Semiconductor Manufacturing: 2025 Q4

AI supports 2026 capital expenditure growth but also raises risks.

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Executive Summary

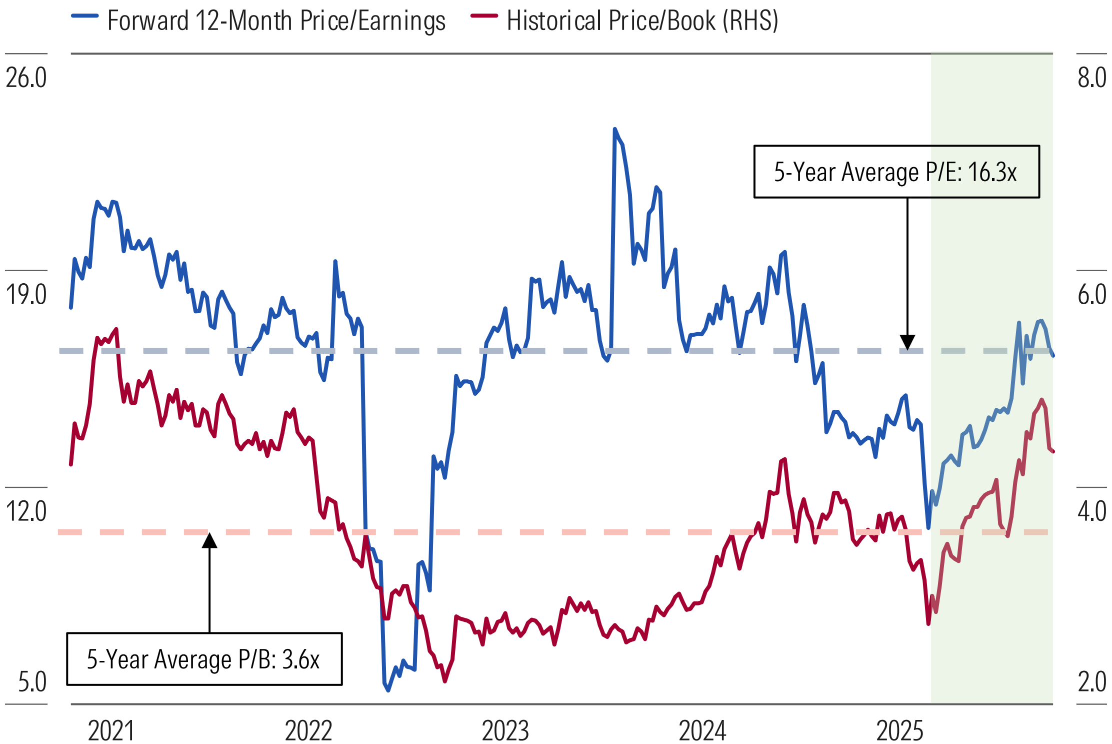
AI spending supports valuations even as consumer demand weakens.

Share Prices Jump as AI Ignites Memory Chip Fervor, but Value Lies Outside of the AI Story

Valuations of semiconductor manufacturers have soared as demand for artificial intelligence has sent memory prices skyrocketing in the past three months. While cloud service providers, with expected spending of $500 billion in 2026, will expedite industry growth, we think this is largely reflected in share prices of beneficiaries. We think companies with less exposure to AI, like automotive and industrial chip firms and their suppliers, are attractive hedges to the risk of disappointment if OpenAI's lofty spending is delayed.

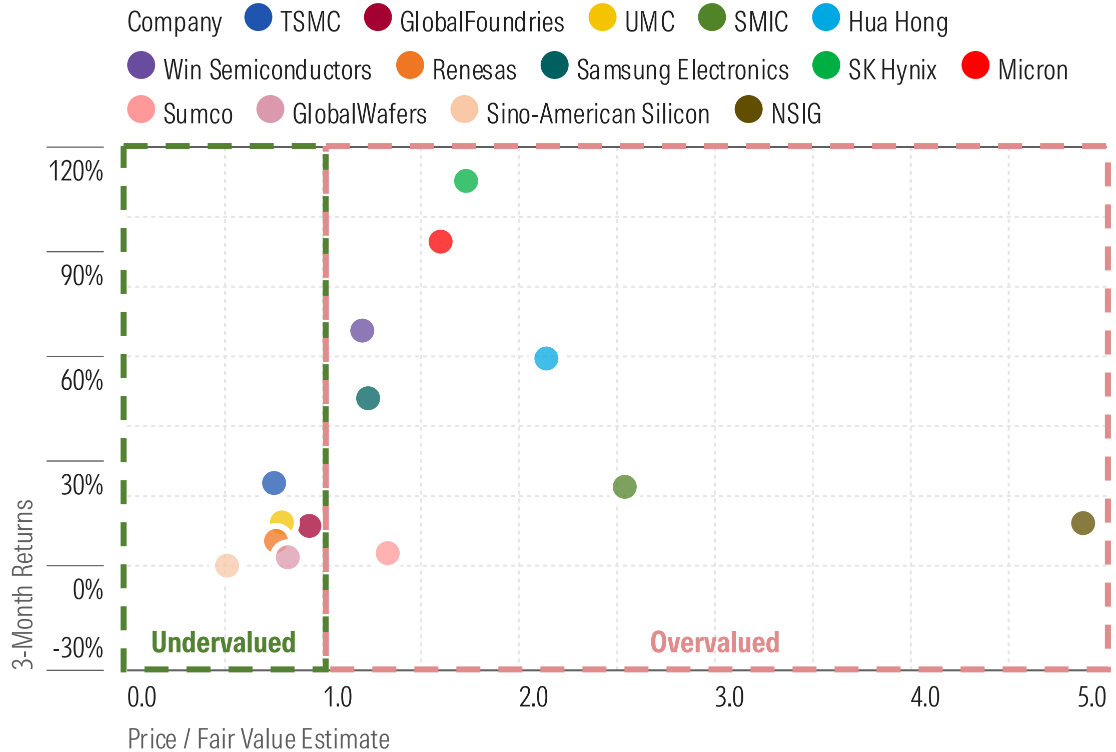
Share Price Market Ratios Rebound as the AI Spending Runway Is Extended

Market cap-weighted average including foundries, memory makers, wafer producers.



We See Poorer Risk-to-Reward Given the Recent AI-Led Stock Rally

Foundry leaders and non-AI names provide value versus memory and Chinese players.

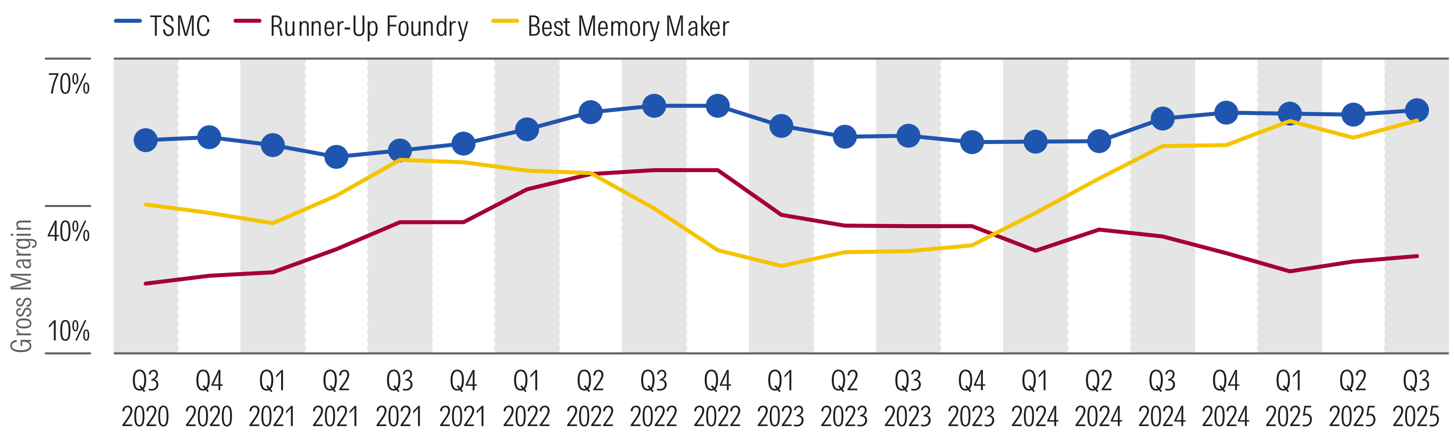


Source: PitchBook. Data as of Dec. 1, 2025.

Note: Market-cap weighted average excludes National Silicon Industry Group. TSMC = Taiwan Semiconductor Manufacturing Co. SMIC = Semiconductor Manufacturing International Corp. UMC = Unitedmicroelectronics Corp.

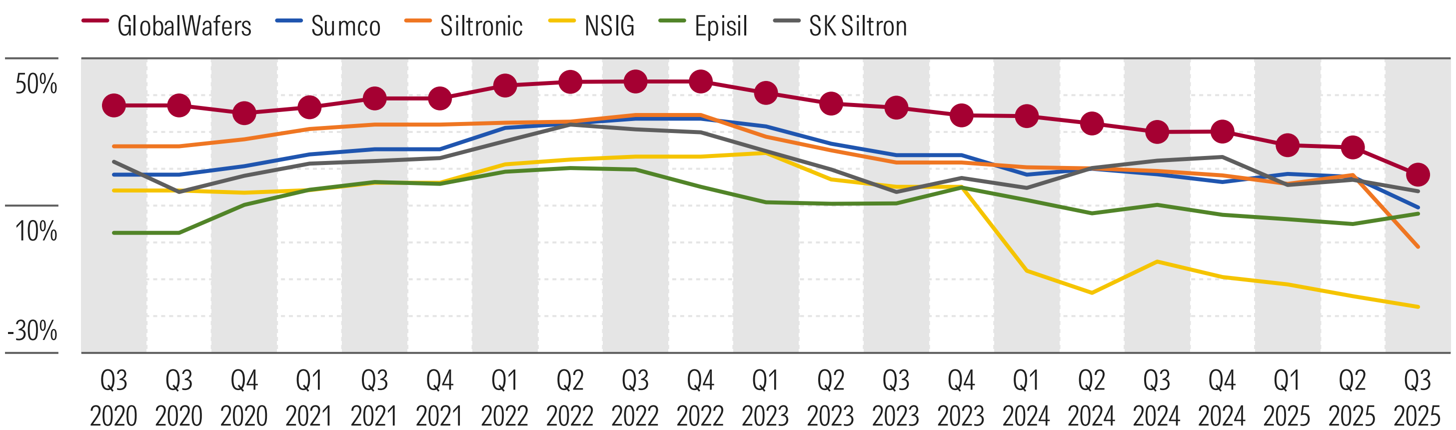
Best-in-Class Stocks Remain Sound Investments

TSMC Gross Margin Advantage Stems From a Cycle of Technology Lead, Research, and Premium Pricing



Foundries and memory makers are exposed to the intense cyclicality of the semiconductor sector. Companies with economic moats have more resilient gross margins than their no-moat peers as they can maintain higher capacity utilization through production quality and reliability in delivery. TSMC fits best among foundries. We estimate TSMC's USD 48 billion capital expenditure in 2026 is capital efficient enough to safeguard its balance sheet for a potential 2027 downturn while ensuring it doesn't miss near-term upside in AI demand.

Sino-American Silicon's (via GlobalWafers) Efficient Operations Are the Key to Its Superior Gross Margin

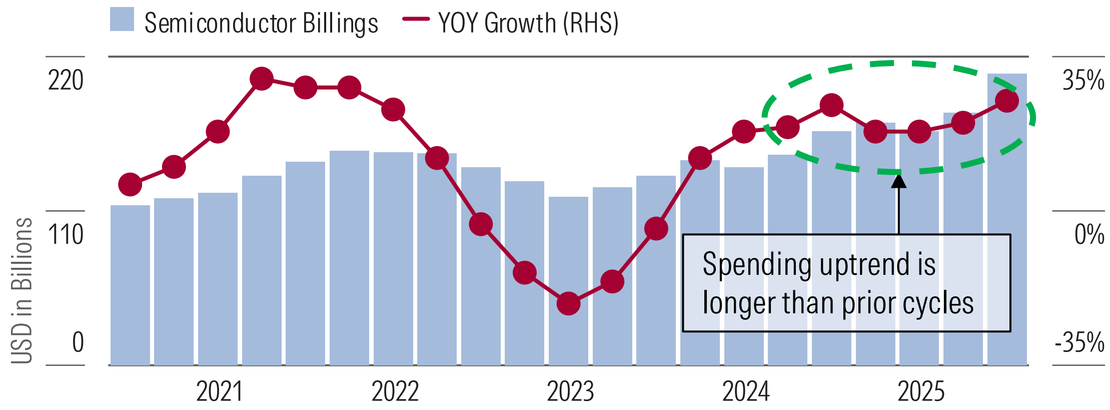


The industry's cyclicality extends to silicon wafer producers. Companies with economic moats have higher gross margins because they maintain higher capacity utilization and more exposure to cutting-edge processes. Proximity to customers is important for wafer suppliers as customers prefer to quickly replenish wafers to keep their production lines fully stocked, with tariff mitigation a bonus. SAS (via GlobalWafers) is ramping up its new site in Texas, and we expect that drives a major margin recovery in mid-2026 together with a recovery in automotive and industrial-related demand.

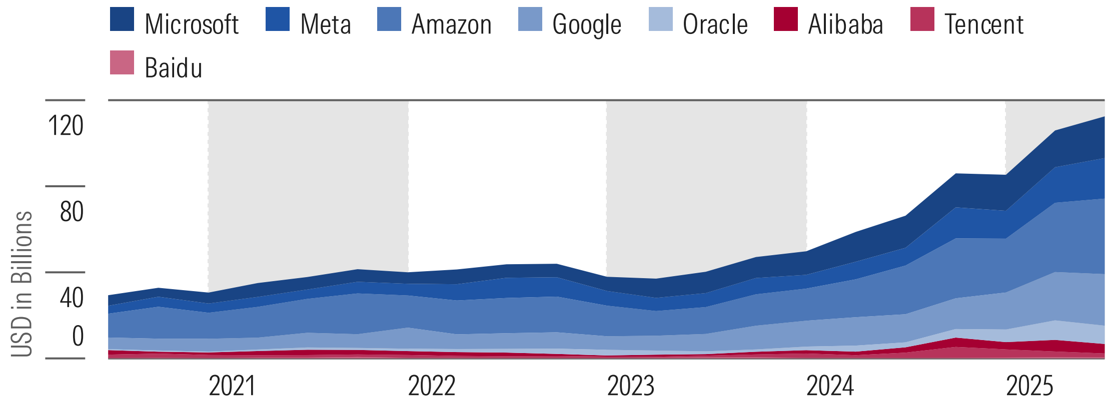
Source: Company filings, Morningstar. Data as of Sept. 30, 2025.

Enterprise Spending on AI Underpins Semiconductor Demand, Overshadowing Sluggish Consumer Sentiment

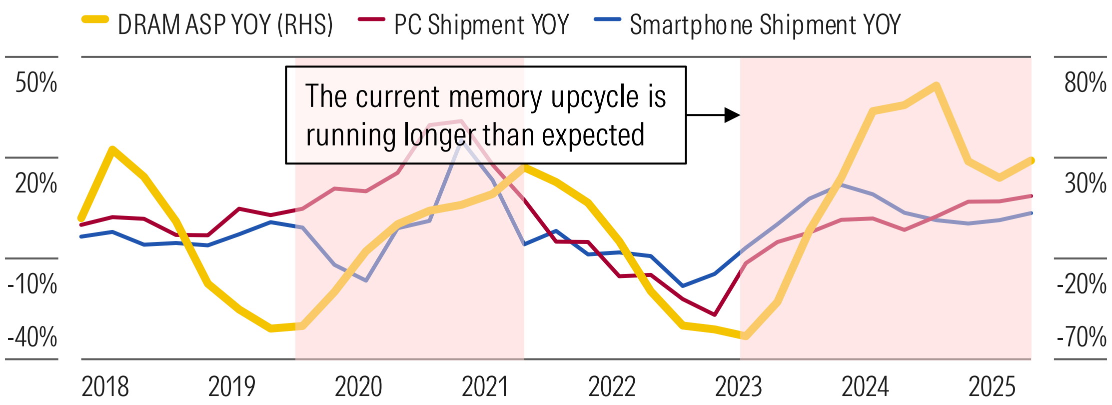
Semiconductor Billings Have Reaccelerated as AI Demand Intensifies...



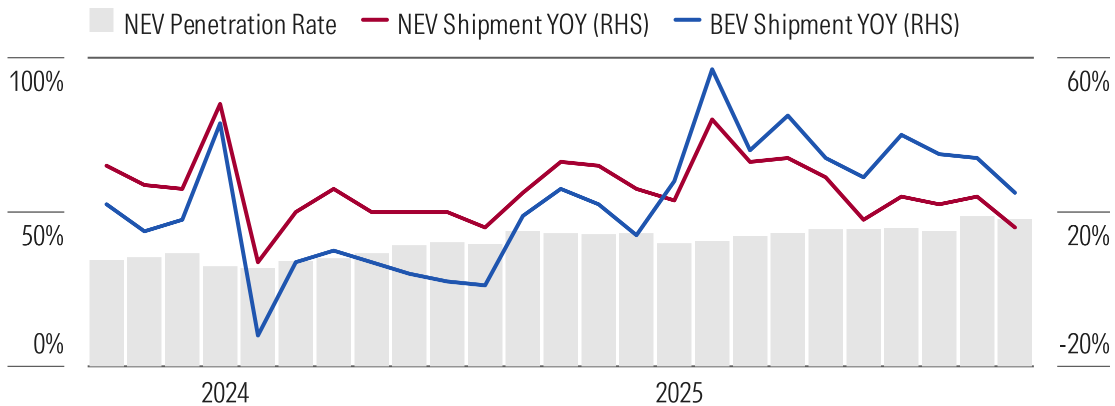
... We Push Our Cycle Peak Expectations to 2026 Due to Sticky CSP Capex



Devices Demand Likely Dragged by Surging Memory Costs...



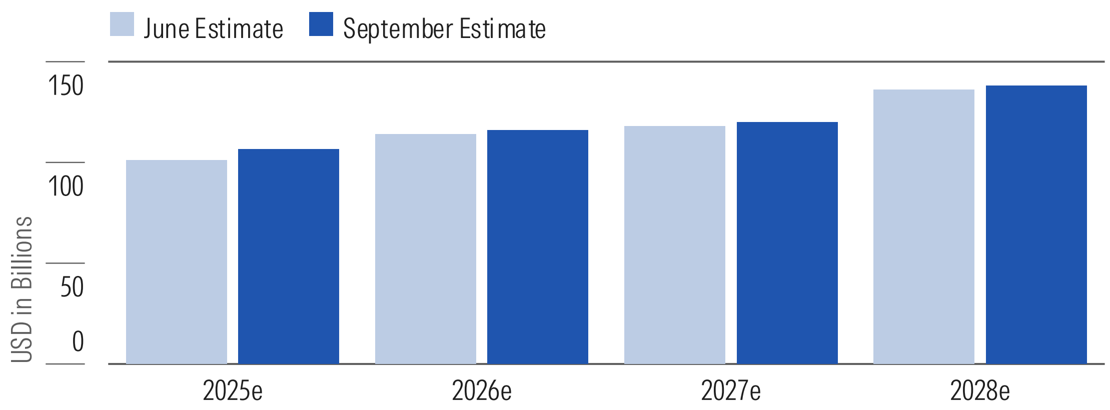
... And New Energy Vehicle Growth May Slow in 2026 as Lower Subsidies Loom



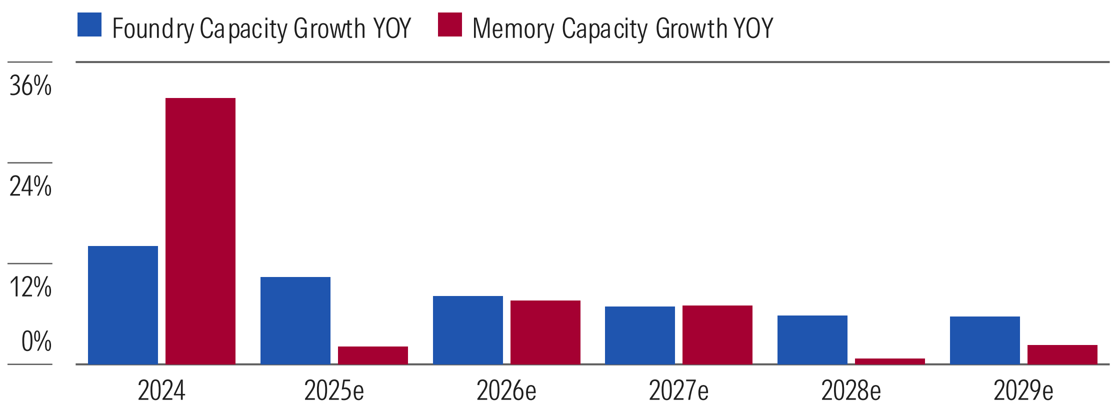
Source(s): World Semiconductor Trade Statistics (top left), Company filings (top right), IDC (bottom left). Data as of Sept. 30, 2025. European Automobile Manufacturers' Association, China Association of Automobile Manufacturers, Argonne National Laboratory (bottom right). Data as of Oct. 31, 2025.

Capex Commitments Improve Slightly, but Focus Is on Cutting-Edge Logic and High-Bandwidth Memory (HBM)

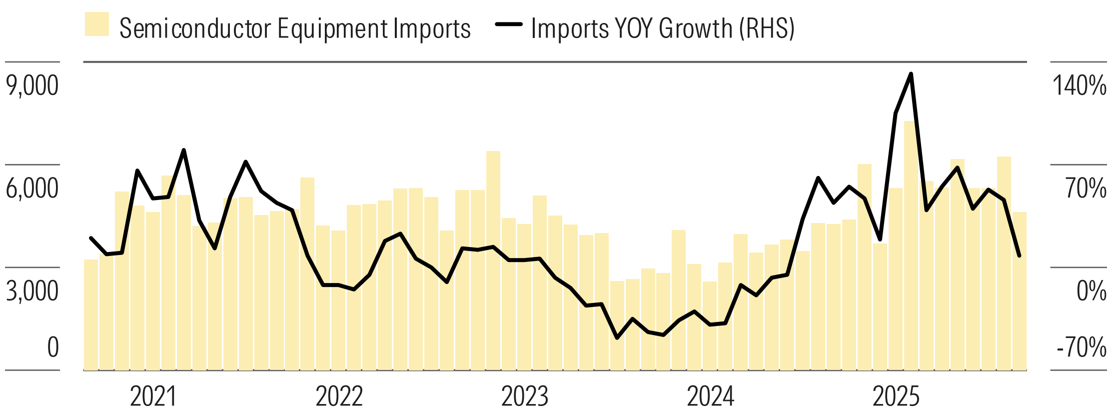
AI Lifted Capex Expectations Despite Sluggish China Consumption...



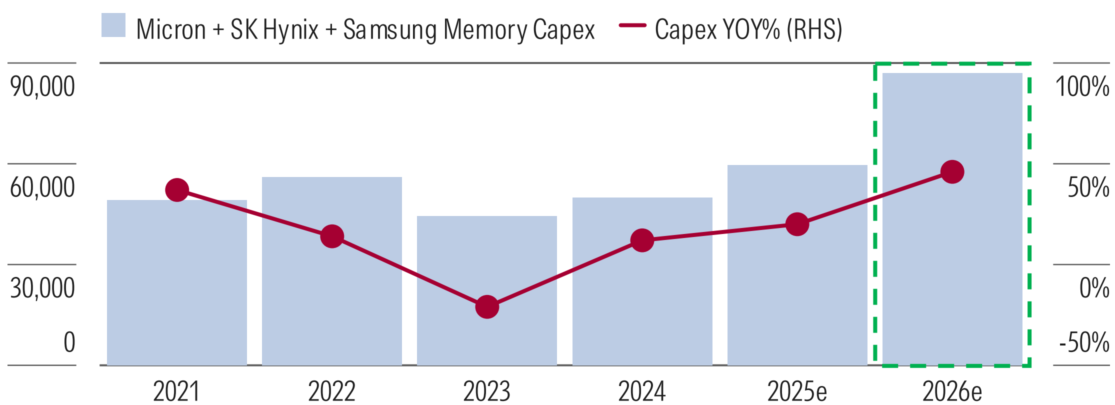
... As Strong Demand for Cutting-Edge Logic Chips and HBM Persists



Equipment Imports Data Suggests Foundry Investments Have Peaked for Now...



... But Memory Capex Looks To Reaccelerate as Incumbents Double Down on HBM



Source: SEMI. Data as of Sept. 5, 2025 (top left). Gartner (top right). Taiwan's Ministry of Foreign Affairs, Korea's Ministry of Economy and Finance. (bottom left). Data as of Oct. 31, 2025. SK Hynix, Micron, Morningstar Estimates. Data as of Sept. 30, 2025 (bottom right).

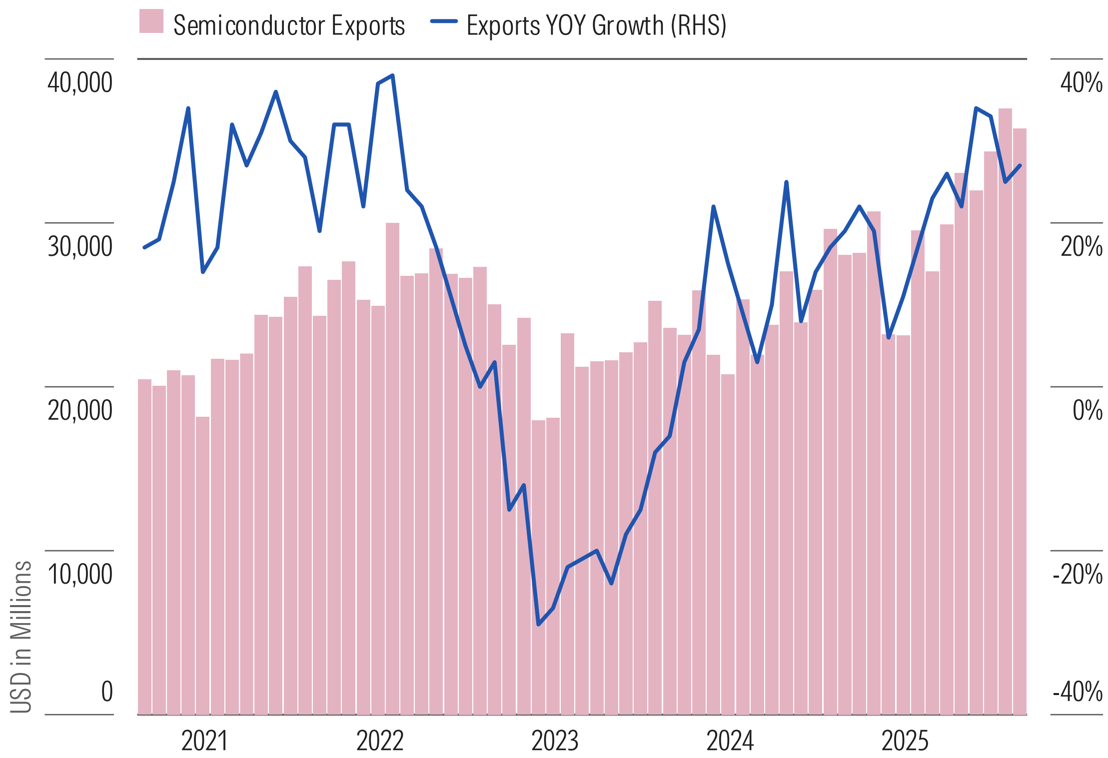
Demand Outlook

AI leads chip demand, but non-AI outlook remains bumpy near term.

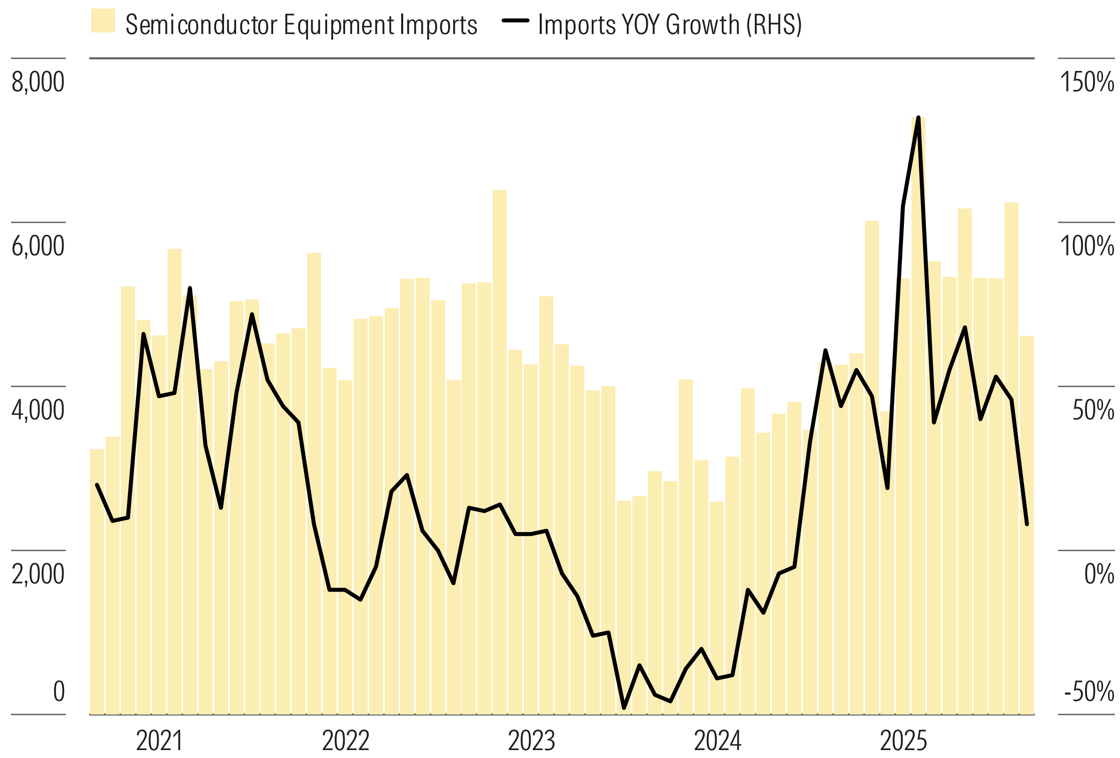
Cautious Capital Spending Backs Our View That Non-AI Demand Is Not Recovering Fast Enough

A typical semiconductor cycle lasts about four years. We believe the ongoing frenzy in AI investments is helping the sector to stretch the upcycle. Exports remain strong, suggesting buyers are keen to put their hands on expensive AI chips, but slower equipment imports growth points to reticence in capacity expansion and a preference for targeted debottlenecking. A more pronounced demand recovery in automotive and industrial chips is needed to achieve a marked uptick in investment.

Export Data Growth Shoots Up After Brief Pause...



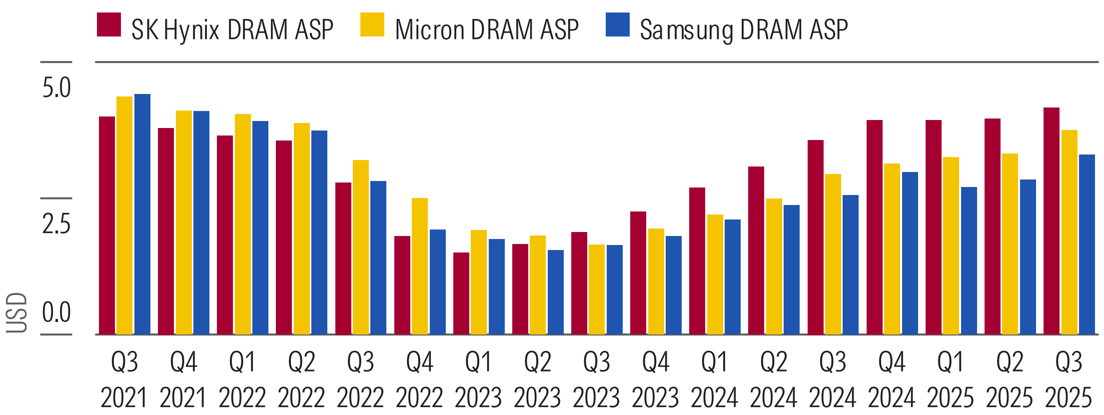
...But Sluggish Automotive and Industrial Outlook Limits Demand



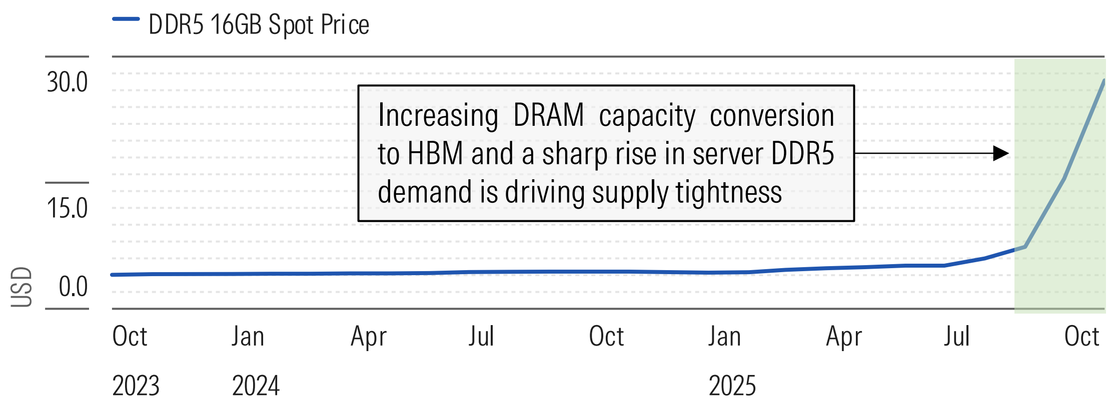
Source: Taiwan's Ministry of Foreign Affairs, Korea's Ministry of Economy and Finance. Data as of Oct. 31, 2025.

AI Continues To Underpin Memory Demand Into 2026, Supporting Sticky Near-Term Conventional Memory Prices

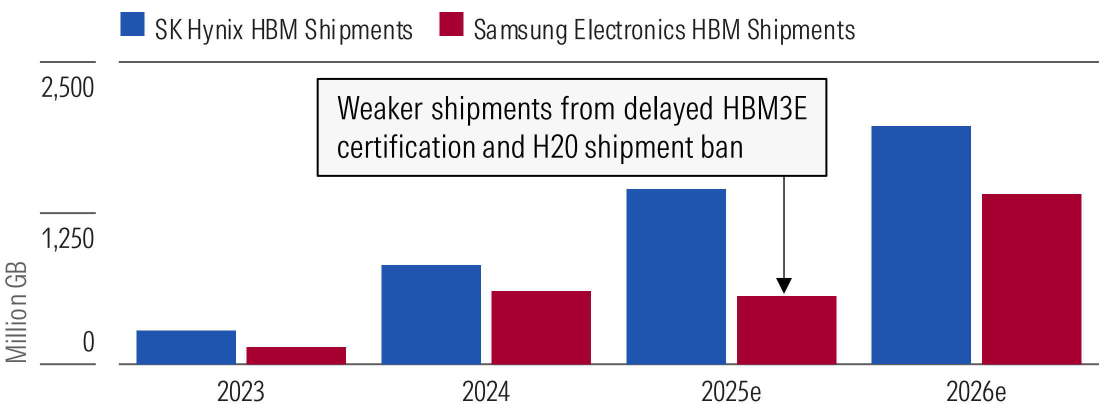
Strong AI Demand for HBM and Conventional Products Drive Higher DRAM ASPs...



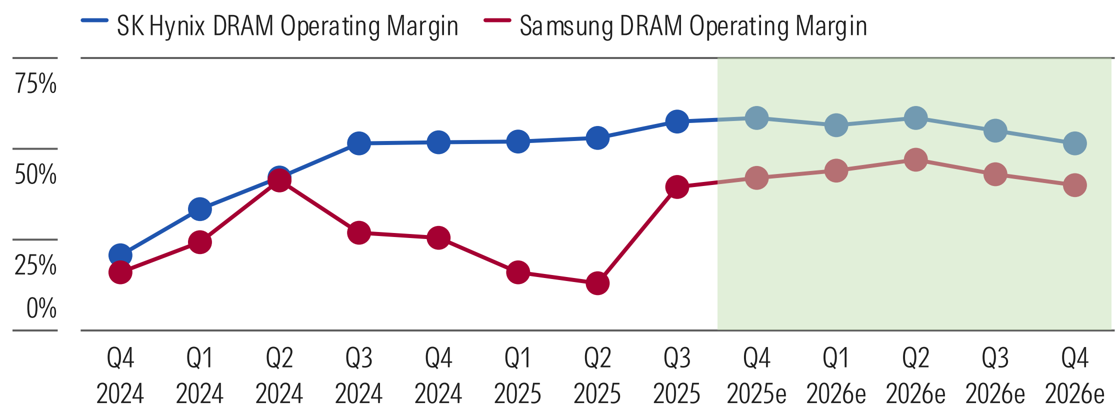
... With DDR5 Prices Skyrocketing Quarter to Date as Near-Term Shortages Surface



2026 HBM Capacity Is Sold Out, Providing Growth and Visibility in the Near Term...



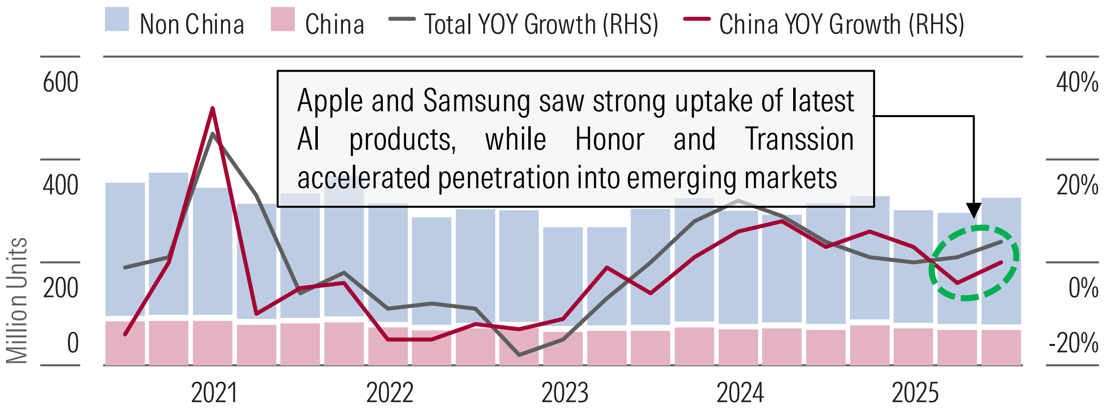
... We Expect Resilient Profitability for Memory Players for the Next Few Quarters



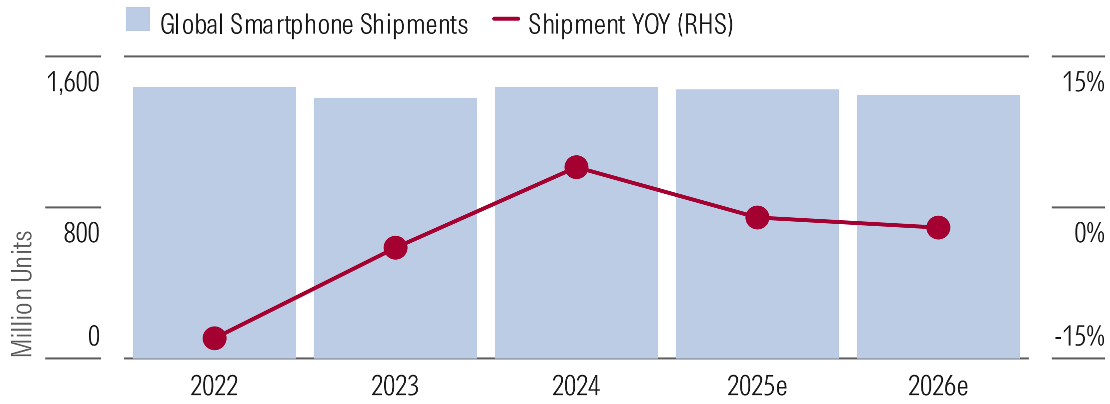
Source: Trendforce. Data as of Dec. 1, 2025 (top right). Micron, Samsung, SK Hynix, IDC, Morningstar estimates. Data as of Sept. 30, 2025 (top left, bottom left, bottom right).
Note: DRAM = Dynamic Random Access Memory. DDR = Double Data Rate. DDR products are considered conventional DRAM products, and DDR5 represents the fifth generation DDR product.

Higher Prices Weigh on Smartphone Demand Recovery in 2026, but Corporate Spending on AI Remains Resilient

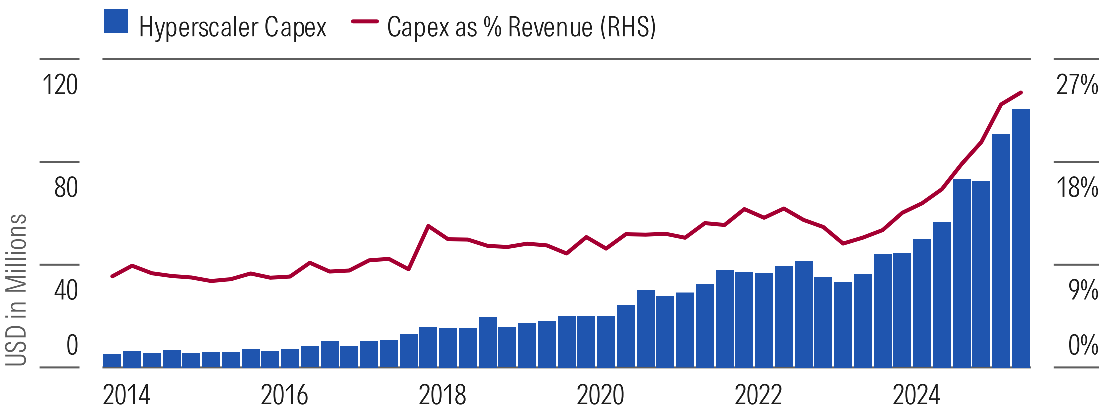
AI Features and Camera Upgrades Helped Smartphone Volumes in 2025, but...



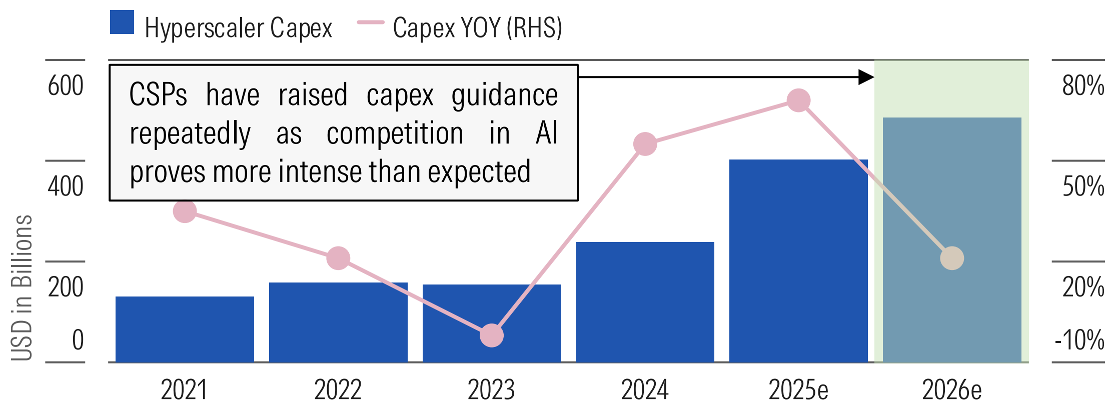
... We See Weak 2026 Smartphone Demand as High Memory Costs Drive ASP Hikes



CSP Capex Continues To Reach New Highs as the AI Arms Race Continues...



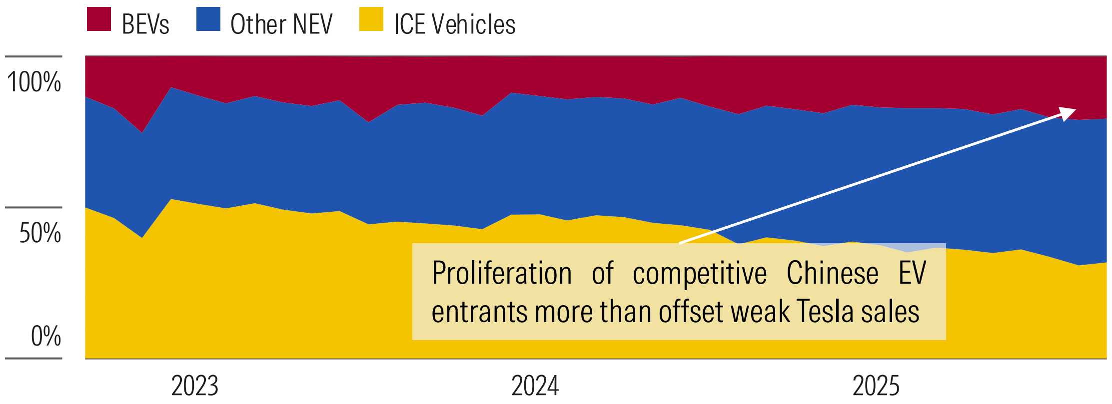
... And We Expect Sticky AI Investment in 2026 as CSP Commitments Increase



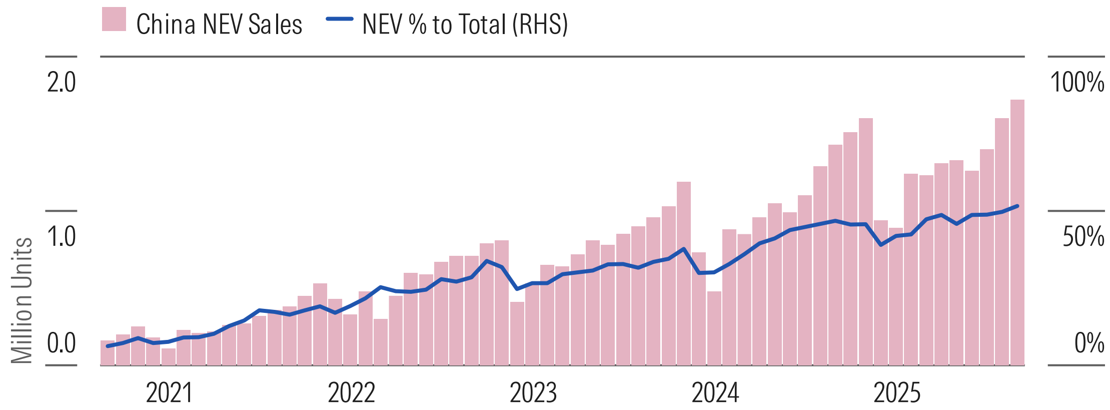
Source: IDC. (top left, top right). Company filings, Morningstar estimates. (bottom left, bottom right). Data as of Sept. 30, 2025.

Our Long-Term View on Electrification Is Maintained, but We See Pockets of Weakness in the Near Term

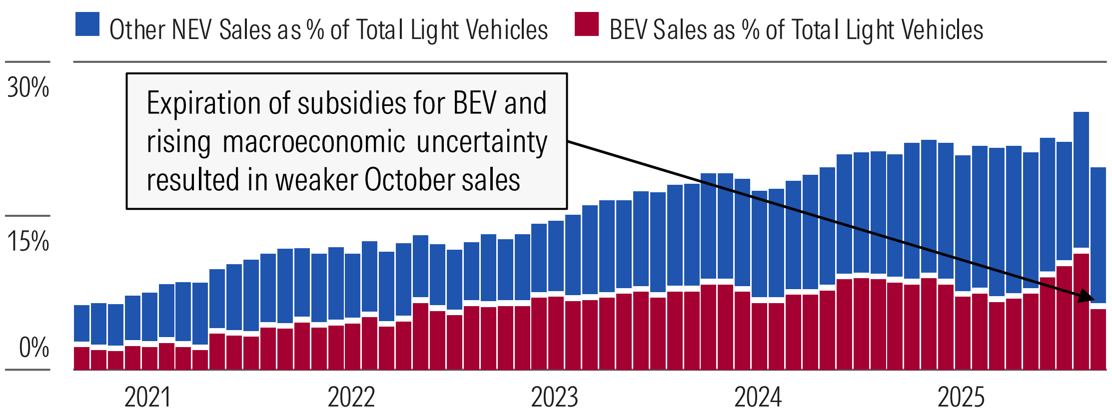
Europe's NEV Penetration Improves, Led by Cheaper PHEV and BEV Options...



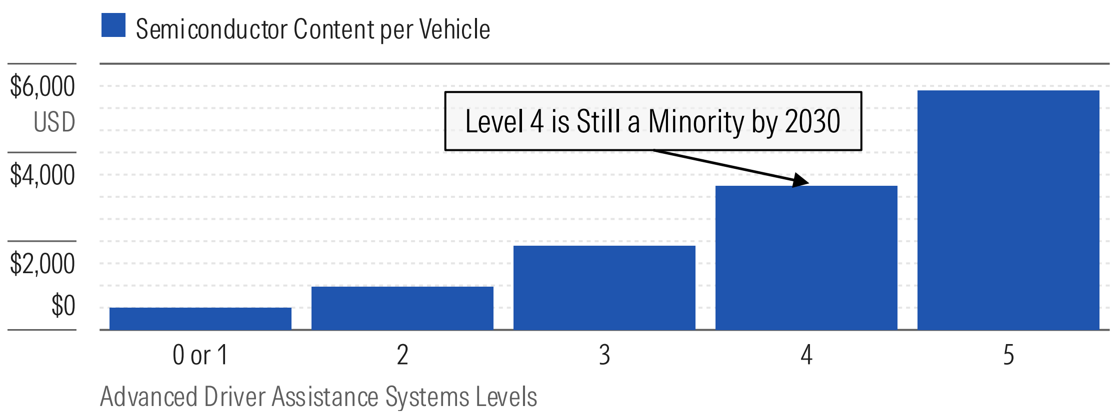
... Penetration Far From Mature in China, Where NEV Adoption Is Steadily Growing



US NEV Adoption Still Has Upside, but Near-Term Demand Looks Shaky...



Room for Growth Remains as BEV's ADAS Capabilities Evolve



Source: ACEA (top left), CAAM (top right), Argonne National Laboratory (bottom left), PwC (bottom right). Data as of Oct. 31, 2025.
Note: Europe includes European Union and European Free Trade Association member states, plus the UK. ICE = Internal combustion engine. BEV = battery electric vehicles. PHEV = plug-in hybrid electric vehicles., NEV = new energy vehicles.

Supply Outlook

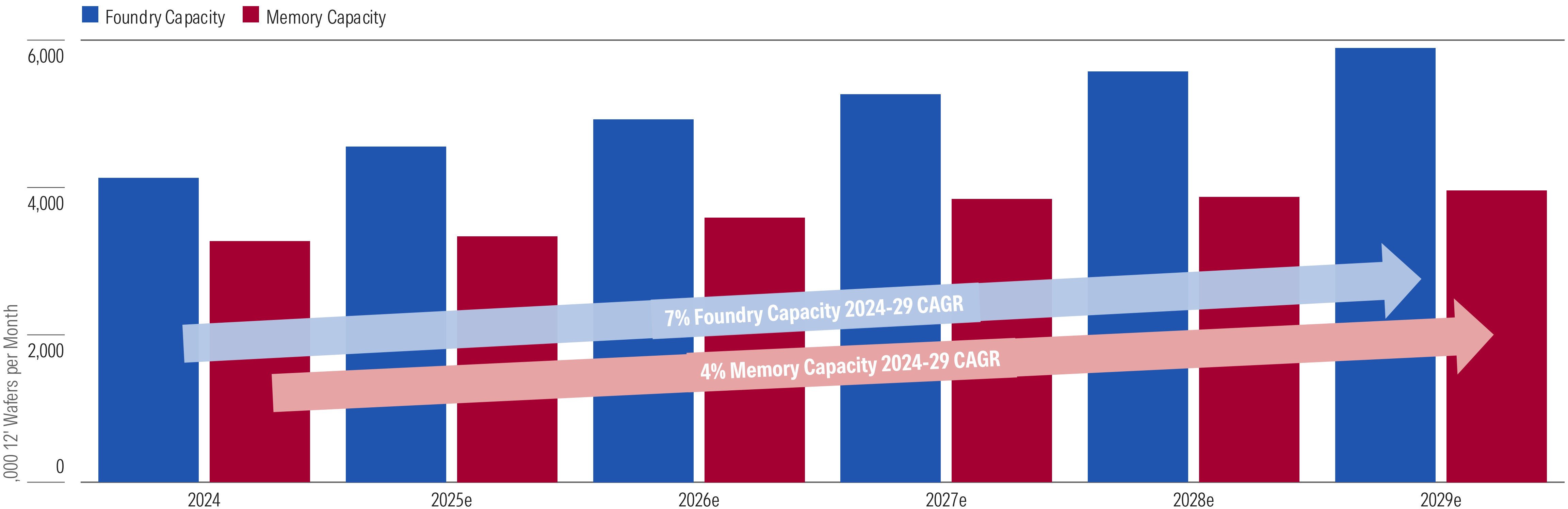
Technology gaps weaken China’s spending; ex-China investments stay AI-heavy.

AI and Supply Chain Security Drive Increasing Capital Expenditure Expectations

We expect capex to be profitable for both memory and foundry segments in the long run. Compared with previous cycles, there will be more mature-node foundry capacity as high-quality sensors and power control chips are crucial for supply chain security. Net capacity increase in memory is more subdued, mostly from HBM chips. Capex allocated to upgrading existing fabs to produce a newer generation of non-AI memory do not lead to net additions. Fast price erosion expectations have deterred large investments in commoditized products.

Semiconductor Capacity Is Driven by AI Investments, Mature-Node Security Needs, and Conversion From Legacy Industrial Products

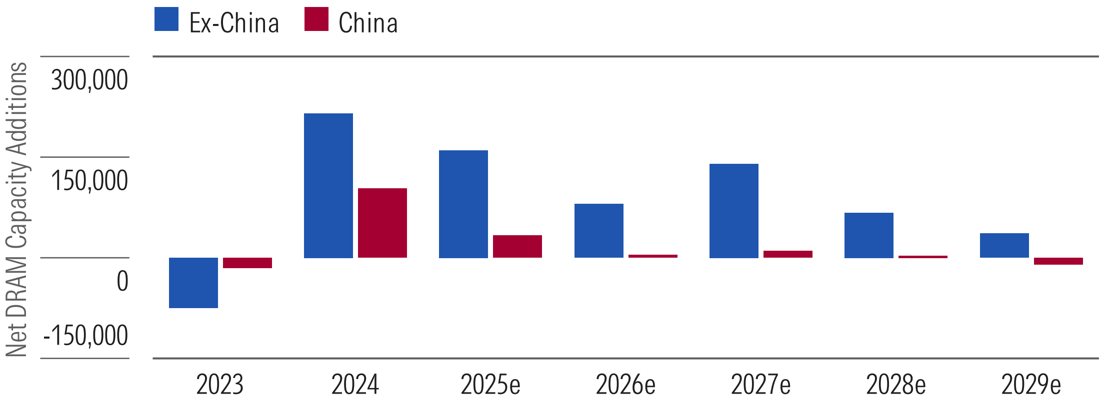
Data centers, autonomous systems, smart factories, and humanoid robots all justify long-term capacity additions.



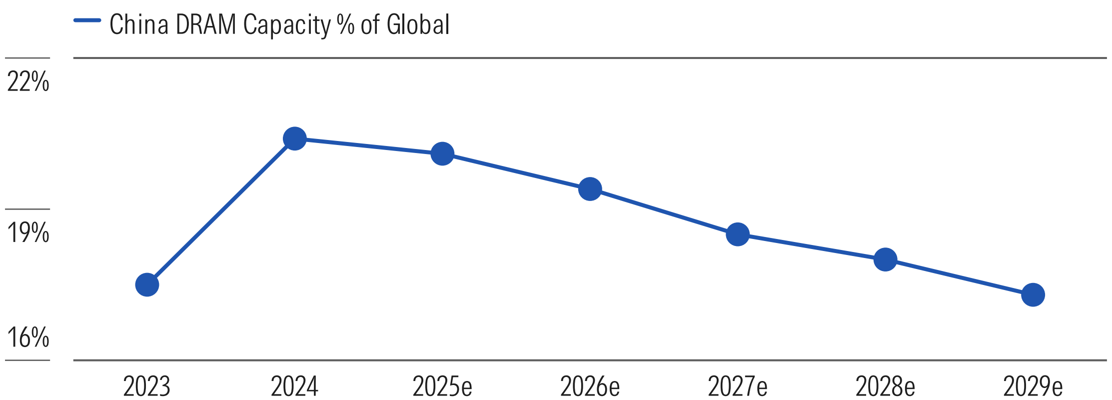
Source: SEMI, Gartner. Data as of October 2025.
Note: Capacity and shipments are quoted in 300mm (12-inch) equivalent wafers per year.

China's Rapid Expansion Has Little Effect on Cutting-Edge Foundry and DRAM Supply

China's Memory Expansion Slowed by Trade Restrictions and Technological Gaps…

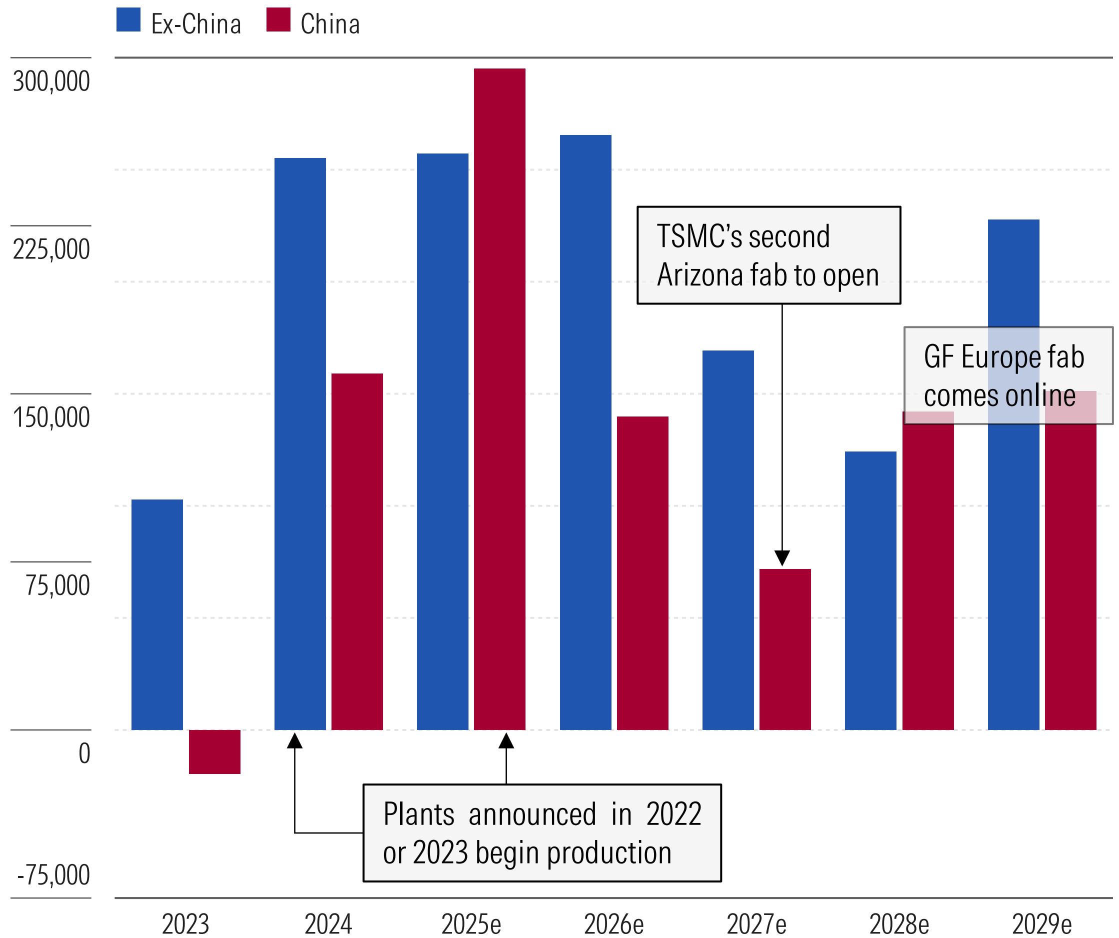


… As Delays in Commercialization of Latest Products Hold Back Further Expansion



Chinese Foundries Do Not Have Enough Cashflow to Expand More Quickly

Chinese foundry announcements peaked in 2022 and focus on 28nm node.



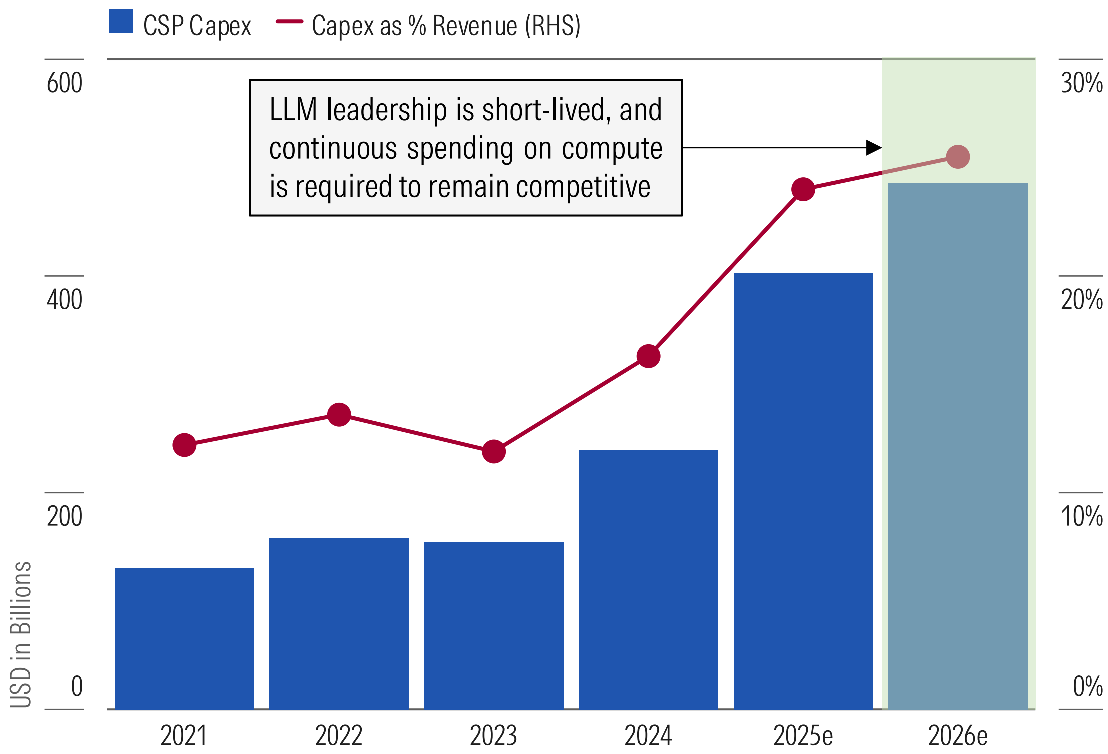
Source: Gartner, Morningstar. Data as of Sept. 30, 2025.
Note: Capacity is quoted in 300mm (12-inch) equivalent wafers per month unless otherwise specified.

Memory Capital Expenditures Look to Reaccelerate as Shortages Appear for Both HBM and Conventional DRAM

AI spending has been much stickier than the market anticipated as CSPs race to eke out a lead in AI model capabilities, leading to a growing shortage for both HBM and DDR5. We expect memory players to increase capex in response to the resilient demand by accelerating ongoing project timelines, expanding project budgets and restarting dormant projects. However, as these projects remain heavily focused on HBM and come online beyond 2026, we believe both conventional DRAM and HBM will remain undersupplied in the near term.

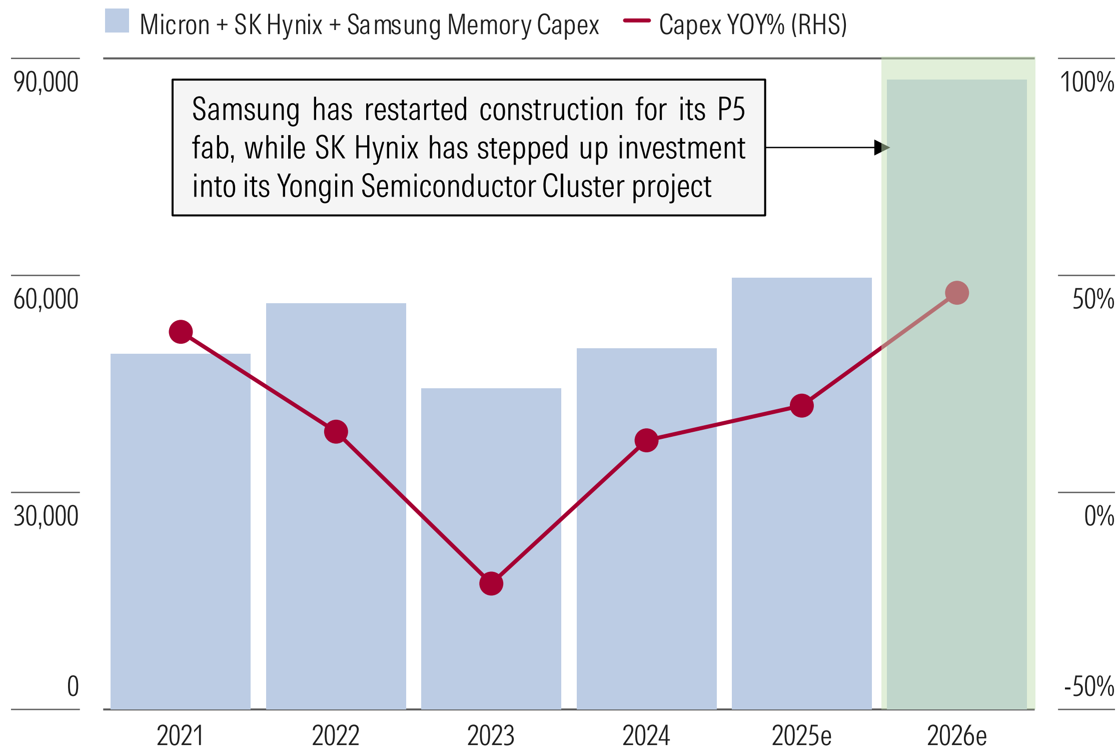
CSP Capex Guides Overshot Our 2025 Peak Expectations on Higher AI Spending...

We expect AI capex by CSPs to grow 21% year over year as leadership race continues.



...We Expect Memory Leaders to Invest More but See Little Supply Relief Near Term

Meaningful capacity will only come in 2027 from SK Hynix and Micron, largely for HBM.

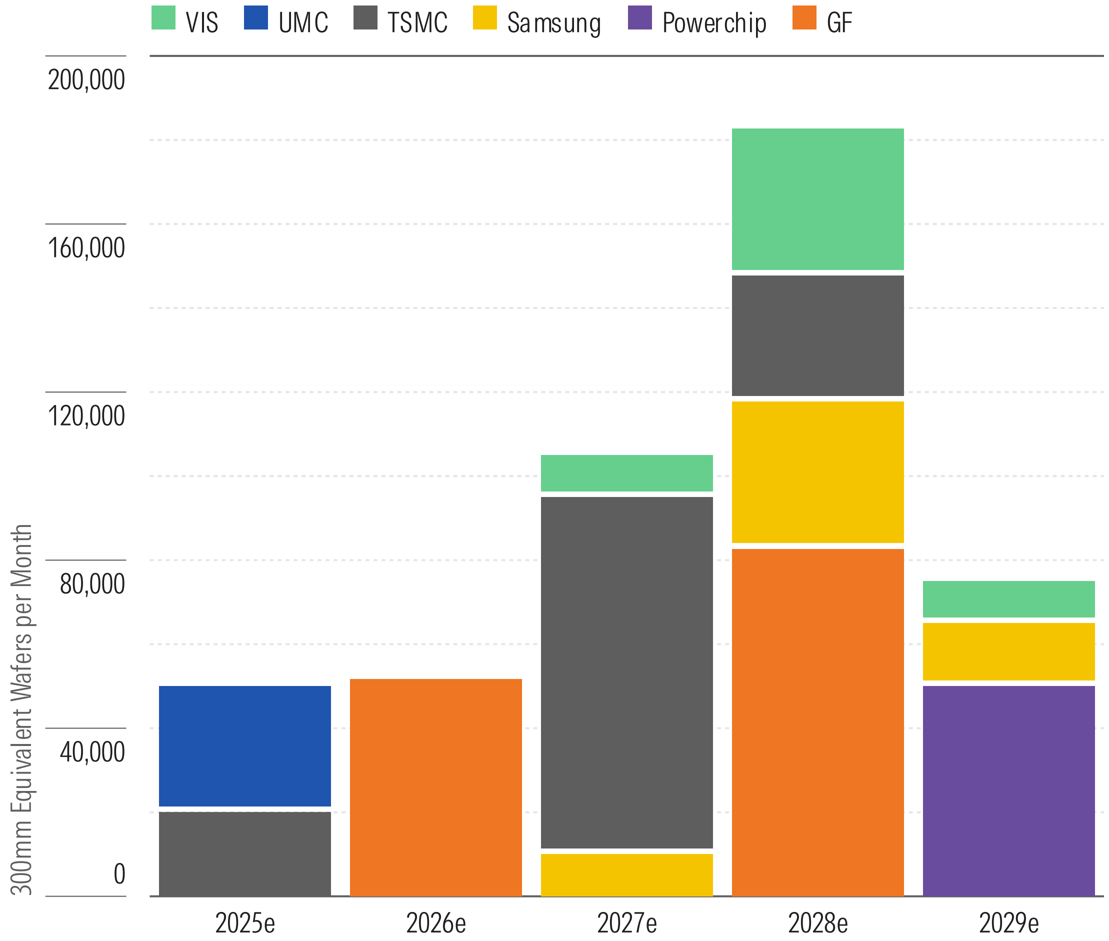


Source: Alphabet, Amazon, Microsoft, Meta, Oracle, Morningstar estimates (Left). SK Hynix, Micron, Samsung Electronics, Morningstar estimates (Right), Data as of Sept. 30, 2025.

While Building Factories Outside Home Countries Is in Vogue, Asia Is Still Preferred

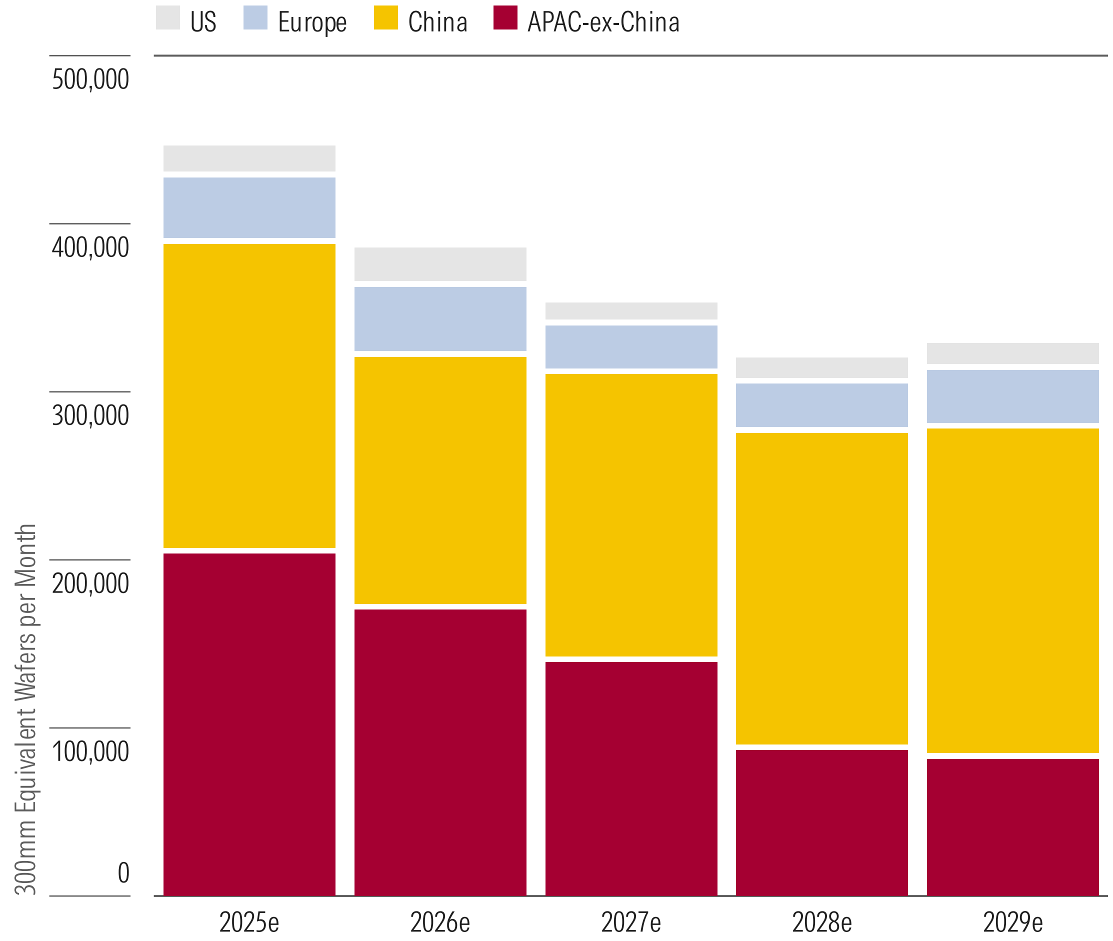
Most Manufacturers Are Hedging Geopolitical Risks With Overseas Sites

Overseas capacity pipeline by firm, TSMC, Samsung, and GF are the most proactive.



... But Asia Remains the Top Choice Despite Western Subsidies and Tariffs

Breakdown of all expansion plans by region, APAC still makes up 90% of pipeline.



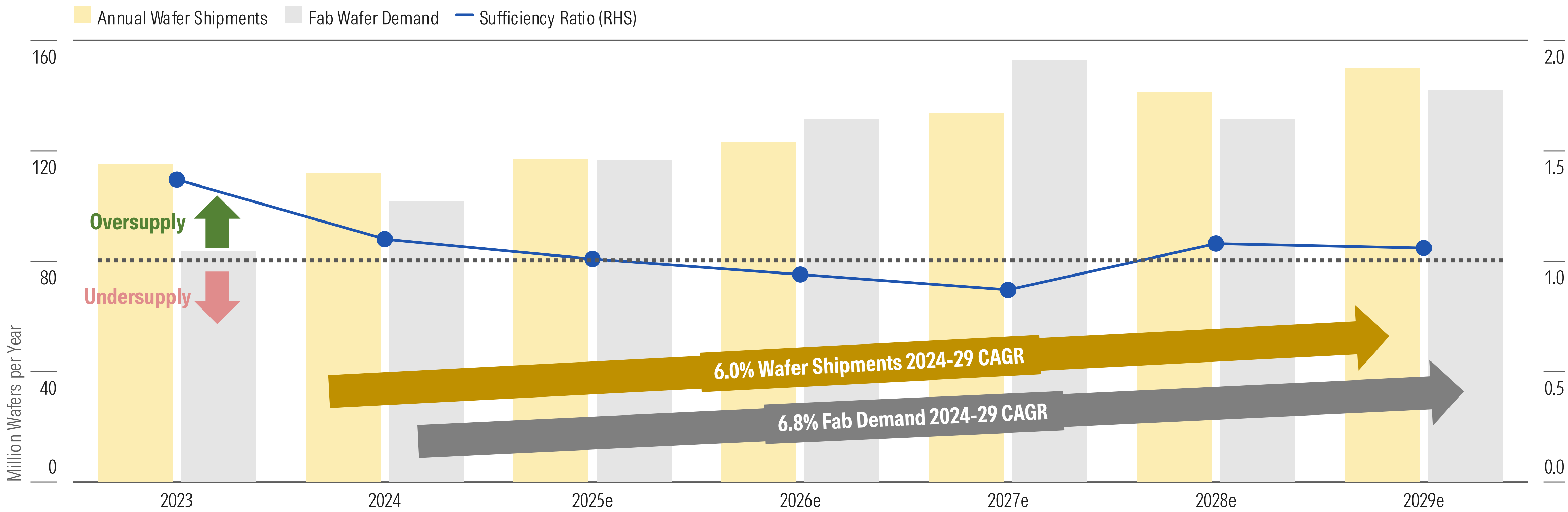
Source: Company filings, Gartner, Morningstar estimates. Data as of Sept. 30, 2025.
Note: Overseas is defined as regions outside a company's headquarters. Powerchip and Vanguard International (VIS) are not covered by Morningstar.

Silicon Wafer Supply at Low Risk of Structural Glut

We see a low risk of structural oversupply of silicon wafers over the long term. Wafer shipments for 2024 dropped 2.7% year on year but could see a 4.5% rebound in 2025 (first nine months actual: 5%) as HBM, automotive, and industrial improve. We estimate wafer shipments to grow slower than fabrication capacity in the next five years since wafer producers are disciplined about expansion. Thus, we believe the risks of price erosion will also be modest.

Semiconductor Fabrication Capacity Outpaces Wafer Shipments for the Next Five Years

We see low risk of structural oversupply and price wars.



Source: SEMI, Gartner. Data as of Sept. 30, 2025.
Note: Capacity and shipments are quoted in 300mm (12-inch) equivalent wafers per year.

Top Picks and Coverage

Non-Chinese foundries are attractive. Memory names are grossly overvalued.

We Prefer TSMC and Sino-American Silicon Among Semiconductor Manufacturers

Semiconductor Manufacturers Coverage List

Ex-China foundries, Sino-American Silicon, and Renesas are undervalued, while we see memory players as overvalued as we disagree with optimistic expectations of lower cyclicality.

Company	Ticker	Industry	Market Cap (US$'b)	Moat Rating	Uncertainty Rating	Trading Currency	Last Close	Fair Value Estimate	Star Rating	P/FVE	2025 P/E	P/B	3M Return	1Y Return
Taiwan Semiconductor Manufacturing Company	NYS:TSM	Semiconductors	1,164.20	Wide	Medium	USD	287.68	310.00	★★★	0.93	27.52	9.10	26.3%	49.5%
Taiwan Semiconductor Manufacturing Company	TAI:2330	Semiconductors	1,164.20	Wide	Medium	TWD	1,410.00	1,900.00	★★★★	0.74	21.96	7.32	22.0%	38.0%
GlobalFoundries	NAS:GFS	Semiconductors	19.94	None	High	USD	35.88	40.00	★★★	0.90	21.88	1.70	8.2%	-20.5%
United Microelectronics	TAI:2303	Semiconductors	18.59	None	High	TWD	46.50	60.00	★★★★	0.78	13.86	1.63	13.7%	10.7%
Semiconductor Manufacturing International	HKG:00981	Semiconductors	85.86	None	High	HKD	69.45	27.00	★	2.57	99.08	3.38	14.4%	163.1%
Hua Hong Semiconductor	HKG:01347	Semiconductors	18.97	None	High	HKD	74.90	34.00	★	2.20	231.44	2.64	52.2%	262.7%
Win Semiconductors	ROCO:3105	Semiconductors	1.90	None	High	TWD	141.00	126.00	★★★	1.12	55.95	1.51	57.4%	20.9%
Foundry Market Cap-Weighted Average										0.89	29.99	6.82	21.6%	48.1%
Renesas Electronics	TKS:6723	Semiconductors	20.99	Narrow	High	JPY	1,809.50	2,390.00	★★★★	0.76	(63.05)	1.61	4.9%	-8.9%
Integrated Device Manufacturer Market Cap-Weighted Average										0.76	(63.05)	1.61	4.9%	-8.9%
Samsung Electronics	KRX:005930	Consumer Electronics	445.10	None	High	KRW	100,800.00	84,000.00	★★	1.20	18.14	1.68	46.4%	90.8%
SK Hynix	KRX:000660	Semiconductors	252.75	None	Very High	KRW	538,000.00	323,000.00	★★	1.67	10.08	3.72	106.7%	240.3%
Micron Technology(Computer Hardware)	NAS:MU	Semiconductors	270.60	None	High	USD	240.46	150.00	★	1.60	29.61	4.98	103.1%	144.5%
Memory Market Cap-Weighted Average										1.43	19.24	3.13	78.0%	144.8%
Sumco	TKS:3436	Semiconductor Equipment & Materials	2.81	None	High	JPY	1,254.00	950.00	★★	1.32	(56.92)	0.74	2.0%	5.7%
Global Wafers	ROCO:6488	Semiconductors	5.76	Narrow	High	TWD	378.50	460.00	★★★★	0.82	25.20	2.02	6.3%	-7.5%
Sino-American Silicon Products	ROCO:5483	Semiconductor Equipment & Materials	2.02	Narrow	High	TWD	103.50	203.00	★★★★★	0.51	17.84	1.35	3.5%	-29.9%
National Silicon Industry Group	SHG:688126	Semiconductor Equipment & Materials	10.00	None	High	CNY	22.15	4.60	★	4.82	(2,274.83)	5.39	1.1%	2.3%
Silicon Suppliers Market Cap-Weighted Average										2.80	(1,103.36)	3.42	2.9%	-3.1%
Overall Market Cap-Weighted Average										**1.13**	**14.59**	**5.20**	**44.8%**	**87.5%**

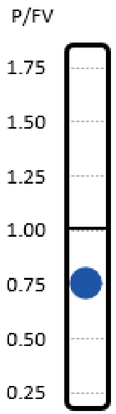
Source: PitchBook. Data as of Dec. 2, 2025.

TSMC Is a Primary AI Beneficiary; SAS Is an Undervalued Monopoly With a Large Holding Discount

TSMC Is the Dominant Foundry With All-Round AI Exposure

Taiwan Semiconductor Manufacturing Company (TAI:2330)

Market Cap	Moat Rating	Last Close	Fair Value Est.	Rating
1180.03B USD	Wide	TWD 1,430	TWD 1,900	★★★★



TSMC has been benefiting from burgeoning demand for cutting-edge artificial intelligence chips, which has boosted its market share in the foundry market to just over 70% in 2025 year to date. It is immune from shifts between cloud AI and edge AI, and between bespoke and off-the-shelf chips, as all these groups rely on TSMC's supply. We believe TSMC's average selling prices will increase as demand for its latest and future processes grows, and volume will benefit from bigger chips to ensure AI features on both servers and devices run smoothly.

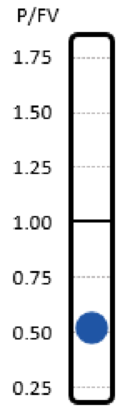
We think TSMC has managed geopolitical risks well. Its commitment to invest USD 165 billion in the US may earn an exemption from semiconductor tariffs. Recent news of TSMC suing a former senior staff member who moved to Intel has no effect to our long-term view as TSMC has framed it as a trade secret case rather than a non-compete case. Non-competes cannot be enforced in California, where Intel is based.

Shares are trading at 19 times 2026 P/E, which we view as undervalued given TSMC's dominant position and strong EPS growth in the coming two years.

Sino-American Silicon Is Our Pick for Its Valuation and US Monopoly

Sino-American Silicon Products (ROCO:5483)

Market Cap	Moat Rating	Last Close	Fair Value Est.	Rating
2.04B USD	Narrow	TWD 104.50	TWD 203	★★★★★



We believe SAS is an undiscovered gem as its subsidiary, GlobalWafers, is expanding globally to benefit from growing silicon wafer demand. For example, HBM needs 3 times the amount of silicon to make wafers compared with conventional DRAM of the same capacity. A potential recovery in non-AI applications like EVs and industrials in 2026 is a secondary driver.

SAS, through its GlobalWafers subsidiary, has opened phase 1 of its new 300mm wafer plant in Texas, next to customers like Intel and Texas Instruments. It is the first new 300mm wafer plant in the US and likely the only one that can supply wafers used in cutting-edge processes. While SAS has not committed to new phases, being called out by Apple could mean incremental upside from Apple's suppliers like Texas Instruments.

Shares are trading at 9 times 2026 P/E, which we think is undervalued given SAS' effective monopoly in the US. It trades with a low-40s holding discount compared with its stake in GlobalWafers, which we find unwarranted as other major subsidiaries are profit-making.

Source: Morningstar. Data as of Dec. 2, 2025.

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