Goldman Sachs

Special Issue | December 15, 2025 | 3:00PM EST

GLOBAL MACRO RESEARCH

TOP *of* MIND

2025: 4 THEMES IN CHARTS

Our special Top of Mind year-end edition
Features charts, quotes, and a crossword, per our tradition.
They tell the story of a year that was anything but boring,
In four themes that we found well worth exploring.

The year began with **tariff** talk galore,
As Donald Trump assumed the US presidency once more,
And upended decades of trade policy through significant action,
Which led to worries about a US economic contraction.

The other focus of the year remained **innovation**,
With AI still at the center, even at higher valuations.
These prompted fiercer bubble concerns than ever,
While stablecoins also had a moment, thanks to a key legislative endeavor.

Amid all that, **institutional credibility** became an obsession,
With fiscal sustainability, data reliability, and Fed independence all questioned.
These led to unease that higher bond yields may not fade,
And created a tailwind for the debasement trade.

Finally, important **geopolitical developments** continued to take shape,
As President Trump shook up the post-Cold War security landscape,
With significant implications for the Russia-Ukraine war and European defense,
While the race between the US and China for tech superiority grew even more intense.

We hope our favorite 2025 charts on these themes bring you cheer,
As well as our annual crossword—the answers to which this year's pieces will make clear.
We wish you a very happy holiday season, and thank you for this year's clicks,
We're looking forward to engaging with you again in 2026.

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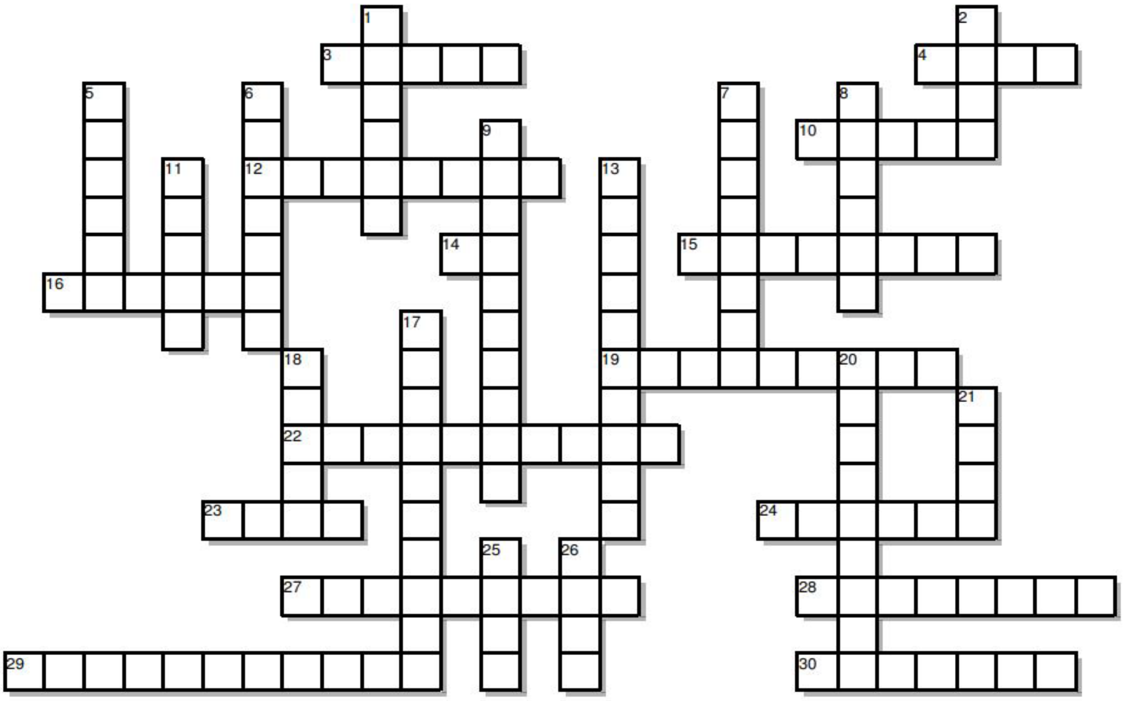
Revisiting 2025 themes, crossword-style



Across:

3. Former Chief of Britain's MI6 Sir Alex Younger argued that the world has transitioned from a rules- and institutions-based order to a strongman and ____________-based order (Issue 137).
4. GS equity analyst Will Nance believes that the potential ____________ savings from using stablecoins rather than traditional channels for remittances is overstated (Issue 141).
10. GS commodity strategist Daan Struyven explained the importance of diverging ____________ capacity in the US-China tech race (Issue 144).
12. Erica Groshen, Former BLS Commissioner, explained that revisions are ____________, not bugs, of the statistical system as producing statistics that don't get revised sacrifices either quality or timeliness (Issue 142).
14. Byron Deeter, Partner at Bessemer Venture Partners, argues that ____________ has the power to reshape businesses in ways previously unimaginable (Issue 143).
15. GS equity analyst Eric Sheridan points out that unlike in the lead up to the Dot-Com bubble, the firms tied to the AI theme today have outsized levels of free cash flow and engage in stock ____________ and pay dividends (Issue 143).
16. Former Acting US Comptroller of the Currency Brian Brooks says that the ____________ Act will create a sense of safety in stablecoins, driving greater stablecoin adoption (Issue 141).
19. President Trump invoked the International ____________ Economic Powers Act to impose tariffs on Canada and Mexico soon after his inauguration (Issue 136).
22. According to former Deputy US Trade Representative Jeff Gerrish, a key goal of President Trump's bold and broad use of tariffs is to address significant trade ____________ (Issue 136).
23. Former Fed Vice Chair Richard Clarida clarified that while the Fed has "instrument" independence, it does not have "____________" independence (Issue 139).
24. The US deficit and debt as a share of GDP are at their highest levels outside of ____________ periods per the latest IMF data (Issue 140).
27. GS global economist Joseph Briggs finds global evidence that public ____________ pressure on central banks results in higher inflation and long-end rates (Issue 139).
28. GS US economist Ronnie Walker's analysis of over thirty economic indicators suggests that US data quality has generally ____________ over the last decade (Issue 142).
29. Nobel Laureate Paul Krugman was more concerned about the ____________ around tariffs, rather than the scale of them, in assessing the risk of a potential tariff-induced recession (Issue 138).
30. According to MIT's Ricardo Caballero, one driver of lower equilibrium interest rates over time will be a rebuilding of the equity risk ____________ (Issue 135).

Down:

1. Bridgewater's Ray Dalio argued that history has shown that unless currencies are effective stores of ____________, they are eventually devalued and abandoned (Issue 140).
2. GS LatAm economist Alberto Ramos finds that despite decades of protectionist policies in Latin America, the performance of tradable sectors in these economies has been notoriously ____________ (Issue 138).
5. GS equity strategist Peter Oppenheimer argues that we are not in an AI ____________ …yet (Issue 143).
6. GS European economist Filippo Taddei argued that the process to increase European ____________ spending will be gradual and complicated (Issue 137).
7. In March 2025, President Trump attempted to fire two FTC commissioners without cause, which the dismissed commissioners argued violates the Humphrey's ____________ precedent (Issue 139).
8. GS strategist Kamakshya Trivedi finds that the effect of fiscal expansion on the ____________ is empirically mixed and typically depends on the state of the business cycle and monetary policy (Issue 140).
9. A key aspect of President Trump's trade policy has been the imposition of ____________ tariffs (Issue 136).
11. Camille Grand, Former Assistant Secretary General for Defense Investment at NATO, argued that the primary driver of the potential sea change in European defense spending was not Trump, but rather this leader (Issue 137).
13. The University of California, Berkeley's Barry Eichengreen is concerned that the proliferation of stablecoins could violate the ____________ of money, which is essential for economic stability (Issue 141).
17. PGIM's Greg Peters argued that bond market ____________ will remain a key feature of the market (Issue 135).
18. DGA-Albright Stonebridge Group's Paul Triolo makes the case that if any country can achieve self-sufficiency in semiconductors, it would be ____________ (Issue 144).
20. GS China economist Hui Shan finds that the economic impact of tariffs is ____________ (Issue 138).
21. GS rates strategist Will Marshall argues that few corners of the market would be impacted as directly by a loss of confidence in official economic data than the ____________ market (Issue 142).
25. GS US economists made the case that consensus around the level of the neutral rate looked too low in the last cycle but as of February it looked too ____________ (Issue 135).
26. In the US-China tech race, China has leverage in its global dominance of ____________ earths (Issue 144).

Puzzle made at www.puzzle-maker.com. Solutions on pg. 45.

In the words of our 2025 interviewees

"It's not the size of the [trade] policy shift, but the uncertainty around it that could cause a recession… [and] at this point, policy reversals may actually worsen the situation because they would enhance uncertainty."
– Paul Krugman, Nobel Laureate
(Issue 138, April 17)

"It's important to understand that revisions are features, not bugs, of the statistical system. Producing statistics that never get revised is easy, but it requires sacrificing either quality or timeliness."
– Erica Groshen, Former US BLS Commissioner
(Issue 142, September 11)

"Two mechanisms will likely exert significant downward pressure on the equilibrium rate over time. The first is a rebuilding of the equity risk premium… The second mechanism is a global phenomenon known as 'indebted demand'."
– Ricardo Caballero, Professor, MIT
(Issue 135, February 5)

"The Fed has what's known as 'instrument independence', which means that the Fed can raise or lower interest rates or buy and sell Treasuries without political interference… But the Fed does not have 'goal independence'. Rather, Congress created the Fed to achieve congressional goals, which have evolved over time."
– Richard Clarida, Former Vice Chair of the Federal Reserve Board of Governors
(Issue 139, May 15)

"Fundamentally, the world is shifting from a unipolar to a multipolar world… At the same time, this dissipation of power has undermined the legitimacy of democratic governments, resulting in a more ideologically contested and chaotic world."
– Sir Alex Younger, Former Chief of Britain's MI6
(Issue 137, March 13)

"The reality is that the primary driver of this sea change in European defense is not the behavior of Donald Trump, but the behavior of Vladimir Putin, who remains unthwarted and might even become further emboldened if the conflict in Ukraine ends in his favor."
– Camille Grand, ECFR, Former NATO Assistant Secretary General for Defense Investment
(Issue 137, March 13)

"Higher rates are the primary reason the fiscal outlook is so concerning. If rates were to fall sharply, I would become far less worried."
– Kenneth Rogoff, Professor, Harvard University
(Issue 140, June 12)

"The GENIUS Act establishes a supervisory system [that] will create a sense of safety in stablecoins, which will drive mass market adoption."
– Brian Brooks, Former US Acting Comptroller of the Currency, Chairman and CEO, Meridian Capital Group
(Issue 141, August 19)

"History is ripe with examples of superpowers that have spent more on debt service than defense and subsequently were no longer super or powerful. That's exactly the position the US is in today."
– Sir Niall Ferguson, Senior Fellow, Hoover Institution at Stanford University
(Issue 140, June 12)

"This isn't a 'hope-and-hype' cycle like the Dot-Com era."
– Byron Deeter, Partner, Bessemer Venture Partners
(Issue 143, October 22)

"The Fed *should* bend to political pressure every now and then. We live in a democracy. We do not give technocrats perpetual power to follow their whims."
– John Cochrane, Senior Fellow, Hoover Institution at Stanford University
(Issue 139, May 15)

"Everyone needs to buckle up, because the President is just getting started [on tariffs] and what lies ahead will likely be even more unpredictable than during his first term."
– Jeff Gerrish, Former Deputy US Trade Representative for Asia, Europe, the Middle East, and Industrial Competitiveness
(Issue 136, February 26)

"I don't disagree that the uncertainty effect could inflict ongoing damage to the economy. But I do think a pullback on tariff policy would nevertheless help stabilize conditions in the near term."
- Jan Hatzius, Head of Global Investment Research and Chief Economist, Goldman Sachs
(Issue 138, April 17)

"Generative AI is still essentially autocomplete on steroids."
– Gary Marcus, Professor Emeritus, New York University
(Issue 143, October 22)

"We should be very worried [about a 'heart attack' US debt crisis] as all the previously mentioned conditions and my indicators that reflect them point toward an impending crisis."
– Ray Dalio, Founder, Bridgewater Associates
(Issue 140, June 12)

"Once the door is open for people to start questioning whether the heads of statistical agencies are motivated by anything other than a desire to measure the truth, it is very difficult to close it, even as leadership shifts."
– Alberto Cavallo, Professor, Harvard Business School
(Issue 142, September 11)

"It is entirely possible that neither the US nor China emerge as the outright victor in the tech race."
– Mark Kennedy, Founding Director, Wahba Initiative for Strategic Competition, New York University's Development Research Institute
(Issue 144, December 4)

"The US has experimented with private monies—which is essentially what stablecoins are—in the past, often with disastrous consequences for financial stability. I'm concerned that stablecoins could follow a similar path."
– Barry Eichengreen, Professor, University of California, Berkeley
(Issue 141, August 19)

Note: All quotes came from interviews that appeared in GS Top of Mind reports in 2025.
Source: Goldman Sachs GIR.

1

*The year began with **tariff** talk galore,*

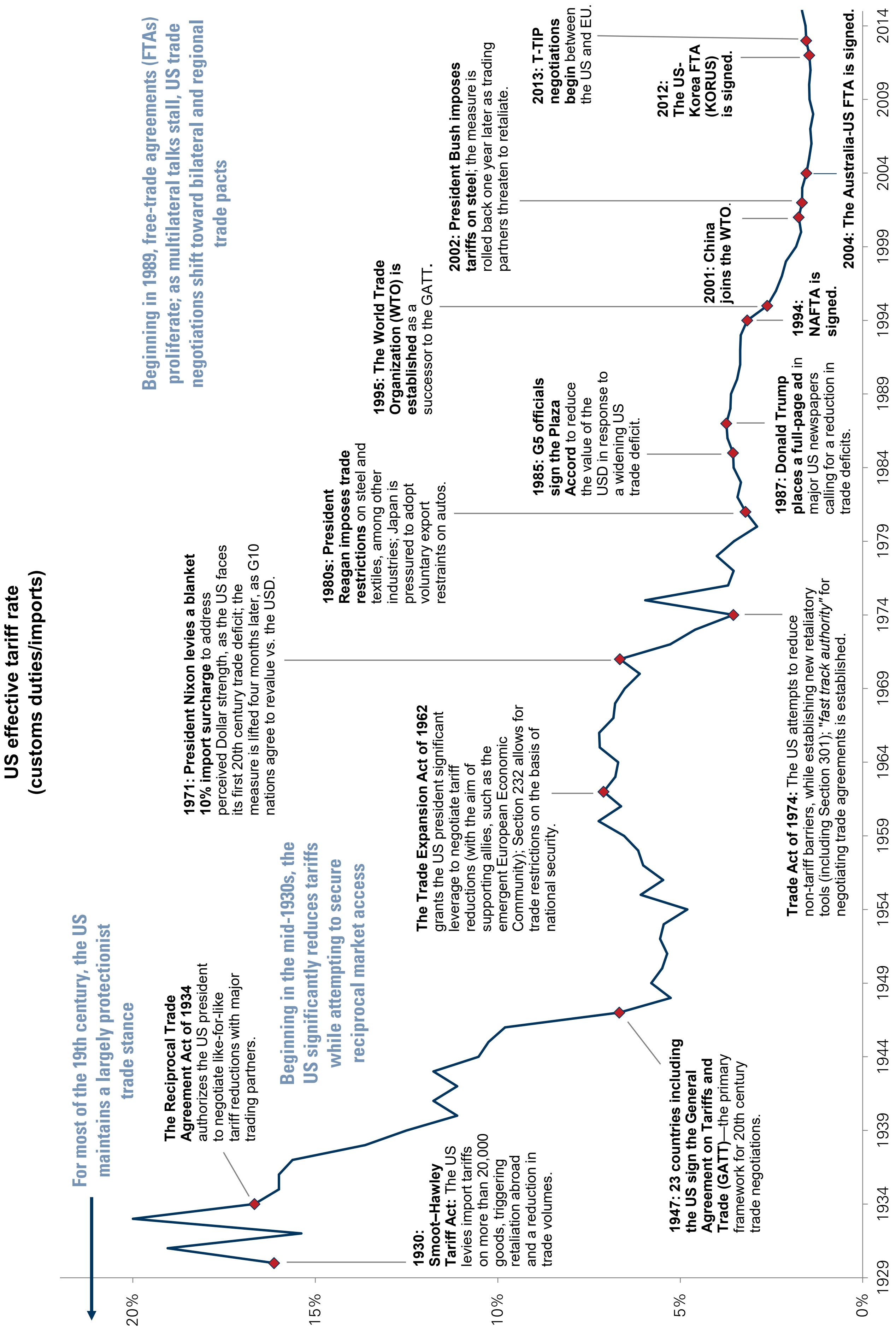
As Donald Trump assumed the US presidency once more,

And upended decades of trade policy through significant action,

Which led to worries about a US economic contraction.

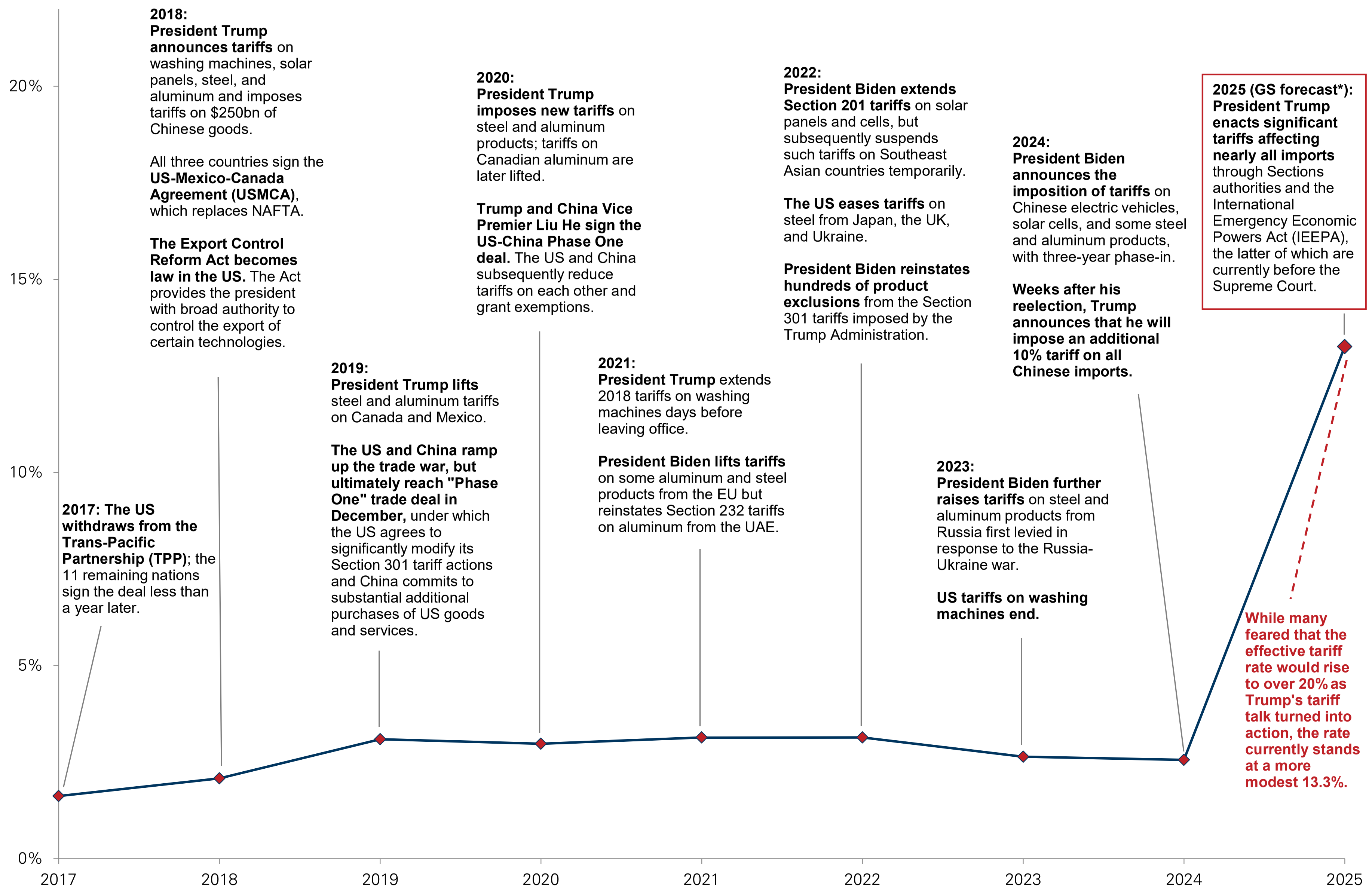
Pgs. 6-11

The US tariff rate has sharply risen…



...but not as much as some had feared...

US effective tariff rate
(customs duties/imports)



*Special thanks to GS US economist Elsie Peng for 2025 figure (excludes frontloading ahead of expected tariff hikes).

Source: US International Trade Commission, US Department of Commerce, WTO, Irwin, Douglas A., "Clashing over Commerce", Peterson Institute for International Economics, Goldman Sachs GIR.

Charts originally appeared in Issue 136: Trump tariffs: mostly talk, or big action?

...with lots of back and forth...

Back and...

January 20
- Trump is inaugurated as the 47th president.
- Trump says he might impose a 25% tariff on imports from Canada and Mexico starting Feb 1.
- Trump issues a presidential memorandum which instructs the USTR to make recommendations on US participation in the USMCA and to review China's compliance with the Phase One trade agreement by April 1, 2025.

January 30
- In response to questions from the press, Trump indicates that he will announce 25% tariffs on Canada and Mexico.

February 1
- Trump signs executive orders that impose a 25% tariff on imports from Mexico, a 25% tariff on imports from Canada apart from energy, which faces a 10% tariff, as well as a 10% tariff on imports from China effective February 4.
- Trump says that EU-focused tariffs will "definitely happen".

February 10
- Trump announces the removal of exclusions to the existing 25% steel tariff and an increase in the aluminum tariff to 25%, effective from early March.
- Trump directs US Customs and Border Patrol to "dramatically increase its oversight" to prevent tariff circumvention.

February 13
- Trump signs a memorandum proposing reciprocal tariffs and orders his staff to develop a "Fair and Reciprocal Plan" for trade, which would match other countries' tariffs, taxes, and non-tariff barriers (regulatory requirements, subsidies, and exchange rate policies).

February 25
- Trump signs an executive order directing his commerce secretary to launch a Section 232 investigation into copper imports, which White House officials say could lead to copper tariffs.

March 13
- Trump threatens to impose a 200% tariff on alcohol from Europe if the EU implements its plans for a 50% tariff on American whiskey.

March 24
- Trump threatens to impose a 25% tariff on Venezuela and on any country that buys oil or gas from Venezuela.

March 26
- Trump says he will impose a 25% tariff on all auto imports to take effect April 3.

April 2
- Trump announces a reciprocal tariff plan that consists of two parts: a 10% baseline tariff on imports from all countries ex. Canada and Mexico as well as additional tariffs for most major trading partners.
- Trump rescinds de minimis treatment for shipments from China.

April 7
- Trump threatens an additional 50% tariff on China.

April 9
- Trump announces a further increase in tariffs on China, bringing the total tariff rate on the country to 145%.

April 13
- Trump says that smartphones and other electronics won't be exempt from tariffs, they are just moving to a different tariff "bucket".

1/20/25 | 1/27/25 | 2/3/25 | 2/10/25 | 2/17/25 | 2/24/25 | 3/3/25 | 3/10/25 | 3/17/25 | 3/24/25 | 3/31/25 | 4/7/25 | 4/14/25

...forth...

February 1
- Canadian Prime Minister Justin Trudeau says Canada will impose retaliatory 25% tariffs on $155 billion worth of US goods, although these tariffs are not ultimately implemented.

February 3
- Trump delays Canada and Mexico tariffs until March 4 as leaders of both countries commit to send 10,000 troops to their respective borders with the US and increase cooperation on organized crime, fentanyl, and other issues.

February 4
- China announces a combination of retaliation measures, including tariffs on US goods, export controls on critical minerals, and non-tariff barriers on US companies operating in China. China also files proceedings against the US with the World Trade Organization.

February 7
- Trump suspends tariffs on low-cost packages—those worth less than $800—from China.

February 10
- Trump says he would consider a tariff exemption on Australian steel and aluminum imports given the US' trade surplus with the country.

March 4
- Canada announces tariffs on more than $100bn of US goods. China imposes tariffs of up to 15% on a range of US farm exports and expands the number of companies subject to export controls.

March 5
- Trump says he will pause tariffs on auto imports from Canada and Mexico.

March 6
- Trump exempts goods covered by the USMCA trade agreement from the 25% tariffs on Canada and Mexico.

March 12
- The EU and Canada threaten billions of dollars in retaliatory tariffs on the US.

April 4
- China announces a 34pp tariff increase on all imports from the US, effective April 10.

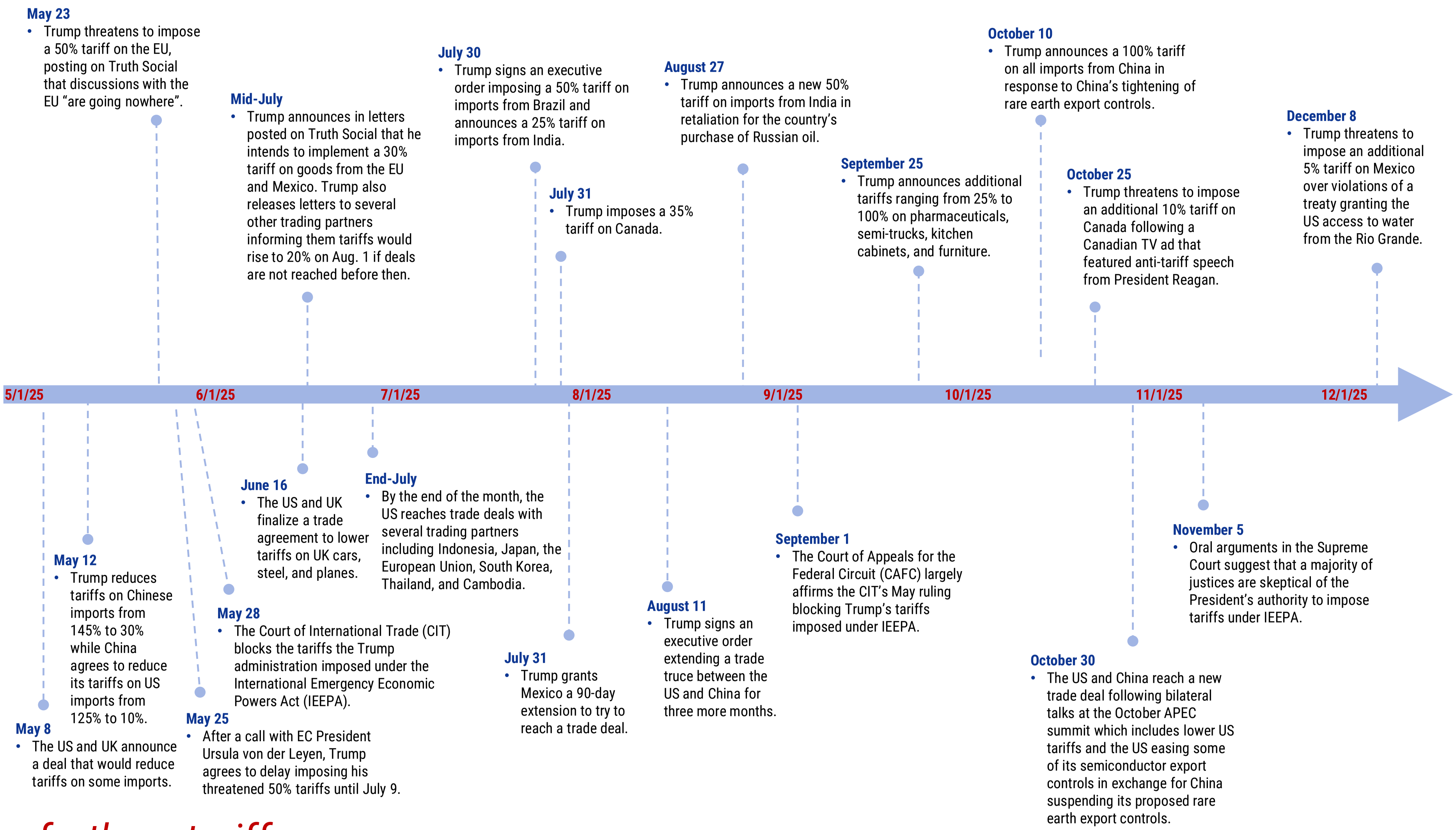
April 9
- Trump announces a 90-day pause on the additional country-specific portion of the reciprocal tariffs for all countries that have not retaliated against the tariffs imposed by the White House.
- The EU announces a pause in the tariffs it threatened on the US.

April 11
- China raises its retaliatory tariffs on the US to 125%.

April 12
- Trump announces that smartphones, computers, and some other electronic devices will be exempt from the 10% reciprocal tariff on all nations.

...resulting in many new trade deals...

...and back and...

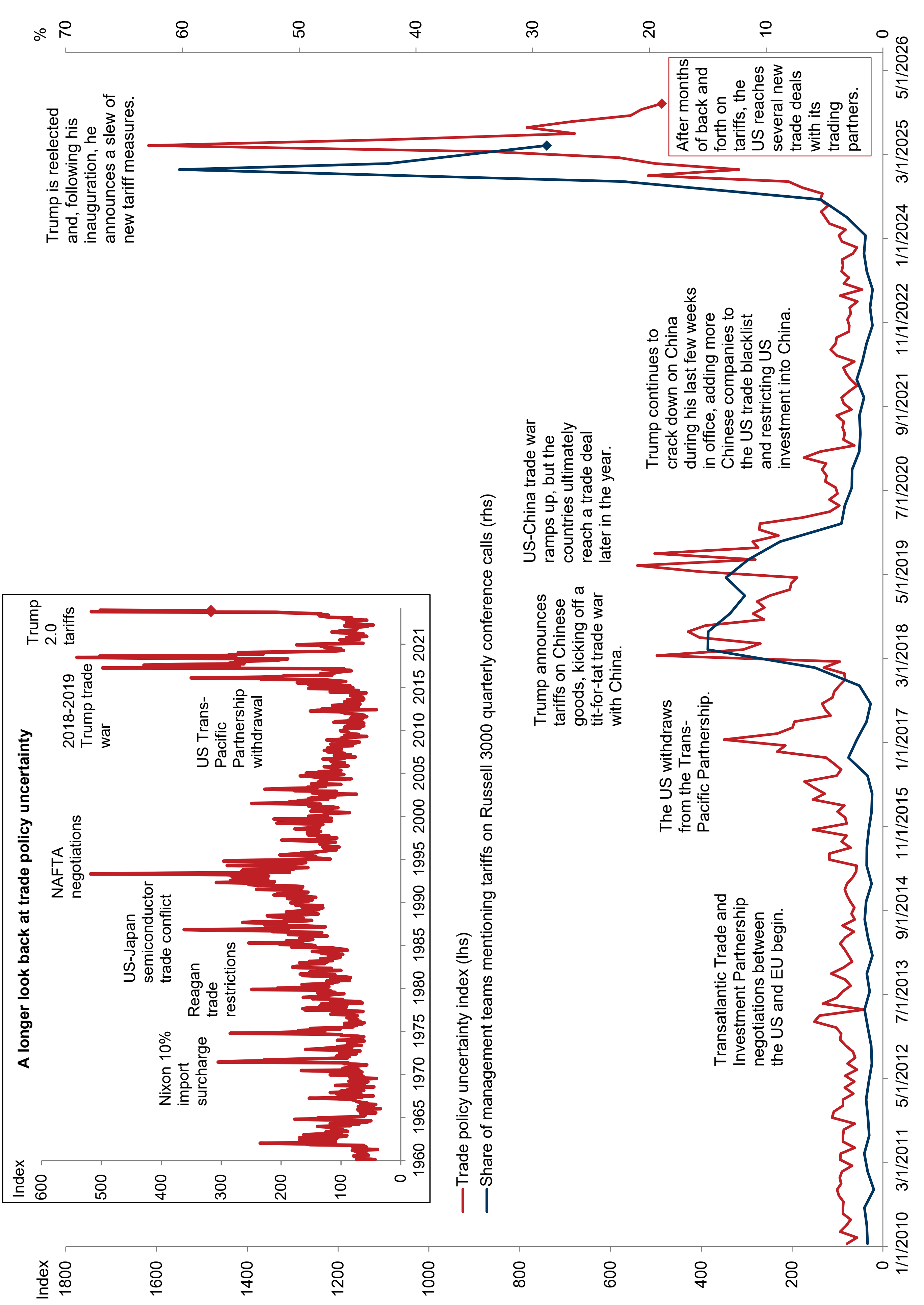


...forth on tariffs

Note: This does not constitute an exhaustive list of all tariff-related developments.
Source: White House, Truth Social, Bloomberg, WSJ, NYT, various news sources, compiled by Goldman Sachs GIR.

Timeline originally appeared in Issue 136: Trump tariffs: mostly talk, or big action?

…reducing trade policy uncertainty…

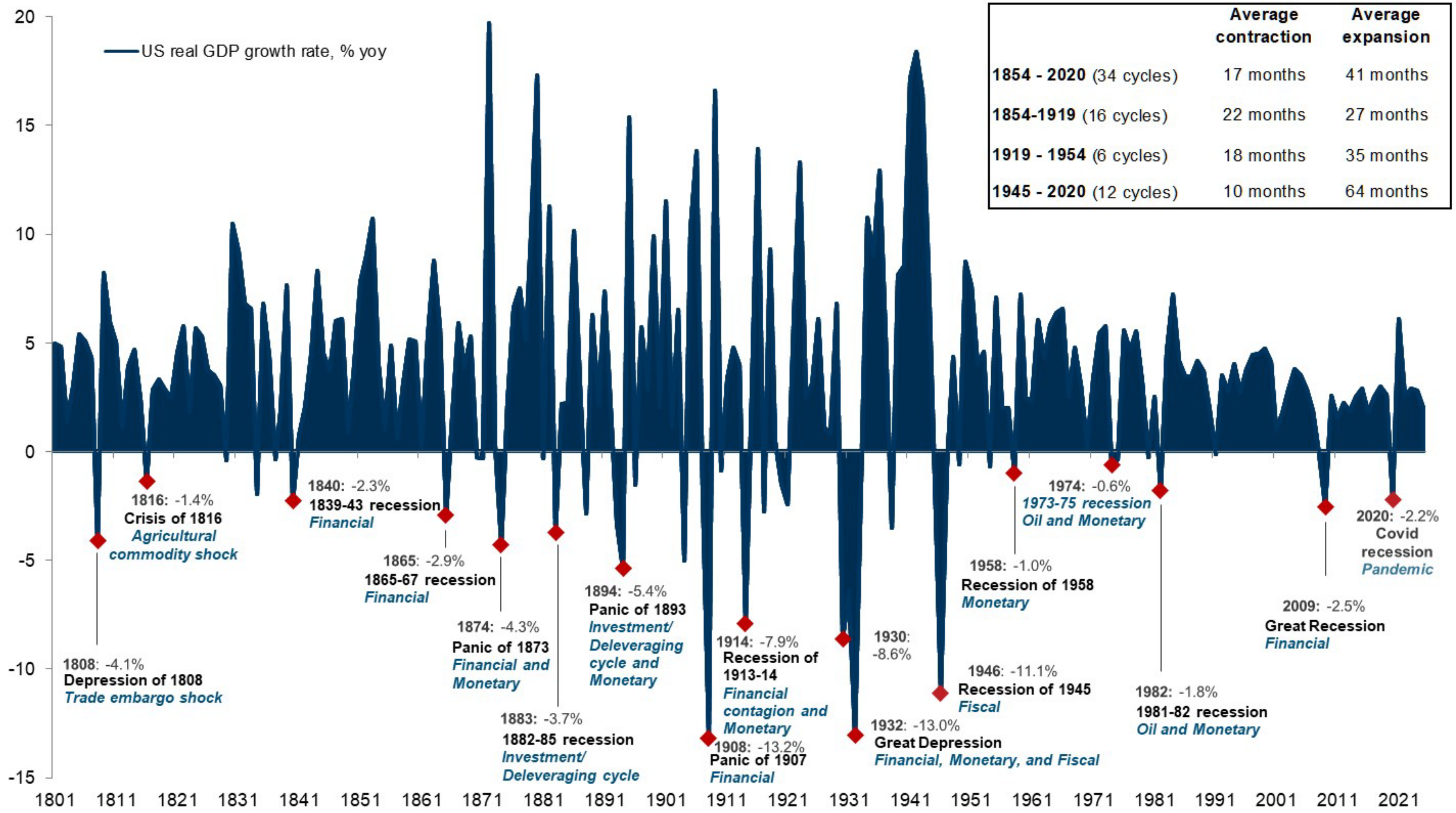


Source: Caldara, Iacoviello, and Molligo, GS Data Works, Goldman Sachs GIR.

Chart originally appeared in [Issue 136: Trump tariffs: mostly talk, or big action?]

...and easing recession concerns

A long history of US recessions



Note: Blue italics denote key contributors to the recession/depression rather than an exhaustive list of drivers, as classified in the June 2017 US Economics Analyst: The Next recession: Lessons from History and the January 2019 US Economics Analyst: Learning from a Century of US Recessions; red markers denote trough in yoy US growth in major recessions; US growth data for 1800-1979 from IMF "Fiscal Prudence and Profligacy".

Source: IMF, NBER, various news sources, Goldman Sachs GIR.

Chart originally appeared in Issue 138: Tariff-induced recession risk.

2

The other focus of the year remained ***innovation****,*

With AI still at the center, even at higher valuations.

These prompted fiercer bubble concerns than ever,

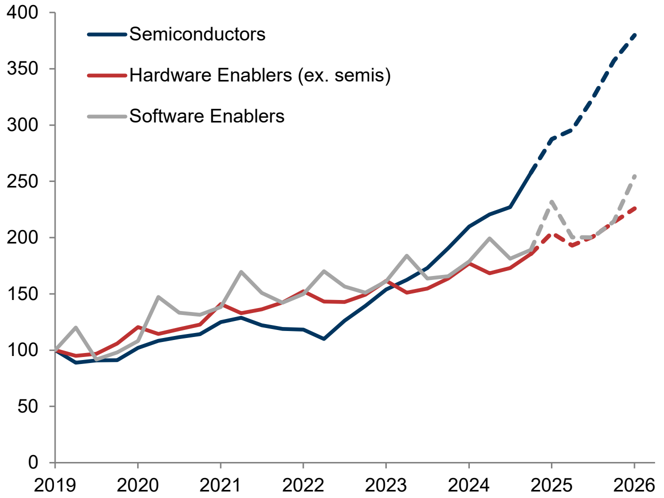
While stablecoins also had a moment, thanks to a key legislative endeavor.

Pgs. 13-21

AI investment growth remains strong...

AI investment growth remains strong...

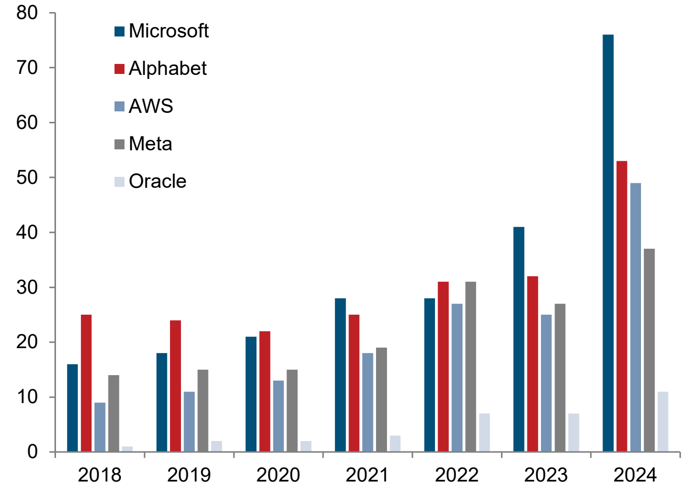
Actual and forecasted revenues by AI-exposed sectors of Russell 3000, index, 4Q19=100



Note: Dashed lines in this chart indicate consensus forecasts.
Source: FactSet, Goldman Sachs GIR.

...with the hyperscalers having made significant investments in AI infrastructure

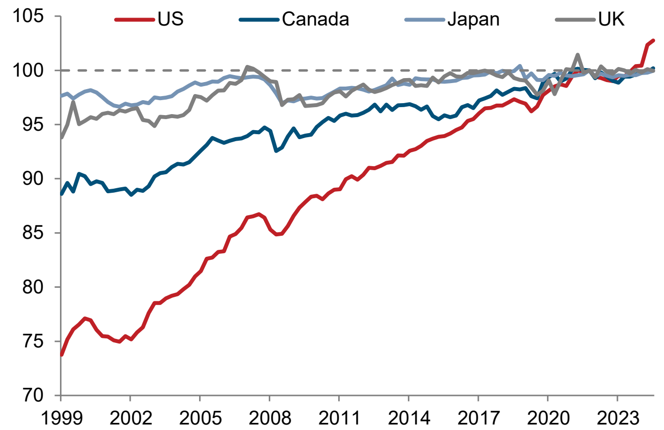
AI infrastructure capex spend by company, $bn



Source: Company data, Goldman Sachs GIR.

AI investment growth has been concentrated in the US...

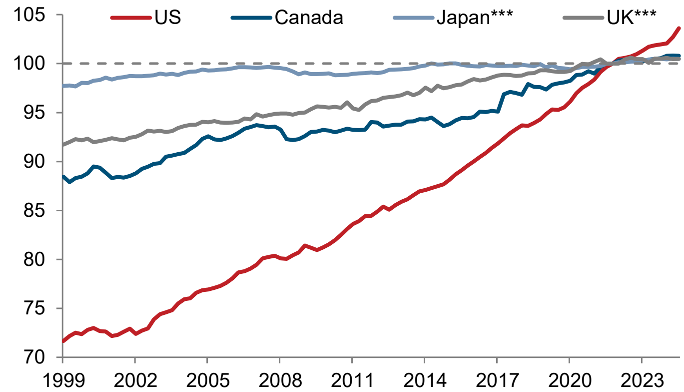
AI-related investment in hardware*: national accounts, log index**, 3Q22=100



**Categories related to information and communication technologies (ICT) and communications equipment.*
Source: Haver Analytics, Goldman Sachs GIR.

...as US AI-related hardware and software investment has risen

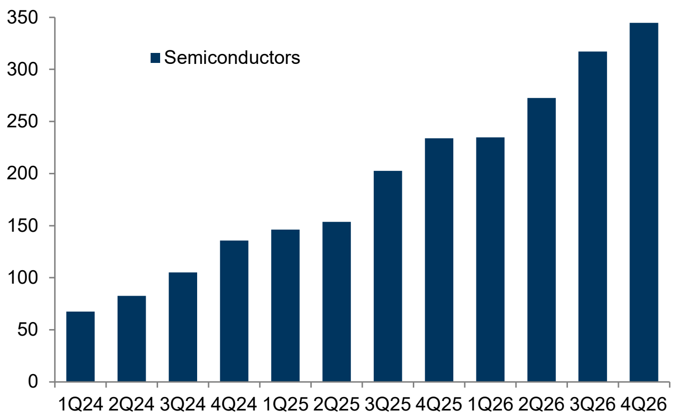
AI-related investment in software: national accounts, log index**, 3Q22=100



***Shown as log index because software investment grows by different exponential rates across countries. Steady growth in investment would appear as a line with a constant slope, while accelerating growth would appear as a line with an increasing slope.*
****Intellectual property products category, which includes software.*
Source: Haver Analytics, Goldman Sachs GIR.

The market continues to upgrade its revenue expectations for semiconductor firms...

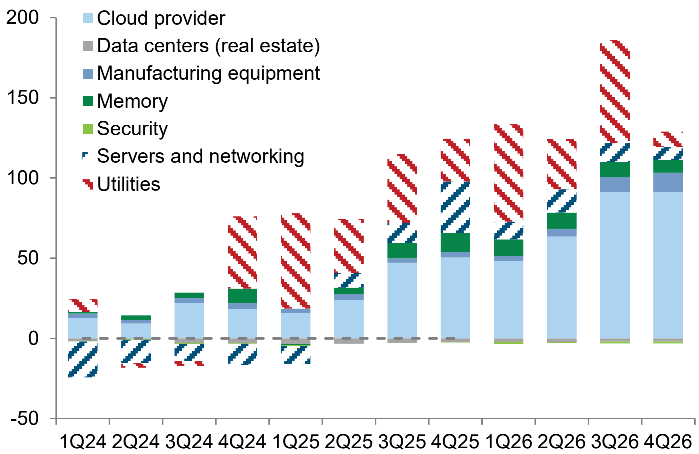
Change in Russell 3000 consensus revenue forecasts since March 2023, $bn, annualized



Source: FactSet, Goldman Sachs GIR.

...while the broader AI space is still seeing a relatively small upgrade

Change in Russell 3000 consensus revenue forecasts since March 2023, $bn, annualized

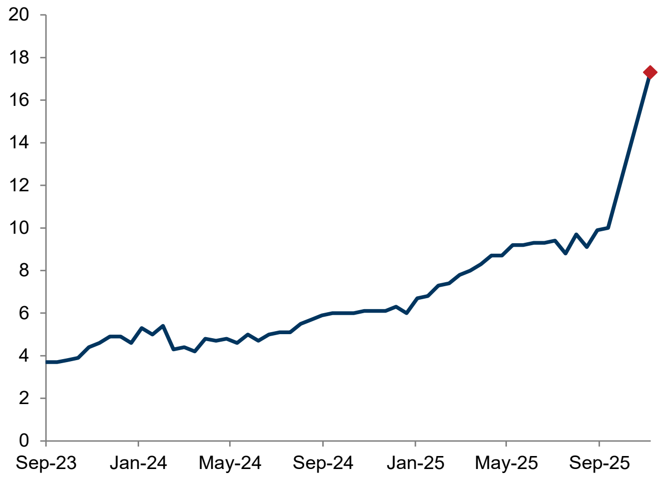


Source: FactSet, Goldman Sachs GIR.

...and AI adoption has risen

The pace of corporate AI adoption rose sharply in the recent quarter, though this most likely reflects a change in the wording of the Census Bureau survey question...

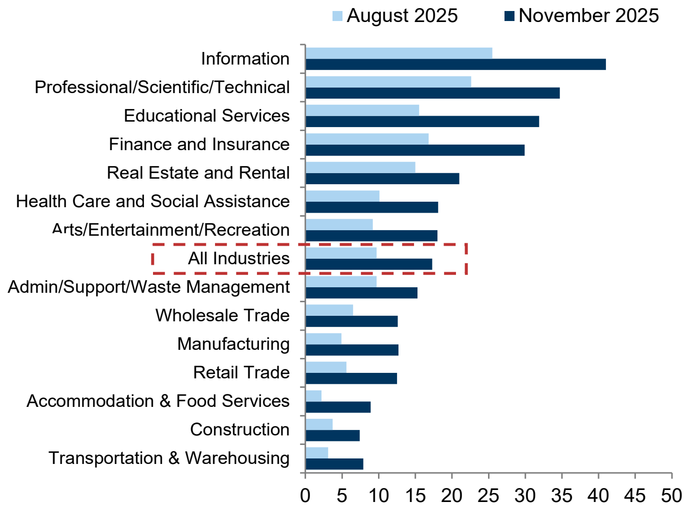
Economy-wide firm AI adoption rate, %



Source: Census Bureau, Goldman Sachs GIR.

...with 17.3% of companies across all industries having adopted AI, up significantly from around 10% in Q3

Share of US firms using AI by sector, %



Source: Census Bureau, Goldman Sachs GIR.

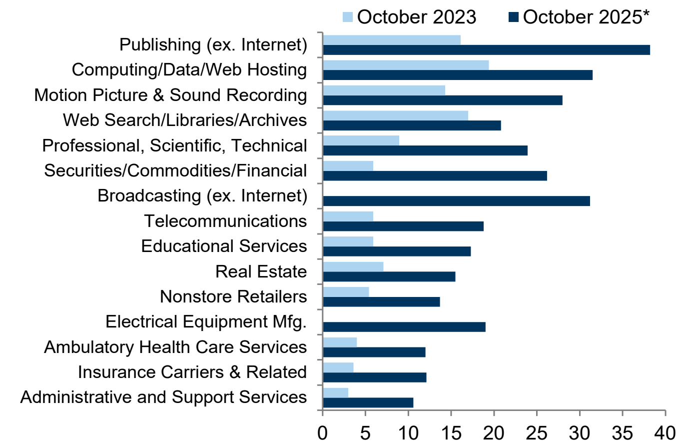
Other surveys also show increased corporate adoption...

Source	Date	Current Adoption
McKinsey	November 2025	88% of surveyed organizations are regularly using AI in at least one business function, up from 78% last year. However, most surveyed organizations are still in the experimentation/piloting phase of AI and nearly two-thirds have not begun scaling AI across the enterprise. 39% reported experimenting with AI agents specifically and the use of AI agents is most commonly reported among TMT and healthcare businesses.
Wharton Human-AI Research and GBK Collective	October 2025	Usage of generative AI among enterprise leaders has risen sharply this year and stands at 46% (+17pp yoy). The most common use cases include data analysis, document summarization, and document editing/writing.
Gartner	June 2025	45% of surveyed firms with high AI maturity reported that their AI initiatives remained in production for 3+ years to ensure sustained impact and value, compared to 20% in low-maturity organizations. 91% of leaders from high-maturity organizations have appointed dedicated AI leaders.
University of Maryland Center for Global Business	June 2025	58% of the business executives and middle managers surveyed reported that their firms had incorporated AI into their business operations in some capacity. 39% reported using generative AI, 30% reported using computer vision, and 27% reported using machine learning.
Paypal and Reimagine Main Street	June 2025	Out of nearly 1000 small businesses surveyed, 25% reported having already integrated AI into their daily operations while another 51% reported experimenting with AI (but not incorporating into regular operations).

Source: Goldman Sachs GIR.

...with publishing and computing firms continuing to lead the way

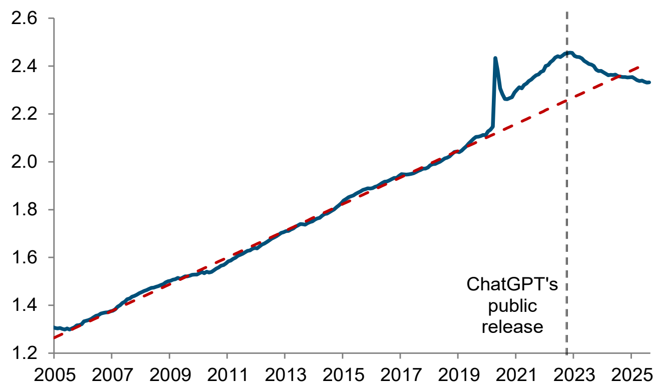
Share of US firms using AI by sector, top 15 subsectors, %



**Latest adoption observation is from early October due to data delays.*
Source: Census Bureau, Goldman Sachs GIR.

Tech's share of total employment continues to decline relative to its long-run trend...

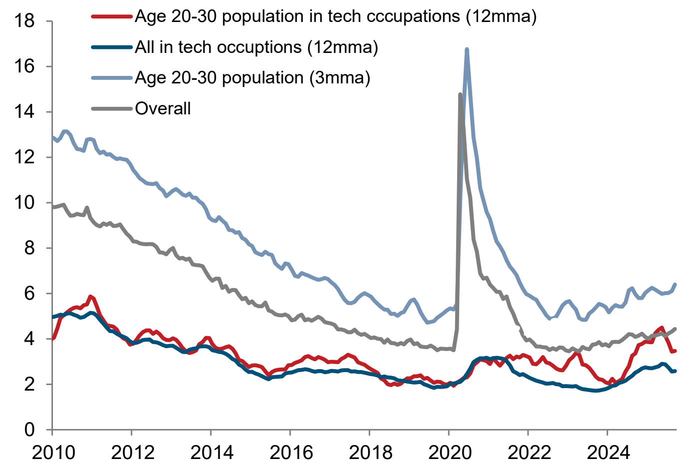
Tech sector* share of total employment, %



**Tech is the software publishers, data processing and related, web search and related, and computer systems design subsectors. Red line is 2007-2019 trend.*
Source: Bureau of Labor Statistics, Haver Analytics, Goldman Sachs GIR.

...and youth unemployment in tech sectors remains elevated

Unemployment rate, %

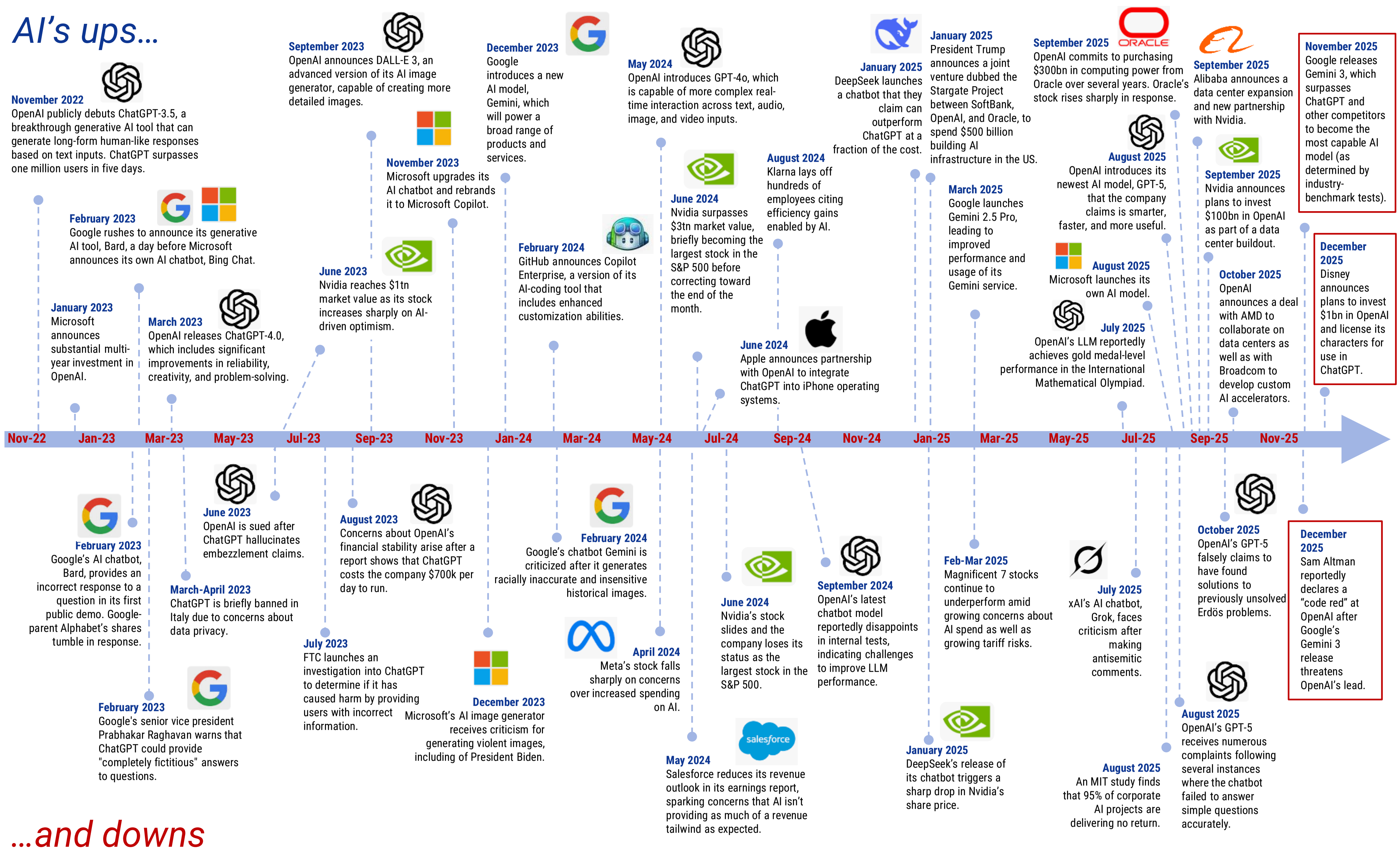


Source: Bureau of Labor Statistics, iPUMS, Goldman Sachs GIR.

Special thanks to GS global economists Joseph Briggs and Sarah Dong and equity analyst Jim Schneider and team for charts.

Exhibit originally appeared in Issue 143: AI: in a bubble?

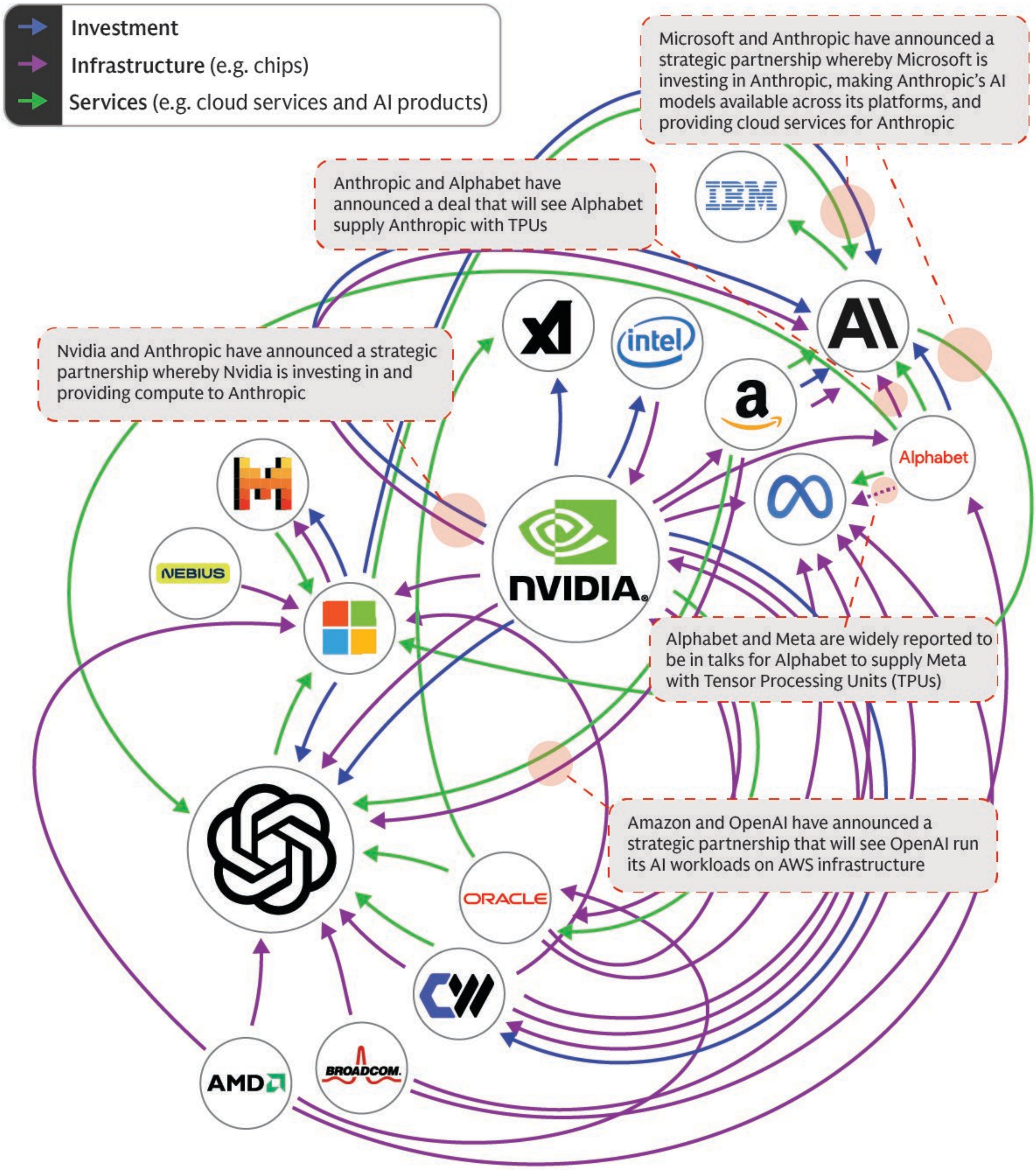
But ongoing developments…



Note: This does not constitute an exhaustive list of all AI-related developments.
Source: BBC, OpenAI, tech.co, Google, WSJ, various news sources, compiled by Goldman Sachs GIR.

Timeline originally appeared in [Issue 143: AI: in a bubble?]

...have further increased AI circularity...



**Red dashed text and corresponding arrows represent deals announced since October 22.*

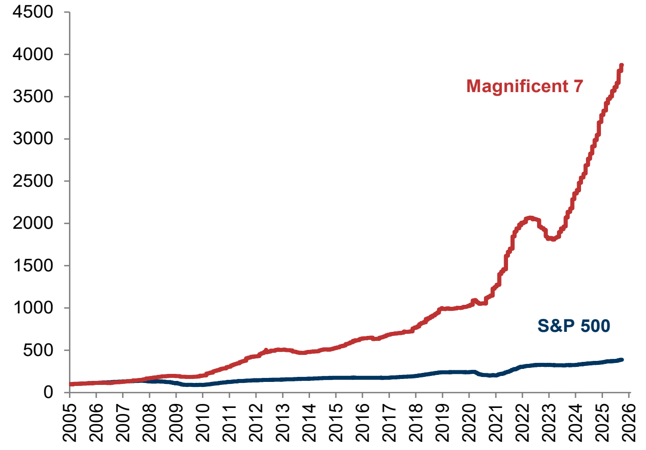
Note: Exhibit does not represent an exhaustive view of the AI ecosystem but rather the most prominent AI model companies, infrastructure providers, and hyperscalers.
Source: Company announcements, various news sources, compiled by Goldman Sachs GIR.

Exhibit originally appeared in Issue 143: AI: in a bubble?

...leaving AI bubble concerns in focus

The outsized performance of the Magnificent 7 stocks on the back of AI enthusiasm has raised concerns about an AI bubble

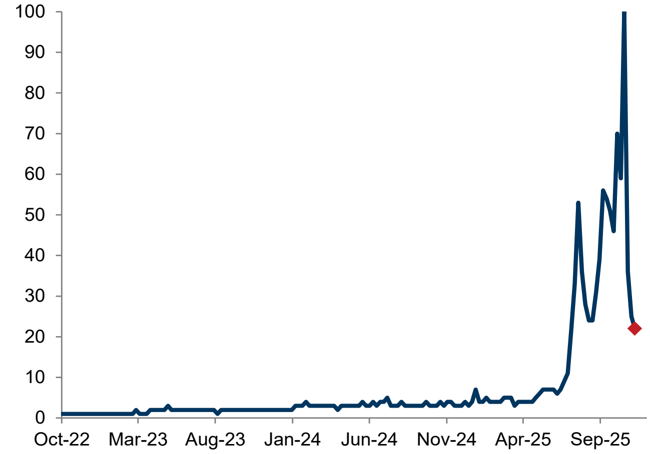
Magnificent 7 and S&P 500, 12m trailing EPS, Jan-2005=100



Source: FactSet, Goldman Sachs GIR.

Some concern may have abated, with Google searches for "AI bubble" declining from their recent peak

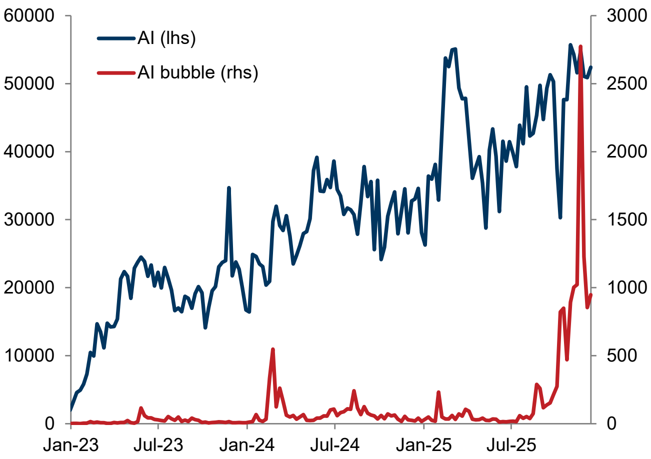
Google mentions of "AI bubble"



Source: Google, Goldman Sachs GIR.

But news stories about an AI bubble show continued focus...

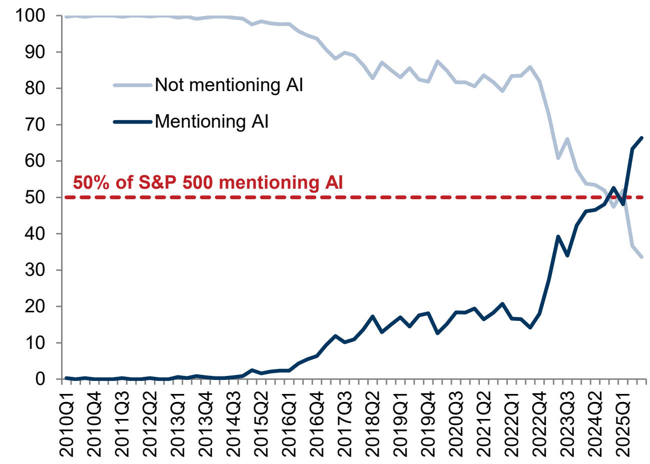
"AI" and "AI bubble" mentions in news on Bloomberg terminals, count



Source: Bloomberg, Goldman Sachs GIR.

...and AI mentions in earnings calls continue to grow, with over 50% of S&P 500 companies mentioning AI in Q3

Share of S&P 500 firms mentioning AI in earnings calls, %



Source: LSEG, Goldman Sachs GIR.

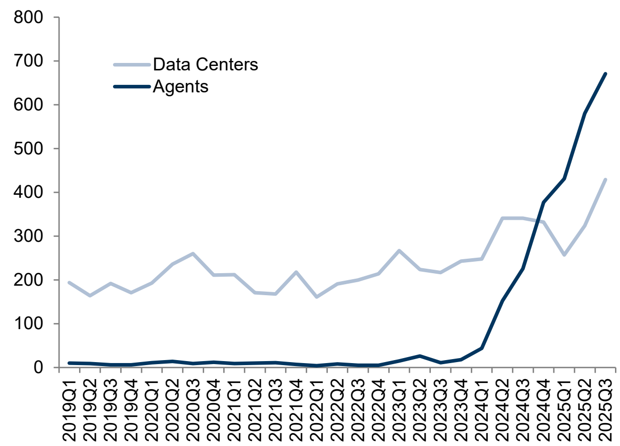
AI focus remains broad, with companies continuing to mention AI investment and opportunity...

AI-related mentions in 3Q2025 S&P 500 earnings calls, scaled by number of mentions

Source: LSEG, Goldman Sachs GIR.

...though tech companies have increasingly shifted their AI focus from infrastructure to the application phase, with rising emphasis on AI agents

Mentions in S&P 500 TMT/Telco earnings calls*



**Keyword counts from S&P 500 TMT and Telecommunications companies.*
Source: LSEG, Goldman Sachs GIR.

Special thanks to Dan Duggan and GS Data Works for their AI-related analysis.

Exhibit originally appeared in [Issue 143: AI: in a bubble?]

Stablecoins also came to the fore...

What are stablecoins?

- Stablecoins are a form of tokenized digital money using **blockchain technology** and are designed to maintain a stable value, typically **pegged** one-to-one with conventional fiat currencies, most commonly the US Dollar. This differentiates stablecoins from bitcoin and other cryptocurrencies whose values are determined by supply and demand of the coin. Their primary purpose is to serve as a medium of exchange in digital assets or for payment settlement.
- Stablecoins maintain their fiat currency peg either through market-based mechanisms that adjust supply (**algorithmic stablecoins**) or through explicit asset backing by issuers (**reserve-backed stablecoins**). The latter is significantly larger by market capitalization and more integrated with the existing financial system due to issuers' holdings of financial assets. Issuers typically hold safe, cash-equivalent assets like bank deposits, US Treasuries, repurchase agreements, and commercial paper, though some also hold precious metals and cryptocurrencies. The GENIUS Act requires stablecoins to be fully backed by 'permitted reserves' (primarily safe assets like US Dollars and short-term Treasuries) after a grace period.
- The overall size of the stablecoin market is around $307bn, with **USDT** (~$185bn in circulation, issued by Tether) and **USDC** (~$78bn in circulation, issued by Circle) commanding the vast majority of market share. The remaining stablecoins outstanding are split across a variety of much smaller issuers.

How are stablecoins used?

- Today, stablecoins are primarily used within the **cryptocurrency ecosystem for trading**, providing a stable asset to move in and out of positions without having to convert to fiat currency.
- The other major use case is providing **access to dollars** outside of the US, especially in devaluation-prone regions, as well as for **cross-border payments** and **remittances.**
- Stablecoins can also be used for **consumer payments**, though this usage remains limited so far as consumers continue to rely on traditional payment systems.
- **Business-to-business payments (B2B)** could be another use case for stablecoins, although B2B payments have historically been very slow to adopt new payment rails.

How do stablecoins work?

1 A customer deposits an underlying asset, typically US Dollars, with a stablecoin issuer and in return the issuer **mints**, or creates, an equivalent amount of stablecoin on a **blockchain** and delivers it to the customer. The US Dollar cash given to the issuer is parked in what are called **reserves**, which are typically high-quality liquid assets like US Treasuries. Stablecoins can also trade on the secondary market, where prices can fluctuate with supply and demand.

2 Stablecoins are typically stored in cryptocurrency **wallets**. These wallets hold the stablecoins as digital assets on the blockchain—which records who owns the coin and any transactions they make with it—allowing users to send, receive, and manage their stablecoins.

3 Customers can use their stablecoins to transact in a variety of ways. When a customer initiates a transaction, they send a request to the blockchain network that includes the recipient's wallet address and the amount of stablecoins to be transferred. The transaction is verified and recorded on the blockchain. The transaction is then reflected in the recipient's wallet balance.

4 When a user wants to **redeem** their stablecoin for the underlying asset, they send the stablecoin back to the issuer. The issuer then **burns**, or destroys, the stablecoin, removing it from circulation, and releases the equivalent amount of the reserve asset back to the customer.

Source: CoinGecko, DefiLlama, US Treasury, Brookings, Goldman Sachs GIR.

Exhibit originally appeared in Issue 141: Stablecoin summer.

...with the passage of the GENIUS Act...

What is it?

- The GENIUS (Guiding and Establishing National Innovation for U.S. Stablecoins) Act is a piece of US stablecoin legislation that was introduced by Senators Hagerty (R-TN), Scott (R-SC), Gillibrand (D-NY), and Lummis (R-WY).
- The Act provides a regulatory framework for **payment stablecoins**, which it defines as a digital asset designed to be used as a means of payment or settlement.
- The Act was signed into law by President Trump on July 18 after passing the Senate on June 17 on a 68-30 vote and the House of Representatives on July 17 on a 308-122 vote. Two other crypto bills passed in the House alongside it: the Digital Asset Market Clarity Act (also known as the **CLARITY Act**), which would provide a regulatory framework for digital assets more broadly, as well as the **Anti-CBDC Surveillance State Act**, which aims to prevent the Federal Reserve from issuing a central bank digital currency (CBDC) directly to individuals without explicit congressional authorization. Both bills are still before the Senate.

What does it do?

The GENIUS Act:

Defines stablecoin issuers. Stablecoins can be issued by subsidiaries of insured depository institutions, federally-licensed non-bank entities provided they obtain a special license from the Office of the Comptroller of the Currency (OCC), and state-chartered issuers provided their issuance is capped at $10 billion. So, banks would be permitted to issue their own stablecoins, while non-financial companies would be restricted unless they meet certain standards (which have yet to be established).

Establishes a framework for regulating reserves. Issuers are required to maintain reserves backing stablecoins on an at least 1:1 basis. Reserves must be comprised of US currency, funds held as demand deposits at depository institutions, Treasury bills, notes, or bonds with a maturity of 93 days or less, repo or reverse repo agreements with a maturity of seven days or less, money market funds, or central bank reserve deposits.

Sets out a framework for reserve audits. Stablecoin issuers must disclosure the composition of their reserves monthly on their websites, and issuers with more than $50 billion in stablecoins outstanding are required to publicly disclose annual financial statements, which must be audited by a registered public accounting firm.

Prohibits interest payments. Stablecoin issuers are prohibited from paying interest to coin holders. However, the bill says nothing about whether third parties or affiliates can pay interest, and issuers can distribute reserve income to affiliates, who can offer rewards to stablecoin holders on their platforms. (Example: Circle can pay reserve income to Coinbase, which can offer rewards to holders of USDC on its platform).

Sets out compliance requirements. Issuers are subject to the Bank Secrecy Act, anti-money laundering compliance, and sanctions requirements. They are also required to conduct transaction monitoring, recordkeeping, and suspicious activity reporting.

Remains neutral on Fed master account access. The Act does not alter who is currently legally eligible for Federal Reserve services or deposit access.

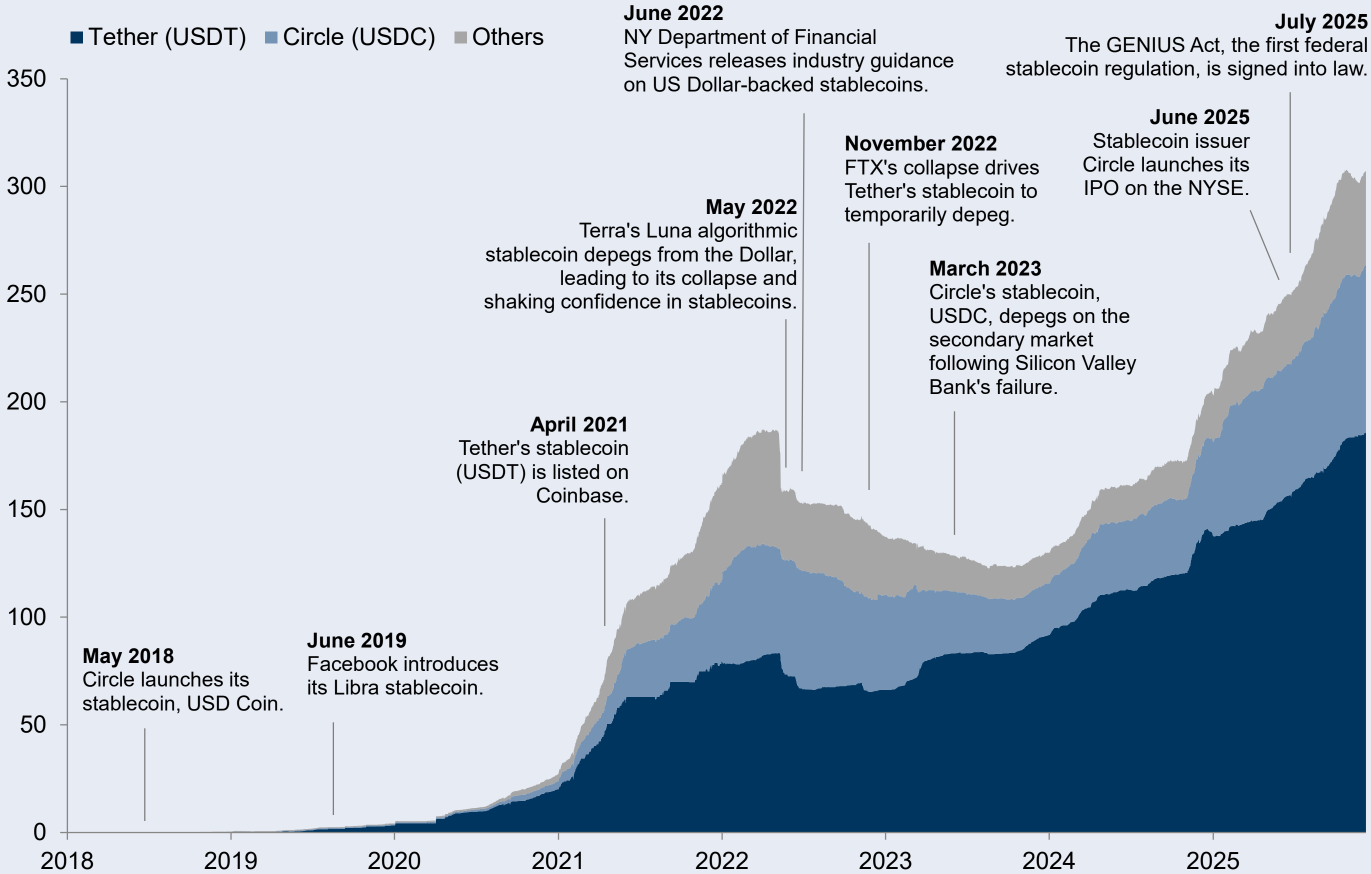
Source: Congress.gov, United States House Committee on Financial Services, United States Senate Committee on Banking, Housing, & Urban Affairs, Goldman Sachs GIR.

Exhibit originally appeared in Issue 141: Stablecoin summer.

...helping drive market cap higher...

The size of the stablecoin market currently sits at ~$307bn, dominated by two issuers: Tether and Circle

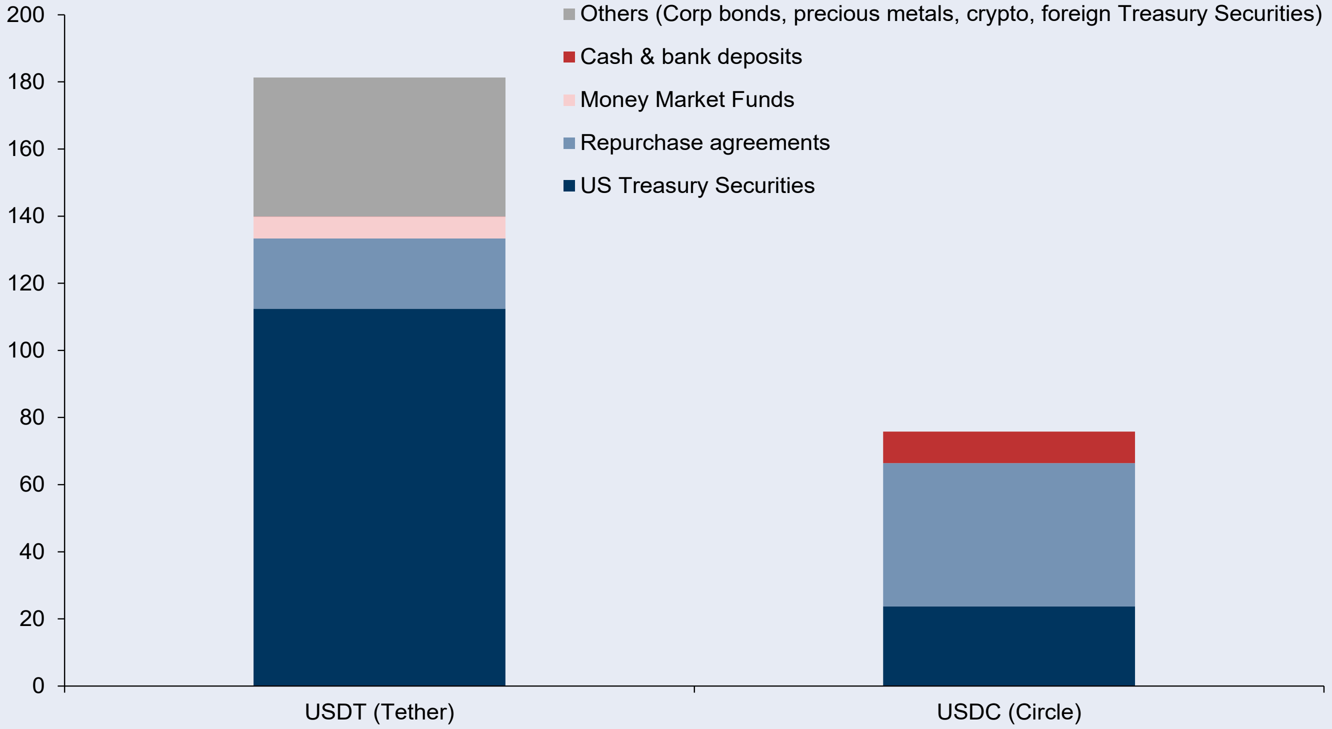
USD stablecoins in circulation by market cap, $bn



Source: DefiLlama, CoinGecko, Moody's, various news sources, Goldman Sachs GIR.

The vast majority of stablecoin reserves are currently held in USD safe assets, including Treasury securities, repos, money funds, and deposits, though the GENIUS Act now requires payment stablecoins to be *fully backed* by safe assets after a grace period

Reserve composition of the largest two USD stablecoin issuers, latest reported (3Q25 for Tether, October 2025 for Circle), $bn



Source: Tether, Circle, Goldman Sachs GIR.

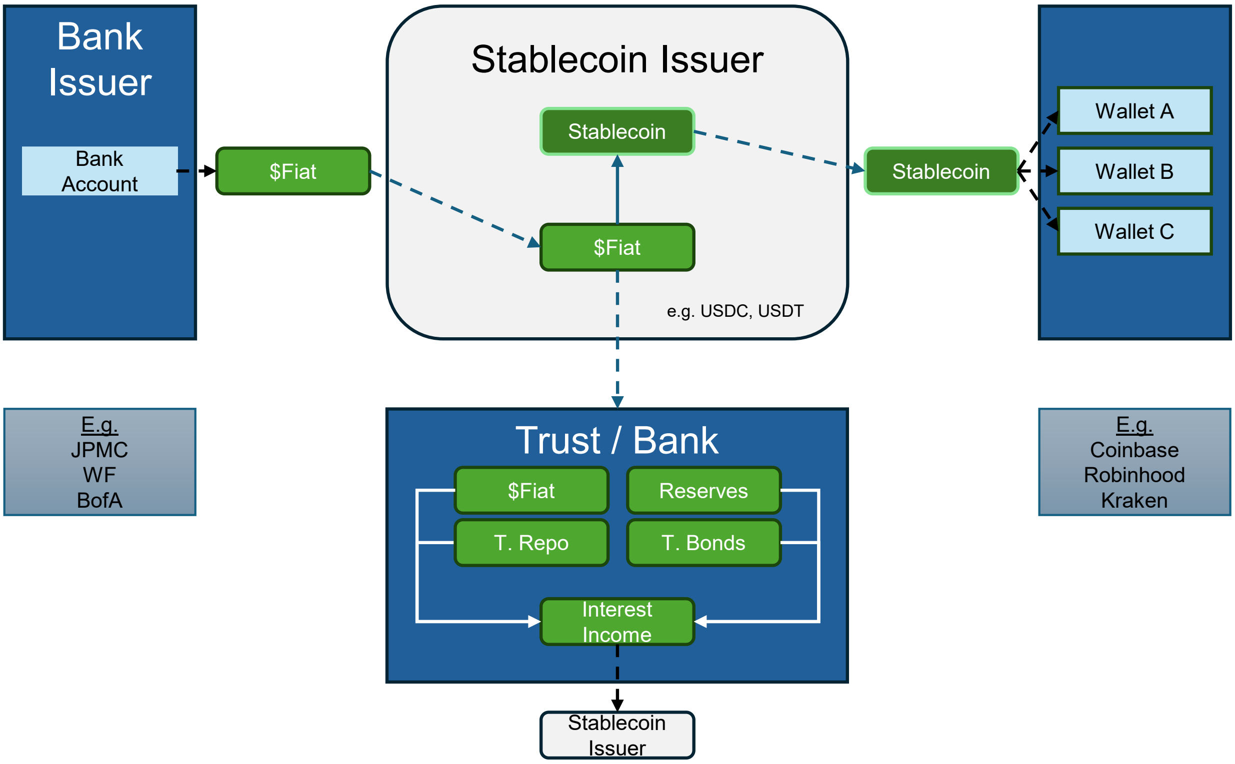
Special thanks to GS Rates research team for charts.

Charts originally appeared in Issue 141: Stablecoin summer.

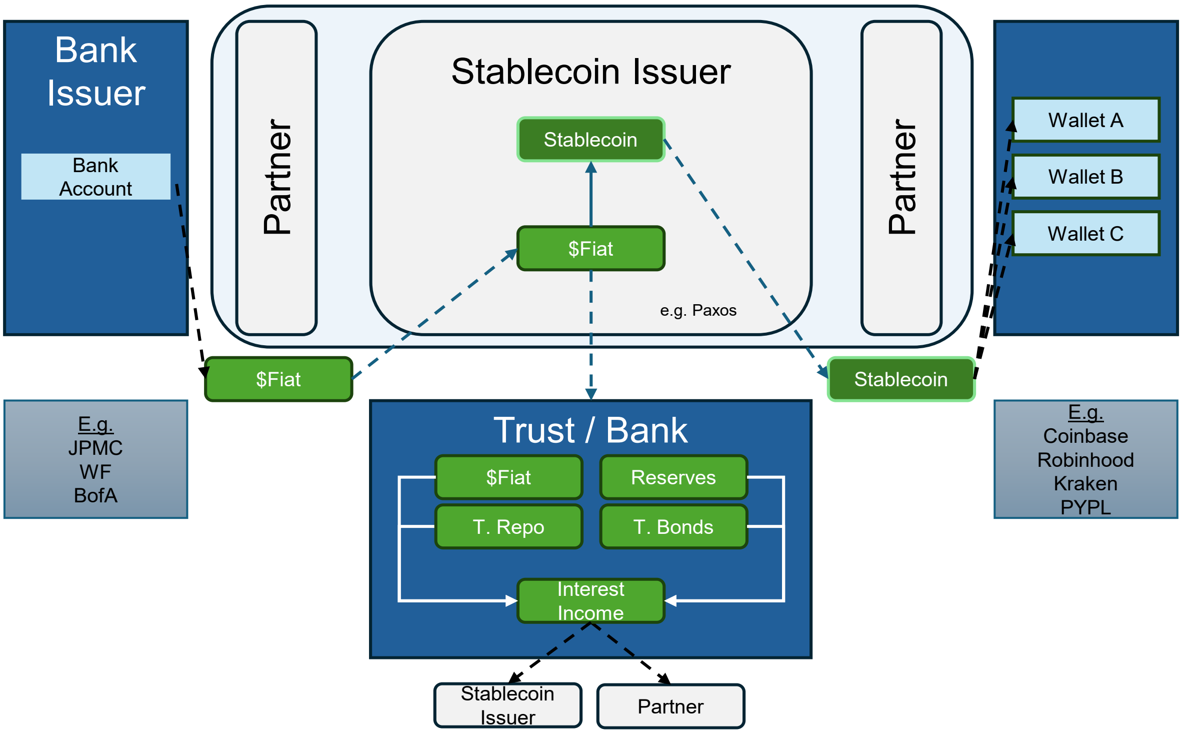
...with issuers focused on monetization

Stablecoin issuers employ one of two primary business models: (1) outright issuance and creation of stablecoins and (2) "white label" stablecoins. In the **outright issuance model**, an issuer "mints" their own stablecoin. In the **white label stablecoin issuance model**, an issuer mints and redeems stablecoins on behalf of a partner, who delivers its customers' dollars to the issuer for minting and delivers the newly-minted stablecoins to customers. While business models differ, stablecoin issuers generate revenue primarily by earning interest on their reserve assets.

In a **direct issuer model**, an issuer mints and redeems stablecoins on their own behalf...



...while in a **white label issuer model**, an issuer performs these tasks on behalf of a partner



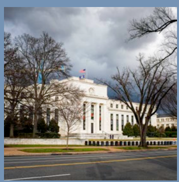
Source: Goldman Sachs GIR.

Special thanks to GS equity analyst James Yaro for exhibits and analysis.

Exhibit originally appeared in Issue 141: Stablecoin summer.

3

*Amid all that, **institutional credibility** became an obsession,*



With fiscal sustainability, data reliability, and Fed independence all questioned.

These led to unease that higher bond yields may not fade,

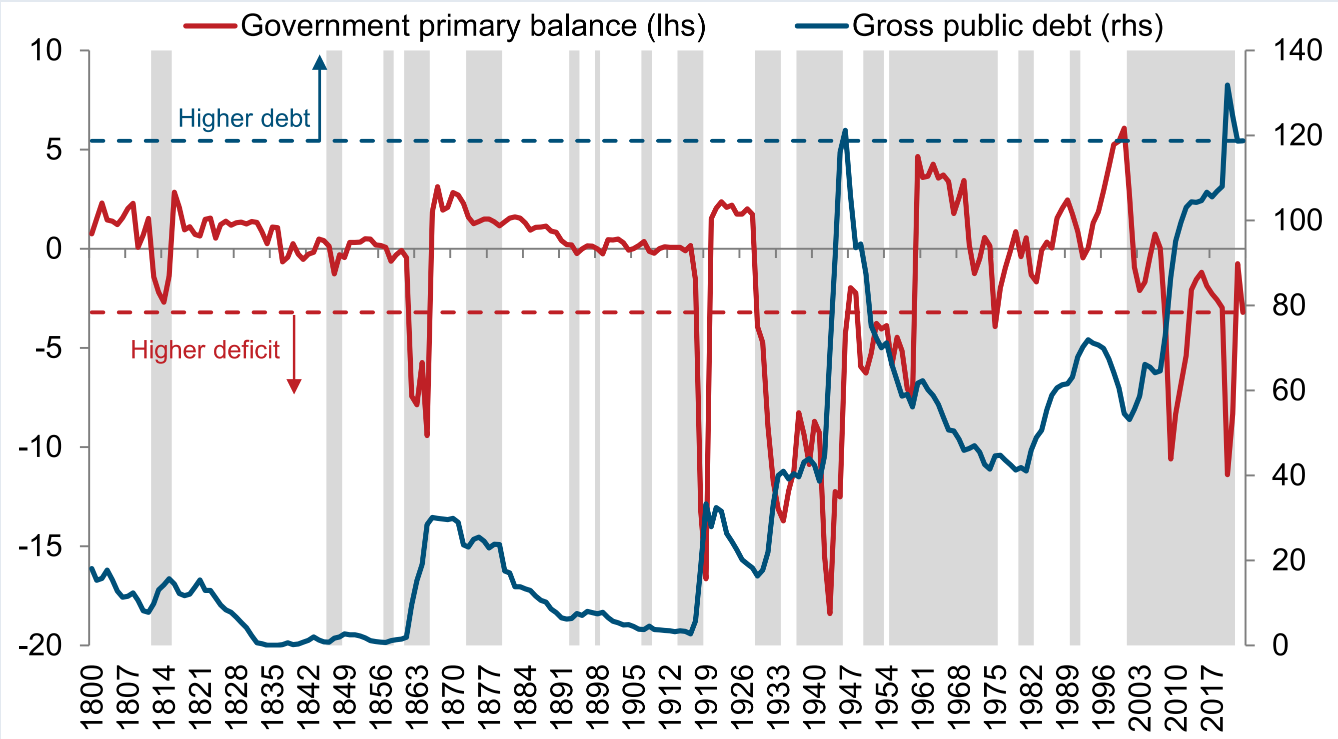
And created a tailwind for the debasement trade.

Pgs. 23-33

The concerning US fiscal situation...

The US deficit and debt are at their highest levels outside of crisis periods...

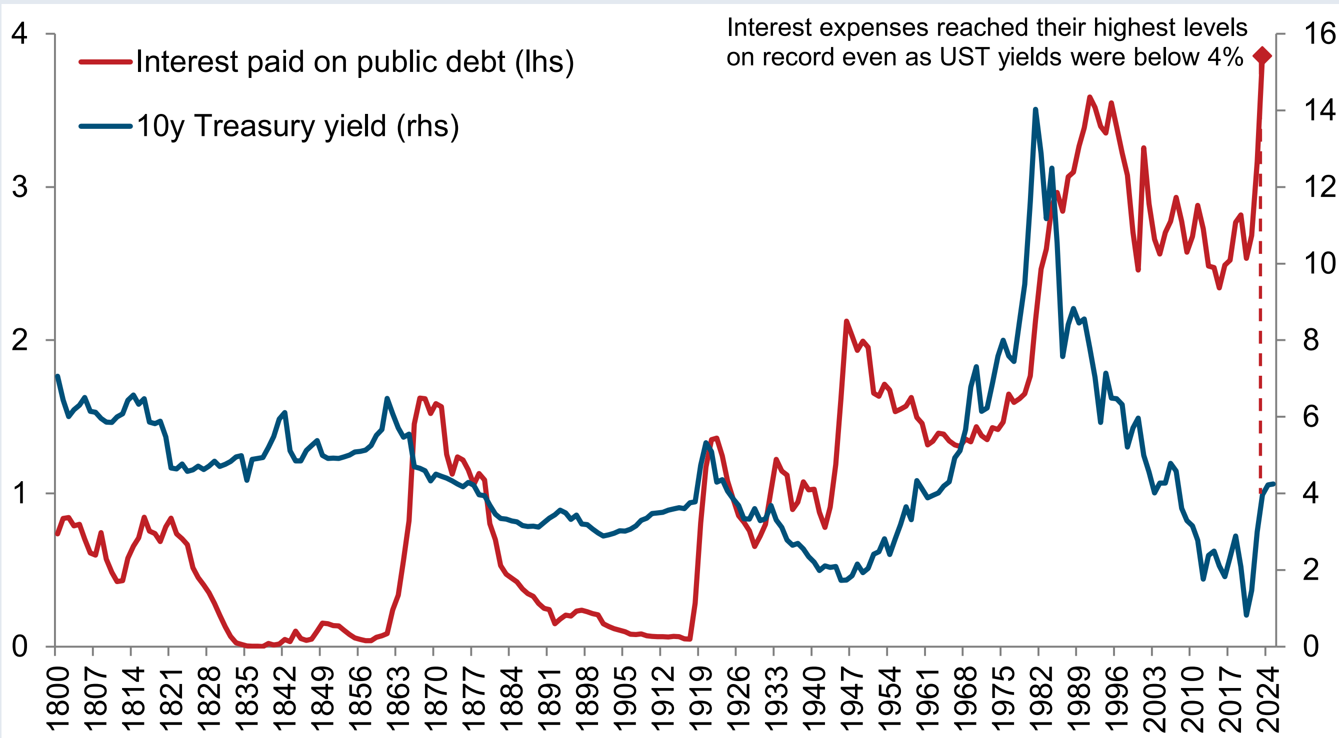
US government primary balance (lhs) and gross public debt (rhs) as % of GDP (data through 2023)



Note: Grey shaded areas represent times of major recessions, crises, or wars in US history.
Source: IMF Public Finances in Modern History database, NBER, Federal Depository Library Program (dates of major wars), compiled by Goldman Sachs GIR.

...while interest expenses were at record highs even before the most recent rise in interest rates

Interest paid on public debt as % of GDP (lhs) (data through 2023), annual average 10y Treasury yield (%, rhs) (current data)

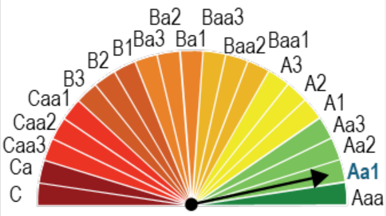
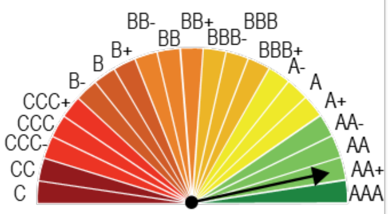
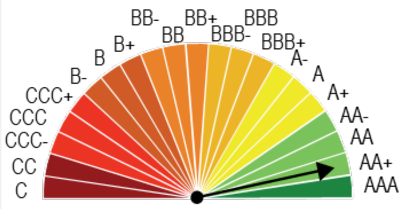


Source: IMF Public Finances in Modern History database, Global Financial Data, Inc., Federal Reserve Board, Haver Analytics, compiled by Goldman Sachs GIR.

Charts originally appeared in Issue 140: US fiscal worries: is this time different?

...raised doubts about US credit quality

A look at US credit ratings

	MOODY'S RATINGS	FitchRatings	S&P Global Ratings
US Credit Rating			
US Outlook	***Stable***	***Stable***	***Stable***
Most recent ratings change...	**In May 2025, Moody's downgraded the US' credit rating by one notch from Aaa to Aa1, citing the increase in government debt owing to increased spending and reduced tax revenues, the inability of the government to address such issues, as well as growing federal interest payments.**	**In 2023, Fitch downgraded the US' credit rating by one notch from AAA to AA+, citing the high and growing debt burden, an expected fiscal deterioration, and an erosion of good governance related to debt limit negotiations.**	**In 2011, S&P became the first major credit rating agency to downgrade the US, lowering its credit rating from AAA to AA+, primarily reflecting political brinksmanship over the debt ceiling and concerns about the stability of US governance and policymaking.**
...and what they've said about it	*"This one-notch downgrade on our 21-notch rating scale reflects the increase over more than a decade in government debt and interest payment ratios to levels that are significantly higher than similarly rated sovereigns."* *"Successive US administrations and Congress have failed to agree on measures to reverse the trend of large annual fiscal deficits and growing interest costs. We do not believe that material multi-year reductions in mandatory spending and deficits will result from current fiscal proposals under consideration."*	*"The rating downgrade of the United States reflects the expected fiscal deterioration over the next three years, a high and growing general government debt burden, and the erosion of governance relative to 'AA' and 'AAA' rated peers over the last two decades that has manifested in repeated debt limit standoffs and last-minute resolutions."* *"Fitch's longer-term projections forecast additional debt/GDP rises, increasing the vulnerability of the US fiscal position to future economic shocks."*	*"The downgrade reflects our view that the effectiveness, stability, and predictability of American policymaking and political institutions have weakened at a time of ongoing fiscal and economic challenges."* *"The prolonged controversy over raising the statutory debt ceiling and the related fiscal policy debate indicate that further near-term progress containing the growth in public spending, especially on entitlements, or on reaching an agreement on raising revenues is less likely."*

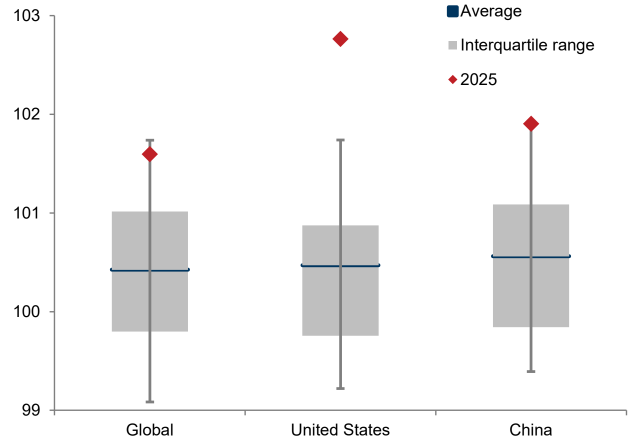
Source: Moody's Ratings, Fitch Ratings, S&P Global Ratings, compiled by Goldman Sachs GIR.

Exhibit originally appeared in [Issue 140: US fiscal worries: is this time different?]

(though fiscal worries are global)

Fiscal policy uncertainty around the world remains high...

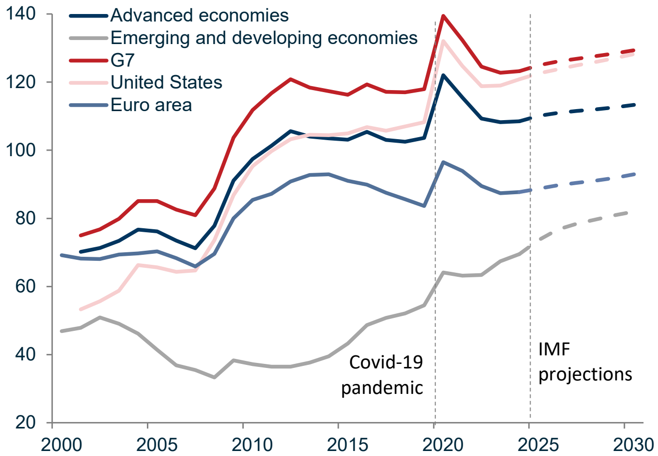
Fiscal policy uncertainty index, 2005-2025



Source: IMF, Goldman Sachs GIR.

...at a time when global debt levels are elevated, with debt-to-GDP ratios across regions expected to rise further...

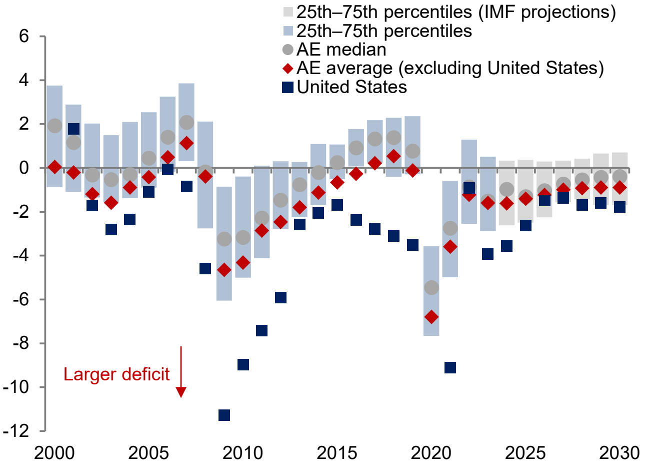
General government debt-to-GDP by country grouping, %



Source: IMF, Goldman Sachs GIR.

...and deficits across advanced economies...

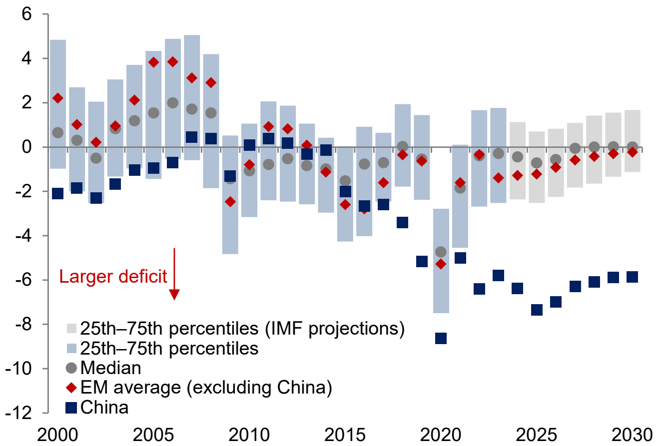
Primary balances in advanced economies (AE), % of GDP



Source: IMF, Goldman Sachs GIR.

...as well as emerging markets are particularly elevated relative to history

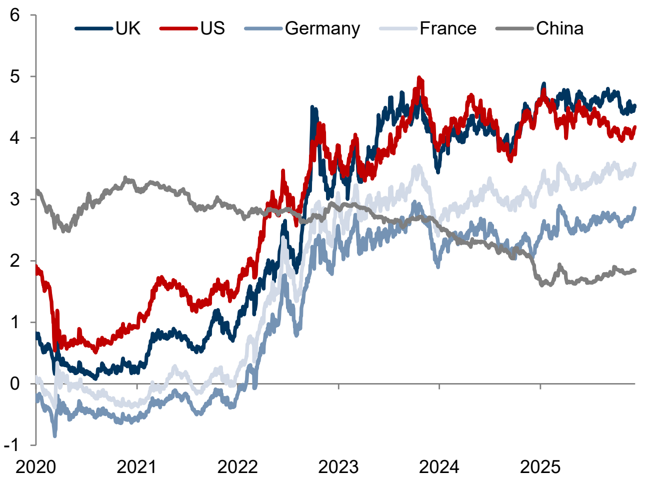
Primary balances in emerging markets (EM), % of GDP



Source: IMF, Goldman Sachs GIR.

At the same time, global interest rates have generally risen recently, although Chinese yields have declined somewhat...

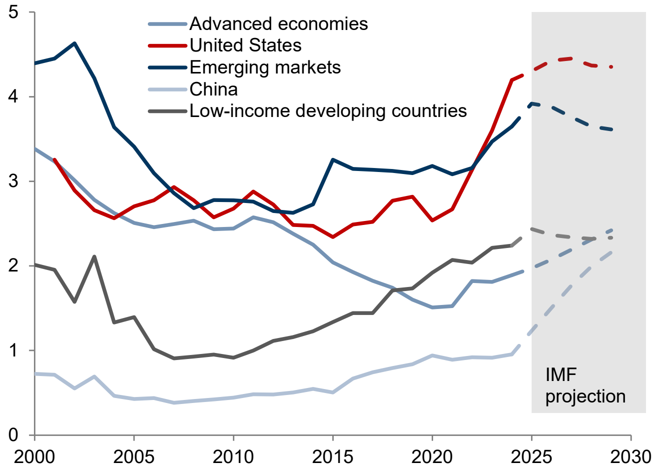
10-year sovereign bond yields, %



Source: IMF, Goldman Sachs GIR.

...contributing to rising government interest expenses, which are set to increase even further in most regions

General government interest expense, % of GDP



Source: IMF, World Economic Outlook database, Goldman Sachs GIR.

Charts originally appeared in [Issue 140: US fiscal worries: is this time different?]

Plus ongoing concerns about Fed...

January 29, 2025:
Fed leaves interest rates unchanged

March 19, 2025:
Fed leaves interest rates unchanged

April 4, 2025:
"We have stressed that it will be very difficult to assess the likely economic effects of higher tariffs until there is greater certainty about the details... While uncertainty remains elevated, it is now becoming clear that the tariff increases will be significantly larger than expected. The same is likely to be true of the economic effects, which will include higher inflation and slower growth..."

April 16, 2025:
"Tariffs are highly likely to generate at least a temporary rise in inflation. The inflationary effects could also be more persistent... Our obligation is to keep longer-term inflation expectations well anchored and to make certain that a one-time increase in the price level does not become an ongoing inflation problem... As that great Chicagoan Ferris Bueller once noted, "Life moves pretty fast." For the time being, we are well positioned to wait for greater clarity before considering any adjustments to our policy stance."

May 7, 2025:
Fed leaves interest rates unchanged

January 20, 2025: Trump reassumes office

January 23, 2025:
"I think I know interest rates much better than they do, and I think I know it certainly much better than the one who's primarily in charge of making that decision... If I disagree, I will let it be known."

April 17, 2025:
"The ECB is expected to cut interest rates for the 7th time, and yet, Too Late Jerome Powell of the Fed, who is always TOO LATE AND WRONG, yesterday issued a report which was another, and typical, complete "mess!" Oil prices are down, groceries (even eggs!) are down, and the USA is getting RICH ON tariffs. Too Late should have lowered Interest Rates, like the ECB, long ago, but he should certainly lower them now. Powell's termination cannot come fast enough!"

April 21, 2025:
"...With Energy Costs way down, food prices (including Biden's egg disaster!) substantially lower, and most other "things" trending down, there is virtually No Inflation. With these costs trending so nicely downward, just what I predicted they would do, there can almost be no inflation, but there can be a SLOWING of the economy unless Mr. Too Late, a major loser, lowers interest rates, NOW."

April 22, 2025:
"I would like to see [Powell] be a little more active in terms of his idea to lower interest rates... but, no, I have no intention to fire him."

May 2, 2025:
"Gasoline just broke $1.98 a Gallon, lowest in years, groceries (and eggs!) down, energy down, mortgage rates down, employment strong, and much more good news, as Billions of Dollars pour in from Tariffs... Consumers have been waiting for years to see pricing come down. NO INFLATION, THE FED SHOULD LOWER ITS RATE!!!"

May 4, 2025:
"Well, [Powell] should lower [rates]. And at some point, he will. He'd rather not because he's not a fan of mine. You know, he just doesn't like me because I think he's a total stiff... No, no, no. That was a total – why would I [remove Powell before his term ends]? I get to replace the person in another short period of time."

May 8, 2025:
"Too Late Jerome Powell is a FOOL, who doesn't have a clue. Other than that, I like him very much!..."

May 13, 2025:
"No Inflation, and Prices of Gasoline, Energy, Groceries, and practically everything else, are DOWN!!! THE FED must lower the RATE, like Europe and China have done. What is wrong with Too Late Powell?..."

Quote | Events/News | Fed decisions | On hold

Source: Truth Social, various interviews and speeches, Federal Reserve, compiled by Goldman Sachs GIR.

...independence...

June 18, 2025:
Fed leaves interest rates unchanged

June 24, 2025:
"For the time being, we are well-positioned to wait to learn more about the likely course of the economy before considering any adjustments to our policy stance."

July 30, 2025:
Fed leaves interest rates unchanged, with two dissents

August 22, 2025:
"With policy in restrictive territory, the baseline outlook and the shifting balance of risks may warrant adjusting our policy stance."

September 17, 2025:
Fed lowers interest rates, with one dissent

September 23, 2025
"Near-term risks to inflation are tilted to the upside and risks to employment to the downside—a challenging situation. Two-sided risks mean that there is no risk-free path. If we ease too aggressively, we could leave the inflation job unfinished and need to reverse course later to fully restore 2 percent inflation. If we maintain restrictive policy too long, the labor market could soften unnecessarily."

October 29, 2025:
Fed lowers interest rates, with two dissents

October 29. 2025
"In the Committee's discussions at this meeting, there were strongly differing views about how to proceed in December. A further reduction in the policy rate at the December meeting is not a foregone conclusion—far from it."

December 10, 2025:
Fed lowers interest rates, with three dissents

June 12, 2025:
"We're going to spend $600 billion a year, $600 billion because of one numbskull that sits here [and says] I don't see enough reason to cut the rates now."

June 18, 2025:
"So we have a stupid person. Frankly, you probably won't cut today... Europe had 10 cuts, and we had none. And I guess he's a political guy, I don't know. He's a political guy who's not a smart person, but he's costing the country a fortune."

June 19, 2025:
"Too Late Jerome Powell is costing our Country Hundreds of Billions of Dollars. He is truly one of the dumbest, and most destructive, people in Government, and the Fed Board is complicit. Europe has had 10 cuts, we have had none. We should be 2.5 Points lower, and save $BILLIONS on all of Biden's Short Term Debt. We have LOW inflation! TOO LATE's an American Disgrace!"

July 15, 2025
"I think he's terrible... But the one thing, I didn't see him as a guy that needed a palace to live in... The one thing I would have never guessed is that he would be spending $2.5 billion to build a little extension onto the Fed."

August 1, 2025:
"Jerome 'Too Late' Powell, a stubborn MORON, must substantially lower interest rates, NOW. IF HE CONTINUES TO REFUSE, THE BOARD SHOULD ASSUME CONTROL, AND DO WHAT EVERYONE KNOWS HAS TO BE DONE!"

August 19, 2025:
"Could somebody please inform Jerome "Too Late" Powell that he is hurting the Housing Industry, very badly? People can't get a Mortgage because of him. There is no Inflation, and every sign is pointing to a major Rate Cut. "Too Late" is a disaster!"

September 10, 2025:
"Just out: No Inflation!!! 'Too Late' must lower the RATE, BIG, right now. Powell is a total disaster, who doesn't have a clue!!!"

November 19, 2025:
*"Scott [Bessent], you've gotta work on this guy... He's got some real mental problems. There's something wrong with him. It's just ridiculous. I'll be honest, I'd love to fire his a**. He should be fired."*

Quote | Events/News | Fed decisions
On hold
Rate cut

Source: Truth Social, various interviews and speeches, Federal Reserve, compiled by Goldman Sachs GIR.

Exhibit originally appeared in [Issue 139: Fed independence: how concerning?]

...as the courts continued to weigh in...

US courts have historically upheld for-cause firing protections to independent boards like the Federal Reserve Board of Governors, but recent decisions suggest support for more removal power

Case	Year	Description	Decision
Humphrey's Executor v. United States	1935	In 1933 President Roosevelt fired William Humphrey from the Federal Trade Commission (FTC) without cause, despite the FTC Act permitting dismissal only for "inefficiency, neglect of duty, or malfeasance in office."	The Court ruled the dismissal invalid, distinguishing FTC commissioners as quasi-legislative or quasi-judicial officers (not executive officers) that may be removed only with procedures consistent with statutory conditions enacted by Congress.
Wiener v. United States	1958	President Eisenhower removed Abraham Wiener, a member of the War Claims Commission, established by Congress to adjudicate claims from parties affected by World War II.	The Court ruled that Wiener's dismissal was invalid, as the Appointments Clause does not guarantee the president's ability to remove an officer of the United States who exercises quasi-judicial authority at will.
Morrison v. Olson	1988	The Chairman of the House Judiciary Committee forwarded a report to the US AG asking that an independent counsel investigate whether Theodore Olson, Assistant AG for the Office of Legal Counsel, had given false testimony regarding EPA enforcement. Olson argued that the Independent Counsel Act was unconstitutional since it created a "hybrid branch" of the government that took executive powers away from the president.	The Court upheld the Independent Counsel Act, affirming that Congress could create independent agencies with limited removal protections for inferior officers that have limited duties and no policymaking role.
Free Enterprise Fund v. Public Company Accounting Oversight Board (PCAOB)	2010	The PCAOB was created by the Sarbanes–Oxley Act of 2002 as a non-profit organization to oversee the audits of US-listed public companies. PCAOB officers could be removed only "for good cause" by SEC officers who could only be removed by the president for "inefficiency, neglect of duty, or malfeasance in office." The Free Enterprise Fund sued in 2006, challenging that the PCAOB violated the appointments clause of the Constitution and vesting clause establishing the separation of powers.	The Court ruled that the appointment provisions of the Act was constitutional, but struck down the for-cause removal provision for PCAOB members. Chief Justice Roberts noted that "the executive power included a power to oversee executive officers through removal" in striking down for-cause protections, but distinguished the case from Humphrey's Executor by noting that it only dealt with principal officers and from Morrison by noting this precedent didn't "address the consequences of more than one level of good-cause tenure".
Seila Law v. Consumer Financial Protection Bureau (CFPB)	2020	The CFPB was established by the 2010 Dodd-Frank Act as an independent agency with a single director selected by the president and confirmed by the Senate for a five-year term. The Act stated that the CFPB could only be removed for "inefficiency, neglect of duty, or malfeasance in office." Seila Law LLC (Seila Law), a law firm that provided debt relief services, challenged the CFPB's constitutionality.	The Court ruled that the CFPB structure was unconstitutional as it violated the separation of powers by establishing a sole director that could only be terminated for cause. While Chief Justice Roberts acknowledged 1) Humphrey's Executor established constraints on the president's removal power for officers of an agency that exercised "no part of the executive power" and performed "specified duties as a legislative or as a judicial aid" and 2) Morrison established similar constraints for "inferior officers with limited duties and no policymaking" role, the CFPB didn't fall under these exemptions.
Collins v. Yellen	2021	The FHFA was established by the Housing and Economic Recovery Act of '08, with the legislation specifying it was to be overseen by a single director that can only be removed "for cause". Shareholders of Fannie Mae and Freddie Mac argued that the government's 2012 decision to allocate nearly all of Fannie and Freddie's profits to the Treasury was invalid since the FHFA is structured unconstitutionally as an agency with a single director who holds power that isn't subject to appropriate checks by the president.	The Supreme Court ruled that the "for cause" restriction on removal of the FHFA director by the president was unconstitutional given the recent Seila Law decision.
Wilcox v. Trump	2025	Trump dismissed Gwynne Wilcox from the National Labor Relations Board (NLRB) in January 2025 even though her term was scheduled to last until August 2028. Wilcox sued, arguing that Humphrey's Executor protects against without cause removal of "principal officers".	On April 7, the DC Court of Appeals blocked the termination, but the Supreme Court issued a stay on this decision.
Dellinger v. Bessent	2025	United States Office of Special Counsel Head Hampton Dellinger was fired by President Trump in February 2025. Dellinger challenged his dismissal, arguing that the Office of Special Counsel is an independent agency where by law the president can only dismiss its head for "inefficiency, neglect of duty, or malfeasance in office."	The DC District Court stayed Dellinger's dismissal in Feb, and the Supreme Court chose to hold the Trump Administration's appeal to vacate the District's court order in abeyance until expiration, effectively allowing the decision to stand. The DC District Court then issued an injunction against Dellinger's firing on Mar 1 which was stayed on Mar 5 by the DC Appeals Court—effectively removing Dellinger from his position—before Dellinger dropped his suit and accepted his dismissal.
Slaughter v. Trump	2025	In March 2025, Trump attempted to fire two FTC Commissioners, Rebecca Slaughter and Alvaro Bedoya, without cause, in violation of the FTC's governing statute. Slaughter and Bedoya subsequently sued in DC District Court arguing their dismissal was illegal under precedent established in Humphrey's Executor.	The case is ongoing with the Supreme Court recently hearing initial oral arguments. The Court has granted a stay, allowing Trump's removal of Slaughter to stand while the case proceeds.
Trump v. Cook	2025	In August 2025, after being fired by President Trump, Fed Governor Lisa Cook sues Trump, the Board of Governors, and Jerome Powell, arguing that Trump lacks the authority to dismiss her.	Litigation is ongoing, but the Supreme Court has ruled that Cook can stay on as governor while the case proceeds. The Court will hear oral arguments in Jan. to deliberate on whether Trump has a legal case for firing Cook.

Source: Justia, Supreme Court of the United States, Goldman Sachs GIR.

Special thanks to GS global economist Joseph Briggs for table, which originally appeared in Issue 139: Fed independence: how concerning?

...potentially overturning lots of history

● Institutional developments ● Political influence/coordination ● Extraordinary Fed actions

The Federal Reserve Act of 1913 establishes the modern Federal Reserve System, consisting of a Board of Governors and 12 regional Reserve Banks, to provide the country with a more stable monetary and financial system

1920s: The Federal Reserve begins to buy and sell US Treasuries as a monetary policy tool to influence money supply and interest rates

1929: President Hoover pressures the Fed to cut rates following the stock market crash

The Banking Act of 1933 (Glass-Stegall Act) creates the Federal Open Market Committee (FOMC) to manage the Fed's open market operations

The Banking Act of 1935 centralizes the Federal Reserve System and shifts monetary policy decision-making power to the Board of Governors; it also makes the Board of Governors more independent from the US Treasury

The Treasury-Fed Accord of 1951 explicitly grants the Fed independence to conduct monetary policy

1951: President Truman summons the Fed Chair to the White House during the Korean War over opposition to ending the interest rate peg

1953: President Eisenhower pressures the Fed to lower rates amid the 1953-54 recession

1961: The Fed purchases long-term Treasury bonds while simultaneously selling short-term bills to influence the shape of the Treasury yield curve in an act dubbed "Operation Twist"

1965: President Johnson shoves Fed Chair William McChesney Martin repeatedly at his Texas ranch after Martin refuses to lower rates

1972: President Nixon calls on Fed Chair Burns to provide expansionary monetary policy in the run-up to the 1972 election

Federal Reserve Reform Act of 1977 amends the original 1913 act to direct the Fed to "promote the goals of maximum employment, stable prices, and moderate long-term interest rates"

The Full Employment and Balanced Growth Act of 1978 (Humphrey-Hawkins Act) more explicitly establishes the Fed's "dual mandate" to support maximum employment and price stability; it also requires the Fed chair to testify to the Senate and House

The Monetary Control Act of 1980 expands the Fed's oversight over non-member banks by requiring all banks, thrift institutions, and credit unions to provide periodic financial reports to the Fed

1984: The Reagan Administration orders Fed Chair Volcker not to raise rates ahead of the 1984 election

1992: President George H.W. Bush pressures Fed Chair Greenspan to lower rates ahead of the 1992 election

The Financial Services Regulatory Relief Act of 2006 grants the Fed the ability to pay interest on reserves and allows it more flexibility in setting reserve requirements

2008: The Fed responds to the Global Financial Crisis with large-scale asset purchases also known as quantitative easing and introduces several lending facilities to support specific segments of the market

The Dodd-Frank Act of 2010 increases the Fed's supervisory powers over banks and establishes the Financial Stability Oversight Council

2018-19: President Trump openly calls on the Fed to lower interest rates, ending an extended period of the White House generally staying out of Fed policy

2020: The Fed responds to the Covid pandemic crisis with substantial asset purchases and establishes several facilities to provide funding for specific markets

2025: President Trump demands that the Fed lower interest rates and repeatedly threatens to fire Chair Powell

2025: President Trump fires Fed Governor Lisa Cook based on allegations of mortgage fraud. Cook, in turn, files a lawsuit against Trump arguing that he lacks the authority to dismiss her. The case is still pending but the US Supreme Court has ruled that Cook can stay on as a Fed governor for now. The Court will hear oral arguments on the case in January 2026.

Note: Not an exhaustive list of all Federal Reserve-related developments and actions.
Source: Federal Reserve, compiled by Goldman Sachs GIR.

Timeline originally appeared in Issue 139: Fed independence: how concerning?

Plus US data reliability concerns...

"In my opinion, today's Jobs Numbers were RIGGED in order to make the Republicans, and ME, look bad... We need accurate Jobs Numbers. I have directed my Team to fire this Biden Political Appointee, IMMEDIATELY. She will be replaced with someone much more competent and qualified. Important numbers like this must be fair and accurate."

"Last weeks Job's Report was RIGGED, just like the numbers prior to the Presidential Election were Rigged. That's why, in both cases, there was massive, record setting revisions, in favor of the Radical Left Democrats. Those big adjustments were made to cover up, and level out, the FAKE political numbers that were CONCOCTED in order to make a great Republican Success look less stellar!!! I will pick an exceptional replacement."

- President Trump, August 2025

"How on earth are businesses supposed to plan—or how is the Fed supposed to conduct monetary policy—when they don't know how many jobs are being added or lost in our economy? It's a serious problem that needs to be fixed immediately... Until it is corrected, the BLS should suspend issuing the monthly job reports. "

""The problems in the BLS data have been evident for three years now, and they still haven't been fixed... The fact that you consistently have large downward revisions means that there are other things wrong with your models and methodologies. Statistical assumptions that may have worked fine before COVID no longer work in today's economy and therefore need to be revised."

- E.J. Antoni, Former Trump nominee for BLS Commissioner, August 2025

"BLS has tackled the problem of declining response rates from many angles... All data collection activities incorporate quality assurance assessments, including reinterviews with data providers, reviews by senior staff, computer-based data checks, and more. "

- BLS statement, March 2023

"I wouldn't say that I'm concerned about the data today, although there has been a very mild degradation of the scope of the surveys. But I would say the direction of travel is something I'm concerned about. It's really important not just for the Fed, but for Congress and for businesses, frankly, to know what really is going on in the economy. I don't like to see the kind of stories I'm reading and the idea being that the data is going to become more volatile and less reliable. That'll make it more difficult for the private sector and for you and for us."

- Jerome Powell, Fed Chair, July 2025

"There's a heck of a lot of noisiness in the labor market data right now, which is bad for markets, it's bad for transparency and it's something that I think a fresh set of eyes should really look at and try to fix because the jobs numbers... need to be independently produced but they need to be reliable and not subject to massive revisions."

"If the data aren't that good, then it's a real problem for the US. And right now the data... have become very unreliable with these massive revisions over the last few years."

- Kevin Hassett, Director of the National Economic Council, August 2025

"Post-pandemic shifts mean our statistical systems are still catching up. Surveys can lag reality, and we have to adjust our readings accordingly."

- Austan Goolsbee, Chicago Fed President, April 2025

"I think the most important thing here is that we get back to the integrity of the numbers, because it just became OK, just like so many things in our government, for it to get sloppy... what we want is good data, because you can't make good decisions without good data... It's very likely that the Fed would have been doing something else in June, in July, if they had had this data."

- Scott Bessent, Treasury Secretary, August 2025

"We've been surprised a few times this year by big revisions. That's just a reminder that the first number you see is not the final story."

- Raphael Bostic, Atlanta Fed President, August 2025

Source: BLS, Fox News, CBS News, Truth Social, various news sources, compiled by Goldman Sachs GIR.

Exhibit originally appeared in Issue 142: Data (un)reliability.

...after some data quality problems...

Indicator	Units	MAP Score	Data Type	Rank: Change in Quality *(lower #=greater decline quality)* Revision	Sampling	Std. Err.	Noise	Average	Response Rate (%) Latest*	Historical**	Standard Error Latest*	Historical**	Standard Deviation Latest*	Historical**	Forecast Surprises^ Latest*	Historical**
JOLTS	k	-	Survey	13	1	1	6	5.3	33	63	214.4	127.6	882.4	741.8	371.7	226.5
NFP	Chg, k	5	Survey	3	3	6	13	6.3	43	60	80	68	79.4	71.3	84.6	63.4
ADP	Chg, k	3	Admin.	4	16	13	2	8.8	-	-	-	-	98.4	50.4	81.2	43.7
Retail Sales	Chg, %	4	Survey	9	7	9	11	9.0	57	67	0.3	0.28	0.6	0.5	0.4	0.4
Core PCE	Chg, %	-	Mixed	8	16	5	7	9.0	-	-	-	-	0.1	0.1	0.1	0.1
Advance Goods Trade	$bn	-	Admin.	7	16	13	1	9.3	-	-	-	-	20.3	5.9	14.1	3.1
Empire Mfg.	Index	2	Survey	2	16	13	8	9.8	50	50	-	-	14.6	12.0	16.6	7.8
Philly Fed Mfg.	Index	4	Survey	19	10	13	5	11.8	-	45	-	-	16.0	11.7	14.4	8.2
Personal Spending	Chg, %	1	Mixed	12	11	12	12	11.8	-	-	-	-	0.3	0.3	0.2	0.1
IP	Chg, %	2	Mixed	15	9	7	21	13.0	-	-	-	-	0.5	0.5	0.3	0.3
Pending Home Sales	Chg, %	2	Mixed	21	16	13	3	13.3	-	-	-	-	4.3	2.4	4.1	2.0
Import Prices	Chg, %	-	Mixed	24	4	1	26	13.8	45	55	0.15	0.07	0.4	0.6	0.3	0.3
S&P Global Mfg.	Index	-	Survey	11	14	13	19	14.3	75	80	-	-	1.7	1.7	-	-
Housing Starts	Chg, %	1	Mixed	17	15	10	16	14.5	-	-	7.5	7.1	9.5	9.0	8.0	7.5
Initial Claims	k	2	Admin.	1	16	13	29	14.8	-	-	-	-	13	26	10.9	11.6
CPI	Chg, %	-	Mixed	33	8	3	20	16.0	54	65	0.05	0.03	0.2	0.2	0.1	0.1
ECI	Chg, %	-	Survey	6	2	33	24	16.3	46	66	0.10	0.12	0.08	0.12	0.11	0.12
NAHB HMI	Index	1	Survey	28	16	13	9	16.5	13	13	-	-	6.1	5.5	3.6	2.7
New Home Sales	Chg, %	2	Survey	22	16	11	18	16.8	-	-	9.6	9.3	8.3	7.9	7.8	7.7
Continuing Claims	k	1	Admin.	5	16	13	34	17.0	-	-	-	-	81	237	28.0	31.7
Existing Home Sales	Chg, %	2	Mixed	26	16	13	15	17.5	-	-	-	-	4.4	4.1	3.4	3.0
Personal Income	Chg, %	-	Mixed	29	30	7	4	17.5	-	-	-	-	0.3	0.2	0.3	0.2
Case-Shiller HPI	Chg, %	-	Admin.	25	16	13	17	17.8	-	-	-	-	0.4	0.3	0.2	0.2
Unemp. Rate	%	5	Survey	31	5	4	32	18.0	70	85	0.13	0.10	0.3	0.6	0.1	0.1
S&P Global Serv.	Index	-	Survey	16	29	13	14	18.0	75	85	-	-	2.5	2	-	-
UMich Sentiment	Index	1	Survey	18	33	13	10	18.5	-	-	-	-	7.3	3.8	-	-
Building Permits	Chg, %	-	Survey	27	12	13	22	18.5	66	70	-	-	4.4	5.3	3.9	5.2
Dallas Fed Mfg.	Index	-	Survey	20	13	13	28	18.5	71	-	-	-	10.0	18.3	8.0	7.5
ISM Serv.	Index	3	Survey	30	16	13	23	20.5	-	-	-	-	1.8	2.2	2.1	1.9
Conference Board	Index	3	Survey	10	32	13	30	21.3	-	-	-	-	6.5	15.0	5.2	5.0
KC Fed Mfg.	Index	-	Survey	14	31	13	31	22.3	-	-	-	-	3.9	10.8	4.9	5.3
ISM Mfg.	Index	5	Survey	32	16	13	33	23.5	-	-	-	-	1.3	4.0	1.1	1.5
Richmond Mfg.	Index	1	Survey	23	34	13	25	23.8	40	40	-	-	6.9	11.0	6.7	8.9
Construction Spending	Chg, %	1	Mixed	34	6	34	27	25.3	23	41	0.5	0.8	0.5	0.9	0.4	0.8

** 2023-present, when available. ** 2015-2019, when available. ^Reports standard deviation.*

Notes: For each ranked category, we use a combination of percent changes and changes in the relevant statistics relative to typical forecast surprises. To rank indicators that mix administrative and survey data, we use the values of their respective source data divided by two. We do not use response rates for UMich or Conference Board, both of which switched to online surveys in the last five years. Standard errors are not applicable to surveys like the building permit survey that do not use probability samples. For construction spending, we report the response rate for private nonresidential construction. For retail sales, we are reporting the response rate for ARTS (the source data). CPI response rate is a weighted average of the C&S and Housing survey response rates. The sample size of price indexes reflects the number of intended price quotes instead of the number of establishments or households.

Source: Bloomberg, Department of Labor, Department of Commerce, Federal Reserve, Institute for Supply Management, S&P Global Market Intelligence, National Association of Realtors (NAR), National Association of Homebuilders (NAHB), University of Michigan, The Conference Board, Goldman Sachs GIR.

Special thanks to GS US economist Ronnie Walker for table, which originally appeared in Issue 142: Data (un)reliability.

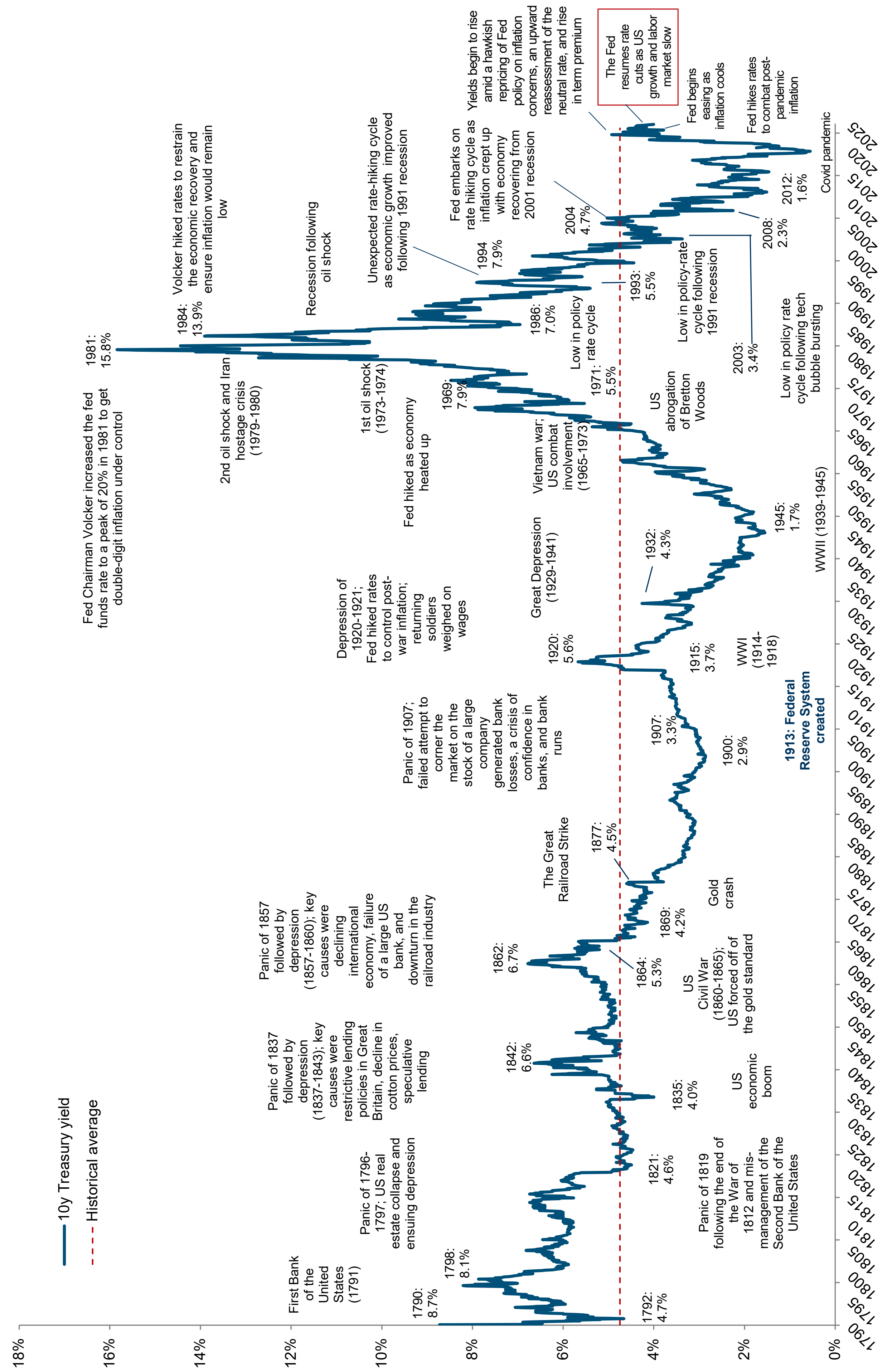
(which, BTW, aren't a new or just US issue)

Country	Agency	Data Release	Issue	Official Quote/Description
US	Bureau of Labor Statistics	Consumer Price Index	Coverage reduction	"To align survey workload with resource levels, BLS suspended data collection for portions of the Consumer Price Index (CPI) sample in select areas across the country starting in April. In April, BLS suspended CPI data collection entirely in Lincoln, NE and Provo, UT. In June, BLS suspended collection entirely in Buffalo, NY. Roughly 15 percent of the sample in the other 72 areas also was suspended from collection, on average. Collection suspension affects both the Commodity and Services Pricing survey and the Housing survey. As a result, the number of collected prices and the number of collected rents used to calculate the CPI has temporarily been reduced."
US	Bureau of Labor Statistics	Current Population Survey Database	Production error	"BLS identified an error in the rounding of median hourly earnings data and associated standard errors in the Current Population Survey database. A total of 162 series were affected. The estimates were rounded to the nearest integer, instead of 2 decimal places (or to the nearest dollar, instead of to the nearest cent). This problem only occurred with the annual averages for 2021."
US	Bureau of Labor Statistics	Current Employment Statistics	Major revisions	"Revisions for May and June were larger than normal. The change in total nonfarm payroll employment for May was revised down by 125,000, from +144,000 to +19,000, and the change for June was revised down by 133,000, from +147,000 to +14,000." (from July Employment Report) "The change in total nonfarm payroll employment for June was revised down by 27,000, from +14,000 to -13,000, and the change for July was revised up by 6,000, from +73,000 to +79,000. With these revisions, employment in June and July combined is 21,000 lower than previously reported." (from August Employment report) "The preliminary estimate of the Current Employment Statistics (CES) national benchmark revision to total nonfarm employment for March 2025 is -911,000 (-0.6 percent)... The annual benchmark revisions over the last 10 years have an absolute average of 0.2 percent of total nonfarm employment." (from Preliminary Benchmark Summary)
US	Census Bureau and Bureau of Labor Statistics	Current Population Survey	Coverage reduction	"The Bureau of Labor Statistics (BLS) and the Census Bureau have paused plans to reduce the Current Population Survey (CPS) sample in January 2025, due to a provision in the recently passed continuing resolution that allows BLS to spend CPS funds at a faster rate. We will continue to monitor the budget situation and will keep the public updated about potential impacts to the CPS sample."
US	University of Michigan	Consumer Survey	Production error	"There was a minor technical error in the generation of the weights used to compute aggregate estimates for January 2025. We have since corrected the weights. Overall, the differences between the estimates originally released and the revised estimates are almost negligible."
UK	Office for National Statistics	Producer Prices Index (PPI) and Construction Price Deflators	Production error	"During work to improve the systems used to create the Producer Price Index (PPI) and the Services Producer Price Indices (SPPI), our quality assurance identified a problem with the chain-linking methods used to calculate these indices... This problem affects the years from 2008 onwards. However, the main impact on annual producer price inflation rates is seen in 2022 and 2023. As a consequence, we are pausing the publication of PPI and SPPI data, which was next due on 26 March, while we rectify this issue. As construction price deflators are partly derived from PPIs and SPPIs, these indices are also affected and publication of them will also be paused. We are planning to recommence publication in the summer and will keep users informed of progress."
UK	Office for National Statistics	UK Labor Survey	Suspended data series	"As we have previously highlighted, falling response rates for household surveys are affecting national statistics institutes internationally. In October 2023, the Office for National Statistics (ONS) suspended publication of the Labour Force Survey (LFS) when its response rates led to increased data uncertainty."
UK	Office for National Statistics	UK Trade Statistics	Production error	"Due to the identification of a further error in UK trade statistics, relating to international trade in services data for 2023, the Office for National Statistics has made the decision to delay the UK Trade: January 2025 release, which was scheduled for Friday March 14." (from the FT)
UK	Office for National Statistics	Consumer Price Inflation	Production error	"An error in car tax data provided by the British government caused the consumer price inflation rate to be overstated by 0.1 percentage points for the year to April [2025]." (from Reuters)
Germany	Destatis	Consumer Spending	Suspended data series	Since May the Federal Statistical Office (Destatis) has not updated time-series data for retail and wholesale sales, as well as revenue from the services sector, hospitality, car dealers, and garages.
Sweden	Statistics Sweden	Unemployment Rate	Production error	In November 2019, Statistics Sweden, which has blamed a subcontractor for the issues, was forced to drastically cut its estimate for unemployment in September. The jobless rate for that month was revised to 6.6% from 7.4%, and the agency has restated nearly all its data since July 2018.
China	National Bureau of Statistics	Broad	Suspended data series	"Land sales measures, foreign investment data and unemployment indicators [including youth unemployment] have gone dark in recent years. Data on cremations and a business confidence index have been cut off. Even official soy sauce production reports are gone. In all, Chinese officials have stopped publishing hundreds of data points once used by researchers and investors." (from WSJ)

Source: BLS, Reuters, WSJ, ONS, FT, UMich, Goldman Sachs GIR.

Special thanks to GS Global Economics research team for table, which originally appeared in Issue 142: Data (un)reliability.

...have led to rising US bond yields



Note: Chart shows monthly averages.
Source: Global Financial Data, Inc., Federal Reserve Board, Haver Analytics, Goldman Sachs GIR.

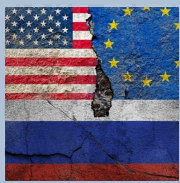
Chart originally appeared in Issue 135: High bond yields: here to stay?

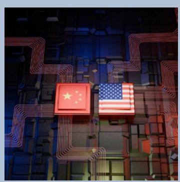
4

*Finally, important **geopolitical developments** continued to take shape,*

As President Trump shook up the post-Cold War security landscape,

With significant implications for the Russia-Ukraine war and European defense,





While the race between the US and China for tech superiority grew even more intense.

Pgs. 35-43

The Russia-Ukraine war...

1990

1991
- >80% of Ukrainians vote for independence from the USSR in Mar 17 nationwide referendum.
- Russian parliament declares Russian independence from the Soviet Union on Dec 12 by adopting the Belovezh Accords, which had been worked out by the leaders of the republics of Russia, Ukraine, and Belarus.

1994
- The US, Russia, and Britain sign the Budapest Memorandum, stating that they will "respect the independence, sovereignty, and the existing borders of Ukraine". In exchange, Ukraine agrees to give up its nuclear weapons.

November 2004
- Orange Revolution begins after reports of widespread vote-rigging in the presidential election won by the Party of Regions candidate Viktor Yanukovych. In **December**, opposition candidate Viktor Yushchenko wins an election runoff.

January 2006
- Russia cuts off all gas supplies passing through Ukrainian territory following a dispute over the price of natural gas and transit costs. Supply is restored a few days later.

January 2009
- Russia again cuts off gas supplies to Ukraine following a pricing dispute. Gas flows are restored three weeks later.

2010
- Viktor Yanukovych wins presidential election; his main rival, Prime Minister Yulia Tymoshenko, is arrested and eventually jailed for abuse of power, an action that Western governments viewed as politically motivated.

2012
- The Nord Stream 1 gas pipeline is completed. It is set to deliver natural gas from Russia to Germany.

2013

November 2013
- Euromaidan protests begin after Yanukovych abandons an agreement to establish closer trade ties with the EU in favor of closer ties with Russia.

2014

February 2014
- Maidan protests escalate following violent suppression by the government, eventually leading Yanukovych to flee Ukraine. Parliament then votes to remove Yanukovych from office.

March 2014
- Russia formally annexes the Crimean peninsula.

April 2014
- The War in Eastern Ukraine begins.

June 2014
- New Ukrainian President Petro Poroshenko signs the Ukraine-EU Association Agreement, describing it as Ukraine's "first but most decisive step" toward EU membership.

July 2014
- A Malaysia Airlines flight (MH17) is shot down by Russian-backed separatists over non-government controlled Ukrainian territory.

September 2014
- The Minsk Protocol is signed in an attempt to end the war in Donbas. It fails to stop fighting in the Donbas, leading to a new package of measures, Minsk II (see Feb 2015).

2015

February 2015
- Poroshenko negotiates a ceasefire with separatist troops in the Donbas region of Ukraine following a summit in Minsk that establishes a protocol for de-escalation that involves a reintegration of Russian-backed separatist regions into Ukraine on terms that would give Russia influence over Ukrainian politics.

March 2015
- Ukrainian Parliament approves a law granting "special status" of local self-governance to Donbas, per the Minsk Protocol.

2016

January 2016
- Ukraine's Deep and Comprehensive Free Trade Area with the EU to modernize its economy, governance, and rule of law in accordance with EU standards and gain access to the European Single Market comes into effect.

2017

March 2017
- Poroshenko halts all trade with the Russian-separatist controlled regions of Donetsk and Luhansk in Eastern Ukraine.

May 2017
- Visa-free travel for Ukrainian citizens to the Schengen Zone goes into effect.

December 2017
- President Trump approves lethal arms sales to Ukraine, going beyond the non-lethal military assistance provided by the Obama Administration.

2018

November 2018
- Russia Federal Security Service coast guard fires upon and captures three Ukrainian navy vessels in the Kerch Strait. The Ukrainian Parliament votes to impose martial law in the country's coastal regions in response.

2019

January 2019
- The leading authority of Orthodox Christianity—the Ecumenical Patriarch of Constantinople—recognizes the independence of the Ukrainian Orthodox Church, thereby formally severing it from the Russian Orthodox Church.

April 2019
- Television comedian Volodymyr Zelensky wins the Ukrainian presidential election.
- Zelensky's party wins a majority of the seats in Parliament two months later.

2020

June 2020
- Ukraine is named a NATO Enhanced Opportunities Partner, granting Ukraine improved access to NATO interoperability programs and exercises.

2021

February 2021
- President Zelensky orders a crackdown on Ukrainian oligarchs, notably the Chairman of pro-Russian political party *Ukrainian Choice* Viktor Medvedchuk, freezing his assets and charging him with treason.

March 2021
- Russian military begins moving large quantities of troops, arms, and equipment into Crimea.
- President Zelensky signs Decree No. 117/2021 approving the "strategy of disoccupation and reintegration of the temporarily occupied territory of the Autonomous Republic of Crimea and the city of Sevastopol".

July 2021
- Putin publishes essay "On the Historical Unity of Russians and Ukrainians".

September 2021
- 80k Russian troops are reported to be stationed at the Ukrainian border.
- Ukraine conducts military exercises with NATO forces, and Russian troops take part in large joint Russia-Belarus military exercises.
- Gazprom completes construction of the Nord Stream 2 pipeline set to deliver natural gas to Germany.

November 2021
- 100k Russian troops are reported to be stationed at the Ukrainian border.
- President Putin warns that NATO expansion into Ukraine would cross a 'red line".

December 2021-January 2022
- President Putin demands a set of security guarantees from the US and NATO. The US delivers written responses rejecting Russia's demand that Ukraine never be accepted into NATO.
- NATO sends ships and fighter jets into Eastern Europe, and US puts thousands of troops on alert.
- US and Western governments warn about the risk of a Russian invasion.

2022

February 2022
- Putin discusses Ukrainian nationhood and recognizes the independence of two Russian-backed territories in Eastern Ukraine, Donetsk and Luhansk, in a televised address, and signs a decree to allow troops to enter the regions for "peacekeeping".
- Early on February 24, Russia launches a full-scale invasion of Ukraine. Zelensky imposes martial law, decrees a full military mobilization against Russia, and signs an official request for Ukraine to join the EU immediately under a special procedure.
- The US, UK, and other countries announce a wave of sanctions and trade restrictions against Russia.

Note: This is not an exhaustive list of all developments in the Russia-Ukraine war.
Source: Council on Foreign Relations, UK House of Commons Library, NY Times, World Economic Forum, various news sources, compiled by Goldman Sachs GIR.

...entered its 4th year...

2022

March 2022
- Russian forces in Ukraine move to tighten siege of key cities; Ukrainian resistance leads to a Russian retreat from Kyiv.
- Russia takes control of southern city of Kherson, with Russian forces also partially occupying Luhansk, Donetsk, Zaporizhzhia.
- Russia bombs a theater in Mariupol, where civilians had been sheltering.
- The International Court of Justice orders Russia to stop its invasion.
- Peace talks occur in Turkey, resulting in the Istanbul Communique, which is ultimately never agreed to.
- The US Congress passes a spending bill that includes $13.6bn in aid for Ukraine.

April 2022
- Russia launches a broad attack in Ukraine's Donbas region.
- The flagship of the Russian Black Sea Fleet, Moskva, is hit by Ukrainian missiles and sinks the following day.
- The UK, EU, and US announce additional sanctions against Russia. The US announces an additional $800mn in military aid to Ukraine.
- The UN General Assembly votes to suspend Russia's membership in the UN Human Rights Council.

May 2022
- Mariupol falls to Russian forces, effectively completing a land bridge to Crimea.
- Sweden and Finland apply to join NATO amid heightened security concerns about Russia.

June 2022
- The EU approves Ukraine's application to become a candidate country.
- Ukraine launches counteroffensive measures against Russia.

July 2022
- Russian energy company Gazprom announces it will reduce gas supplies to Europe through the Nord Stream 1 pipeline by half and later halts flows entirely.
- Russia and Ukraine agree to a deal to re-open Ukraine's Black Sea ports, which the Russian Navy had been blockading.

September 2022
- The Nord Stream natural gas pipelines, which ship gas from Russia to Germany, are damaged by a series of explosions.
- Ukraine widens counteroffensive measures in the northeast of the country near Kyiv.
- Putin signs "accession treaties" to annex four regions in Ukraine that it partially occupies: Zaporizhzhia, Luhansk, Donetsk, and Kherson.

October 2022
- Russia carries out strikes focused on Ukrainian infrastructure, including the power grid and other key energy infrastructure.
- An explosion damages the Crimean Bridge, which Ukraine later claims responsibility for.

November 2022
- Ukraine begins counteroffensive attacks in Kherson. Russian troops are forced to withdraw.

December 2022
- Zelensky visits the US, meeting with President Biden and addressing Congress in an effort to secure further US aid.
- Putin says Russia's war in Ukraine could turn into a "long-term process".

2023

January 2023
- Russia captures Ukrainian town Soledar.

February 2023
- President Biden visits Kyiv to meet with Zelensky before announcing an additional $500mn in aid. The next day, Putin announces that he has suspended the US-Russia nuclear treaty.

March 2023
- The International Criminal Court issues an arrest warrant for Putin.

May 2023
- Russia launches a barrage of strikes on Kyiv in one of the largest drone attacks yet.

June 2023
- The private Russian military company Wagner Group stages an armed uprising against Putin, but the rebellion ultimately ends.

July 2023
- Ukraine attacks the Crimean Bridge, damaging a portion of the bridge.
- Russia withdraws from a deal that allowed Ukraine to export grain across the Black Sea; afterward, Russia launches a series of attacks on Ukrainian port cities, including Odesa, Mykolaiv, and Chornomorsk.
- At the 2023 NATO summit in Vilnius, Lithuania, Ukraine is not extended an invitation to join the Alliance, despite Zelensky's wishes.

November 2023
- Ukrainian Commander-in-Chief Valerii Zaluzhnyi says that Ukraine and Russia "have reached the level of technology that puts us into a stalemate".

December 2023
- Russia launches strikes on Ukraine in what the Ukrainian military calls the "largest strike since the beginning of the full-scale invasion".

2024

February 2024
- Russian forces take control of the city of Avdiivka in eastern Ukraine.

March 2024
- Russia holds presidential elections in which Putin is reelected for a fifth term.

April 2024
- The US approves an additional $61bn in aid to Ukraine.

June 2024
- The US signs a bilateral security commitment with Ukraine.
- The G7 announces $50bn in financial assistance to Ukraine consisting of loans backed by the proceeds from immobilized Russian reserve assets. This represents the single largest source of financing for Ukraine in 2025-26.
- Russia and North Korea sign an agreement to come to each other's aid if either country faces "aggression".

August 2024
- Ukraine launches a surprise incursion into the Russian region of Kursk but is forced to withdraw as Russia deploys over 50,000 troops to counter the attack.

November 2024
- Donald Trump is reelected as the US president. During his campaign, he promises to end the war in Ukraine within 24 hours of assuming office. Zelensky congratulates Trump, saying he looks forward to a "strong" US under his "decisive leadership".
- North Korea sends troops to Russia to help Russian forces.

2025

January 2025
- Trump is inaugurated as president of the United States.
- Trump says it's time to "make a deal" on the Russia-Ukraine war and that without a deal, he may be forced to place further restrictions on Russia.

February 2025
- Trump has a call with Putin; afterwards, Trump says that negotiations to end the Russia-Ukraine war will start "immediately".
- Zelensky says that US-Russia talks are happening "behind Ukraine's back" and "decisions about Ukraine are being made without Ukraine". Trump says he is disappointed by Ukraine's reaction.
- The US votes against a UN General Assembly Resolution condemning Russia's war against Ukraine.
- Trump and Zelensky meet in the White House to discuss a critical minerals deal, but the meeting turns tense and Zelensky leaves without a deal.

March 2025
- Trump halts US military aid to Ukraine as well as intelligence sharing.
- Zelensky says the tense White House meeting with Trump was "regrettable" and that "Ukraine is ready to come to the negotiating table as soon as possible to bring lasting peace closer".
- US-Ukraine talks in Saudi Arabia lead Trump Administration to resume military aid and intelligence sharing. Ukraine also agrees to implement a 30-day ceasefire, contingent on Russia's acceptance; Russia does not agree.
- Trump speaks to Zelensky and Putin on separate phone calls and US and Russian negotiators hold talks in Saudi Arabia.

April 2025
- The defense ministers of 30 nations meet at NATO headquarters to discuss a "coalition of the willing" peacekeeping force.
- US Envoy Steve Witkoff meets Putin twice.
- French President Emmanuel Macron hosts ceasefire talks with senior US, European, and Ukrainian officials.
- Ukraine and Russia swap over 500 POWs.
- Trump and Zelensky have a "very productive" meeting on the sidelines of Pope Francis' funeral.

May 2025
- The leaders of France, the UK, Germany, and Poland meet Zelensky in Kyiv. Plans for a peace settlement are then discussed with Trump.
- Russian and Ukrainian delegations meet in Istanbul for the first direct talks since 2022. Little is accomplished.
- Trump and Putin speak on the phone again, a call Trump says was "excellent", but no ceasefire is reached.

June 2025
- Russian and Ukrainian officials talk again in Istanbul, but no major breakthroughs are made.
- Trump and Putin speak on the phone again.

July 2025
- US Secretary of State Marco Rubio and his Russian counterpart Sergei Lavrov meet on the sidelines of the ASEAN foreign ministers meeting.

August 2025
- Witkoff and Putin meet again in Moscow. Trump calls the meeting "highly productive".
- Trump and Putin meet in Alaska in their first in-person meeting to discuss a resolution to the conflict.
- Trump holds talks with Zelensky at the White House.
- Lavrov says that European proposals to deploy troops to Ukraine post a deal would be unacceptable.

September 2025
- Trump and Zelensky meet in New York, after which Trump says he believes Ukraine can regain all the land lost since 2022.

October 2025
- Trump announces new sanctions on Russia's two largest oil companies.

November 2025
- A 28-point peace plan to end the war, drafted by US and Russian officials, is leaked. The plan is revised after talks between US, Ukrainian, and European officials in Geneva.

December 2025
- Witkoff and Jared Kushner meet Putin and other Russian officials at the Kremlin; no agreement is reached.
- US, Ukrainian, and European officials hold talks in Berlin; the US reportedly offers Ukraine security guarantees.

Note: This is not an exhaustive list of all developments in the Russia-Ukraine war.
Source: Council on Foreign Relations, UK House of Commons Library, NY Times, World Economic Forum, various news sources, compiled by Goldman Sachs GIR.

Timeline originally appeared in Issue 137: Europe's shifting security landscape.

...with little progress in sight...

"The so-called civilized world, of which our Western colleagues have self-appointed themselves the only representatives, prefers not to notice [the situation in the Donbas] as if there isn't a genocide through which nearly four million people are being put through, all simply because these people did not agree to the Western coup of Ukraine in 2014."

- Address by President Putin, February 2022

"When some propose alternatives, half-hearted settlement plans—so-called sets of principles—it not only ignores the interests and suffering of Ukrainians, who are affected by the war the most, it not only ignores reality, but also gives Putin the political space to continue the war and pressure the world to bring more nations under control. Any parallel or alternative attempts to seek peace are, in fact, efforts to achieve a lull instead of an end to the war, as a global initiative—the Peace Formula—has already existed for two years. And maybe somebody wants a Nobel Prize for their political biography for frozen truce instead of real peace, but the only prizes Putin will give you in return are more suffering and disasters."

- President Zelensky UN General Assembly Speech, September 2024

"I just had a lengthy and highly productive phone call with President Vladimir Putin of Russia... as we both agreed, we want to stop the millions of deaths taking place in the War with Russia/Ukraine... We agreed to work together, very closely, including visiting each other's Nations. We have also agreed to have our respective teams start negotiations immediately, and we will begin by calling President Zelenskyy, of Ukraine, to inform him of the conversation..."

- President Trump Truth Social post, February 2025

"What happened at the White House on Friday [February 28], of course, demonstrated how difficult it will be to reach a settlement trajectory around Ukraine. The Kyiv regime and Zelensky do not want peace. They want the war to continue."

- Remarks by Kremlin spokesman Dmitry Peskov, March 2025

"We are ready to work fast to end the war, and the first stages could be the release of prisoners and truce in the sky—ban on missiles, long-ranged drones, bombs on energy and other civilian infrastructure—and truce in the sea immediately, if Russia will do the same. Then we want to move very fast through all next stages and to work with the US to agree a strong final deal."

- President Zelensky social media post and letter to President Trump, March 2025

"I appreciate that [Zelensky] sent this letter, just got it a little while ago. Simultaneously, we've had serious discussions with Russia and have received strong signals that they are ready for peace."

- President Trump's speech to Congress, March 2025

"We will categorically not tolerate such actions. Again, I want to emphasize that this would not be a so-called hybrid involvement but direct, official and undisguised participation of NATO countries in a war against the Russian Federation..."

- Remarks by Russian Foreign Minister Sergei Lavrov regarding the deployment of European troops in Ukraine, March 2025

"Today we made an offer which the Ukrainians have accepted, which is to enter into a ceasefire and into immediate negotiations to end this conflict in a way that's enduring and sustainable and accounts for their interests, their security, their ability to prosper as a nation... We will take this offer now to the Russians and we hope that they'll say 'yes,' that they'll say 'yes' to peace. The ball is now in their court."

- Remarks by Secretary of State Marco Rubio following US-Ukraine talks in Saudi Arabia, March 2025

Source: Truth Social, X, various speeches, interviews, and texts, compiled by Goldman Sachs GIR.

Exhibit originally appeared in Issue 137: Europe's shifting security landscape.

...as leaders remain far apart

"I am not happy with the Russian strikes on KYIV. Not necessary, and very bad timing. Vladimir, STOP! 5000 soldiers a week are dying. Lets get the Peace Deal DONE!"

- President Trump Truth Social post, April 2025

"I have said many times that I consider the Russian and Ukrainian peoples to be one people. In this sense, all of Ukraine is ours... We have an old rule. Wherever a Russian soldier sets foot is ours."

- Remarks by President Putin during St. Petersburg International Economic Forum, June 2025

"There's no deal until there's a deal."

- Remarks by President Trump following the Alaska summit, August 2025

"After getting to know and fully understand the Ukraine/Russia Military and Economic situation and, after seeing the Economic trouble it is causing Russia, I think Ukraine, with the support of the European Union, is in a position to fight and WIN all of Ukraine back in its original form."

- President Trump Truth Social post, September 2025

"This is one of the most difficult moments in our history... Currently, the pressure on Ukraine is one of the hardest. Ukraine may now face a very difficult choice, either losing its dignity or the risk of losing a key partner."

- Remarks by President Zelensky regarding the 28-point US peace plan proposal, November 2025

"We firmly believe security decisions about Ukraine must include Ukraine—that was our position in Geneva and always... We all believe that people should decide their own future, and this is, in particular, what sets us apart from regimes like the one in Moscow."

- Address by President Zelensky to participants of the Coalition of the Willing meeting, November 2025

"We are clear on the principle that borders must not be changed by force. We are also concerned by the proposed limitations on Ukraine's armed forces, which would leave Ukraine vulnerable to future attack. We reiterate that the implementation of elements relating to the European Union and relating to NATO would need the consent of EU and NATO members respectively."

- Statement on Ukraine adopted by several European leaders and the PMs of Canada, Japan, and the UK, November 2025

"Ukraine is prepared for any possible developments, and of course we will work as constructively as possible with all our partners to ensure that peace is achieved—and that it is, after all, a dignified peace. Only a dignified peace provides real security, and we fully understand that this requires—and will continue to require—the support of our partners."

- President Zelensky speech, December 2025

"We want peace. Why aren't we immediately signing a peace deal?"

- Remarks by Kremlin spokesman Dmitry Peskov, December 2025

"It all comes down to this. Either we liberate these territories by force of arms, or Ukrainian troops leave these territories and stop fighting there."

- Remarks by President Putin in an interview with India Today, December 2025

"[Zelensky] is gonna have to get on the ball and start accepting things. You know, when you're losing, cause he's losing... you certainly wouldn't say it's a victory. I could show you a chart. It's a lot of land they lost."

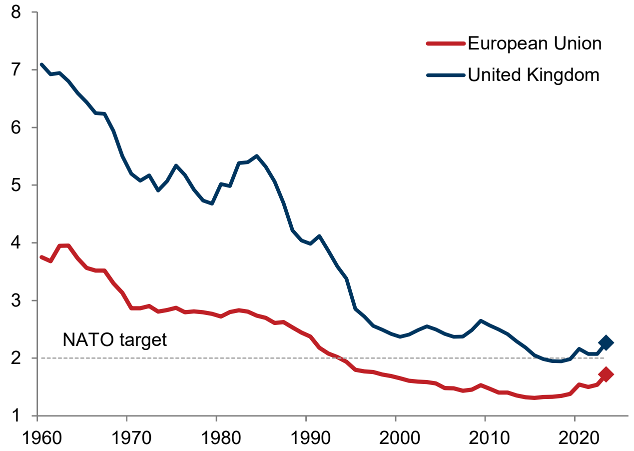
- Remarks by President Trump in an interview with Politico, December 2025

Source: Truth Social, X, various speeches, interviews, and texts, compiled by Goldman Sachs GIR.

So, Europe turns to building defense…

Defense spending in Europe has fallen as a share of GDP since the 1960s, reaching the lowest level in the last decade, but it began to rise in 2022 following Russia's invasion of Ukraine

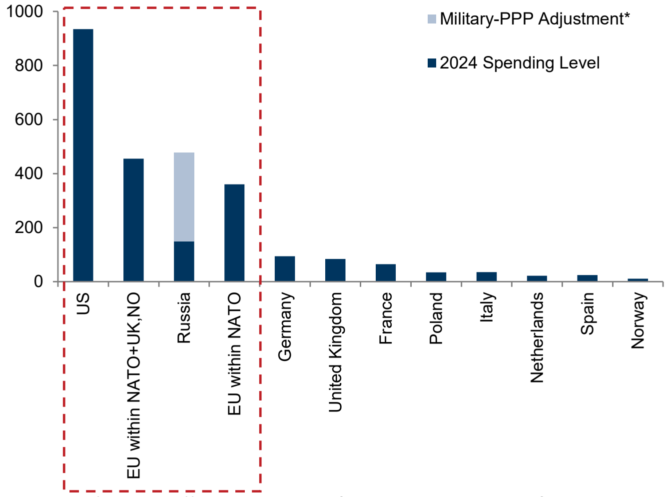
Military expenditure, % of GDP



Source: World Bank, Goldman Sachs GIR.

The US significantly outspends Europe on defense, though Europe spends on par with Russia in PPP-adjusted terms

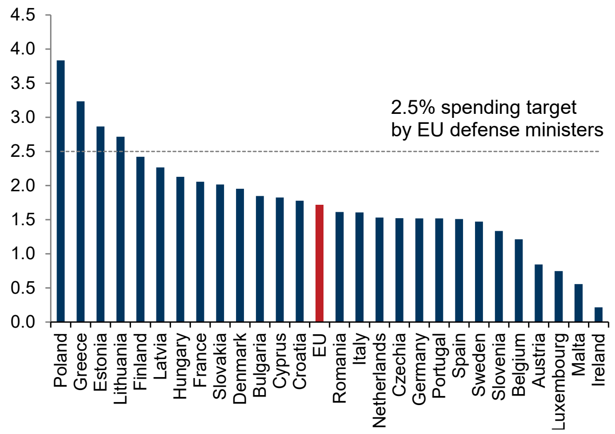
Absolute military spending levels, $bn



**Adjusted for price differential vs. the US (Robertson, 2021 and SIPRI).*
Source: SIPRI, NATO, Robertson (2021), Goldman Sachs GIR.

Only a few EU countries exceed the 2.5% of GDP defense spending target focused on by EU defense ministers

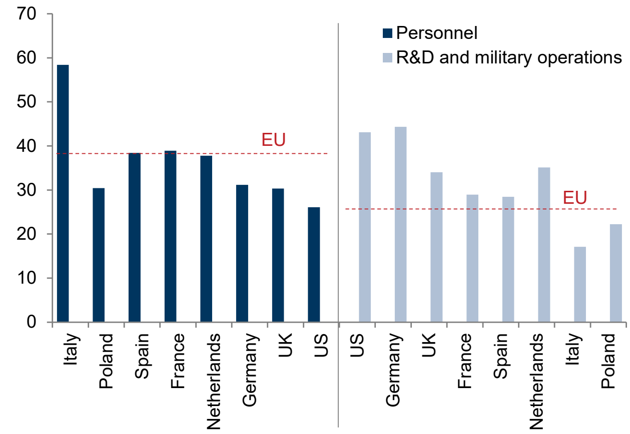
Defense spending by EU countries in 2023, % of GDP



Source: World Bank, Goldman Sachs GIR.

European defense expenditure remains structurally and technologically outdated, overfunding personnel instead of investing in research and operations…

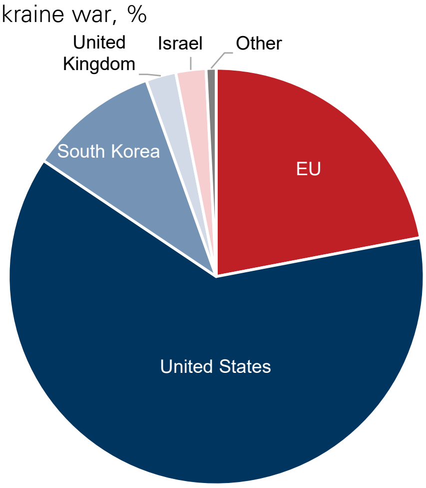
Defense expenditure composition, %



Source: Haver Analytics, Goldman Sachs GIR.

…and Europe imports a large share of the military equipment it spends money on

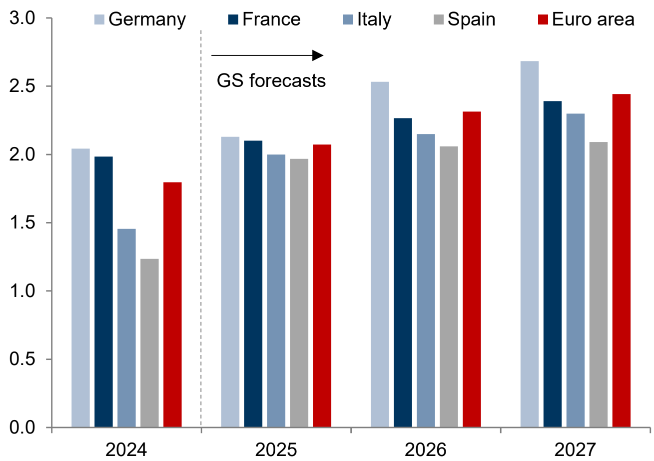
Import share of equipment sourced in the EU since the start of Russia-Ukraine war, %



Note: Based on value of defense acquisitions announced by EU countries from the start of the Russia-Ukraine war to June 2023.
Source: Institut de Relations Internationals, Goldman Sachs GIR.

However, increased urgency for greater European defense expenditure suggests more spending ahead; we forecast EU military spending of around 2.5% of GDP by 2027

Military expenditure, % of GDP



Source: NATO, Goldman Sachs GIR.

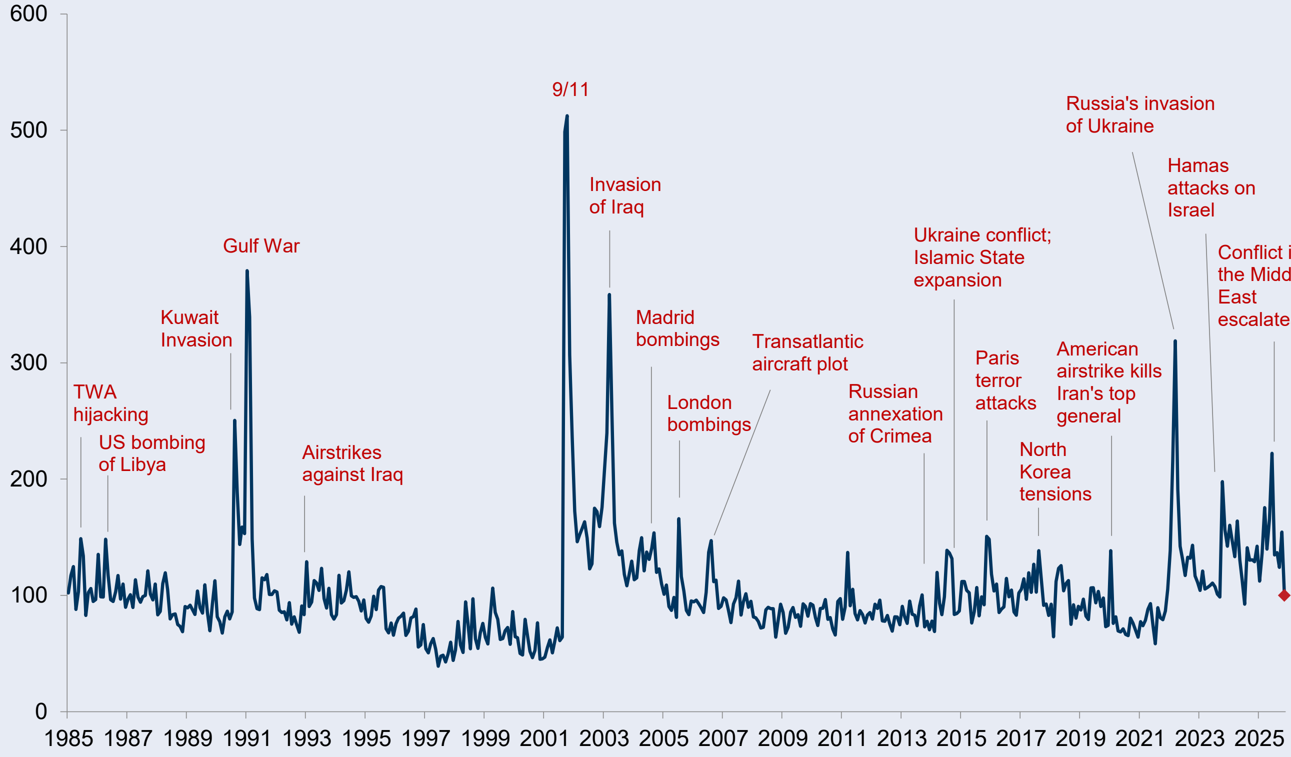
Special thanks to the GS European Economics research team for charts, which originally appeared in Issue 137: Europe's shifting security landscape.

...amid still-elevated geopolitical risk

Geopolitical tensions, which take many different forms, are difficult to measure. One proxy for assessing the geopolitical environment is the news-based Geopolitical Risk Index developed by economists from the Federal Reserve Board.

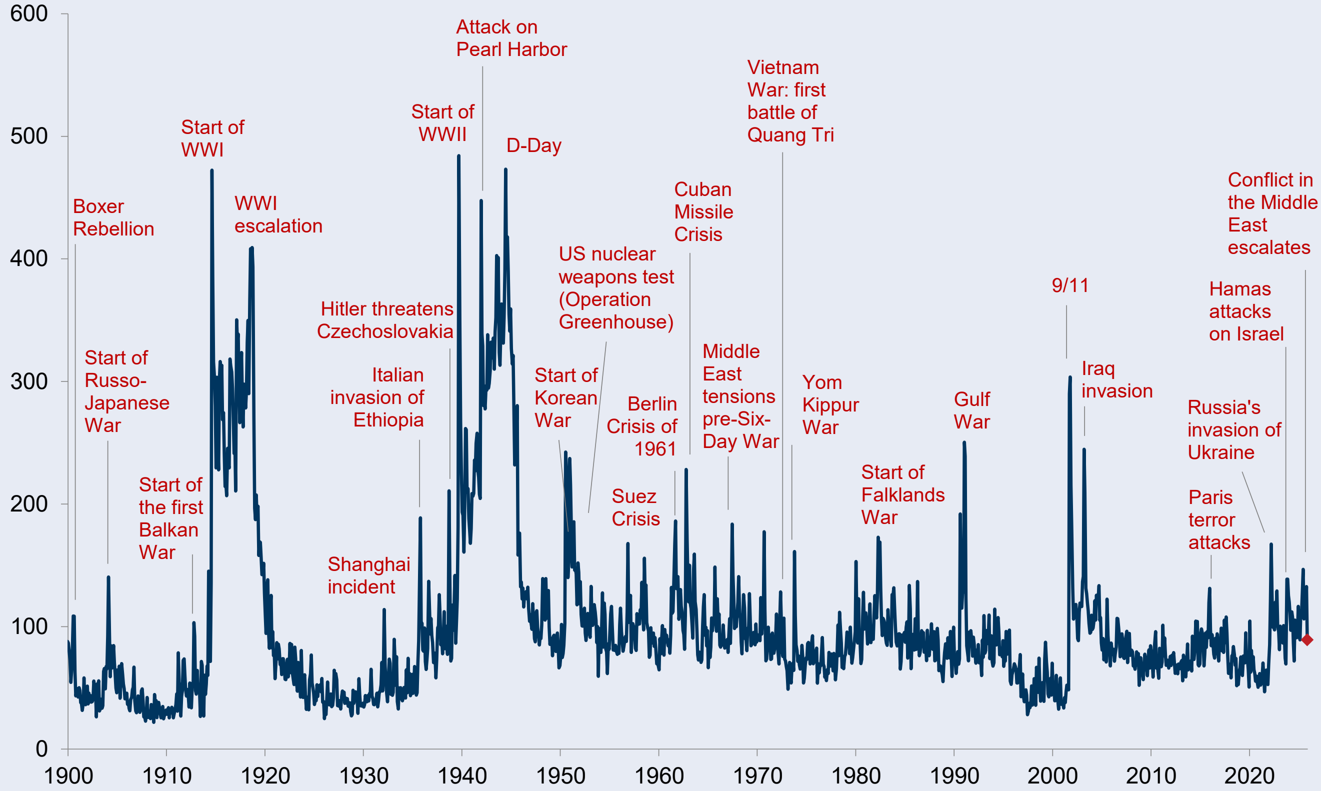
1985-Present

Geopolitical Risk Index, 1900-2019=100



1900-Present

Geopolitical Risk Index, 1985-2019=100



Note: The index from 1985 on counts the number of articles in 11 US, UK, and Canadian newspapers mentioning phrases related to geopolitical tensions. The index from 1900 on performs the same analysis using the archives of three newspapers: the New York Times, the Wall Street Journal, and the Financial Times. The choice of newspapers for both indices implies a measure of geopolitical risk as covered by the Anglo-Saxon press. See here for more information.

Source: Dario Caldara and Matteo Iacoviello, Federal Reserve Board, Goldman Sachs GIR.

Charts originally appeared in Issue 137: Europe's shifting security landscape.

And the US-China tech race intensified...

2018

March 2018 – The US claims that China has conducted unfair trade practices related to technology, intellectual property, and innovation. The US applies 25% tariffs on ~$50bn of Chinese goods, including semiconductors and electronics.

April 2018 – The US bans the sale of components to Chinese tech company ZTE.

August 2018 – The US extends tariffs to an additional $200bn worth of Chinese goods, including a wider range of electronic components and goods.

2019

May 2019 – The US bans the sale of components to Chinese tech company Huawei, though with some exemptions.

June 2019 – China launches a science and technology innovation board to facilitate the financing of high-tech manufacturing companies.

October 2019 – China launches its "Big Fund" Phase II, a government-led investment fund aimed at bolstering the country's semiconductor industry.

2020

January 2020 – As part of the Phase One trade deal, China commits to increase purchases of US goods and services, limit technology transfers, and improve IP enforcement.

May 2020 – The Chinese government grants semiconductor fab SMIC $2.25bn to build new chip capacity.

August 2020 – The Chinese government vows to increase the self-sufficiency rate of semiconductors to 70% in 2025 from 30% in 2019.

November 2020 – The US makes a $9.6mn contribution to MP Materials efforts to build separation capacity for light rare earths to its California extraction operations site—the US' only rare earth extraction operation.

2021

February 2021 – The US awards Lynas $30.4mn to develop domestic separation capabilities for light rare earths.

March 2021 – China releases its 14th Five-Year Plan which prioritizes technological self-sufficiency, with a focus on key industries including the semiconductor industry.

June 2021 – Biden expands Trump-era ban on US investment into Chinese firms with ties to defense or surveillance technology sectors.

February 2022 – The DoD grants $35mn to MP Materials to separate and process heavy rare earths , creating a full value chain operation, from extraction to manufacturing magnets at a single facility.

2022

August 2022 – The US passes the CHIPS Act, which blocks certain chip exports to China.

October 2022 – The US announces restrictions on exports of advanced computing chips and related equipment to China.

December 2022 – The US blacklists 36 Chinese companies, including advanced chip producers, restricting their use of US semiconductor manufacturing tech.

December 2022 – China announces a support package for its domestic semiconductor industry to counter heightened US chip restrictions.

2023

March 2023 – China launches cybersecurity review of imports from US memory-chip maker Micron and later bans sales of Micron chips.

July 2023 – China announces new restrictions on gallium and germanium exports.

October 2023 – China imposes export restrictions on certain types of natural graphite.

October 2023 – The US tightens restrictions on the sale of chips that Nvidia designed for the Chinese market.

December 2023 – China announces a ban on rare earth extraction and separation technologies.

March 2024 – The DoD establishes a goal to develop a complete 'mine-to-magnet' supply chain for rare earth materials that can meet all US defense needs by 2027.

2024

August 2024 – China announces new export controls on critical raw materials including antimony and superhard materials.

December 2024 – China bans exports of gallium, germanium, antimony, and superhard materials to the US.

January 2025 – The Biden Administration establishes the AI Diffusion Rule which limits the export and use of US chip technologies based on a multi-tiered system.

April 2025 – China implements export controls on several rare earth elements and magnets used in the defense, energy, and auto sectors in response to US tariffs.

2025

May 2025 – The Trump Administration rescinds the AI Diffusion Rule but warns against the use of Chinese tech.

July 2025 – The DoD announces a deal with MP Materials that includes an offtake commitment and a price floor.

October 2025 – The US announces a 100% tariff on China and additional export controls in response to China's rare earth export controls, but later agrees to loosen restriction after Trump-Xi talks.

October 2025 – China expands rare earths export controls, which are later suspended as part of a broader US-China deal. China's 15th Five-Year Plan proposal includes a focus on developing "chokehold technologies" including chips.

December 2025 – Trump says he will allow Nvidia to sell H200 chips to China with 25% of the revenue going to the US government.

Note: not an exhaustive list of all US and Chinese policy developments.
Source: Center for Strategic and International Studies, White House, USTR, Peterson Institute for International Economics, various news sources, Goldman Sachs GIR.
Timeline originally appeared in Issue 144: The US-China tech race.

...amid a push for semiconductor and...

What are semiconductors, and who makes them?

Semiconductors are also known as **microchips or chips**. A microchip is a set of electronic circuits layered on a thin wafer of semiconductor material, typically silicon. Transistors located on the chip act as miniature electrical switches that can turn a current on or off. The more transistors that are located on a chip, the more the chip can do. The size of a microchip and the number of transistors on it varies; a microchip the size of a human fingernail can contain billions of transistors.

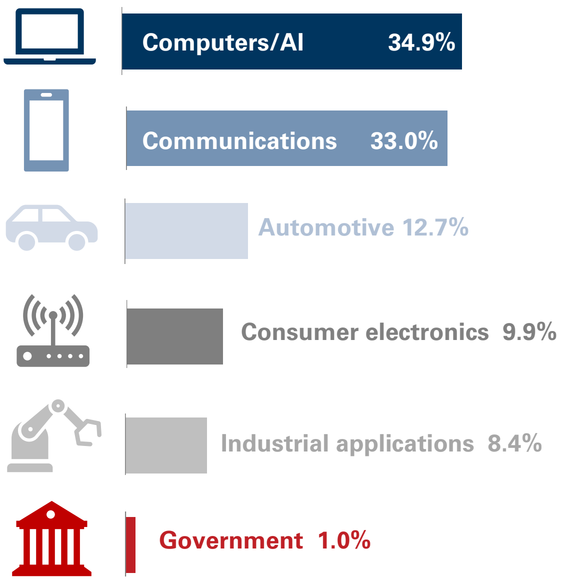
There are three main types of microchip companies: **Integrated Device Manufacturers (IDMs)** (Intel, Samsung), who design and manufacture chips in-house, **Fabless companies** (Nvidia, AMD), who design chips in-house but outsource manufacturing, and **Foundries** (TSMC, GlobalFoundries), who manufacture chips for fabless companies as well as for IDMs who don't have sufficient in-house capacity.

What do semiconductors do?

Semiconductors are the building blocks of technology, and are central inputs in many devices, including cars, computers, smartphones, and medical devices. There are three main types of chips: logic chips, memory chips, and Discrete, Analog, and Other (DAO) chips. Logic chips are the 'brains' of electronics. They process information in order to complete tasks. Central processing units (CPUs) are built for general functionality, graphics processing units (GPUs) are optimized for visual displays, and neural processing units (NPUs) are designed for machine learning applications. Memory chips store information. DRAM chips save data when a device is turned on, while NAND chips save data after a device is turned off. DAO chips transmit, receive, and transform information dealing with continuous parameters, like temperature.

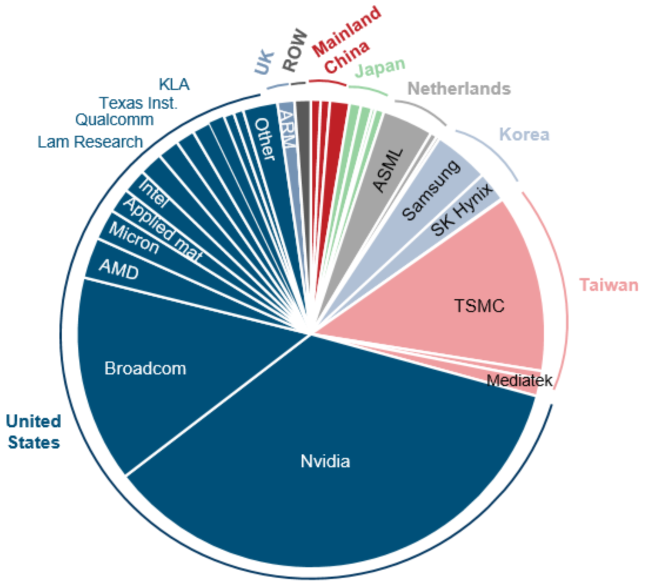
How are semiconductors used?

Global demand share by end use, 2024



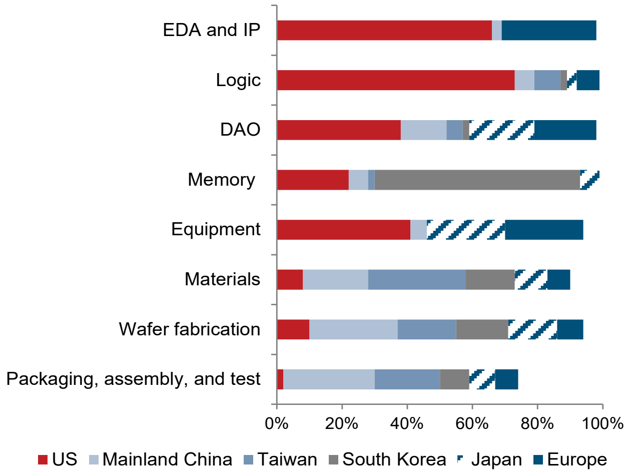
Who are key competitors in the chip industry?

Global semiconductor companies by market cap



What in the supply chain does each region specialize in?

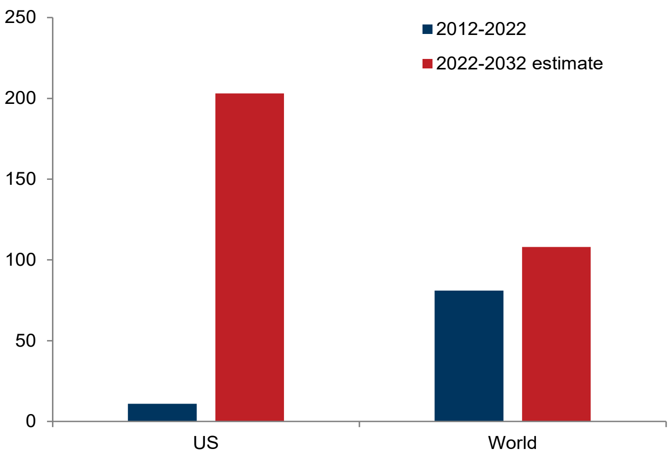
Semiconductor value added by activity and region, 2024, %



Note: DAO is discrete, analog, other; EDA is electronic design automation.

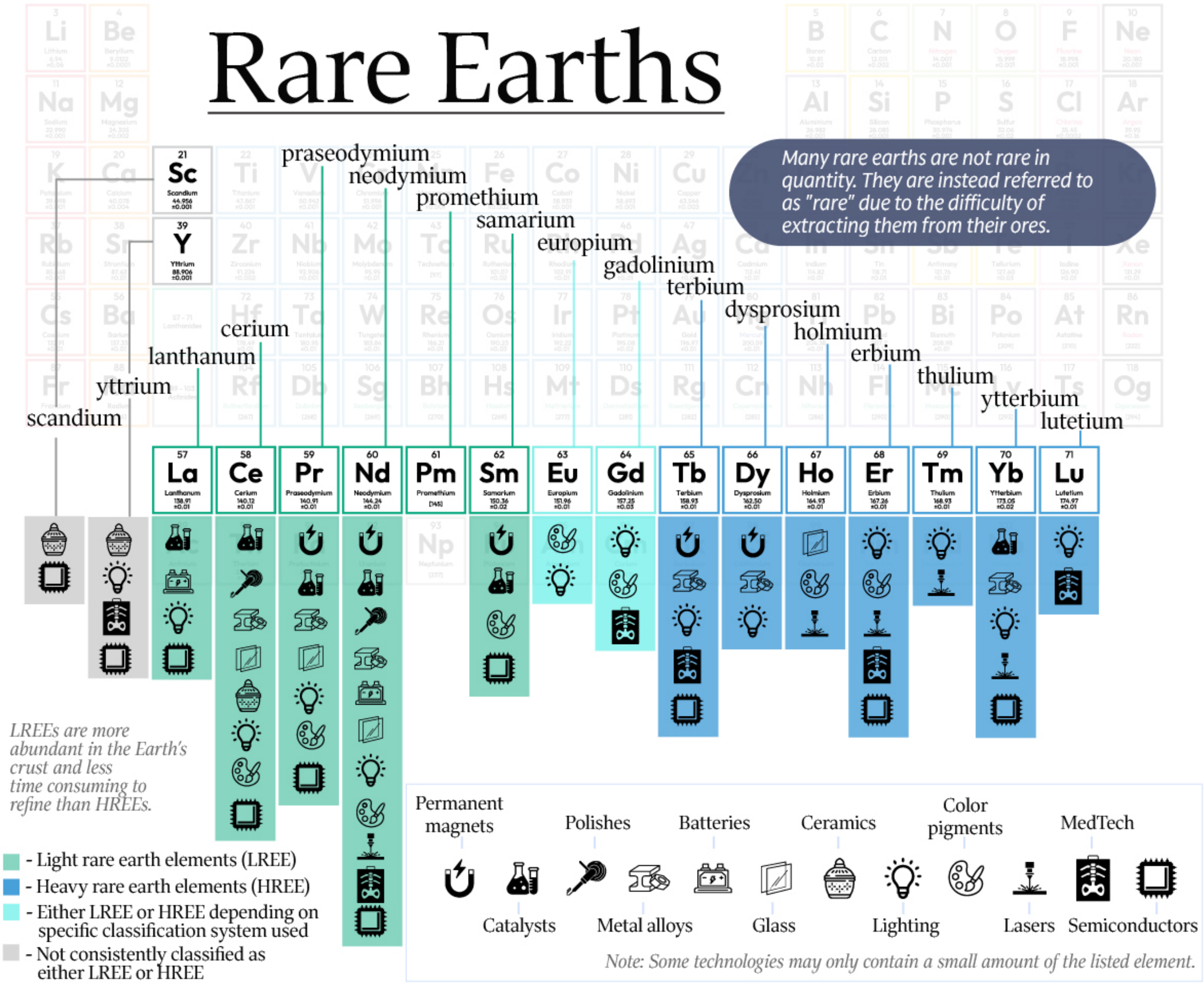
Where is chip-making investment concentrated and how could it evolve?

Projected increase in US fab capacity vs. world avg., % chg.

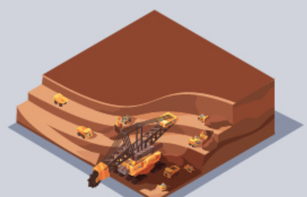


Source: Semiconductor Industry Association, BCG, government websites, various news sources, companiesmarketcap.com, Goldman Sachs GIR.
Charts originally appeared in Issue 144: The US-China tech race.

...rare earth self-sufficiency



The rare earth supply chain, at a glance



Mining

Rare earth elements are mined from the ground. These elements are found in various ore deposits. The mining method depends on the type of deposit. Methods include open-pit mining, underground mining, and in-situ leaching.

China has the largest share of global rare earth reserves (49%). This includes both light and heavy rare earths, with known HREE reserves extremely scarce outside of China and Myanmar. China also dominates global rare earth mining (69%). Other countries with significant rare earth reserves/mining are:

- Brazil (23% and 0%)*
- India (8% and 1%)
- Australia (6% and 3%)
- US (2% and 12%)

Processing and Refining

Following mining, the extracted ore undergoes several stages of processing. These include crushing and grinding (the raw ore is crushed and ground into small particles), beneficiation (which separates the rare earths minerals from other waste minerals), and extraction and separation (chemical treatments are used to extract the individual rare earths from concentrate).

China also dominates global rare earths refining (92%), particularly in heavy rare earths, with Chinese refineries producing the vast majority of the world's supply of dysprosium and terbium metals. Lynas, an Australian company with operations in Malaysia, is one of the only other major players at this stage of the supply chain, accounting for 4% of global refined production. The US accounts for only 1%.

Manufacturing of products

The separated oxides are converted into rare earth metals and, in turn, alloys. These alloys are used to create powerful magnets known as permanent magnets, which are a key component of various technologies.

China is the world's largest supplier of permanent magnets, which are critical in many technologies. China accounts for 98% of magnet manufacturing.

** Figures in parentheticals represent the share of reserves and mining, respectively.*

Source: IEA, Rareearths.com, Federal Register, various news sources, Goldman Sachs GIR.

Exhibit originally appeared in [Issue 144: The US-China tech race](#).

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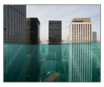
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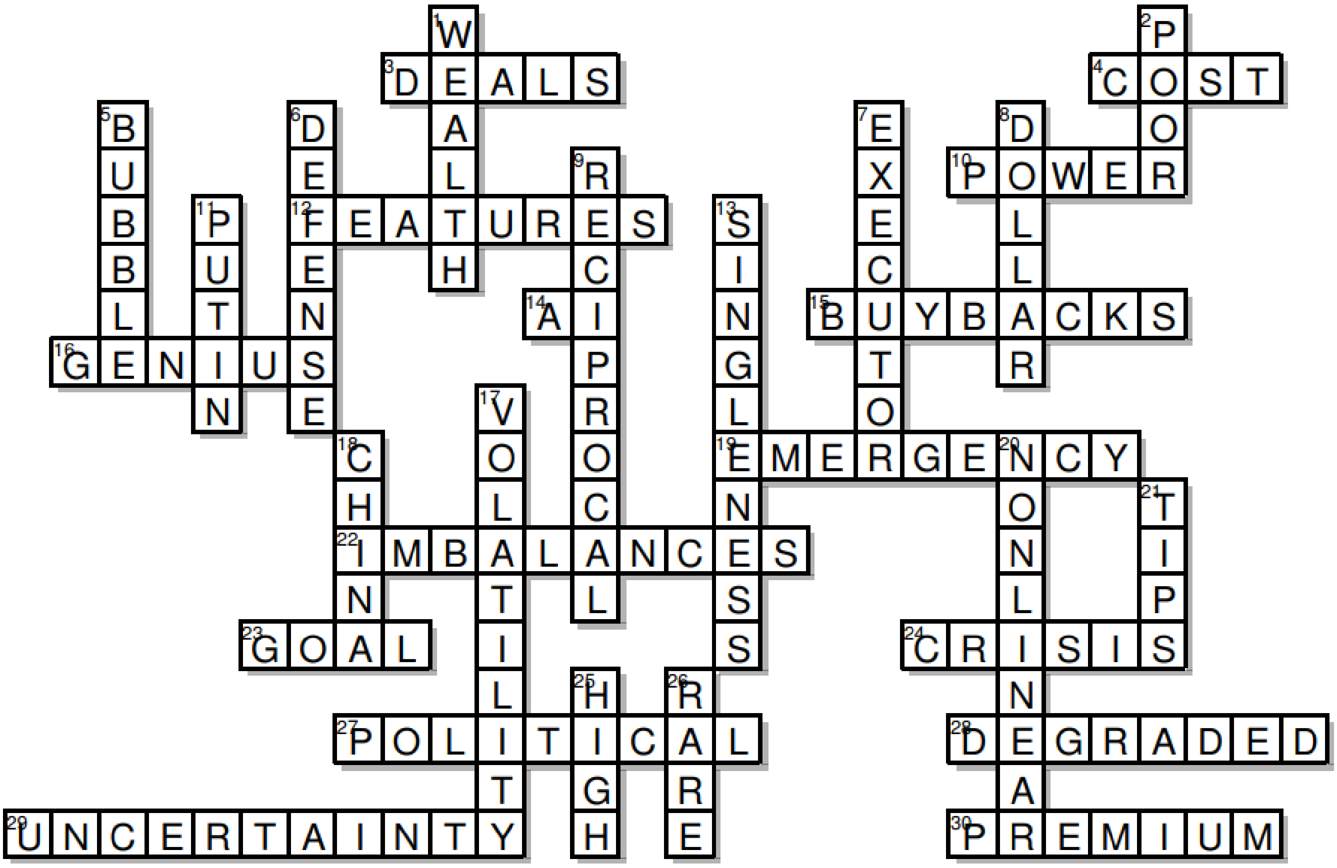
Puzzle solutions

Crossword from pg. 3 of this report:



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For more, see our CAI page and Global Economics Comment: Technical Updates to Our Global CAIs.

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For more, see our GSDEER page, Global Economics Paper No. 227: Finding Fair Value in EM FX, 26 January 2016, and Global Markets Analyst: A Look at Valuation Across G10 FX, 29 June 2017.

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For more, see our FCI page, Global Economics Analyst: Our New G10 Financial Conditions Indices, 20 April 2017, and Global Economics Analyst: Tracking EM Financial Conditions – Our New FCIs, 6 October 2017.

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Reg AC

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