Financial Times 번역요약본 (‘25. 9/11)

1. Homegrown robots help drive China’s global export surge : 중국산 로봇, 글로벌 수출 급증을 견인하다 (‘25. 9/2)

- 중국 공장들은 매년 약 28만대의 로봇을 설치하고 있는데, 이는 전 세계 총 설치량의 절반에 해당하며 독일을 제치고 한국에 근접하는 수준의 로봇-노동자 밀집도를 달성함. 중국의 자국산 로봇 제조업체들이 저비용 자동화 물결을 주도하고 있으며 이는 현지 공장이 더 많은 상품을 더 낮은 가격에 생산할 수 있게 해주며, 그 결과 중국은 노동집약적 제품을 포함한 다양한 품목에서 수출 점유율을 늘려가고 있음. 경제학자들은 이러한 공격적 자동화가 중국이 임금 상승에도 불구하고 전형적인 개발 경로와 달리 저부가자치 제조업을 계속 유지할 수 있는 배경이라고 봄.

2. Why memory chips are the new frontier of the AI revolution : 왜 메모리 반도체가 AI 혁명의 새로운 전장이 되었는가 (‘25. 9/3)

- SK 하이닉스의 거대한 M14 반도체 공장에서는 흰색, 분홍색, 파란색의 클린룸 복장을 한 직원들이 기계들을 점검하고 700여대의 로봇이 천장 레일을 따라 실리콘 웨이퍼를 공정 단계별로 빠르게 나르고 있음. 이천 본사 캠퍼스에 위치한 이 공장은 초당 장편 영화 200편 분량의 데이터를 전송할 수 있는 고대역폭 메모리 (HBM) 칩을 생산함. 수십 년 동안 메모리 반도체는 반도체 산업의 변방에 머물러 있었으며, AMD, 퀄컴, 엔비디아, TSMC 같은 기업이 설계, 제조한 프로세서 칩이 계산을 수행하고 전자기기의 두뇌 역할을 하면서, 메모리 칩은 빛을 받지 못하는 조연에 불과했음. 그러나 이천 공장에서 생산되는 HBM3E와 같은 차세대 설계는 메모리 산업의 판도를 뒤흔들고 있으며, HBM은 대규모 언어모델 개발자들이 직면한 ’메모리 장벽‘ 문제, 즉 데이터 저장과 처리 한계로 인한 성능 저하를 극

복하게 해줄 뿐 아니라, 전 세계적으로 건설 중인 수천 개 데이터센터의 효율성을 높이고 비용을 낮추고 있음. AI에 있어 메모리의 중요성이 커지면서, 메모리 산업은 미중 기술 패권 경쟁의 중심에 섰고, 미국은 중국의 첨단 기술 접근을 막고 있으며, 중국은 자국 반도체 산업을 육성해 글로벌 경쟁에 맞서려 하고 있음.

3. BMW to unveil 'superbrain' EVs in bid to challenge Chinese rivals : BMW '슈퍼브레인' 전기차 공개, 중국 경쟁자에 도전 ('25. 9/3)

- BMW는 '슈퍼브레인'으로 구동되는 소프트웨어 중심 전기차에 승부수를 던지며, 전통 완성차 업체 중 가장 야심찬 시도로 중국 경쟁사들과 테슬라에 맞서고 있음. BMW의 iX3 SUV는 뮌헨 모터쇼에 앞서 공개되며, 중장 집중식 컴퓨터 시스템이 하드웨어를 대체하는 핵심 요소가 되는 '소프트웨어 정의 차량 (SDV)'중 하나로 전시될 예정. 노이에 클라세 (Neue Klasse) 플랫폼에서 처음 개발되는 모델이 될 예정이며, 앞으로 2년 동안 40개 이상의 신모델과 모델 업데이트가 이어지면서 BMW는 자동차 설계, 제작, 판매 방식을 근본적으로 바꿀 예정임. BMW는 이 기술이 현재 차량 대비 20배 이상의 컴퓨팅 성능을 제공하고, 차량 전자장치의 복잡성을 대폭 줄일 것이라고 밝힘.

4. Is the US already in a recession? : 미국은 이미 경기침체에 들어섰나? ('25. 9/7)

- 미국 경제가 경기침체에 진입했는지를 두고 논쟁이 뜨거움. 흔히 알려진 단순한 정의는 '2분기 연속 마이너스 성장'이지만, 미국은 이를 더 정교하게 판단하며, 민간 비영리기관인 '전미경제연구소 (NBER)'가 경제 전반의 동반적 하락 여부를 기준으로 판정함. NBER에 따르면, 경기침체는 경제 전반에서 몇 개월 이상 지속되는 실질적인 경기활동 위축이며, NBER이 주로 보는 6대 지표 (개인소

득, 고용, 제조 및 무역 판매, 개인 소비, 산업생산, 가계 고용)는 5월에 이미 수축 국면에 있거나 근접했음. 미국의 방대한 경제 규모 속에서 일부 지역과 산업은 침체를 겪는 반면 다른 부분은 성장세를 유지하고 있으며, 미국이 전체적 침체를 피하고 있는 주된 요인은, 캘리포니아, 텍사스, 뉴욕 등 일부 주의 안정세 유지, 데이터센터 건설 붐과 AI 투자 확대 등 인공지능 산업, 고용 창출의 중심축인 헬스케어 분야와 주식시장의 상승에 따른 부유층의 소비 등임. 미국이 경기침체인지 여부는 결국 기술적 판단의 문제일 뿐이며, 이미 상당수 산업과 지역은 침체를 겪고 있으며, 나머지는 AI, 헬스케어, 부유층 소비라는 좁은 동력이 경제를 버티고 있음.

5. Online travel platforms prepare for rise of artificial intelligence 'agents' : 온라인 여행 플랫폼, 인공지능 '에이전트' 시대에 대비하다 ('25. 9/9)

- AI 에이전트는 사용자의 선호를 바탕으로 자동으로 여행 일정을 짜고 예약까지 진행할 수 있는 자율형 봇이며, 이는 1조 6천억 달러 규모의 글로벌 여행 시장에 큰 변화를 가져올 수 있으며, 호텔, 항공사가 소비자와 직접 연결될 수 있도록 해 기존 온라인 여행사(OTA)의 비즈니스 모델을 위협함. 세계 최대 온라인 예약 플랫폼들이 인공지능 '에이전트'의 도래에 대비해 OpenAI와 같은 기업들과 파트너십을 맺으며, 고객이 기존 플랫폼을 거치지 않고도 여행을 직접 예약할 수 있게 만드는 기술에 대응하고 있음. Booking.com과 Expedia는 OpenAI 모델을 활용한 새로운 AI 기반 기능을 도입하고 있으며, 자동화된 서비스와 여행 일정 플래너 같은 신도구를 선보이고 있으며, Airbnb는 고객 문의를 처리하는 AI 기반 고객 서비스 에이전트를 도입했으며 내년에는 보다 '에이전트화 (agentic)' 기능을 플랫폼에 추가할 계획임.

Robotics

Homegrown robots help drive China's global export surge

Economists say cheaper automation could explain why country maintains low-end manufacturing even as wages rise

Chinese factories are installing about 280,000 industrial robots every year, or half the global total © Lintao Zhang/Getty Images

Ryan McMorrow in Chengdu, **Haohsiang Ko** in Hong Kong and **William Langley** in Guangzhou

Published SEP 2 2025

China's homegrown robot makers are driving a wave of low-cost automation that is helping local factories churn out more goods at lower prices, allowing the country to increase its share of exports, even in labour-intensive products.

President Xi Jinping's Made in China 2025 plan and other government initiatives have pushed to build up domestic robot makers and pump investment and credit into manufacturing.

Chinese factories are installing about 280,000 industrial robots every year, or half the global total, bringing the country's robot-to-worker density ahead of Germany and closing in on leader South Korea, according to the International Federation of Robotics.

Data from Chinese research group MIR Databank shows that about half of those robots are made by domestic groups such as Chengdu CRP Robot Technology, which has won local customers by undercutting global rivals on price.

"Not everyone needs an Audi A8. For many scenarios our functionality and stability will suffice," said CRP's chief Li Liangjun. His welding robots sell for about 60 per cent of the price of Japanese rivals Yaskawa and Fanuc, and those from ABB and Kuka.

PLAY | 00:40

CRP robots weld parts at Shuangsheng New Energy Vehicle factory in Chengdu © Ryan McMorrow

Economists believe aggressive automation may help explain why China has defied the typical development trajectory of losing low-end manufacturing as wages rise.

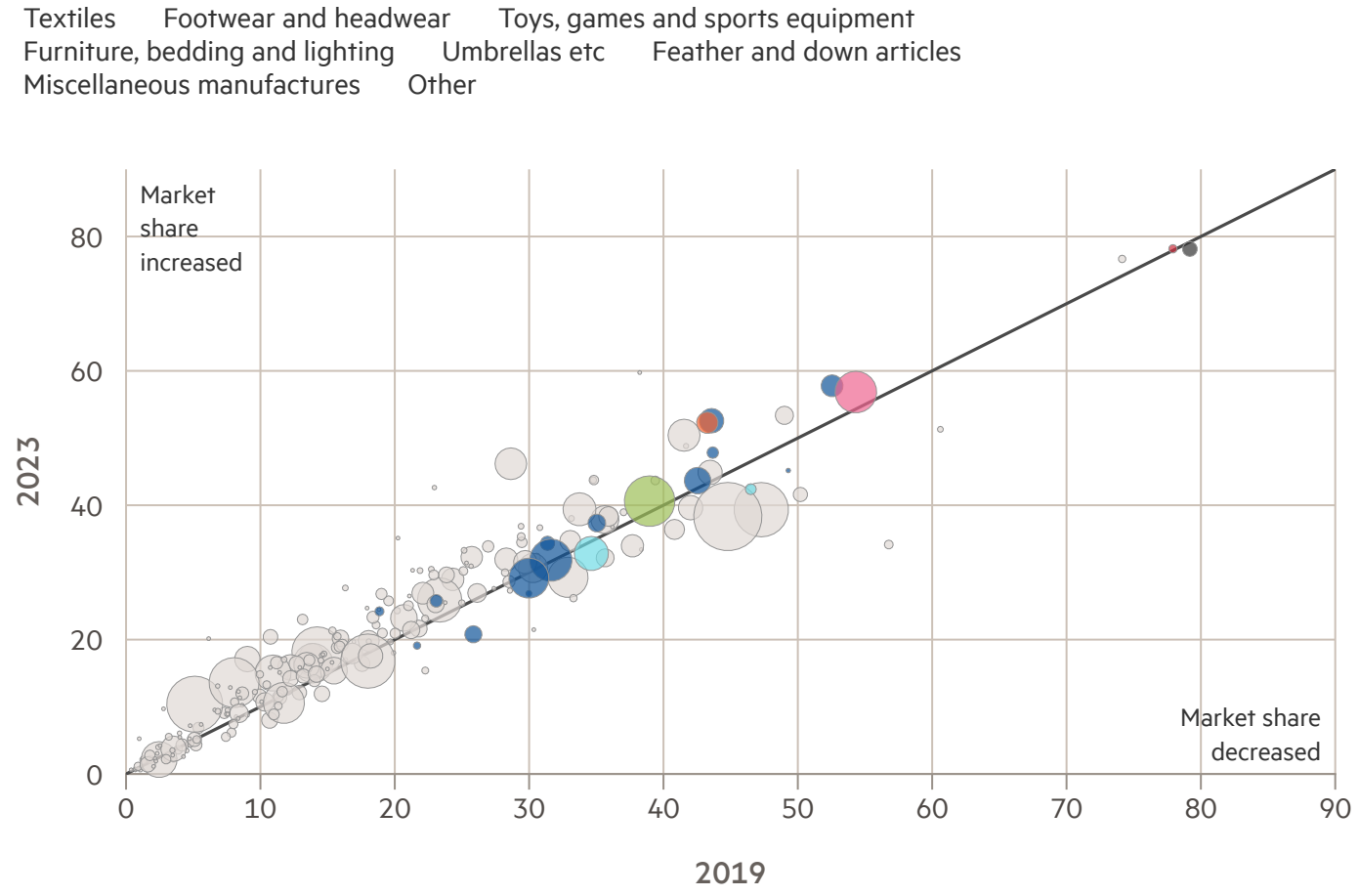
Trade data compiled by Harvard's Growth Lab shows China grew its global export share in a swath of labour-intensive industries from 2019 to 2023.

The country's global export share of small manufactured goods, such as brooms, mops and pens, rose 9 percentage points to 52.3 per cent over the four-year period. Furniture exports gained about 1.5 percentage points of market share, while China's proportion of the world's toy exports rose from 54.3 per cent to 56.9 per cent.

Some of China's labour-intensive exports increased their global market share

Market share (%), by product, 2019 vs 2023

Bubble size = the product's average share of China's total exports



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Source: The Growth Lab at Harvard University, UN Comtrade, Capital Economics, FT calculations • Market share is measured by the export value. Products under HS codes 84-85 are classified at the 4 digits; others at 2 digits. Dataset last updated in April 2025

This comes even as the average factory worker in Dongguan makes about Rmb5,200 ($729) a month while an Indian counterpart may earn Rs17,100 ($194), according to government statistics in both places.

“It’s quite striking,” said Leah Fahy, China economist at Capital Economics. “Historically, as countries develop, labour costs rise and they move away from producing these goods.”

The trend can be seen in a factory in Sichuan, a south-western province, where welding robots from Chengdu CRP are fusing steel pieces together to form the chassis of a three-wheeled electric cart.

“With each robot, our labour costs come down by half and our efficiency increases,” said Song Ling, deputy manager of Shuangsheng New Energy Vehicle, the small company which owns the factory. “There is no choice but to automate.”

Over the past three years, Shuangsheng has automated about half of its production line, opting to buy dozens of locally made machines after testing them against several from Japanese groups. The factory is now shipping growing volumes of Rmb6,000 cargo-carrying carts and tuk-tuks to south-east Asia as well as Africa and the US.

CRP’s chief Li said local factories were buying his more affordable Chinese robots to make a variety of low-end goods, including three-wheeled carts, furniture, fitness equipment and bicycles.

“In the past China relied on its large population of 1.3bn people and abundant cheap labour to gain its status as a manufacturing powerhouse,” Li added. “Now China is maintaining its labour advantage with robotic labour instead of human labour.”

At Shuangsheng, dozens of CRP robots began replacing welders who could demand monthly wages of up to Rmb15,000. The government hopes many blue collars workers can upgrade their skills into an expanding “purple collar” workforce of robot technicians.

Longkai Textile has purchased several massive printing and embroidery machines to replace workers and increase productivity © FT

But overall employment in labour-intensive industries is declining. From 2011 to 2023, employment at large companies in 12 labour-intensive industries fell by about 26.5 per cent, according to Chinese government data.

Jiang Xiangqian, vice-president at robot maker Topstar, said that ultimately robots would replace all factory workers. “We won’t need a single person in the entire chain,” he said.

In the southern textile hub of Keqiao, Jay Ye, owner of Shaoxing Longkai Textile, has purchased several massive printing and embroidery machines to replace workers and increase productivity.

Ye said the locally made machines had helped double his factory's output while increasing profit margins. "In India they are still embroidering by hand," Ye said. "We are using machines."

The Big Read Semiconductors

Why memory chips are the new frontier of the AI revolution

Innovation has helped push SK Hynix ahead of Samsung — and put chipmakers in the middle of growing US-China tensions

Christian Davies in Icheon

Published 2 HOURS AGO

At SK Hynix's vast M14 chip fabrication plant, workers in white, pink and blue clean-room suits inspect rows of machines as 700 robots zip along overhead rails, carrying silicon wafers between different stages of the manufacturing process.

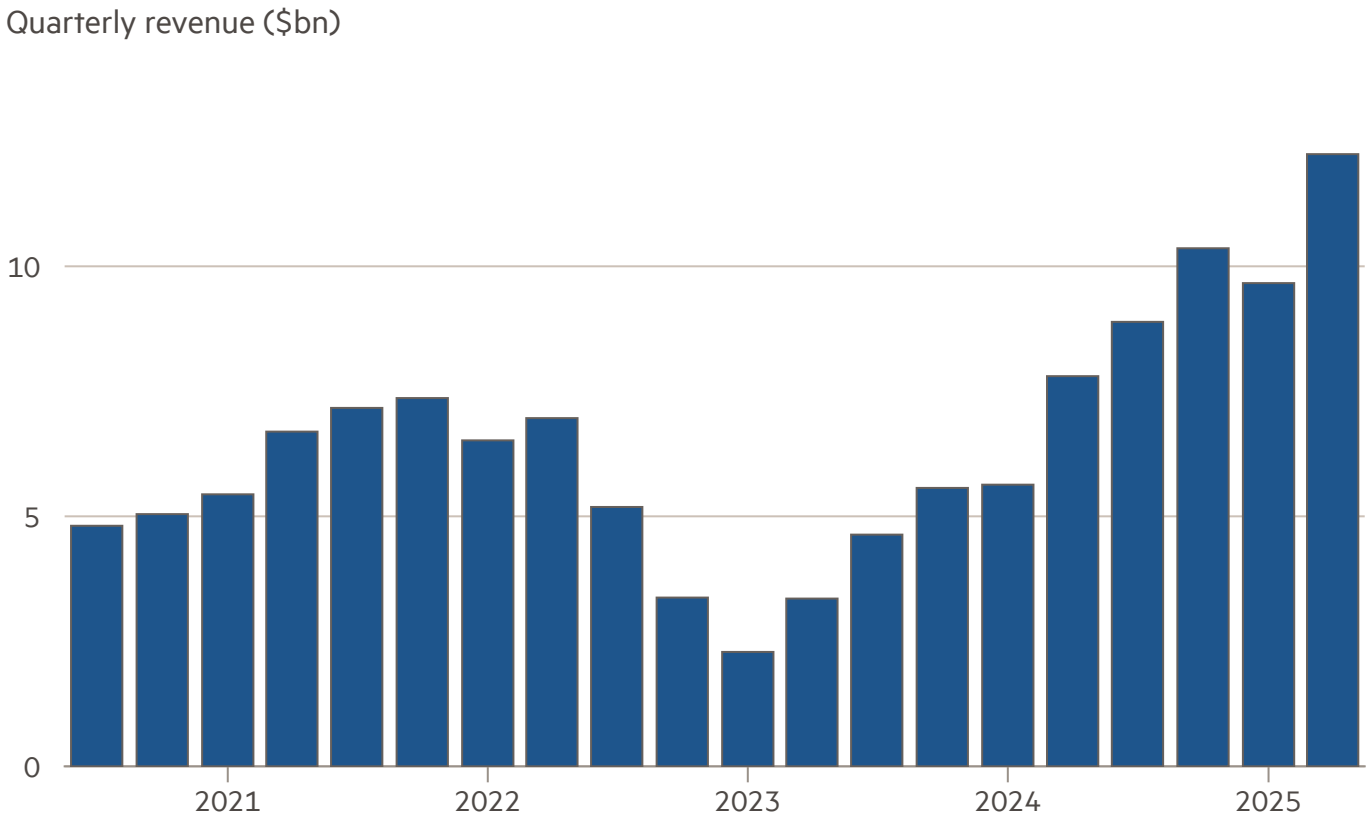
The factory, at the South Korean company's main campus in the city of Icheon, produces high bandwidth memory (HBM) chips, capable of transferring data equivalent to 200 feature-length movies every second.

For decades, memory chips were the unglamorous end of the semiconductor industry, overshadowed by the logic or processor chips designed and produced by companies such as AMD, Qualcomm, Nvidia and TSMC to conduct calculations and control an electronic device's operations.

But HBM designs, such as the HBM3E produced at the Icheon factory, are transforming the memory industry. Joon-yong Choi, vice-president and head of HBM business planning at SK Hynix, notes that whereas in conventional dynamic random-access memory (Dram), "cost was prioritised by customers over power and performance, with HBM power and performance are prioritised over cost".

They are helping developers of so-called large language models alleviate the effects of the "memory wall" — where limitations in storing and retrieving data are an impediment to improving performance — as well as boosting efficiency and lowering costs at thousands of data centres under construction around the world.

SK Hynix's revenue from Dram chips hit a record level in the second quarter



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Source: Bloomberg

The growing importance of memory to AI has placed the sector at the centre of intensifying competition between Washington, which is trying to restrict Chinese access to cutting-edge technology, and Beijing, which is nurturing a domestic semiconductor sector that it hopes can go toe-to-toe with global rivals.

It has also shifted the historic order of the industry's top players. SK Hynix's revenues from Dram, of which HBM is a subset, swelled from Won7.5tn ($5.4bn) in the second quarter of 2021 to Won17.1tn in the same quarter of 2025, pushing them past those of its great rival Samsung for the first time since the two Korean groups started competing in the memory market in the 1980s.

"The idea that SK Hynix could surpass Samsung would have been unthinkable as recently as five years ago," says Chris Miller, associate professor at Tufts University and author of *Chip War*. "It would be like Dr Pepper suddenly becoming more popular than Coca-Cola."

"It became clear decades ago that the commodity dynamic in the memory market would make it very hard to make outsized profits," says Miller. That prompted many of the brightest minds, and ambitious entrepreneurs like Nvidia's Jensen Huang and Qualcomm's Irwin Jacobs, to turn their attention to processor chips, he adds.

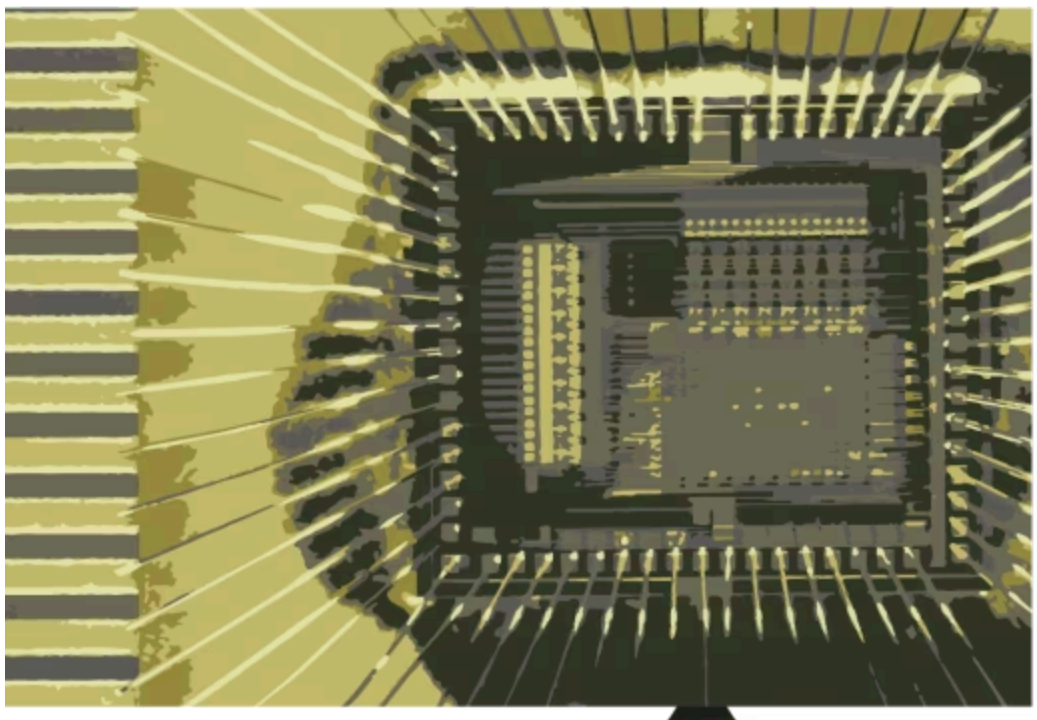
"But now, memory is back."

Intel began life in the 1960s as a memory chip company, but exited the Dram sector in the 1980s under pressure from Japanese rivals Toshiba and NEC.

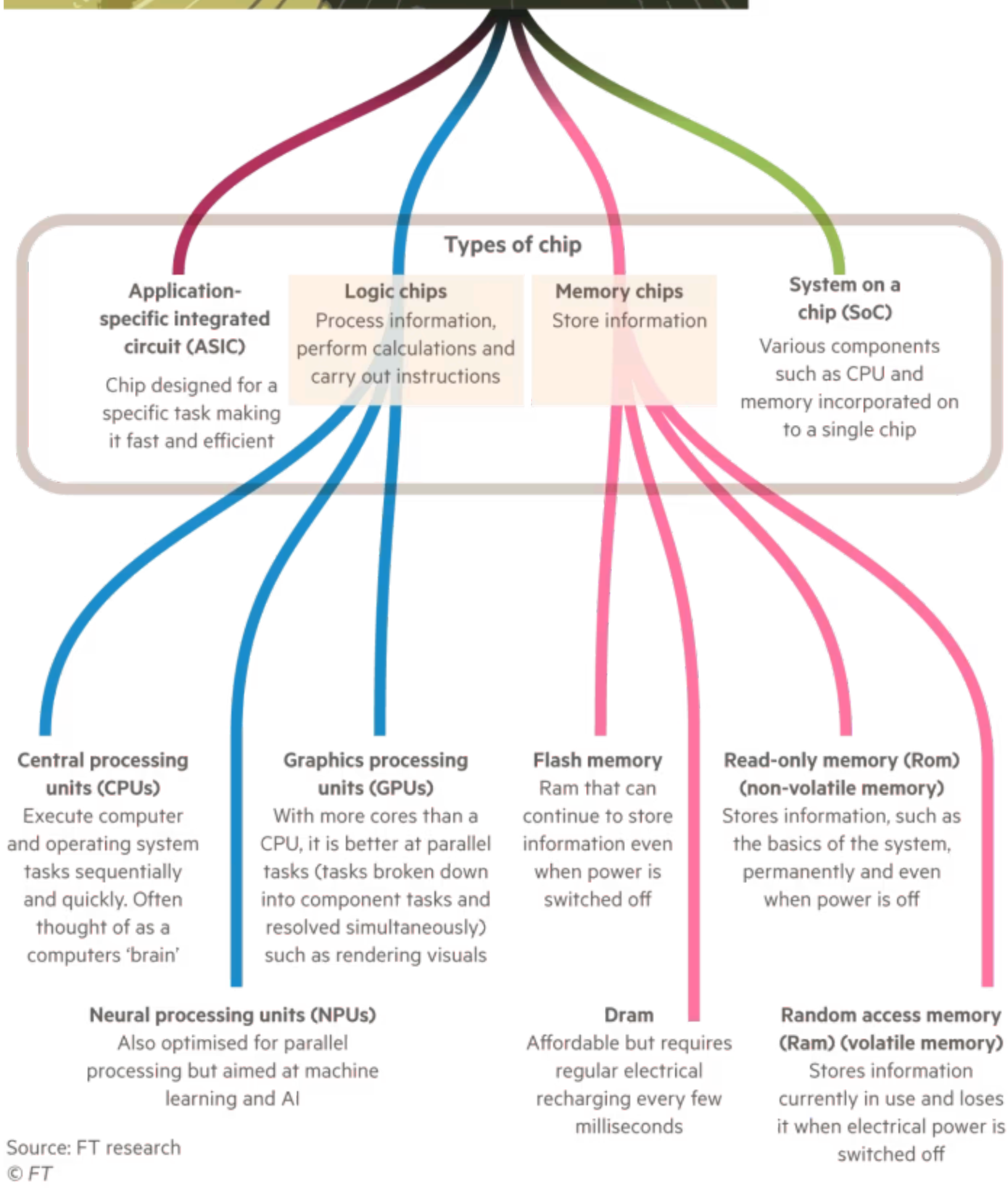
They, in turn, were supplanted in the 1990s by Samsung and the chip division of Hyundai Electronics, or Hynix, which would later be acquired by the SK conglomerate. The two Korean groups and Micron, of the US, have dominated the sector ever since.

Samsung was until recently the undisputed leader of the heavily commoditised market in Dram chips, which are powered and store data temporarily while a processor is running. It used its superior scale to invest in production capacity during the cyclical industry's regular downturns.

Chip taxonomy



Microchips are assemblies of complex electrical circuitries mounted on to very small pieces of semiconductor material, normally silicon. They are connected to other components, including other chips, on printed circuit boards



Source: FT research

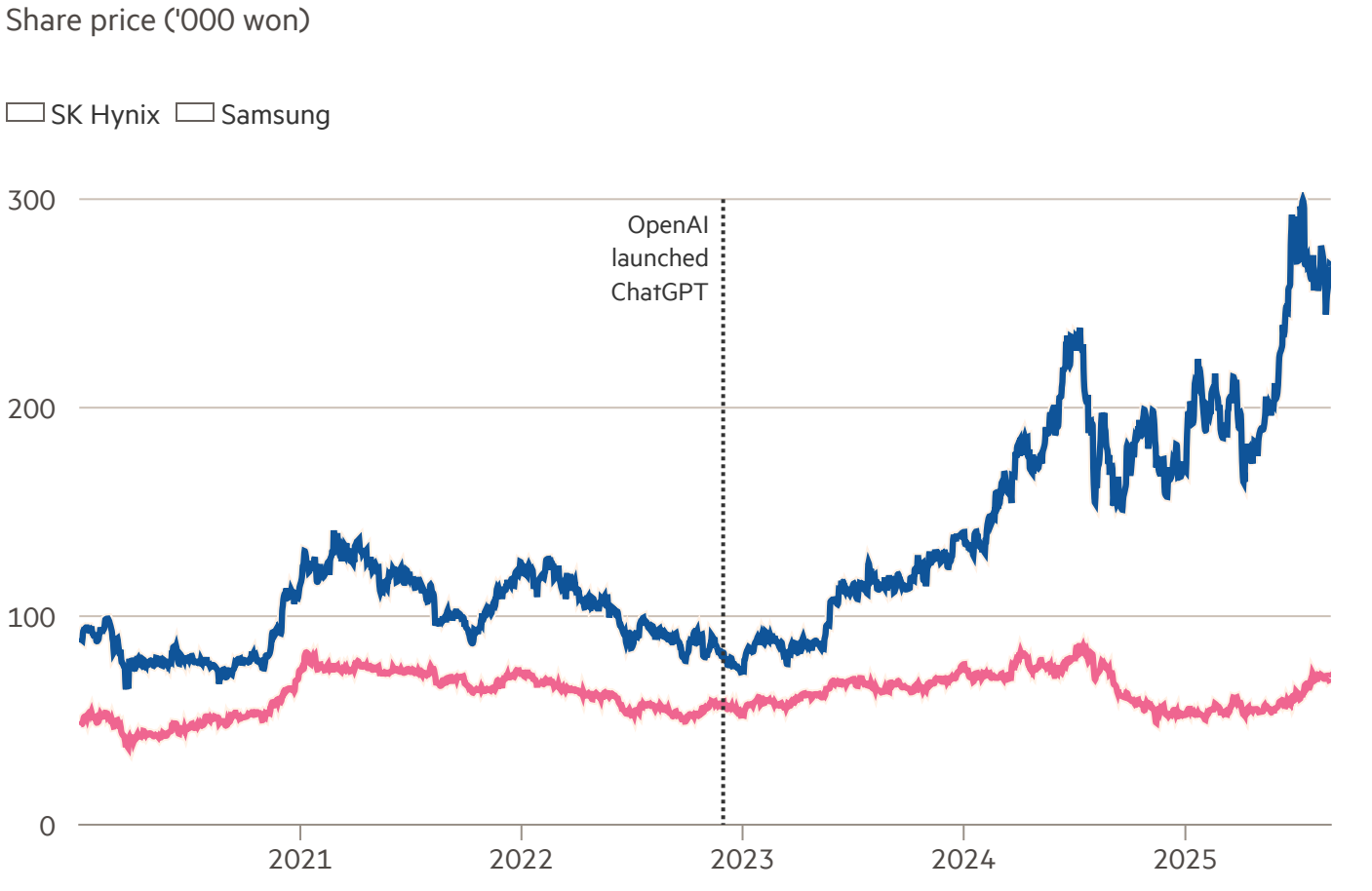
Choi explains that while Dram and lower-value Nand chips — which store data for longer periods without power — were the dominant technologies, companies also experimented with more niche products.

HBM chips, which Hynix began developing in 2013, were among them. They involved stacking layers of Dram units connected by copper wires a tenth of the thickness of a human hair, like a multistorey library with lifts to quickly transport piles of books between floors.

That means HBM chips can offer 1,024 pathways for sending data to and from a processor, Choi explains, compared with 64 for conventional advanced Dram chips. “Think of it like the number of taps filling a water tank, or the number of lanes on a highway,” he says. “When it comes to the memory requirements of AI, nothing comes close to HBM.”

Ray Wang, lead semiconductor analyst at the Futurum Group consultancy, also points to Hynix’s early adoption of an advanced bonding technology called mass reflow-molded underfill, or MR-MUF, as key to its HBM success. It involves the use of a special resin-based insulation material to prevent overheating, crucial when stacking up to 16 Dram chips on top of each other.

SK Hynix’s share price gap with Samsung has widened in the past two years



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Source: Bloomberg

Hynix’s exclusive contract for the material with its Japanese supplier Namics Corporation forced Samsung and Micron to settle for an inferior manufacturing process involving high temperatures and strong forces, both of which can crack the silicon layers and result in a higher failure rate.

Its superior product helped Hynix to secure its position as the principal supplier of HBM chips to Nvidia and allowed it to ride on the US company’s coat-tails as demand for AI chips exploded after OpenAI’s ChatGPT chatbot was released in late 2022.

HBM’s share of Hynix’s overall Dram revenues went from about 5 per cent in the final quarter 2022, according to Bernstein research, to more than 40 per cent by the first quarter of 2025.

Myron Xie of the consultancy SemiAnalysis notes that while Micron’s HBM3E chips have now passed the stringent qualification tests for use in Nvidia’s most advanced AI chips, Samsung’s equivalent is yet to do so.

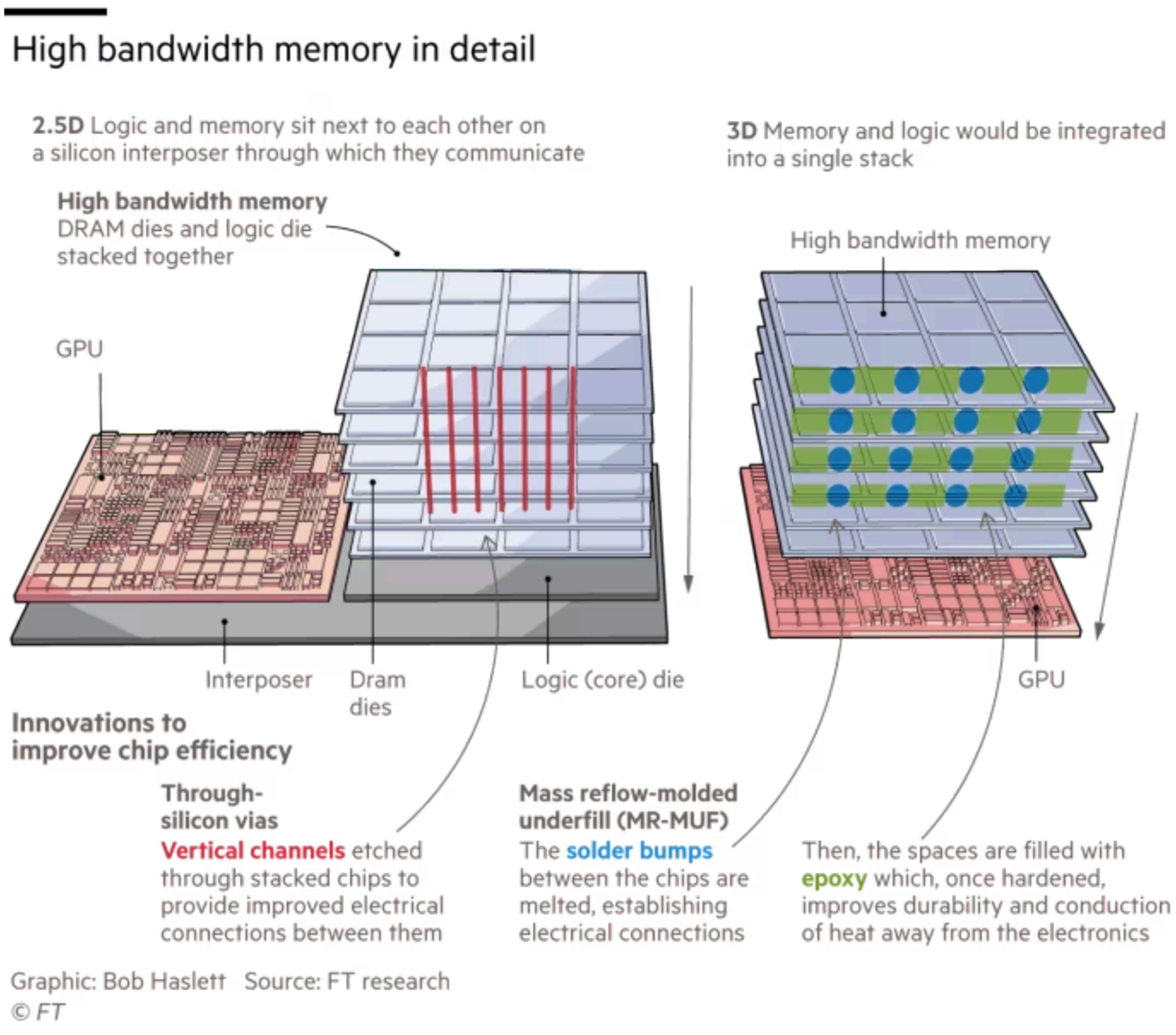
People close to the company say its HBM3E chip is set to pass Nvidia’s tests “imminently”. But they also acknowledge that, as the dominant player in what was until recently a commoditised market, it was caught cold by the needs of AI players for more customised memory solutions tailored to their specific requirements.

“Samsung is also struggling with the bread-and-butter task of producing the cutting-edge Dram chips that end up getting stacked into HBM,” says Xie. “Micron has done well, but it’s also pretty damning against Samsung for it to be in third place.”

Miller adds that Samsung “was optimised for the smartphone era” rather than the AI one. “I think the entire organisation has struggled to conceive of what the world would look like when the smartphone was no longer the dominant product.”

It has proved a costly stumble. Peter Lee, a Seoul-based semiconductor analyst at Citigroup, notes that HBM chips offer profit margins of about 50-60 per cent, compared with about 30 per cent for conventional Dram units.

Because each HBM chip needs to be designed to fit the specific AI graphics processing unit to which it is paired, orders must be placed a year before production, typically on one-year contracts.



“That gives memory companies much more pricing leverage over potential customers than when selling conventional Dram, which can be bought at a month’s or even a day’s notice and easily swapped for the product of a rival chipmaker,” adds Lee.

Wang estimates that Samsung’s mis-steps have cost it tens of billions of dollars a year in lost revenue since ChatGPT’s release. “They should have been aware of the implications for memory demand of the rise of machine learning,” he says.

“Underestimating the potential of HBM was a huge strategic mistake.”

If the rise of HBM has disrupted the old order at the top end of the memory market, another source of disruption is emerging from below: Chinese memory champion ChangXin Memory Technologies, or CXMT.

Based in Hefei, in the eastern province of Anhui, CXMT has increased its share of the global Dram market from close to zero in 2020 to 5 per cent last year, according to Shenzhen-based consultancy Qianzhan.

It remains unclear whether CXMT's progress in conventional Dram will allow it to catch up with Hynix, Samsung and Micron in mass producing cutting-edge HBM chips — a development that would potentially reduce the dependence of Chinese AI developers and chipmakers on foreign companies for critical components.

The Financial Times reported last month that CXMT was testing samples of HBM3 products — one generation behind HBM3E — with a target to launch next year. But analysts and industry insiders remain sceptical that, without access to key equipment and materials that are subject to US export controls, CXMT can close the HBM gap in the near future.

"CXMT stockpiled a lot of the equipment it needed before the most recent round of controls," says Futurum Group's Wang. "But it cannot access extreme ultraviolet machines, and it is not clear that they have enough equipment to mass produce advanced HBM products at a similar scale to the leading memory players." He estimates CXMT is "three to four years behind" in HBM development.

Last week, the US government revoked waivers that had allowed Hynix and Samsung to send chipmaking equipment to their manufacturing facilities in China without a licence, a decision that Wang says "underscores Washington's intent to further limit China's access to memory technology".

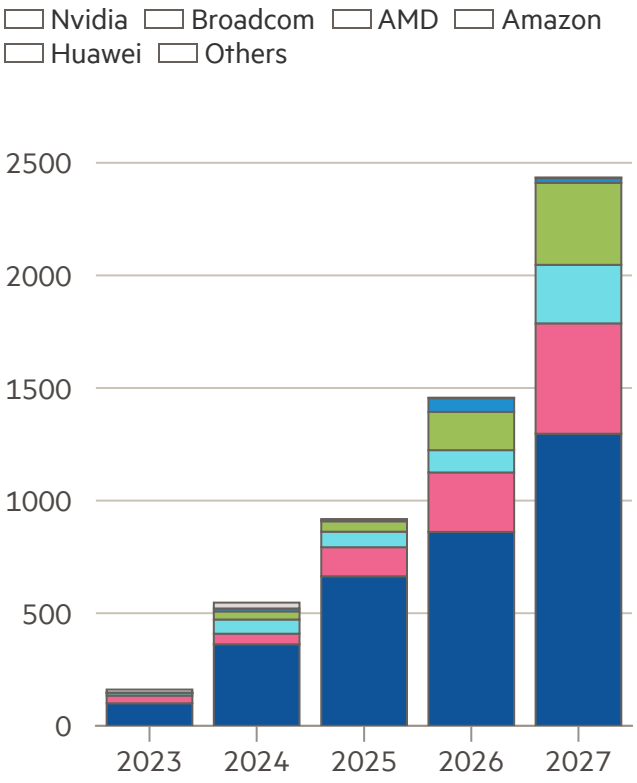
In a sign of the importance of HBM for China's AI ambitions, the country's tech groups and chipmakers rushed to stockpile Korean HBM before their availability was restricted by US export controls in December last year.

Despite those controls, many experts argue that US policymakers have been slow to recognise memory's centrality to AI performance, leaving Chinese companies with access to cutting-edge memory technologies long after restrictions were imposed on the most advanced processing chips.

While individual HBM chips equivalent to the HBM2E standard and above can no longer be exported to China, more advanced chips can if they have been pre-packaged into AI chips that do not exceed certain performance criteria.

High bandwidth memory demand is expected to rise

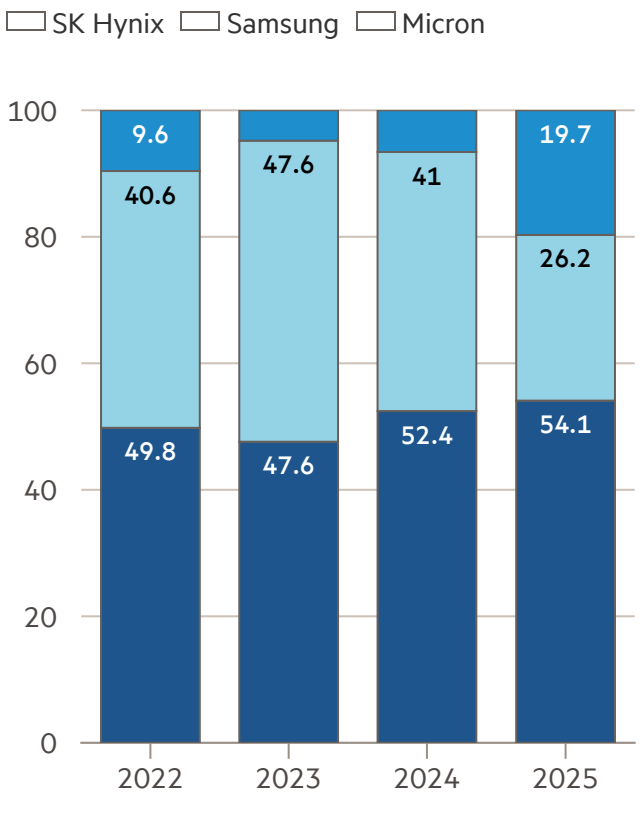
Rebased HBM bit demand (Nvidia in 2023 = 100), by customer



Source: SemiAnalysis

SK Hynix leads the HBM market while Samsung has slipped

HBM market share (%), by supplier



Source: TrendForce • Market share is based on HBM shipments. Forecast data for 2025

Xie, of SemiAnalysis, cites the example of Nvidia's H20 chip, which US President Donald Trump has permitted to be sold into China on the basis that it is "obsolete".

While the H20's processing power is clearly inferior to the H100, its six on-board Samsung HBM3 chips actually provide better memory performance: four terabytes per second of memory bandwidth, compared with 3.4TBps in the H100 and 3.2TBps in Huawei's flagship Ascend 910c.

Xie notes that while compute performance is more important for training AI models, memory is widely considered more important for deployment, also known as inference.

"In some ways, the H20 is a better chip than the H100 because there's more memory capacity and bandwidth," says Xie. "People still overly focus on compute, but that's only one aspect of performance."

SK Hynix's current dominance of HBM could yet come under pressure from other quarters, analysts say.

The Korean company plans to begin mass production this year of its next-generation HBM4 chip that is set to be used in Nvidia's forthcoming Rubin platform, offering LLM developers a substantial leap forward in performance.

Whereas HBM3E and its predecessors use relatively unsophisticated Dram chips as their "logic die" — a base chip that regulates the HBM stack's operations — that task will be performed by an advanced processor chip produced by TSMC in the new design.

Samsung's HBM4 will also use an advanced processor chip, produced by its own foundry division. A person familiar with its thinking told the FT that as the only company with cutting-edge capabilities in both processor and memory chips as well as advanced packaging — the process of integrating multiple chips closer together — it could offer customers a "one-stop shop".

The person adds that the company is also in “active discussions with key clients” about a technique called “hybrid bonding”, an improved method of connecting the stacked Dram chips that could potentially offer greater bandwidth, power and signal integrity.

There’s not much value to being a one-stop shop if all the individual parts are inferior

Wang, at Futurum Group, argues that whoever manages to incorporate hybrid bonding first “will decide who has leadership in the next generation of HBM”. He says Chinese companies are also investing heavily in related research and accelerating hybrid bonding-related patent filings.

Lee of Citigroup notes that in addition to improving performance, the use of processor chips as the logic die will increasingly allow HBM products to be tailored for specific tasks, making it even harder for customers to switch between suppliers.

That raises the question of whether HBM4 will pave the way for Samsung to make a comeback. The larger company has had time to correct the mistakes it made on its HBM3E designs for HBM4, meaning it is likely to qualify as a supplier to Nvidia, says Lee.

But Wang notes that Hynix will continue to benefit from its recent close co-operation with Nvidia, as well as its long-standing relationship with industry leader TSMC. On Wednesday, Hynix unveiled high numerical aperture extreme ultraviolet lithography machines it has acquired from ASML, giving it a further edge over its HBM rivals.

In contrast, Xie at SemiAnalysis notes that Samsung’s foundry and memory businesses have both been dogged by quality and production issues. “There’s not much value to being a one-stop shop if all the individual parts are inferior.”

Samsung “has continued to invest in the HBM business and is focusing on developing next-generation memory technologies”, the company said in a statement.

In the meantime, Chinese AI chipmakers unable to circumvent US export controls are looking for ways to reduce their dependence on HBM as a means to boost performance.

Huawei last month launched new AI software designed to allocate different memory tasks to different kinds of memory chip, thereby reducing HBM reliance. Last week, the Chinese tech giant also unveiled three new “AI solid state drives” as alternative memory solutions.

Miller, of Tufts University, says that with HBM still relatively expensive and energy intensive, and with memory capacity so critical to AI performance, many tech companies are trying to develop an alternative.

They include Japanese tech group SoftBank, which is working with Intel to develop a stacked Dram product that utilises a different wiring system to HBM.

Most analysts agree that HBM will probably dominate memory solutions for the next five years at least. But greater customisation is likely to mean deeper involvement of foundry companies, chip designers and the customers themselves in the design and manufacturing process.

That could threaten the memory companies’ ambitions to capture more value from the supply chain, warns Xie. “The more parts of the HBM stack get outsourced to TSMC and the fabless design companies, the higher the risk for the memory companies that the sexy guys end up doing the hardest stuff,” he says.

“If that happens, then this moment could prove bittersweet.”

BMW

BMW to unveil 'superbrain' EVs in bid to challenge Chinese rivals

Legacy carmaker has spent €10bn developing ambitious technologies for 'software-defined vehicles'

BMW's iX3 sport utility vehicle will be the first to be developed on its long-awaited Neue Klasse platform © Daniel Kraus

Sebastien Ash in Frankfurt and **Kana Inagaki** in London

Published 2 HOURS AGO

BMW is betting on software-controlled electric vehicles powered by "superbrains" in one of the most ambitious attempts by struggling legacy carmakers to take on Chinese rivals and Tesla.

Its iX3 sport utility vehicle, which debuts on Friday ahead of the Munich motor show, will be the first to be developed on its long-awaited Neue Klasse platform. Another 40 new models and model updates will follow in the next two years as BMW radically changes the way the German carmaker has designed, built and sold cars.

"With the Neue Klasse, we are making great strides in all relevant technology fields," chief executive Oliver Zipse told investors in July. "The new BMW iX3 will be the benchmark in our industry."

BMW's iX3 will be among a series of "software-defined vehicles" which will be on display in Munich as a centralised computer system replaces hardware as the most important feature.

Traditional European, US and Japanese groups have long lagged behind Elon Musk's Tesla and a new generation of Chinese manufacturers such as Xiaomi and Xpeng in software development.

BMW unveiled the concept for the Neue Klasse platform in 2021, and has spent more than €10bn in developing the technologies.

Bernstein analyst Stephen Reitman said the new platform had the potential to be a "massive leap forward" for BMW.

"You could say that BMW is betting the farm on the success of the Neue Klasse," Reitman said following a recent preview of the Neue Klasse technologies. The carmaker's successful rollout had the potential to "change a lot about the future of the car industry" and the perception of western automakers' ability to compete on software, he said.

BMW has said the technology will deliver more than 20 times the computing power of current vehicles and slash the complexity of the car's electronics.

Alongside a longer electric range of up to 800km and faster charging with drivers able to add over 350km in range in just 10 minutes, the Neue Klasse fleet will be powered by four "superbrains" that vastly improve communication inside the vehicle, infotainment displays, automated driving and other vehicle functions.

The shift to software-powered vehicles will allow carmakers to improve the performance of the vehicles even after they are sold to consumers and offer services that they hope will create new sources of revenue.

In addition to its new generation of electric vehicles, the platform will also provide the basis for its future internal combustion and hybrid models.

The German carmaker, which also owns the Rolls-Royce and Mini brands, has long been cautious about the pace of the global shift to EVs, taking a multi-energy approach.

Nevertheless, sales of its EVs — which have the same design and appearance as their petrol and hybrid counterparts — have grown with battery-powered vehicles accounting for about 18 per cent of its deliveries globally during the first half of the year. That compared with 8 per cent for Mercedes-Benz and 11 per cent for Volkswagen.

Even with the advances under Neue Klasse, it remains unclear whether BMW can close its gap with Chinese rivals. Legacy carmakers are also at a disadvantage to Chinese companies that can produce EVs at a far lower cost.

Still, executives said the new platform will allow the company to continue improving not only its software capabilities, but also its battery technology.

Unlike rivals such as VW, BMW does not produce its own cells, but does its own research on battery cells and chemistry while partnering with companies such as China's CATL to develop new batteries.

Martin Schuster, BMW's vice-president of battery cell and cell module, told the Financial Times that the company was able to save up to 50 per cent in manufacturing costs for its new generation of cylindrical lithium-ion batteries.

While that may still not bring down the cost of its EVs to be as profitable as petrol vehicles, Schuster said its latest battery system would allow it to adopt cell formats if they were deemed better than the current ones.

"You need to be open and flexible in the architecture," he said.

Opinion **Free Lunch**

Is the US already in a recession?

For vast segments of the American economy it certainly feels that way

TEJ PARIKH

Sectors such as construction and manufacturing are experiencing recessionary conditions © AFP via Getty Images

Tej Parikh

Published YESTERDAY

Welcome back. What is a recession? The popular, yet overly simplistic, shorthand is two consecutive quarters of negative economic growth. The US, however, has a more refined approach, determined by technocrats at the National Bureau of Economic Research.

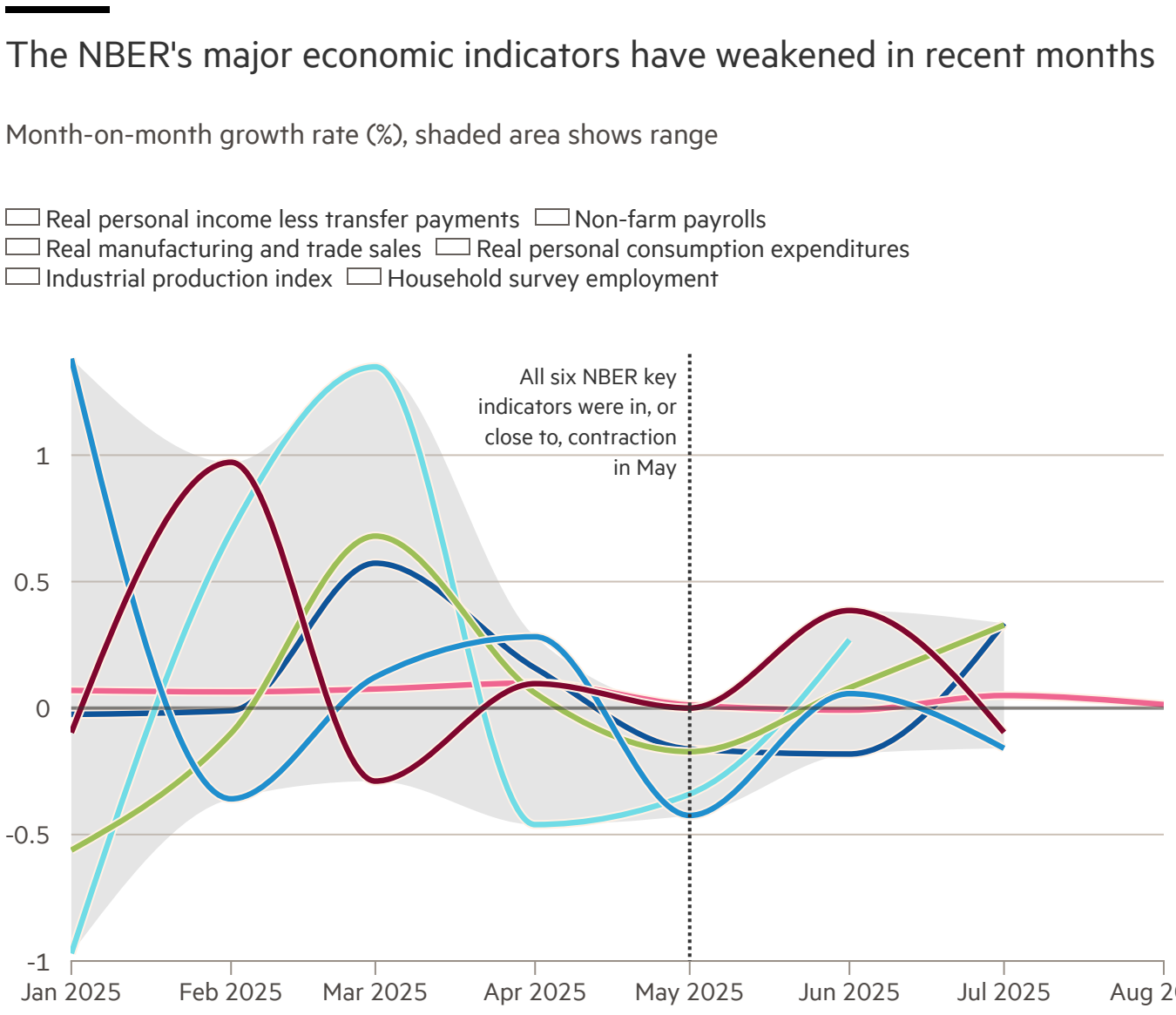
“A recession involves a significant decline in economic activity that is spread across the economy and lasts more than a few months,” says the private non-profit.

Annualised US GDP grew in the second quarter of this year, following a first-quarter contraction, meaning the country avoided a recession by the basic definition. The same appears true according to the NBER’s broader standard.

However it is defined, in this edition, I outline why the recession label isn’t particularly meaningful — especially when applied to the world’s largest economy.

The main six indicators used by the NBER to determine the onset of a recession are shown in the chart below.

All six indicators were either in or close to contraction in May on a month-on-month basis. In recent months, all have remained weak, but not perhaps bad enough to clear the NBER’s criteria.



However, Pascal Michaillat, professor of economics at the University of California, Santa Cruz, cites two main shortcomings of relying on the research organisation's approach.

"It places too little emphasis on unemployment and vacancy rates," he says. "Also, as it waits for data and revisions, recessions are often declared several months after they have begun."

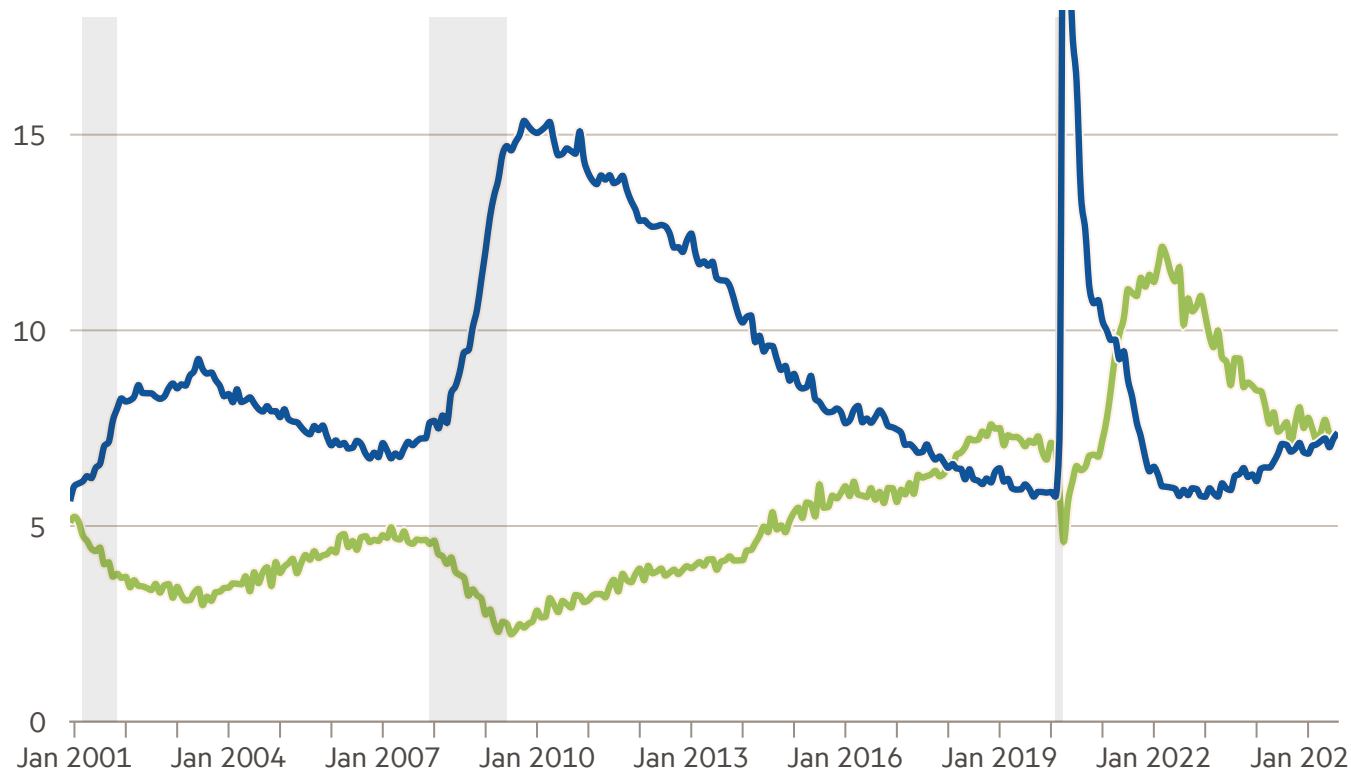
Using a real-time recession detection algorithm trained on a century of broader labour market data, Michaillat — who is also a research associate at the NBER — estimates a 71 per cent probability that the US economy was *already* in recession in May.

"While the other NBER data might seem useful, the labour market reflects a more fundamental reality. Falling vacancies and rising unemployment are, in my view, a more reliable indicator of widespread economic distress," he says. Indeed, in July the number of job seekers exceeded the number of openings for the first time since 2021.

Many Americans would agree with Michaillat's assessment. In an early August poll by the Economist and YouGov, almost half of respondents said the US economy was "getting worse". Close to one-third thought the US was already in recession; 28 per cent weren't sure.

There are now more **job seekers** than **openings**, which points to a demand-driven slowdown

Mn, recessions shaded



FINANCIAL TIMES

Sources: Haver Analytics, BLS

Clearly the NBER's task is difficult and subjective, not to mention fraught with data complications. (I wrote about America's dodgy jobs numbers for FT Alphaville last year.)

Nor is the recession nomenclature that useful, anyway. In an economy of the US's size — which is greater than the other G7 nations combined, on a purchasing power parity basis — many states, sectors and households can be facing a downturn, while expansions elsewhere raise activity in aggregate.

A more informative question to ask, then, is what is keeping the US afloat despite weakness across several national-level indicators?

In US President Donald Trump's second-term, economic resilience has come largely from four narrow sources: a handful of states, artificial intelligence, healthcare and the wealthy.

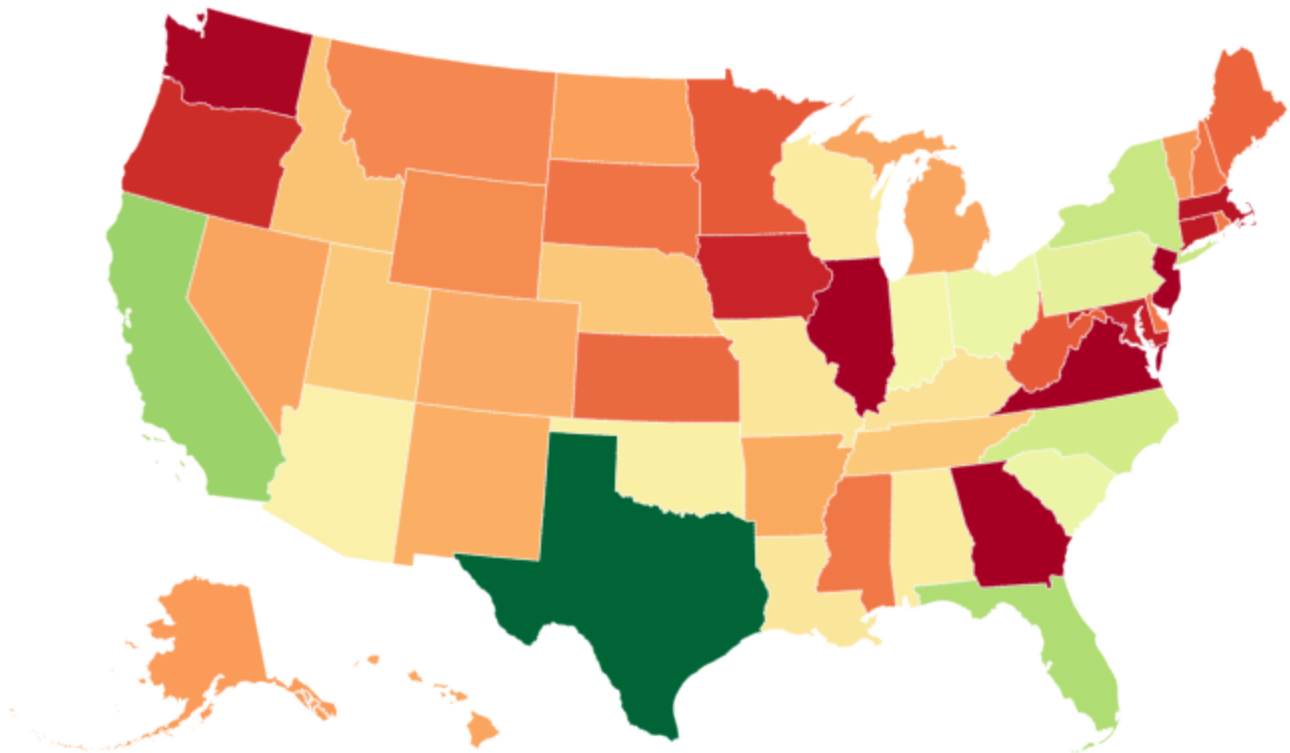
Using a similar methodology to the NBER, Mark Zandi, chief economist at Moody's Analytics, finds that US states making up close to one-third of the country's GDP are either in or at high risk of recession.

"States experiencing recessions are spread across the country," he says. This includes the midwest and parts of the rustbelt. "California, Texas and New York, which together account for close to a third of US GDP, are holding their own, and their stability is crucial for the national economy to avoid a downturn."

A third of US states could already be in recession

Moody's Analytics' coincident economic indicator for each state, weighted by share of US GDP

Recession Expansion



FINANCIAL TIMES

Source: Moody's Analytics

The geographical distribution of industries is a key determinant of how US regions are performing.

Zandi's calculations find that the agriculture, manufacturing and construction sectors are in recession, which is hitting rural and industrial states. These are goods-producing sectors most likely to be affected by Trump's tariffs and trade partners' retaliatory measures.

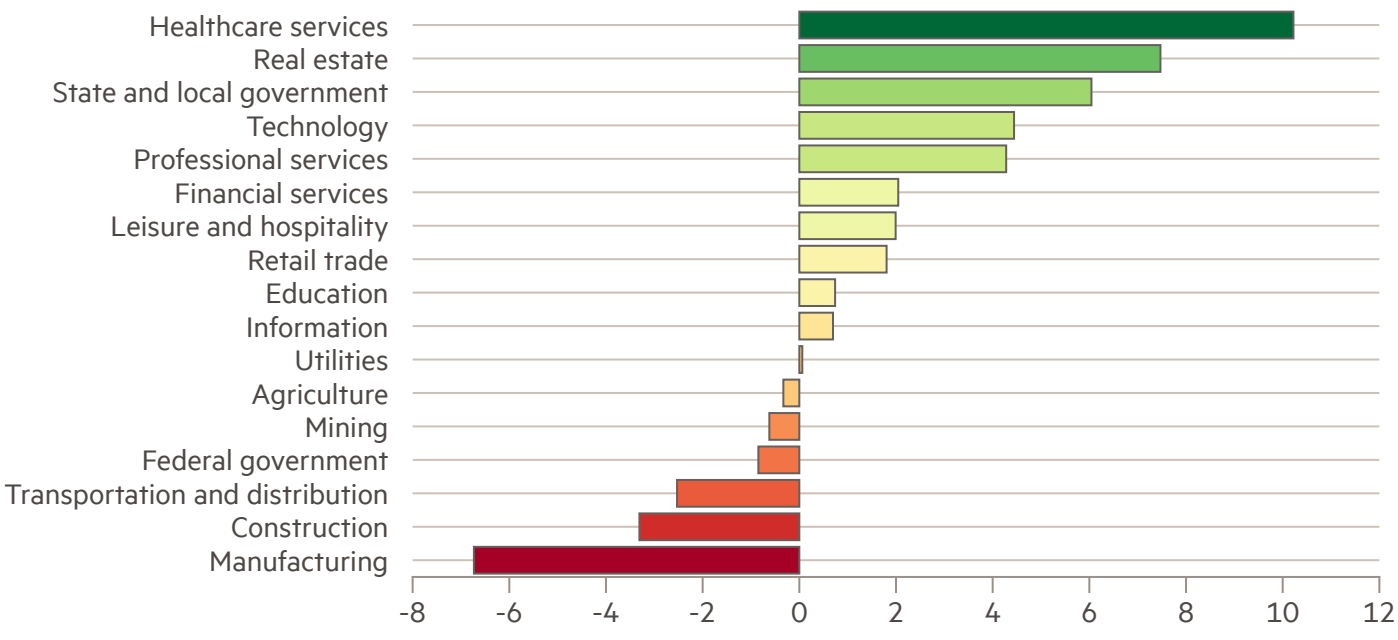
A downturn in the federal government sector, linked to the administration's cuts, has also pushed Washington DC into a slowdown

"Healthcare, technology and real estate are expanding, while financial services, retail and hospitality are treading water," he adds.

US manufacturing and construction are experiencing recession-like conditions

Moody's Analytics' coincident economic indicator for each industry, weighted by share of US GDP

Recession Expansion



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Source: Moody's Analytics

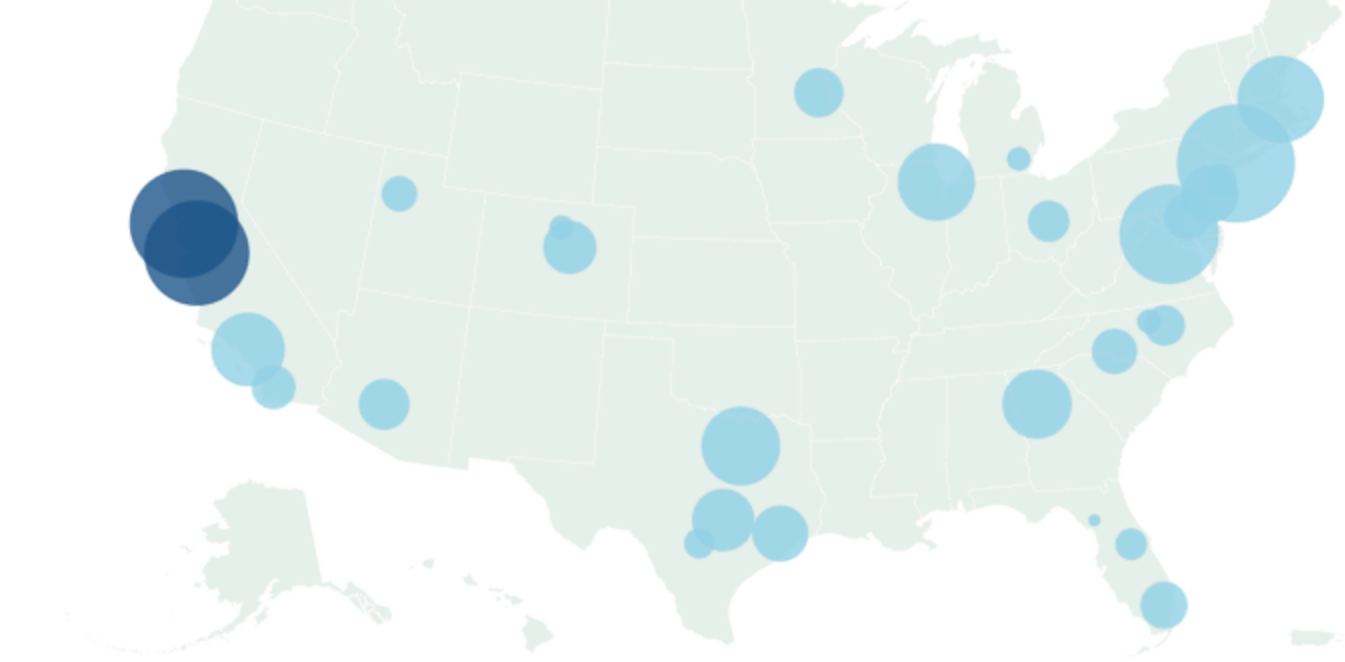
Relatedly, the AI boom has provided an uplift to particular states and industries.

“AI is primarily a bigger-city office technology. Most of its superstar and star hubs are in California’s coastal cities, Texas’ business cities and the Boston to Washington corridor,” says Mark Muro, senior fellow at the Brookings Institution. “Data centre construction is also booming across the US, but this leads more to a short-term surge in building activity.”

Pantheon Macroeconomics estimates that US GDP would have grown at a mere 0.6 per cent annualised rate in the first half were it not for AI-related spending, or half the actual rate.

Expanding regions correspond with areas of strong AI activity

Size of bubble reflects job postings in Q1 2025



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Source: Brookings Institution

Beyond the surge in AI-related spending, private investment elsewhere in the US economy has started to shrink this year under the weight of higher interest rates and uncertainty.

Total private fixed investment rose by about 3 per cent year on year in the second quarter, but it would have fallen by around 1.5 per cent if AI-related components were excluded, says Pantheon in a recent research note.

The annual rate of data centre construction has grown over Trump’s second term — but residential, manufacturing and other commercial building work have declined.

AI expenditure has propped up private investment in recent quarters

Contributions to year-on-year growth in real private fixed investment (% points)

Total AI-related components*
Other components

Source: Pantheon Macroeconomics
*Computer and communications equipment, software, data centres, power and communications grid

Data centre development has bucked the declining construction trend

Annual rate of new private construction put in place ($bn)

Residential Manufacturing
Other commercial Data centres (RHS)

Source: Haver Analytics, FT graphic: Tej Parikh / @tejparikh90

FINANCIAL TIMES

As Zandi's research suggests, the healthcare industry is also driving the economy.

Friday's non-farm payrolls report, showing a small gain of 22,000 jobs in August, would have been negative were it not for the sector. So far in Trump's second term, 598,000 jobs have been created. A staggering 515,000 — or 86 per cent of them — are healthcare and social assistance jobs.

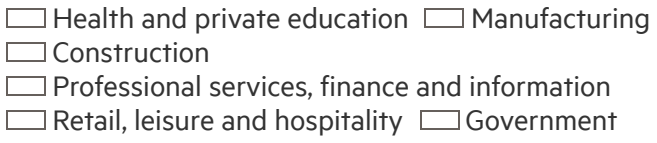
Since April, the Bureau of Labor Statistics' payroll diffusion index for the private sector fell below 50, signifying that more sectors are shedding jobs than gaining them. That is a rarity outside of a recession.

Healthcare jobs are less a reflection of a booming industry and more one of sickness, as I outlined in the May 18 edition of this newsletter.

Indeed, household expenditure on healthcare — which accounted for 12 per cent of US GDP last year — prevented the annual growth rate of real consumer spending from going negative in the first quarter.

Healthcare is responsible for the bulk of jobs created in Trump's second term so far

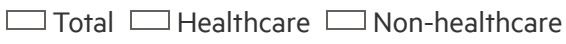
Cumulative monthly net non-farm payrolls since end of 2024 (000s)



Source: Haver Analytics, FT Graphic: Tej Parikh/@tejparikh90

Healthcare has bolstered weak household spending in recent quarters

Contributions to year-on-year growth in real private personal consumption expenditures (% points)



Source: Haver Analytics, FT graphic: Tej Parikh / @tejparikh90

FINANCIAL TIMES

More broadly, real consumer spending — which comprises around two-thirds of US annual GDP — has slowed into this year.

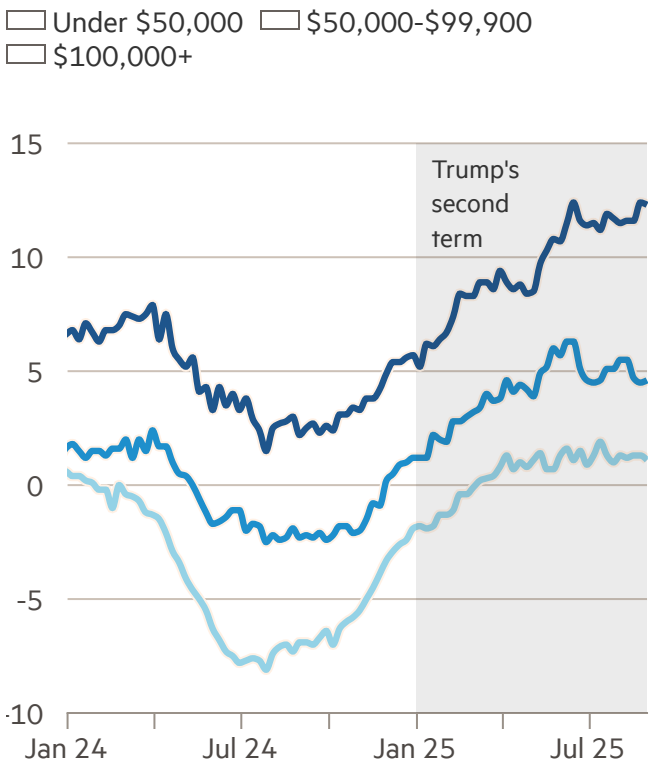
Other than healthcare expenditure, Morning Consult's new Consumer Health Index, which combines labour market dynamics with consumer sentiment to provide a gauge on near-term expenditure, suggests that high-income households have driven spending, while demand from lower-earning cohorts has tailed off.

Part of this reflects lower-earning households' greater exposure to higher interests rates and slower-growing sectors. US stock market gains — linked to the AI boom — have also largely accrued to richer individuals.

"Wealth effects will go from being a drag on consumption in the wake of the 'liberation day' tariff announcement, to a boost, as the S&P 500 is near all-time highs," says Bernard Yaros, lead US economist at Oxford Economics. "High-income, wealthy households will ride the coattails of this positive financial wealth effect."

Household spending has been driven by higher-income cohorts this year

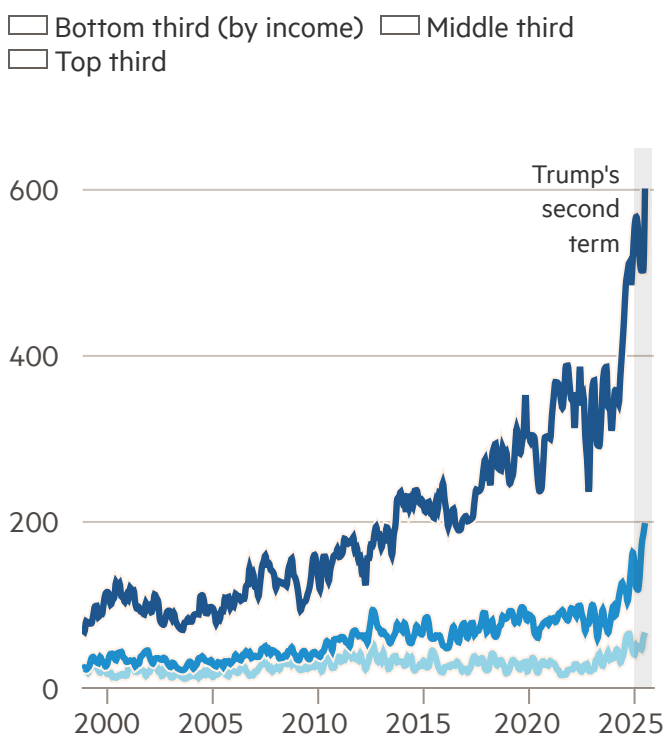
Consumer health index by income



Source: Morning Consult

Richer cohorts gain most from rising stock values

Nominal current value of stock market investments, three-month moving average (000s)



Source: University of Michigan

FINANCIAL TIMES

So, whether or not the NBER eventually declares a US recession is, in the end, a technicality.

For now, a handful of narrow growth engines are propping up an otherwise broadly slowing economy.

This highlights America's economic diversity and collective resilience, but it also shows that the absence of an official nationwide recession verdict does not spare large parts of the country from recession-like conditions.

In a system as vast, complex and uneven as the US economy, a binary judgment obscures more than it reveals.

Send your thoughts to freelunch@ft.com or on X @tejparikh90.

Food for thought

When should you leave for the airport to catch a flight? This statistical model has an answer, proving economics still has an everyday purpose.

Free Lunch on Sunday is edited by Harvey Nriapia

Artificial intelligence

Online travel platforms prepare for rise of artificial intelligence ‘agents’

Booking.com, Expedia and Airbnb face threat of a technology that could bypass them as people make travel arrangements

Online travel agents maintain agentic AI is still early in its development © Alex Wheeler/FT montage/Getty Images

Rafe Rosner-Uddin and **Mari Novik** in London

Published YESTERDAY

The world’s largest online booking platforms are preparing for the advent of artificial intelligence “agents”, signing partnerships with groups such as OpenAI in an effort to counter technology capable of arranging travel for customers without tapping their services.

Booking.com and Expedia are taking steps to deploy new AI-enabled features underpinned by models from OpenAI to automate services and launch new tools including trip planners.

Airbnb has rolled out an AI-enabled customer service agent to handle queries, while it plans to launch more “agentic” functions on its platform next year.

The moves come as makers of AI agents — autonomous bots that can take actions on behalf of users — develop technology designed to make travel arrangements for users based on their unique preferences.

This could upend the $1.6tn global travel market, allowing more hotels and airlines to be accessed directly. That would disrupt the business model of dominant online travel agents that rely on the commissions and fees they can charge those businesses.

“We don’t have to do what OpenAI, Google, Grok or Meta are doing . . . [all of whom] are having to invest incredible amounts of money to build these models,” said Glenn Fogel, chief executive of Booking Holdings, which owns the Priceline and Booking.com platforms.

“Our belief is that as long as we . . . work closely with them that we will be able to participate in a way that provides a great return for our customers and our partners,” he added.

Anthropic in late 2024 began rolling out an AI agent dubbed “computer use” that can take actions in browsers, while rivals including OpenAI and Google launched their equivalents this year.

The hotel sector, which has long complained about fees online travel platforms impose that can range between 15 per cent and 20 per cent, has heralded the technology’s potential.

Hotrec, a European hotel industry group, said AI agents showed “clear potential” to reduce hoteliers’ reliance on online travel agents but warned they could also replicate what it described as a “dependency cycle”. The lobby group argued that existing online platforms operate by using opaque ranking models and offer its members limited visibility around the return made on fees they charge to boost the visibility of properties.

Max Niederhofer, partner at Heartcore Capital, an investor in travel start-ups such as GetYourGuide, said agentic AI would help widen the possible range of providers that travellers use to find properties.

“Fundamentally, [OTAs] are parasitic . . . If [hotels] don’t have any commission to pay, that’s 20 or so per cent they can use to give [customers] other things like a better room,” he said. “Online travel agents’ ‘take rates’ are at risk.”

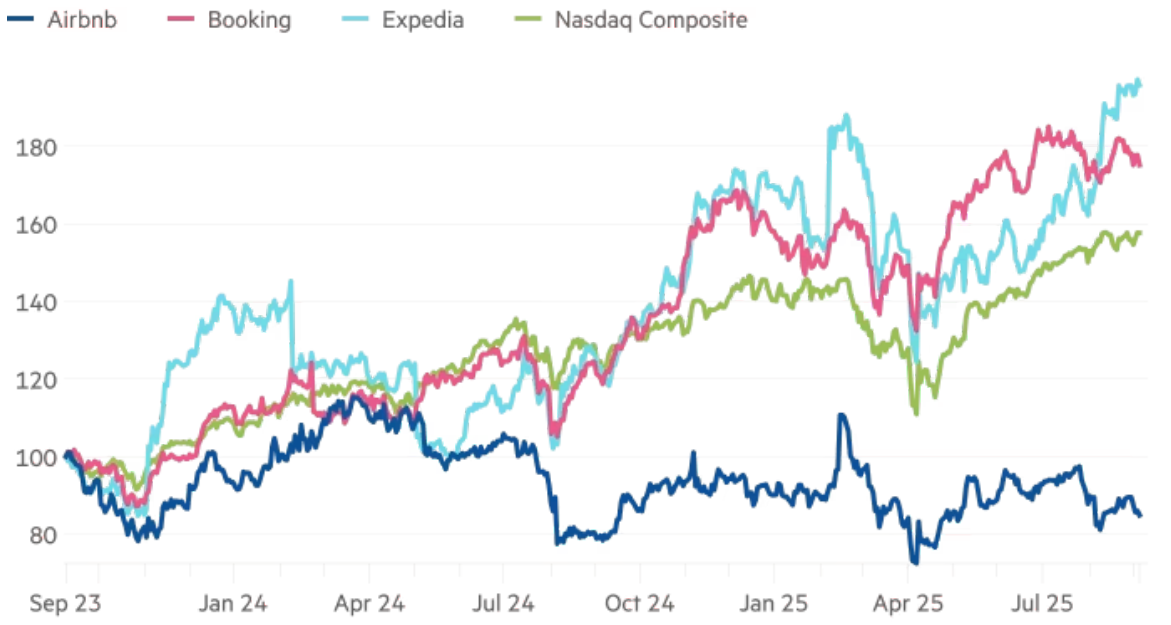
A senior executive at a global hotel chain said Booking and Expedia had spent more time in outreach in recent months amid concerns that AI tools would cut them out of the process when customers sought to book accommodation.

“There was a natural inclination and still is among investors that travel loses in an AI-first world,” said Eric Sheridan, analyst at Goldman Sachs, who noted that concerns about the technology were weighing on online travel agents’ share price alongside soft US consumer demand.

Booking and Expedia have tracked closely with the performance of the tech-heavy Nasdaq Composite this year, but have not posted the same astronomic performance seen elsewhere in the wider tech market. Airbnb shares are down nearly 6 per cent this year.

Booking and Expedia shares soar as Airbnb trails the market

Share price and index rebased in $ terms



Source: LSEG

OTAs have sought to damp these concerns by highlighting the customer support infrastructure and vast datasets including user preferences and a ready-made inventory of properties that underpin their services. They argue that replicating this would constitute a significant time and resource drain for major technology companies.

“We have a lot of data on travel behaviour [that shows] what our travellers want,” said Jochen Koedijk, Expedia’s chief marketing officer. “What sells and what doesn’t sell. That’s the really big value proposition. It’s not easy to build an online travel agency.”

Yet Fogel acknowledged the nascent technology fed into his own “paranoid view of the world”. “You’re always worried that you’re going to fall off the map,” he added.

Booking.com reached an agreement with OpenAI in 2023 to build an array of tools, including an “AI trip planner” that utilises the start-up’s models. The planner uses Booking’s own property, pricing and availability data to fine-tune the model to its customers’ needs. Rival Expedia integrated OpenAI’s models in the same year and is deploying the ChatGPT maker’s “Operator” agent system.

Airbnb chief executive Brian Chesky in early August said the platform would become “more personalised and more agentic” next year. “It will not only tell you how to cancel your reservation, it will know which reservation you want to cancel. It can cancel it for you . . . It can start to search and help you plan and book your next trip,” he said.

Unlike ecommerce group Amazon, major online travel agents have not blocked scrapers designed to pull content for AI-enabled search engines and agents such as Operator and Perplexity’s Comet browser.

Fogel said Booking Holdings would not rule out the possibility of blocking scrapers in the future. “We believe at this stage of development it is good to have conversations . . . This doesn’t mean that we won’t block in the future.”

Online travel agents maintain agentic AI is still early in its development. Researchers late last year found OpenAI's GPT4 model was able to successfully complete complex travel planning tasks only 0.6 per cent of the time.

"I am not foolish enough to say that I'm not worried about it," said Fogel. "There's no such thing as a moat."

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