Pause	**Conditions**
Illinois	2.9	Conditions	**Conditions**
Arizona	2.7	Conditions	**Conditions**
Oklahoma	2.1	**Conditions**	Pause
Iowa	1.6	Pause	**Conditions**
Wyoming	0.8	**Conditions**	Conditions
Oregon	0.7	Pause	**Pause**

Source: Aterio, SemiAnalysis, JPMAM. 2026

Voters overwhelmingly favor restrictions on data centers

Local data center ballot measures by measure type

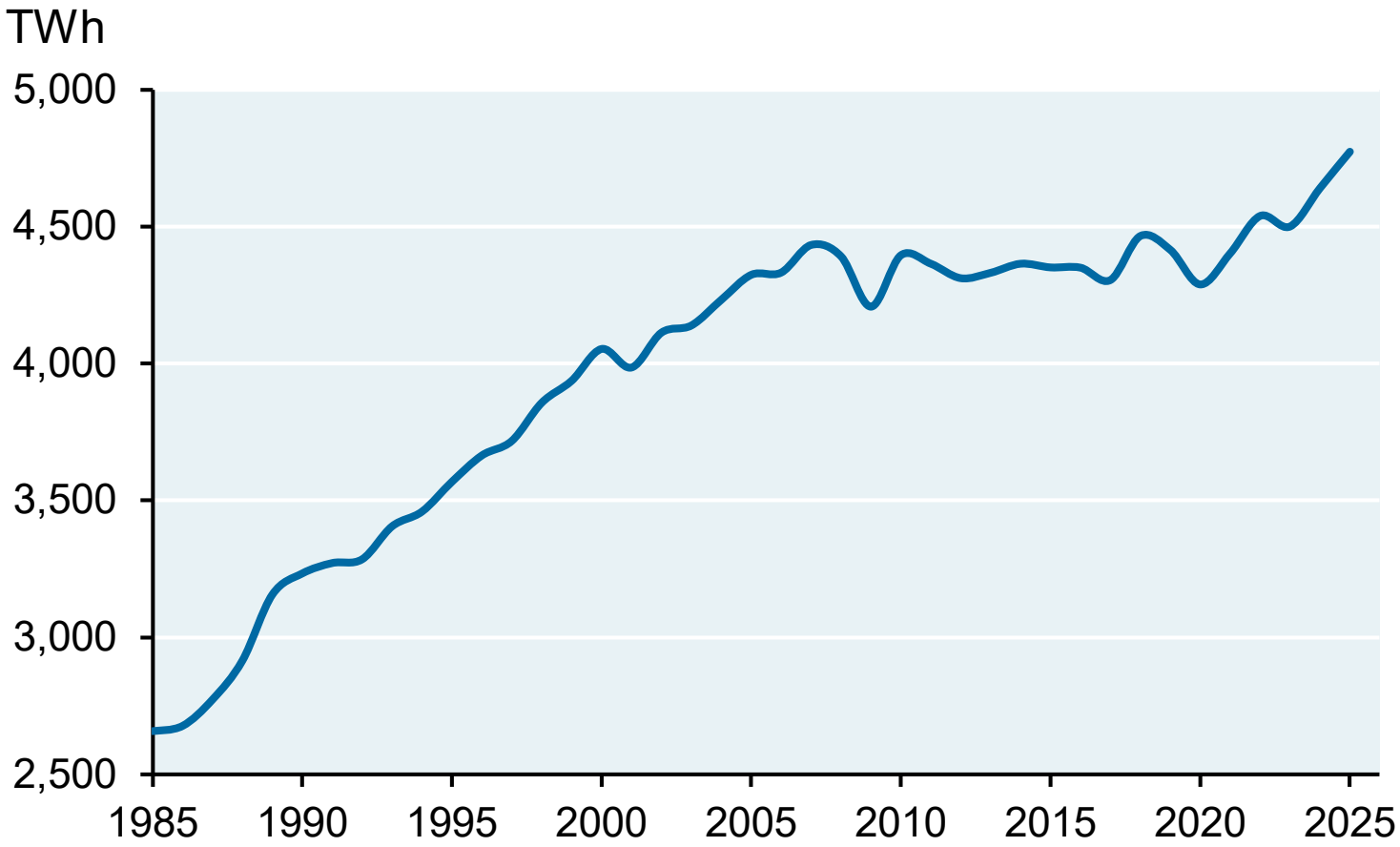
Percent of votes; each dot represents one measure



Source: Redbud Consulting, JPMAM, November 5, 2026

US electricity generation on the rise for the first time since the early 2000's

US electricity generation

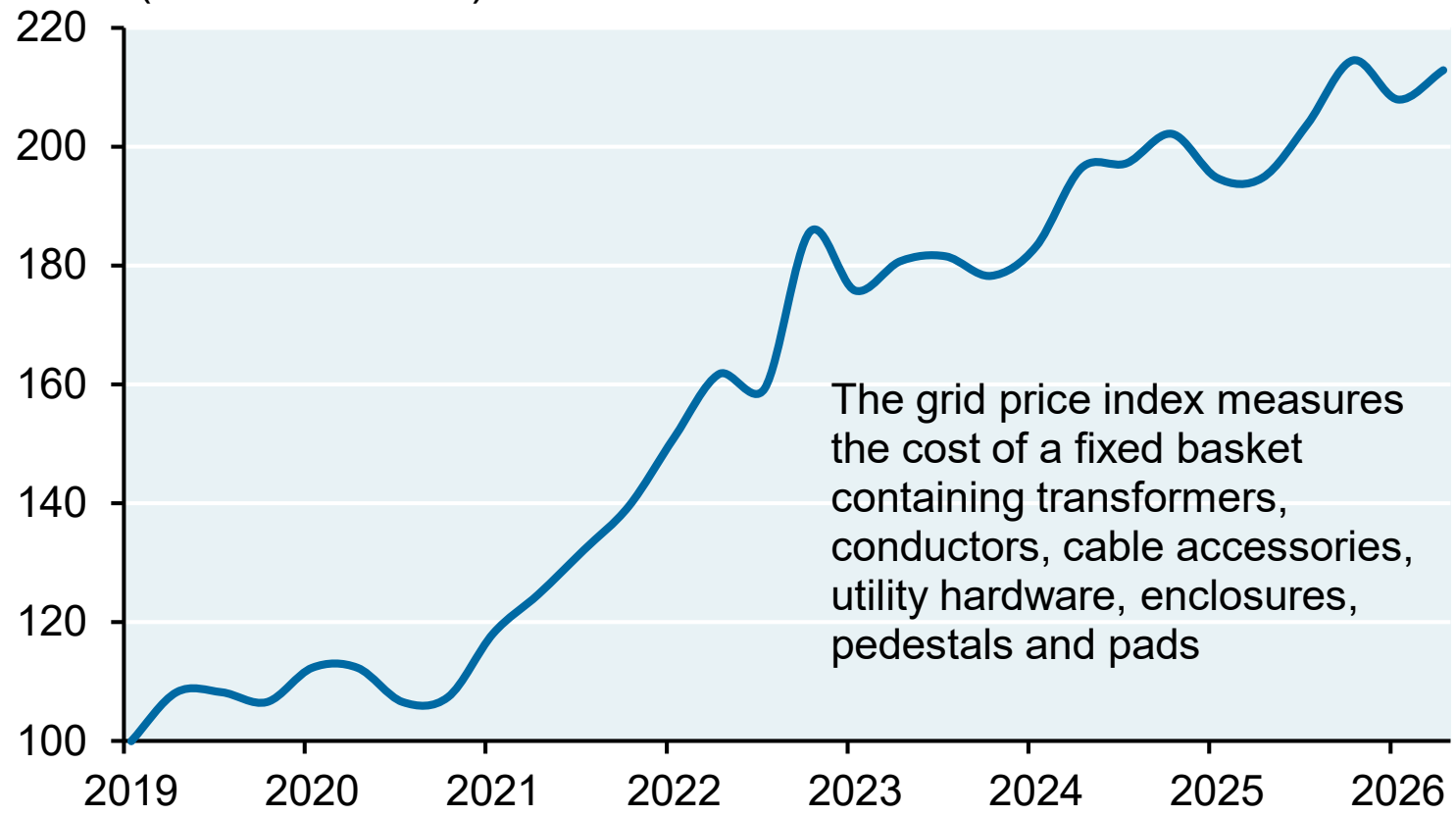


Source: Energy Institute, JPMAM, 2025

The cost of fixing the grid

Electricity grid price index

Index (Q1 2019 = 100)



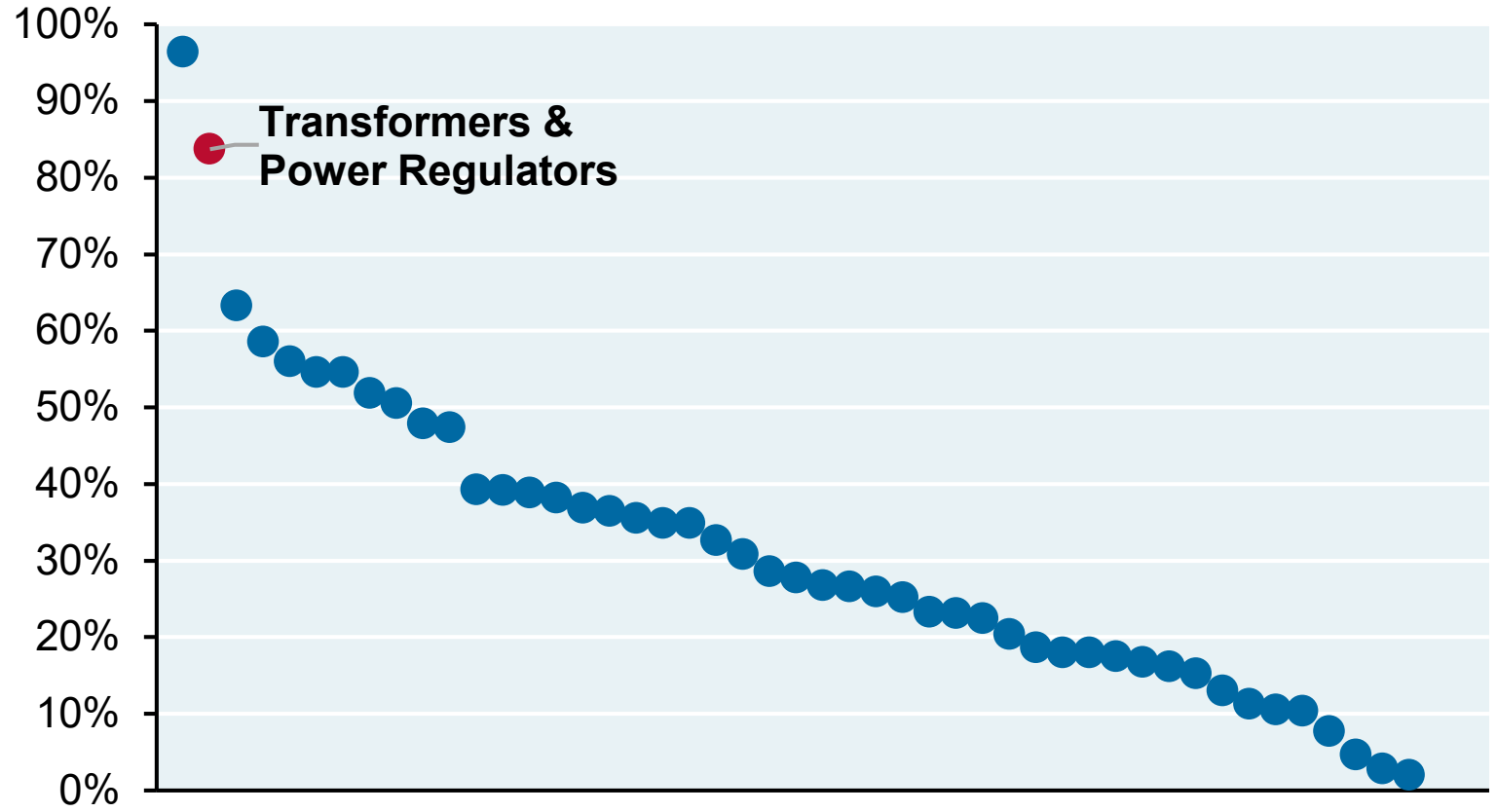
Source: National Rural Utilities Cooperative Finance Corporation, Q2 2026

Of all 47 categories in the US PPI report, transformers and power regulators have seen the second highest level of inflation since 2020

Data centers and energy

Producer price inflation: core goods

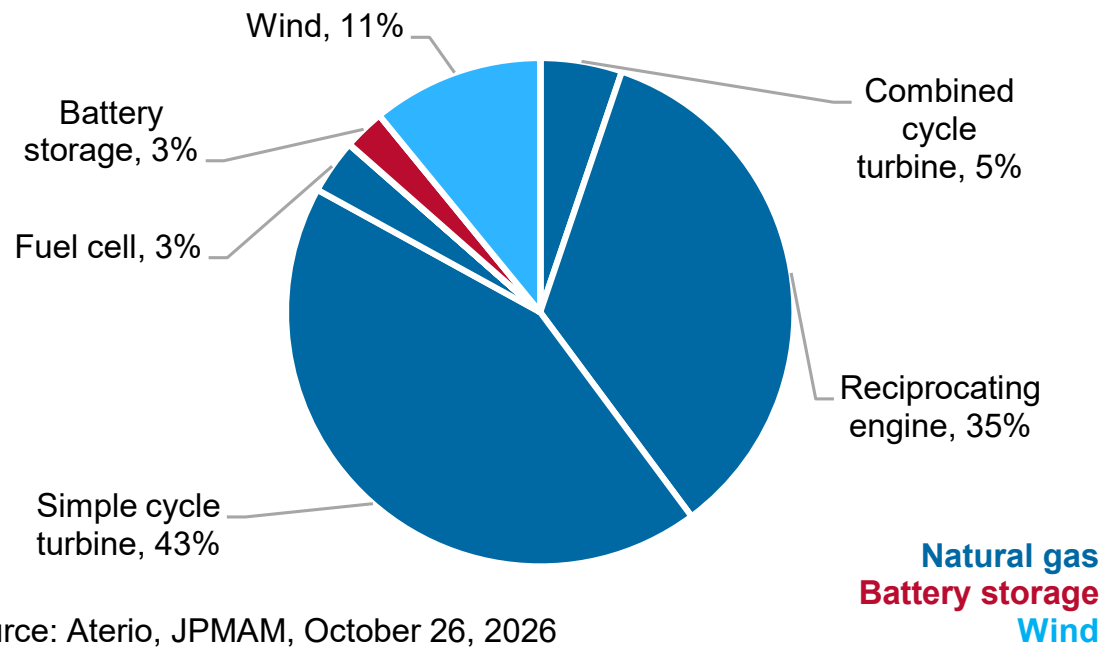
% increase vs 2020 for each of the 47 core goods categories



Source: Bloomberg, BLS, JPMAM, September 30, 2026

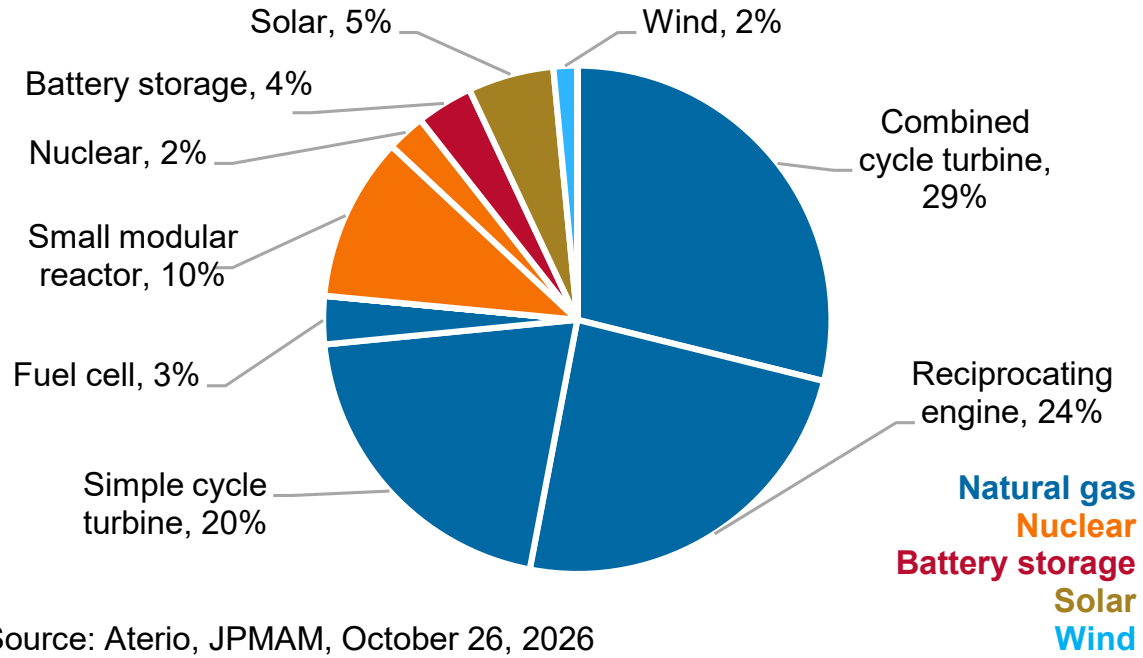
Data centers: powering options, under construction and announced

Behind-the-meter nameplate capacity under construction by generation source, Percent



Source: Aterio, JPMAM, October 26, 2026

Announced behind-the-meter nameplate capacity by generation source, Percent

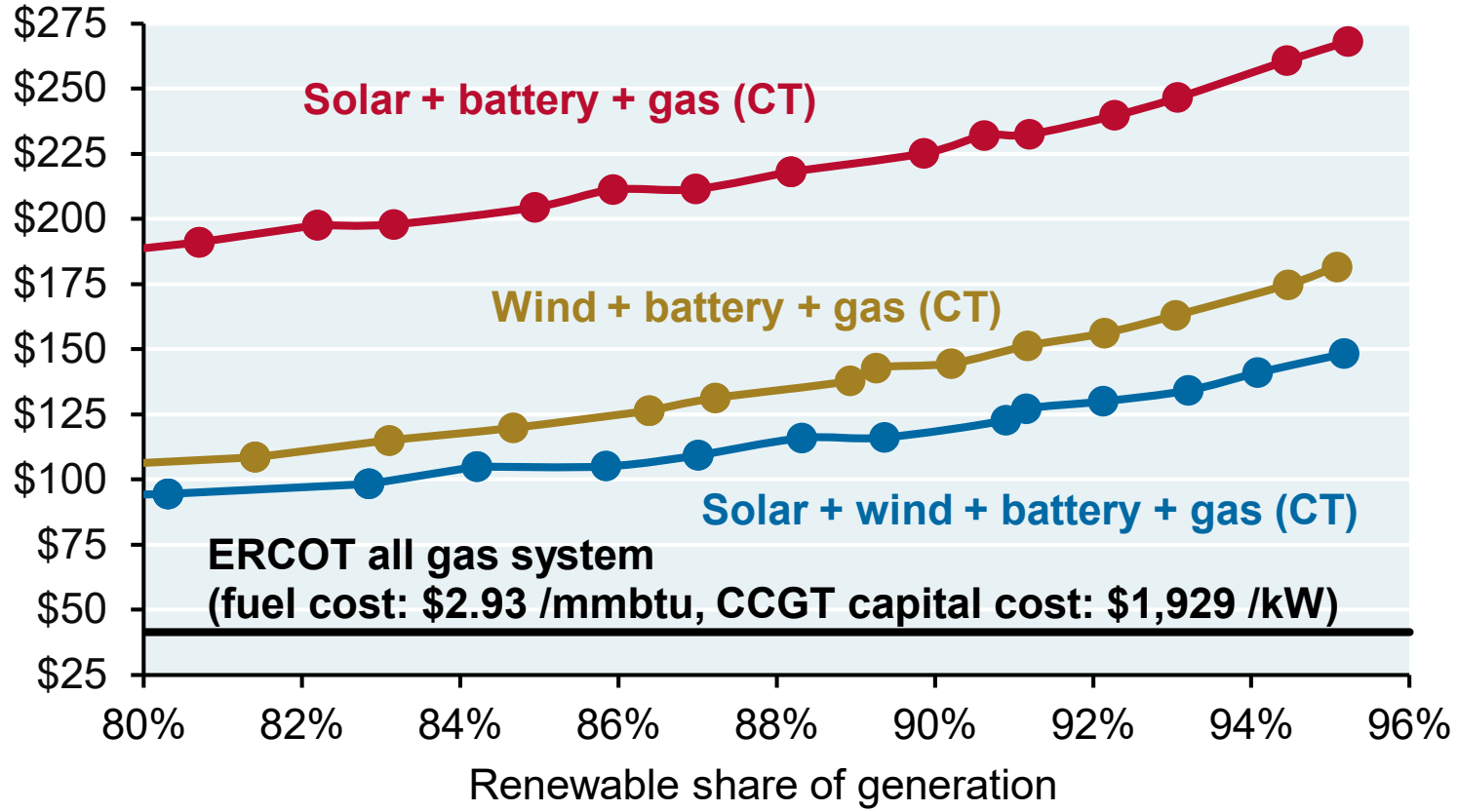


Source: Aterio, JPMAM, October 26, 2026

Relative cost of BTM power

ERCOT BTM configuration for a data center

US$ per MWh of system levelized cost

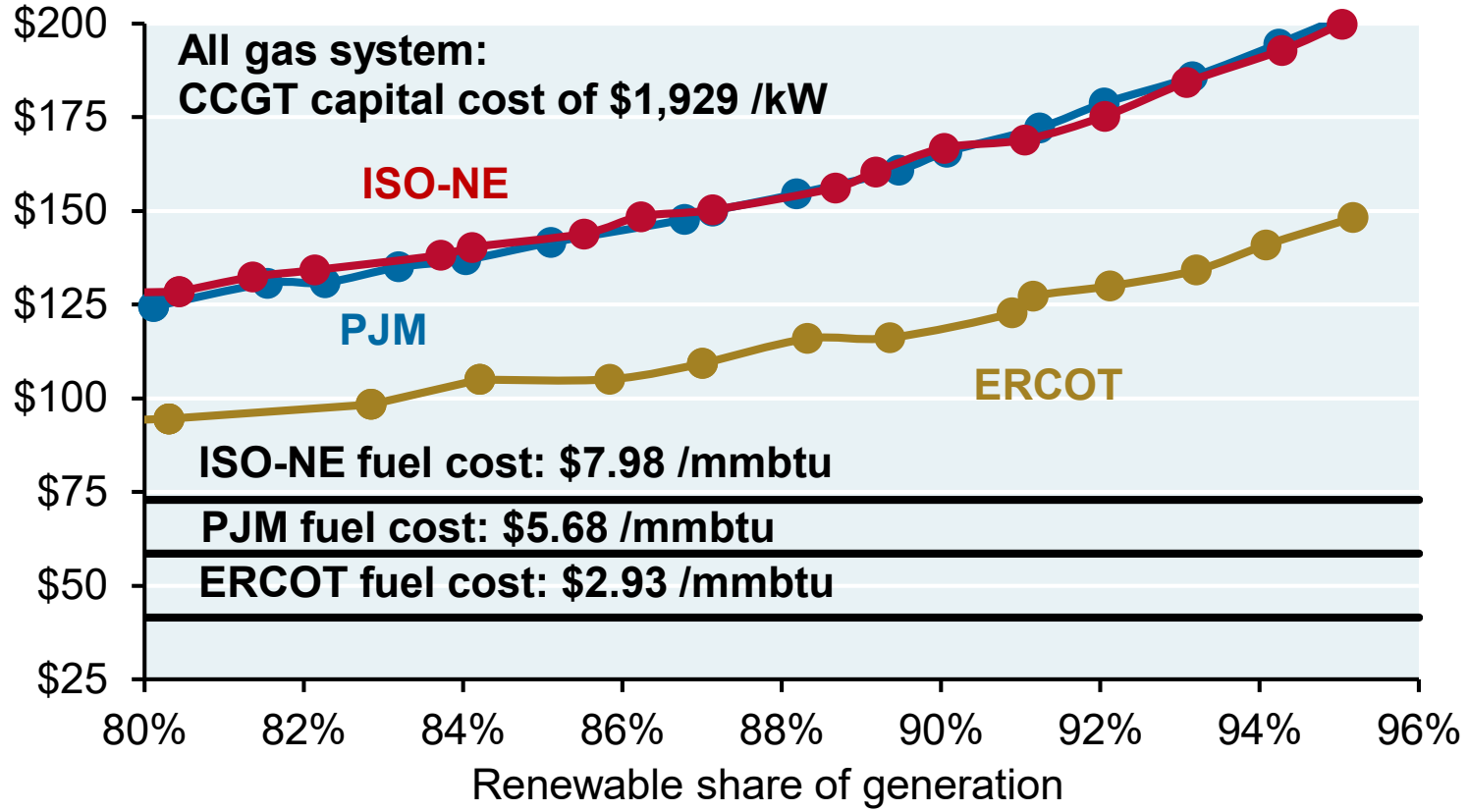


Source: Brattle, KPSC, EIA, NREL, NACO, LBNL, JPMAM, 2026

Relative cost of BTM power

BTM wind + solar + battery + gas (CT) system by ISO

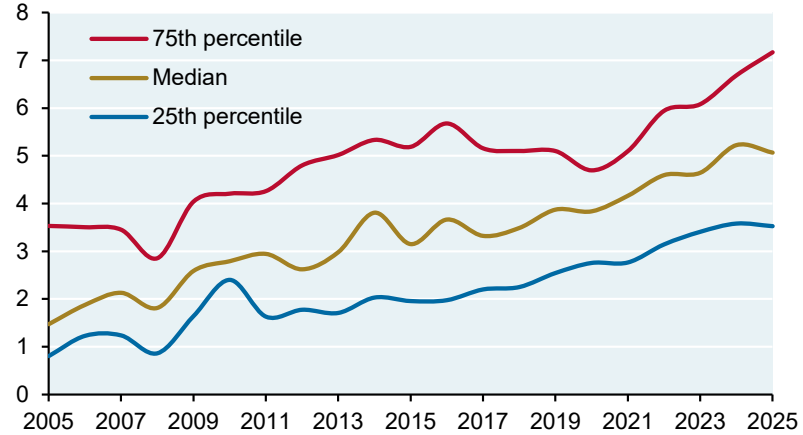
US$ per MWh of system levelized cost



Source: Brattle, KPSC, EIA, NREL, NACO, LBNL, JPMAM, 2026

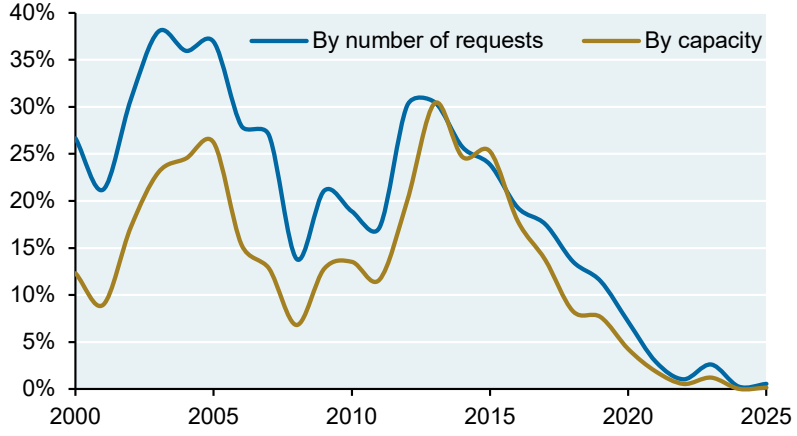
Grid bottlenecks driving BTM adoption

Time elapsed from interconnection request to commercial operation date, Years



Source: LBNL, 2025

Generation completion rates by interconnection request year, Percent of total capacity or number of requests



Source: LBNL, 2025

Completion rates for projects with signed interconnection agreements by interconnection request year, Percent of projects by count

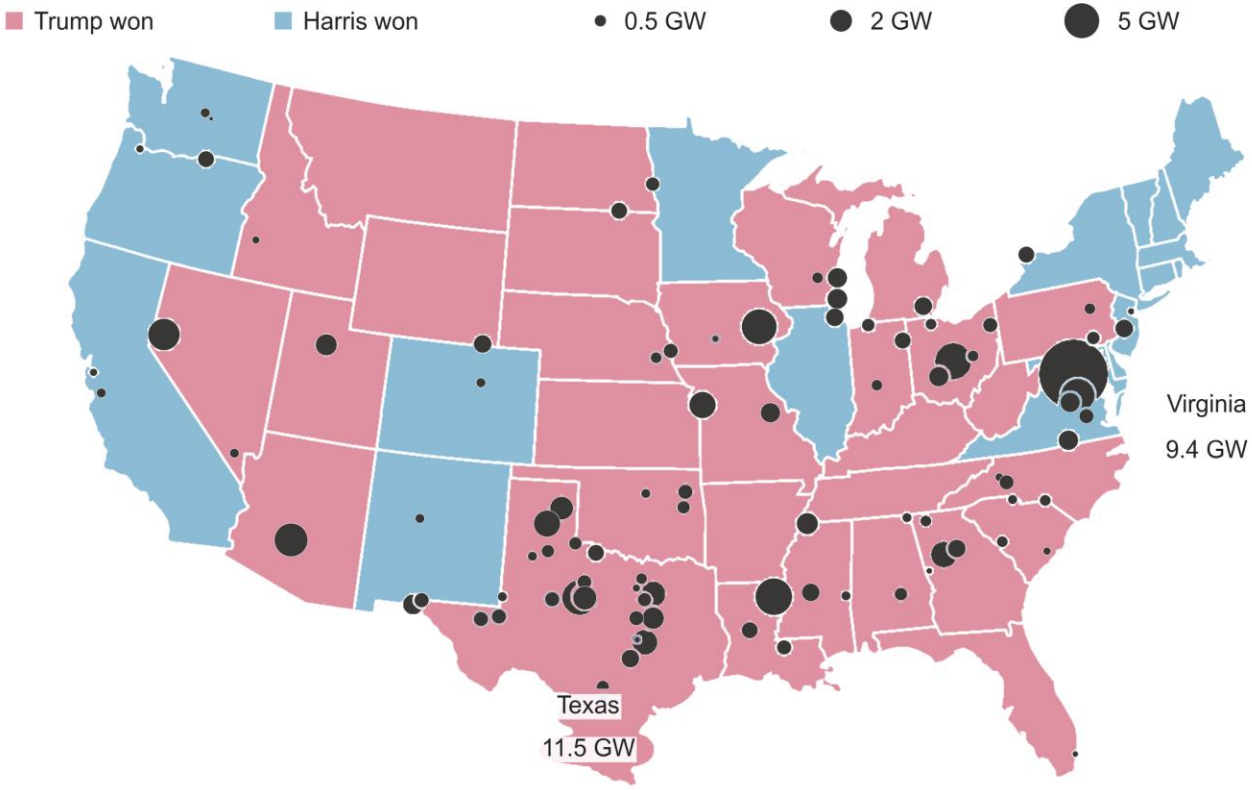


Source: LBNL, 2025

Data center capacity under construction

Outside Virginia, 92% of data center construction is in states Trump won

Data center capacity under construction

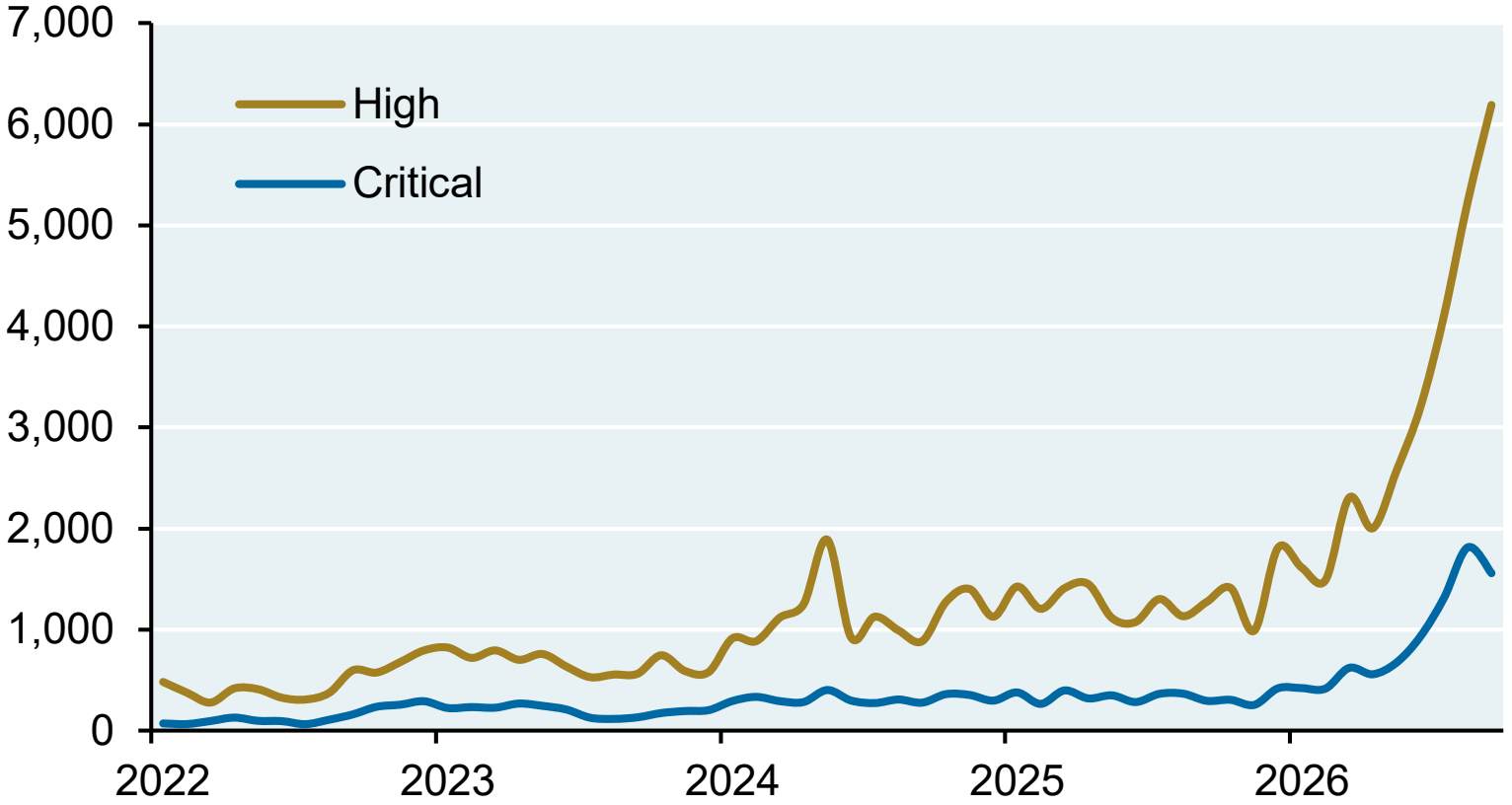


Source: Cleanview data center tracker, September 26, 2026.
2024 state voting results compiled by T. McGovern.

New frontiers in cyber risks

Cybersecurity

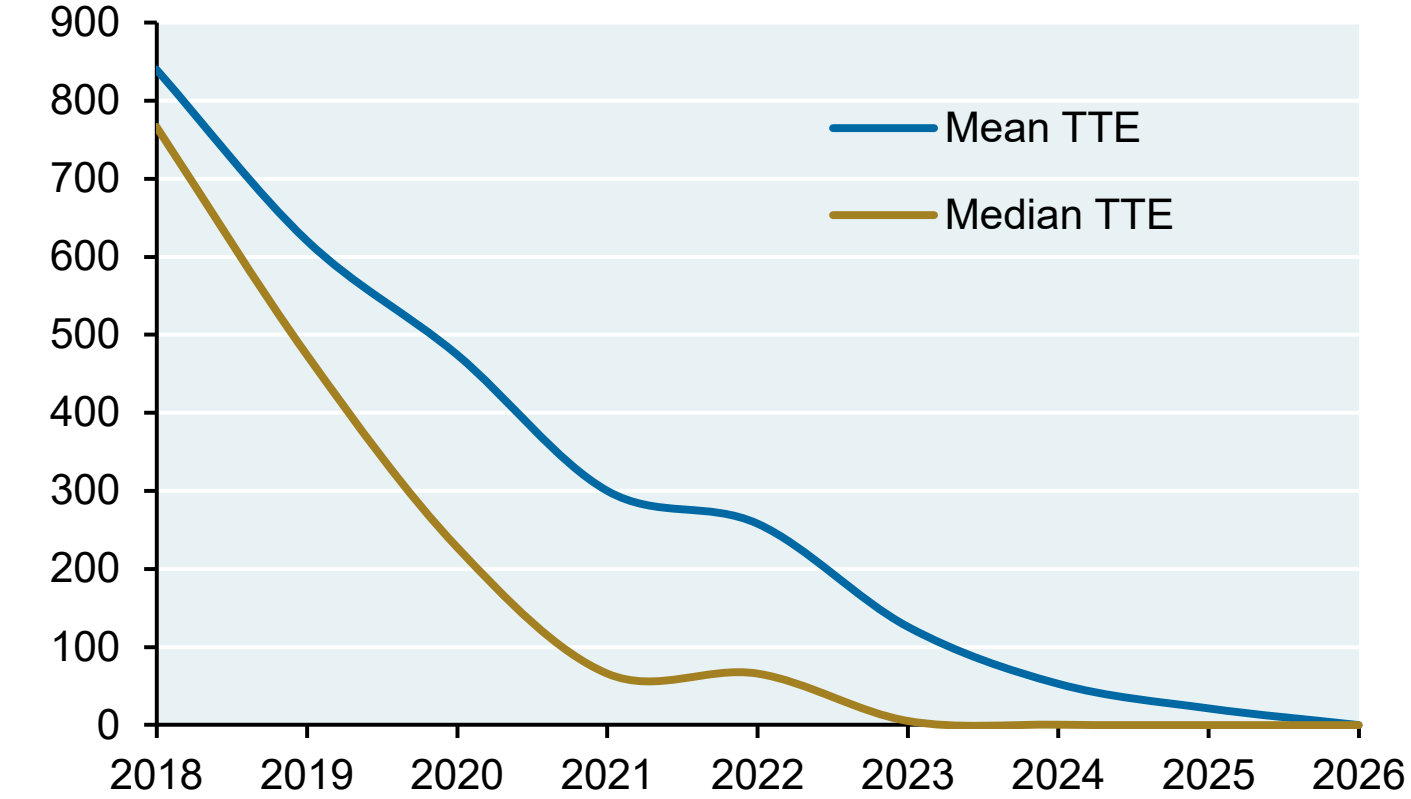
Critical & high severity cybersecurity vulnerabilities (CVEs) from all organizations, Number of CVEs



Source: Epoch AI, September 2026

New frontiers in cyber risks

Mean and median total time to exploitation (TTE)



Source: Zero Day Clock, July 2026

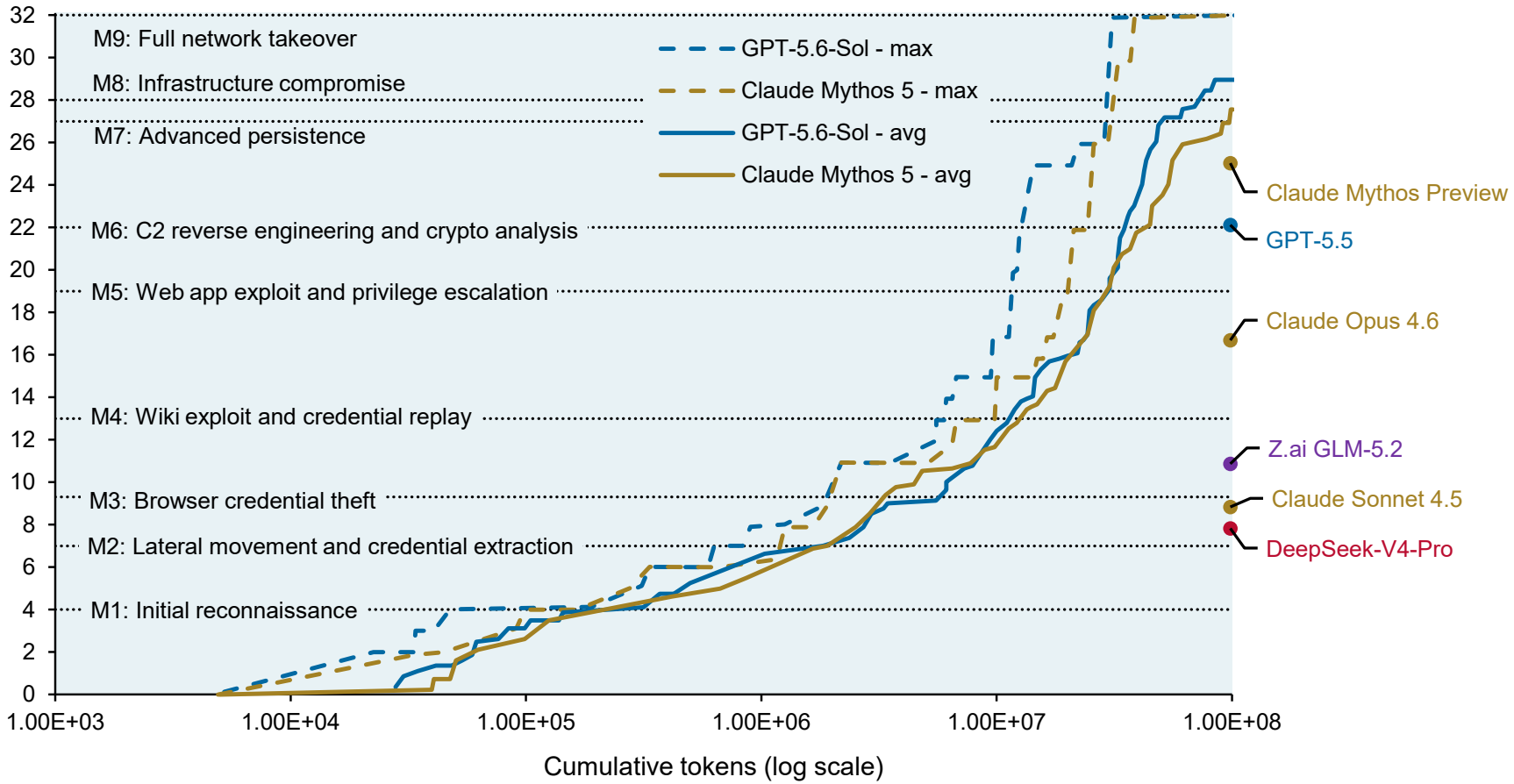
Time to exploitation is measured as the time between the initial publication of a given vulnerability and its first confirmed exploitation

New frontiers in cyber risks

Cybersecurity

Completed steps per spent tokens on a 32-step corporate network attack simulation

Number of steps completed



Source: AI Security Institute, July 17, 2026

Appendix A: assumptions for revenue potential for 1 GW of compute

Key assumptions: power, inference and utilization

[a] GPU mix assumptions are from the SpaceX + Anthropic deal: 29.2% GB300 GPUs, 9.2% GB200 GPUs, 15.4% H200 GPUs and 46.2% H100 GPUs

[b] Power assumptions per GPU: GB300 2.12 kW; GB200 1.87 kW; H100 and H200 1.37 kW. These figures are all-in per GPU, including power cooling and associated rack equipment

[c] Neocloud 3-year contracts and SpaceX agreements are modeled as fixed price agreements, with costs charged independently of usage. On-demand Nebius rates and OpenAI/Anthropic inference revenue modeled at 85% utilization

[d] B200 and B300 Nebius on-demand prices are used as proxies for GB200 and GB300

[e] OpenAI/Anthropic inference revenues are based on the following assumptions: $0.68 blended inference price per 1 million tokens; GPU throughput is measured at an interactivity of 100 tokens/sec/user, using Kimi K3 2.8T and DeepSeek v4.1 Flash as proxies for the OpenAI/Anthropic model mix based on their size and performance. Throughput estimates incorporate multi-token prediction

[f] Note that OpenAI/Anthropic are selling tokens while neoclouds and SpaceX are selling compute

[g] Power figures are all-in per GPU, including power for cooling and associated rack equipment

Sources: SemiAnalysis, Nebius, SpaceX disclosures, Astra Intellectus, HIVE Digital Technologies, Ramp, Epoch AI

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