TSMC (2330 TT/TSM US) The Leader of Fab Foundry with Unrivaled Edge in High-End Chips

- TSMC has shown steady growth with short-term performance accelerating
- The Company distinguishes itself from the competition through its technology leadership, manufacturing excellence, and customer trust
- Artificial intelligence (AI) is likely to be the main theme of future technological development. We expect the Company to become one of the biggest beneficiaries of the AI wave
- Initiate with **BUY**; our TP implies a 2024E-26E P/E of 31.4x/25.0x/20.4x

TSMC pioneered the pure-play foundry business model with an exclusive focus on manufacturing its customers' products. TSMC's foundry business model has led to the rise of the global fabless industry and, since its inception, TSMC has been one of the world-leading semiconductor foundries.

TSMC attributes its success to technological leadership, manufacturing excellence, and strong customer relationships. It leads in developing advanced process technologies like 7nm, 5nm, and 3nm, crucial for high-performance, energy-efficient chips. TSMC's manufacturing precision ensures high quality and yield, allowing rapid scaling without quality compromise. Strong partnerships with key tech firms like Apple, AMD, and NVIDIA, based on trust and reliability, further cement TSMC's position as a top semiconductor foundry.

AI is likely to be the main theme of future technological development. The explosion of AI applications and demand has significantly driven the need for high-performance chips. We expect the Company to become one of the biggest beneficiaries of the AI wave.

Initiate with BUY, TP at US $207.80/NT$ 1330. We provide investment recommendations based on P/E valuations. We forecast the Company's 2024E-26E net profit to be NT$ 1,098bn / NT$ 1,381bn/ NT$ 1,692bn, respectively. Our TP corresponds to a 2024E-26E P/E of 31.4x/25.0x/20.4x and a 2024E P/B of 8.4x.

Risk factors: 1) Geopolitical risk; 2) Demand risk; 3) Competition risk; 4) The ADR's price premium fluctuates.

Results and Valuation

As of Dec 31	2022A	2023A	2024E	2025E	2026E
Revenue (NT$ bn)	2,264	2,162	2,798	3,474	4,254
Chg (YoY %)	42.6	(4.5)	29.5	24.1	22.5
Net Profit – to shareholders of the Company (NT$ bn)	1,017	838	1,098	1,381	1,692
Change (%,YoY)	70.4	(17.5)	30.9	25.8	22.6
Basic EPS (NT$)	39.20	32.34	42.34	53.25	65.26
Change (YoY %)	70.4	(17.5)	30.9	25.8	22.6
P/E (x)(TW)	24.8	30.1	23.0	18.3	14.9
BVPS (NT$)	113.60	133.40	159.24	190.49	229.75
P/B (x)(TW)	8.6	7.3	6.1	5.1	4.2
ROAE (%)	39.8	26.2	28.9	30.5	31.1
ROAA (%)	23.6	16.2	18.8	20.8	22.4

Note: US$/NT$=32.0
Source(s): The Company, ABCI Securities estimates

Company Report Initiation Oct 3, 2024

Rating (TW): BUY
TP (TW): NT$ 1330
Rating(ADR): BUY
TP(ADR): US$ 207.80

Analyst: Alex Bai
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Share price (ADR/TW)	US$175.80/ NT$972
52WK H/L (ADR)	US$193.47/84.95
52WK H/L (TW)	NT$1080/519
Est. share price return (ADR/TW)	18.2%/36.8%
Est. dividend yield (ADR/TW)	1.5%/1.7%
Est. total returns (ADR/TW)	19.7%/38.5%
Previous rating&TP	N/A
Previous report date	N/A

Source(s): Bloomberg, ABCI Securities estimates

Key data

Shares outstanding (mn)	25,932
Mkt cap (US$ mn)	911.8
3-mth ADT (US$ mn) (ADR)	2,794.0
3-mth ADT (NT$ bn) (TW)	44.8
Major shareholders (%)	
National Development Fund Executive Yuan	6.4

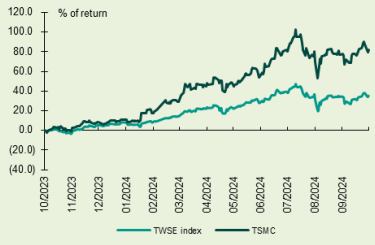
Source(s): Bloomberg, the Company, ABCI Securities

Price performance (%)

	Absolute	Relative*
1-mth	2.5	1.8
3-mth	1.3	3.4
6-mth	82.4	47.1

Note: relative to TWSE Index
Source(s): Bloomberg, ABCI Securities

1-yr price performance



Source(s):Bloomberg, ABCI Securities
Note:
1) Market data as of Oct 2, 2024
2) US$/NT$=32.0
3) US share price & TP are on per-ADS basis; 1 ADR = 5 common shares.

Core assumptions and valuation

High revenue growth boosted by emergence of generative AI

The Company's business includes IC wafer foundry and others. The Company pioneered the pure-play foundry business model with an exclusive focus on manufacturing IC products. IC wafer accounts for nearly 90% of the Company's total revenue. TSMC's continuous breakthroughs in the field of technology have led it to achieve a near-monopoly in the chip foundry industry in recent years. The demand for high-performance computing chips driven by the wave of AI has become the biggest contributor to the Company's revenue growth. We expect the development of generative AI to continue driving investment from tech giants in related fields, and the Company will continue to benefit from this trend. We expect that the Company's revenue will maintain a high growth rate, with gross margins remaining at a high level.

We expect revenue to increase 29.5% YoY in 2024E. We forecast TSMC's revenue in 2024E-26E to be NT$ 2,798bn/ NT$ 3,474 bn / NT$ 4,254bn, with YoY growth rates of 29.5%/ 24.1%/ 22.5%. We forecast 2024E-26E gross margins to be 54.0%/56.0%/56.5%, respectively.

Exhibit 1: Core assumptions

	2022A	2023A	2024F	2025F	2026F
Revenue divided by type of goods or services (NT$ bn)					
IC wafer	1,992	1,883	2,485	3,125	3,857
Others	272	279	314	349	398
Total	2,264	2,162	2,798	3,474	4,254
Gross profit margin(%)	59.6	54.4	54.0	56.0	56.5
Key financial data (NT$ bn)					
Revenue	2,264	2,162	2,798	3,474	4,254
Gross profit	1,348	1,175	1,512	1,946	2,404
EBIT	1,156	991	1,283	1,612	1,980
Shareholder's profit	1,017	838	1,098	1,381	1,692
Basic EPS (NT$)	39.20	32.34	42.34	53.25	65.26

Source(s): The Company, ABCI Securities

Initiate with BUY; TP at US$ 207.80/NT$ 1330.00

Due to the highly cyclical nature of the chip foundry industry, we prefer to use the P/E valuation method over the DCF valuation method. We forecast that the shareholders' profit of the Company in 2024E-26E to be NT$ 1,098bn / NT$ 1,381bn/ NT$ 1,692bn, respectively. Current price of NT$ 972 as of Oct 2 represents 23.0x/18.3x/14.9x 2024E-26E P/E and 6.1x 2024E P/B.

P/E valuation: The simple average industry is 33.4x 2024E P/E as of Oct 1. Based on our estimates, the Company's 2024E net profit will increase significantly due to an increase in revenue driven by strong demand for high-performance computing chips. We expect the development of generative AI may continue to boost the Company's performance in 2025 and 2026. Applying 25.0X 2025E P/E, w**e conclude that its valuation is NT$ 1330.00.** One ADR of TSMC on the US market represents to 5 common shares, and we expect the exchange rate of US$/NT$ to be 32.0. **Therefore, our TP for TSMC-ADR (TSM US) is US$ 207.80.** Recommend **BUY.** Our TP corresponds to a 2024E-26E P/E of 31.4x/25.0x/20.4x and a 2024E P/B of 8.4x.

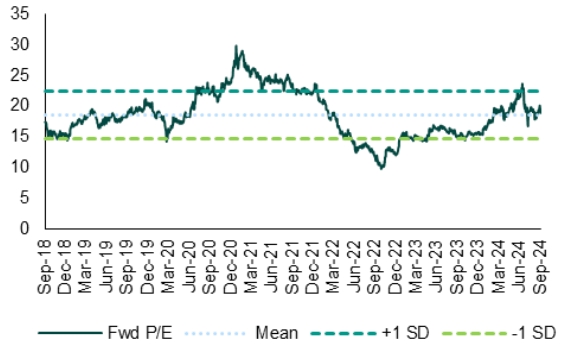
Exhibit 2: Peer comparison

Company	Stock Code	Currency	Last Price	Market Cap (HK$ mn)	PE (fiscal year)				PB (fiscal year)				ROE (%)	D/Y (%)
					23A	24F	25F	26F	23A	24F	25F	26F	24F	24F
Global Listed Peers														
Taiwan Semiconductor Manufac	2330 TT	TWD	972.000	6,143,791	30.1	23.1	18.1	15.2	7.3	5.9	4.8	3.9	28.2	1.5
Semiconductor Manufacturing	981 HK	HKD	20.850	265,684	24.2	33.6	23.7	19.4	1.1	1.0	1.0	1.0	2.9	0.0
Hua Hong Semiconductor Ltd	1347 HK	HKD	20.900	46,375	14.1	43.3	21.4	15.9	0.7	0.7	0.7	0.6	1.6	0.0
United Microelectronics Corp	2303 TT	TWD	53.700	163,981	10.9	12.9	11.1	10.0	1.9	1.8	1.7	1.6	14.5	5.3
Globalfoundries Inc	GFS US	USD	38.560	166,354	20.8	29.6	21.4	14.3	1.9	1.9	1.7	1.5	6.4	0.0
Tower Semiconductor Ltd	TSEM US	USD	43.080	37,161	9.2	20.8	18.5	16.8	2.0	n.a.	n.a.	n.a.	n.a.	n.a.
China Resources Microelect-A	688396 CH	CNY	47.150	69,050	42.1	53.6	39.3	33.5	2.9	2.8	2.6	2.4	5.0	0.3
Nexchip Semiconductor Corp-A	688249 CH	CNY	17.510	38,869	145.9	50.3	33.8	24.6	1.6	1.6	1.5	1.4	2.7	1.5
Simple Average					37.2	33.4	23.4	18.7	2.4	2.2	2.0	1.8	8.8	1.2
Weighted Average					29.7	24.0	18.6	15.4	6.6	5.5	4.5	3.6	25.9	1.5

Note: The data as of Oct 1, 2024

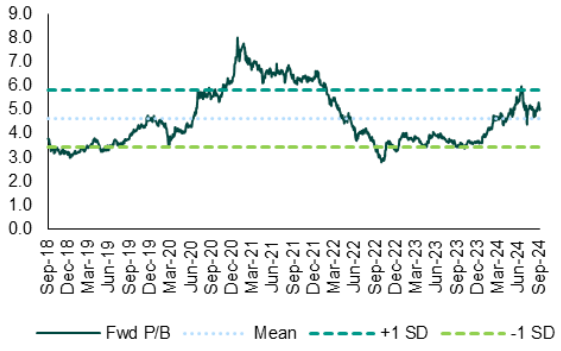
Source(s): Bloomberg, ABCI Securities

Exhibit 3: The Company's forward P/E



Source(s): The Company, ABCI Securities

Exhibit 4: The Company's forward P/B



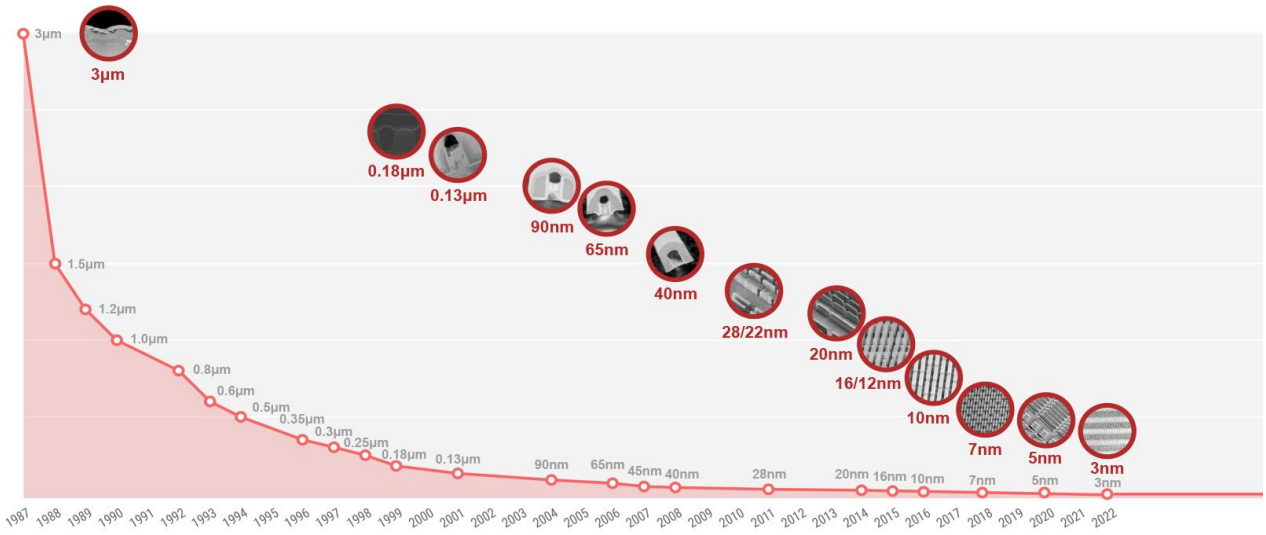
Source(s): The Company, ABCI Securities

TSMC is a leading wafer manufacturer worldwide

The first company pioneering the pure-play foundry model

After nearly 40 years of development, TSMC has become the leading semiconductor foundry in the world. Established in 1987, TSMC pioneered the pure-play foundry business model with an exclusive focus on manufacturing its customers' products. TSMC's foundry business model has led to the rise of the global fabless industry and since its inception, TSMC has been one of the world-leading semiconductor foundries.

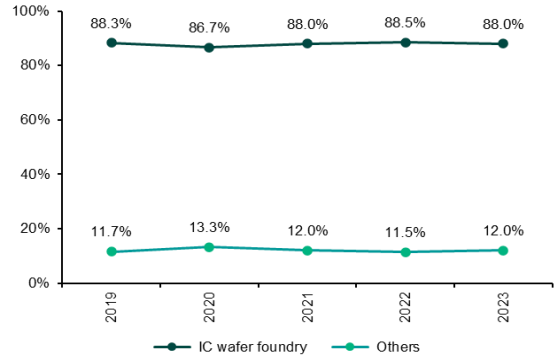
Exhibit 5: The Company has several fabs in China



Source(s): The Company

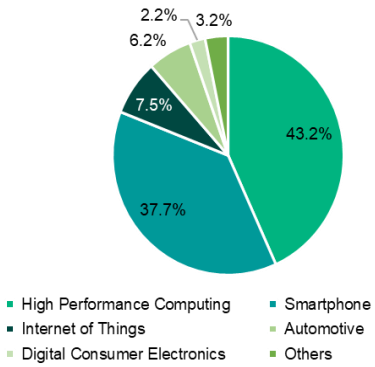
The Company's main business is IC wafer foundry, with products applied in various sectors. It provides IC wafer foundry and related services based on multiple technology nodes and different processes. Wafer foundry services account for nearly 90% of the Company's revenue. The chips produced through its foundry services are widely used in HPC, smartphone, IoT, automotive, digital consumer electronics, and others.

Exhibit 6: IC Wafer foundry business is the Company's main business



Source(s): The Company, ABCI Securities

Exhibit 7: The Company's products are used in various industries in 2023



Source(s): The Company, ABCI Securities

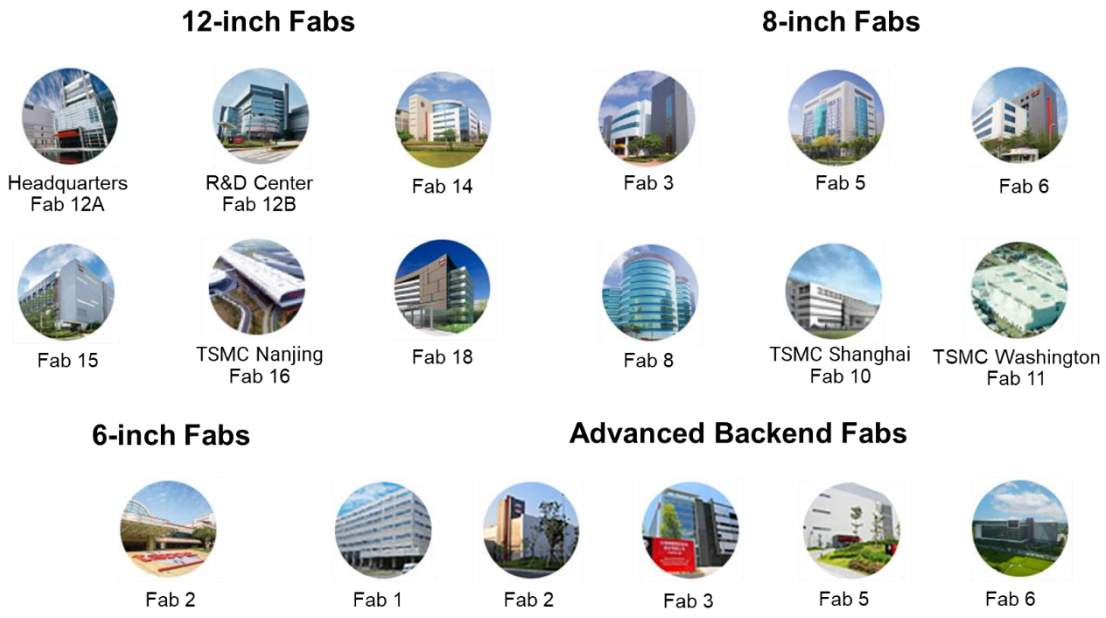
Focusing exclusively on wafer foundry services, TSMC has gradually built formidable technological barriers. Unlike the IDM (Integrated Device Manufacturer) model, TSMC's specialization in the foundry business has allowed the Company to enhance its wafer manufacturing capabilities and refine its production processes. Decades of continuous efforts have enabled TSMC to achieve significant breakthroughs in advanced process technologies. In 2018, TSMC became the first to mass-produce 7nm chips, establishing its leadership in advanced nodes. This was followed by the mass production of 5nm chips in 2020 and 3nm chips in 2022, with plans to mass-produce 2nm chips by 2025.

By continuously strengthening its R&D capabilities and optimizing its manufacturing processes, TSMC has pulled ahead of its competitors, achieving an almost monopolistic position in the market for advanced nodes. These technological breakthroughs solidify TSMC's core competitiveness in the global semiconductor manufacturing sector and boost customer confidence, driving the implementation of high-performance computing and AI applications. Looking forward, as the next-gen process nodes enter mass production, TSMC is expected to expand its market share further and maintain its dominant position in the global wafer foundry market.

The Company operates multiple production facilities, primarily focusing on 12-inch and 8-inch wafer production. Currently, it has six 12-inch wafer fabs, six 8-inch wafer fabs, one 6-inch wafer fab, and five advanced back-end fabs, mostly located in Taiwan. TSMC provides customer service through account management and engineering services offices in North America, Europe, Japan, China, and South Korea.

TSMC plans to build new wafer fabs overseas to expand its overseas production capacity. In the US, the Company is making good progress on its fab in Arizona in terms of the fab infrastructure, utilities and equipment installation. The Company is on track for volume production of N4 technology in the 1H25. The Company is also building a 12-inch specialty technology fab in Japan, which is on track for volume production in 4Q24. The Company announced plans to build an automotive and industrial specialty fab in Germany, with construction starting in 4Q24. Ongoing investments in production capacity help the Company meet market demand and diversify geopolitical risks.

Exhibit 8: The Company's fabs worldwide

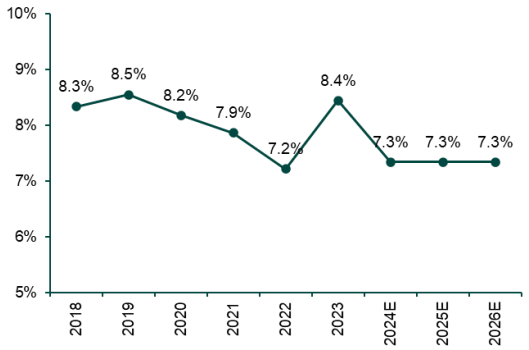


Source(s): The Company, ABCI Securities

To maintain its technology leadership, TSMC plans to continue investing heavily in R&D. While TSMC's 2nm and 14 Angstrom advanced CMOS logic nodes are progressing through the development pipeline, the Company's exploratory R&D work is focused on nodes beyond 14 Angstrom, and on areas such as 3D transistors, new memories and low-R interconnect, to lay a strong foundation to foster the development of innovative technology platforms in the future. TSMC's 3DFabric advanced packaging R&D is developing innovations in subsystem integration to further augment advanced CMOS logic applications. The Company continuously focuses on new specialty technologies such as RF and 3D intelligent sensors for 5G and smart IoT applications.

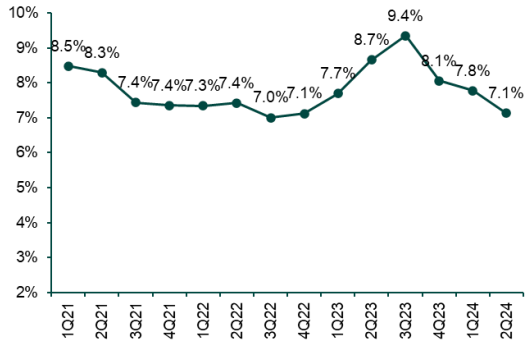
TSMC has a large R&D investment, with R&D expense ratio was 8.4% in 2023. Since 2024, due to the rapid growth of revenue, the R&D expense ratio has declined. We expect TSMC will continue to increase R&D expense in the next few years. However, due to the rapid growth of revenue, we believe the Company's R&D expense ratio may not increase significantly.

Exhibit 9: The Company's R&D expense ratio



Source(s): The Company, ABCI Securities

Exhibit 10: The Company's R&D expense ratio quarterly



Source(s): The Company, ABCI Securities

Exhibit 11: The Company's major future R&D projects

Project Name	Description
2nm logic technology platform and applications	3D CMOS technology platform for SoC
A14 and beyond logic technology platform and applications	3D CMOS technology platform for SoC
3DIC	Cost-effective solutions with better form factor and performance for 3DIC integration
Next-gen lithography	Next-gen EUV lithography and related patterning technology to extend Moore's Law
Long-term research	Specialty SoC technology (including new NVM, MEMS, RF, analog) and transistors with 8 to 10 years horizon

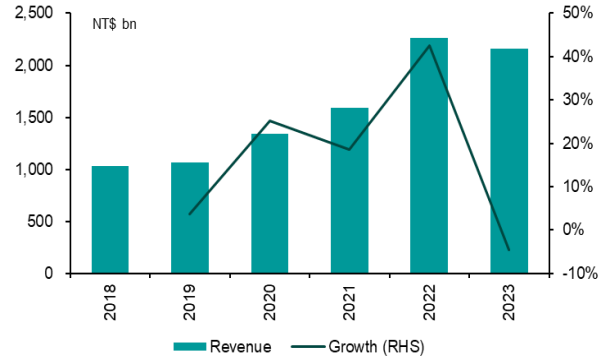
Source(s): Company, ABCI Securities

The Company has shown steady growth with recent performance accelerating

The Company's revenue has shown steady growth. The Company achieved a revenue of NT$ 2,162bn in 2023, a decline of 4.5% from 2022, primarily due to the weak demand of electronic equipment end and supply-chain inventory corrections. Still, 2018-23 revenue CAGR was ~16%, which is sound.

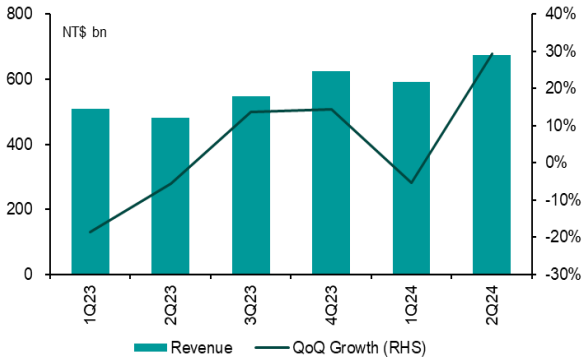
Strong demand for HPC chips boosted the Company's recent performance. Generative AI took the world by storm in the past two years, with LLM becoming the fastest-growing consumer application. Generative AI requires high computing power and interconnect bandwidth, which drives increases in semiconductor content. TSMC is a crucial enabler of AI applications. Since 2024, the Company's revenue has shown an accelerating uptrend. In 2Q24, the Company's quarterly revenue reached a record high at NT$ 674bn, up 29.5% QoQ.

Exhibit 12: The Company's revenue declined in 2023



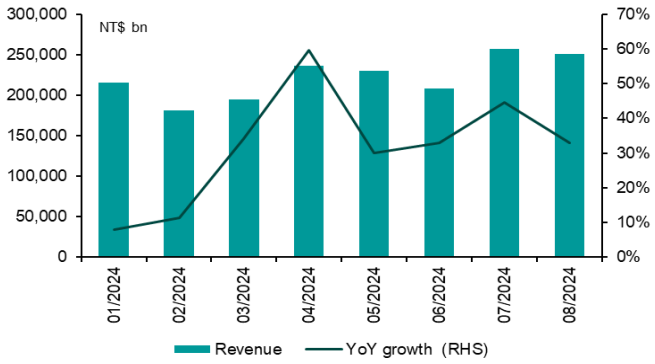
Source(s): The Company, ABCI Securities

Exhibit 13: The Company's revenue increased in 2Q24



Source(s): The Company, ABCI Securities

Exhibit 14: The Company's monthly revenue accelerated

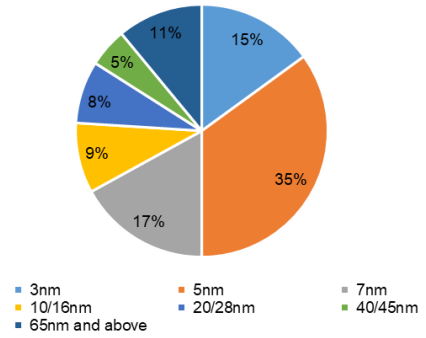


Source(s): The Company, ABCI Securities

The revenue of advanced nodes accounted for the majority of the Company's total revenue. Leveraging its technology advantages, the Company's production capacity of advanced nodes is in short supply. A large number of tech giants rely on TSMC to manufacture high-performance chips. Its competitors face shortcomings in yield rates, production capacity, and technological capabilities. As a result, TSMC has achieved a dominant position in the lucrative high-performance chip market, which powers its rapid growth.

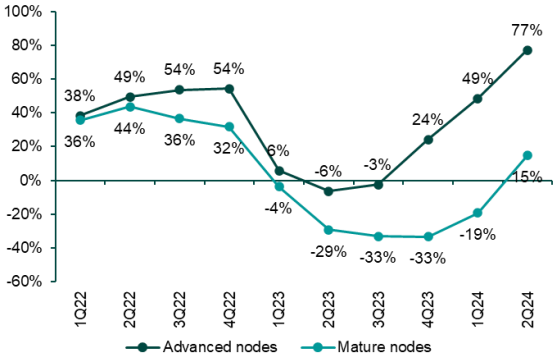
TSMC's strong technical capabilities and advanced manufacturing processes allow it to quickly generate substantial revenue each time it enters a new process node. For example, in 2022, the Company achieved a breakthrough with 3nm volume production, and by 2Q24, revenue from 3nm accounted for more than 15% of total revenue. The Company expects to achieve volume production of 2nm in 2025, and we expect this process upgrade to continue contributing significantly to TSMC's revenue.

Exhibit 15: 5nm accounts for the largest proportion of the Company's revenue in 2Q24



Source(s): The Company, ABCI Securities

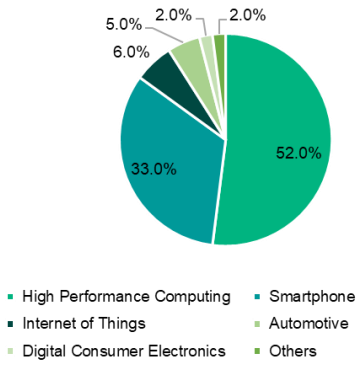
Exhibit 16: Advanced nodes achieved rapid revenue growth YoY



Source(s): The Company, ABCI Securities

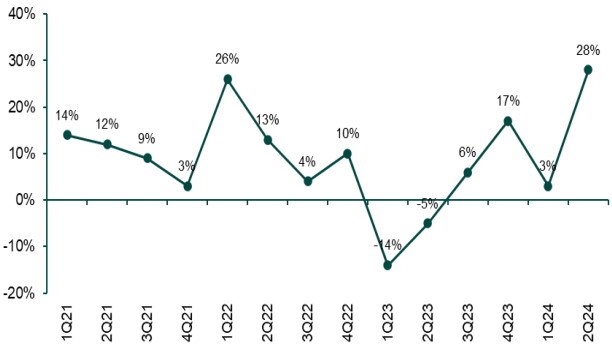
High performance computing (HPC) is the biggest driver of TSMC's revenue growth. Driven by data explosion and AI application innovation, HPC has become one of the key growth drivers for TSMC's business. In 2Q24, HPC accounted for 52% of the Company's total revenue. As more industries adopt HPC solutions to handle complex workloads, TSMC's ability to deliver high-performance, energy-efficient chips has made it a crucial partner for leading technology companies, fueling the Company's robust revenue expansion.

Exhibit 17: HPC accounted for over half of revenue in 2Q24



Source(s): The Company, ABCI Securities

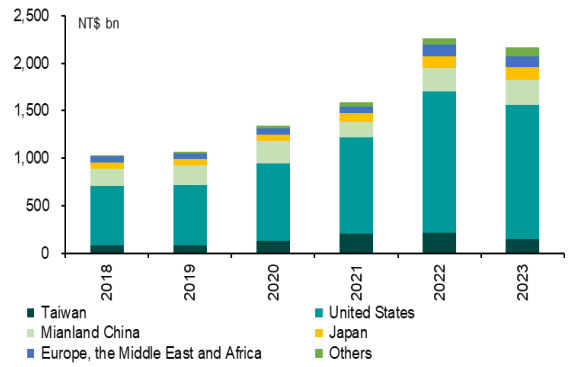
Exhibit 18: HPC business achieved rapid revenue growth QoQ in 2Q24



Source(s): The Company, ABCI Securities

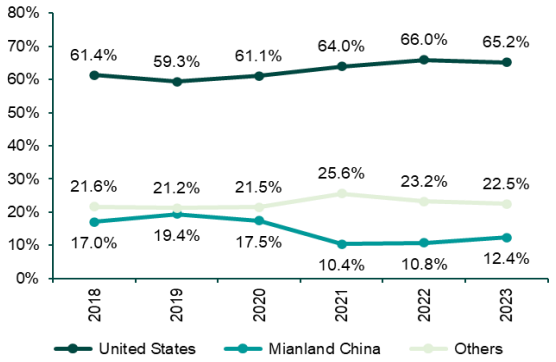
The Company's core market is the US. TSMC's primary customers are global tech giants such as NVIDIA (NVDA US), Qualcomm (QCOM US), and Apple (AAPL US). As a result, TSMC predominantly serves the North American market, with the US market contributing more than 65% of the company's revenue. Due to the impact of rising US-China competition, TSMC faces restrictions in providing foundry services to Chinese companies. Consequently, the proportion of revenue from the Chinese market has significantly declined since 2021.

Exhibit 19: Revenue breakdown by region



Source(s): The Company, ABCI Securities

Exhibit 20: Revenue breakdown by region

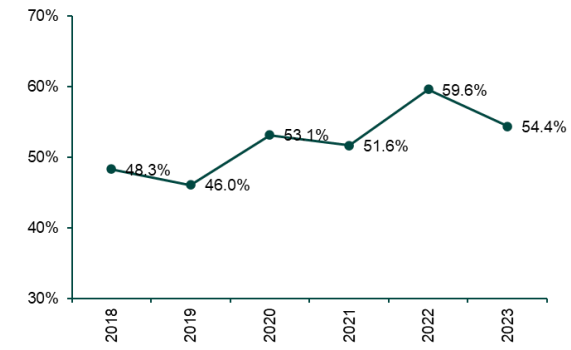


Source(s): The Company, ABCI Securities

As the company's competitiveness improves, its gross margin has steadily increased. The increase of its gross margin is driven by the Company's leadership in advanced process technologies, such as 5nm and 3nm, which allow it to command premium pricing for its high-performance chips. Additionally, TSMC's focus on operational efficiency and cost control has further contributed to its ability to maintain strong profitability. Besides, the Company has secured long-term contracts with key customers, reinforcing its dominant position in the global semiconductor supply chain and supporting ongoing margin expansion.

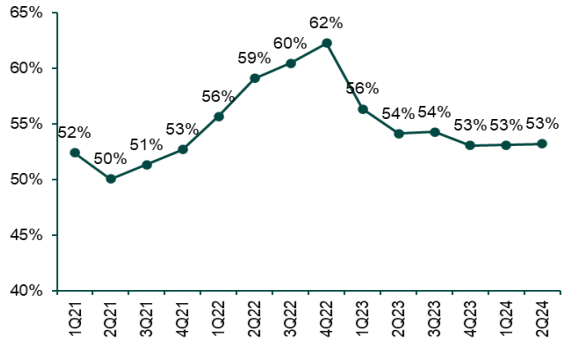
The Company guided its 3Q24 gross margin to increase by 1.3ppt to 54.5% at the midpoint. The positive guidance is primarily due to the higher overall capacity utilization rate in 3Q24 and better cost improvement effort, including productivity gains, partially offset by continued dilution from N3 ramp-up, N5 to N3 tool conversion costs, and higher electricity prices. The Company continued to forecast a long-term gross margin of 53% and higher is achievable. According to public news, TSMC plans to raise its product prices in 2025. We expect gross margin to continue improving in 2025 on price adjustment.

Exhibit 21: The Company's gross margin increased in past years



Source(s): The Company, ABCI Securities

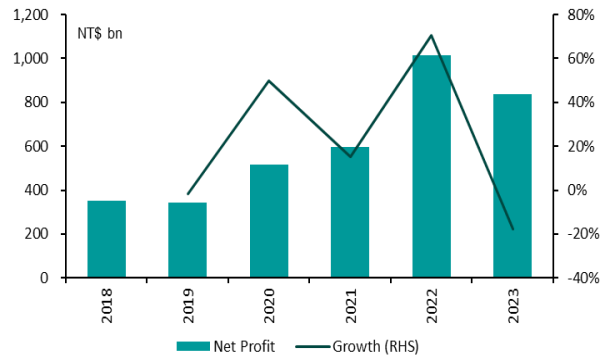
Exhibit 22: The Company's gross margin quarterly



Source(s): The Company, ABCI Securities

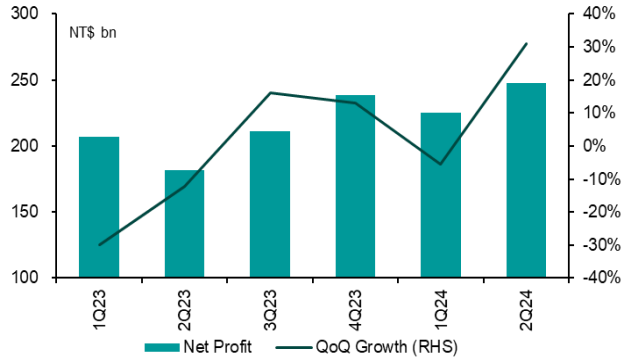
Net profit has declined in 2023 but rebounded significantly in 2Q24. Due to weak demand and the impact of downstream inventory reduction, the Company's revenue declined in 2023. The sluggish demand also led to lower capacity utilization throughout the year, which weighed on gross margin performance. As a result, the Company's overall net profit decreased in 2023. However, since the beginning of 2024, downstream demand has gradually recovered; along with the strong demand for the Company's advanced nodes products, a significant rebound was seen in 2Q24 net profit. We expect the Company's net profit will continue to grow in the near future.

Exhibit 23: The Company's net profit declined in 2023



Source(s): The Company, ABCI Securities

Exhibit 24: The Company's net profit rebounded in 2Q24



Source(s): The Company, ABCI Securities

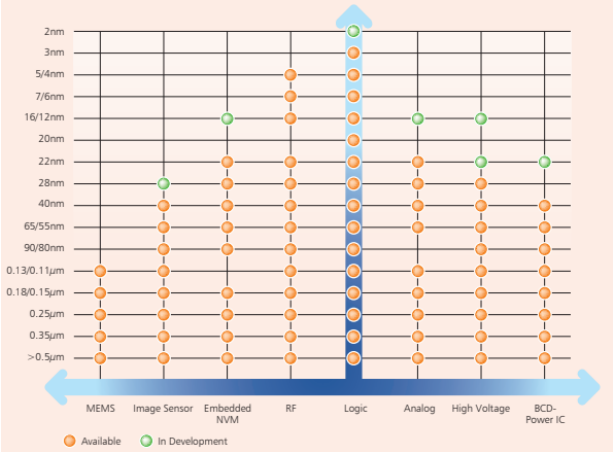
The Company's competitive strengths

TSMC's leadership position is based on three defining competitive strengths. The Company distinguishes itself from the competition through its technology leadership, manufacturing excellence, and customer trust.

Firstly, technological leadership is at the core of TSMC's success. The Company consistently pioneers advanced process technologies, such as 7nm, 5nm, and 3nm nodes, which are critical for producing high-performance and energy-efficient chips. By staying at the forefront of semiconductor innovation, TSMC can meet the ever-growing demand for cutting-edge chips in industries like AI, high-performance computing, and mobile devices.

Secondly, manufacturing excellence is another crucial factor. TSMC operates with unparalleled precision and efficiency, boasting high yields and consistent quality across its production lines. This manufacturing prowess enables the Company to scale rapidly and meet global demand without compromising quality. Its ability to manage complex production processes while maintaining cost-effectiveness solidifies its leadership in the semiconductor foundry industry.

Exhibit 25: The Company's technology portfolio in 2023

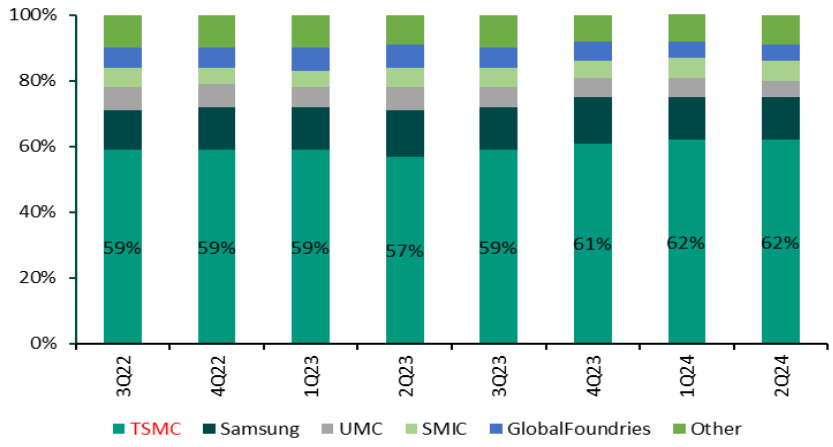


Source(s): The Company, ABCI Securities

Lastly, TSMC's strong customer relationships are pivotal to its competitive advantage. The Company has cultivated long-term partnerships with major technology companies, including Apple, AMD, and NVIDIA. These relationships are built on trust, reliability, and the Company's proven track record of delivering timely leading-edge solutions. As a result, TSMC remains the preferred partner for many of the world's top semiconductor design firms, further strengthening its market position.

Based on its strong competitiveness, TSMC's market share has steadily increased over the past few years. In 2Q24, TSMC's market share reached 62%, significantly ahead of its competitors. We believe TSMC's competitive advantage will not be challenged in the short term.

Exhibit 26: TSMC has a 62% market share in 2Q24



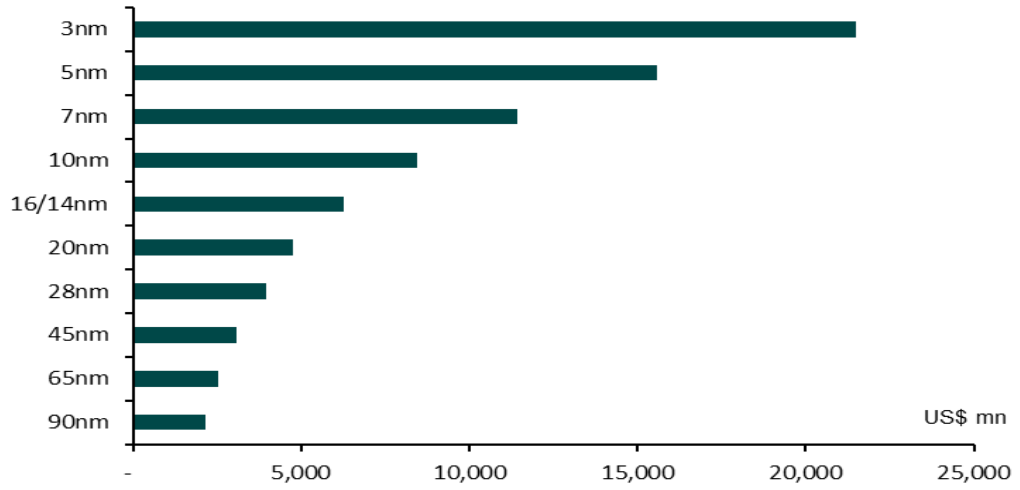
Source(s): Counterpoint, ABCI Securities

TSMC continues to extend its lead while competitors fall further behind. Currently, only Intel and Samsung can produce 7nm process chips, and TSMC remains the sole company capable of mass-producing 3nm chips. By consistently pushing the boundaries of semiconductor technology, TSMC is widening the gap between itself and its competitors. Moore's Law is not yet obsolete, and there is still significant potential for further improvements in chip performance, making it difficult for competitors to close the gap in the near term.

Wafer foundry involves numerous complex steps and requires sophisticated semiconductor equipment. IC manufacturing occurs under highly precise conditions, with processes such as photolithography, etching, and ion implantation repeated dozens or even hundreds of times. This intricate process transfers complex circuit patterns from photomasks to wafers, integrating kilometers of wiring and billions of transistors in an extremely small space.

Building new wafer fabs requires massive investments, creating significant financial barriers. The cost of constructing state-of-the-art semiconductor fabrication facilities is extremely high, requiring billions of dollars in capital expenditures. This substantial financial commitment is a major entry barrier for potential competitors and even existing players, limiting their ability to scale up production and keep pace with TSMC's advancements. According to IBS, as technology nodes continue to shrink, the investment in IC manufacturing equipment has significantly increased. The investment cost for the 5nm technology node can reach several billion US dollars, more than doubling that of the 14nm node and around four times that of the 28nm node.

Exhibit 27: Building wafer fabs requires significant investment



Source(s): The Company, ABCI Securities

The process know-how that TSMC has developed over decades is the most significant barrier. TSMC's decades of experience in semiconductor manufacturing have allowed it to accumulate unmatched expertise and technical know-how in advanced processes. This deep knowledge cannot be easily replicated by simply investing in resources or hiring talent, as it is deeply embedded in TSMC's organizational structure, operational processes, and technological innovations, making it a formidable barrier for competitors to overcome.

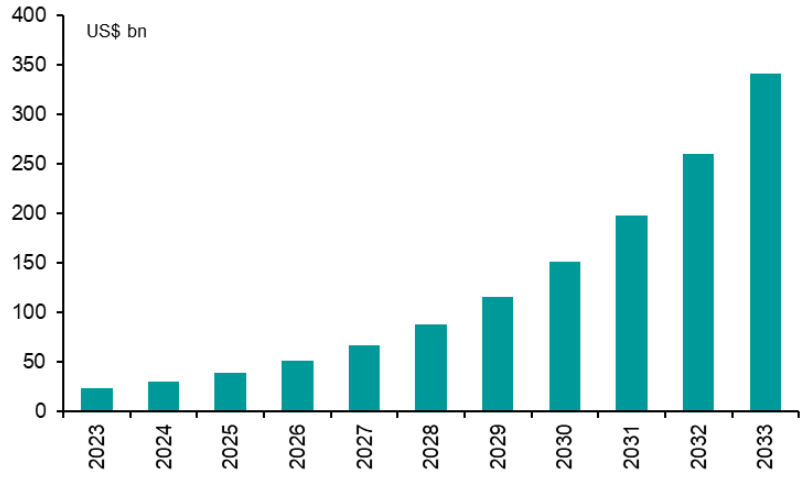
A new round of AI wave to boost the semiconductor industry.

Advancements in intelligence and information technology to drive growth in the semiconductor industry

From a global perspective, AI will likely be the main theme of future technological development. Generative AI has already begun to be applied across a wide range of fields. From content creation and design to healthcare and finance, its ability to generate text, images, audio, and even code is transforming industries. In marketing, generative AI is used to create personalized ads and customer experiences, while in entertainment, it's helping to produce music, artwork, and animations. In healthcare, AI models aid drug discovery and medical imaging analysis. As technology advances, we are likely to see even more innovative applications emerge, further integrating generative AI into everyday life and business operations.

The explosion of AI applications and demand has significantly driven the need for high-performance chips. As AI models become more complex and require greater computational power, industries are turning to advanced semiconductor technologies to support machine learning, data processing, and real-time analytics. This surge in demand for high-performance chips is especially evident in sectors like cloud computing, autonomous vehicles, and AI-driven healthcare, where efficient and powerful processing capabilities are critical to meeting the growing needs of AI-driven solutions. Driven by large language models, intelligent driving, and robotics, the demand for advanced process computing chips will remain strong. Leading global chip companies are expected to continue to grow rapidly. According to Market US, the Global AI chip market will reach US$ 341 bn in 2033, with a CAGR of 31% from 2023-33.

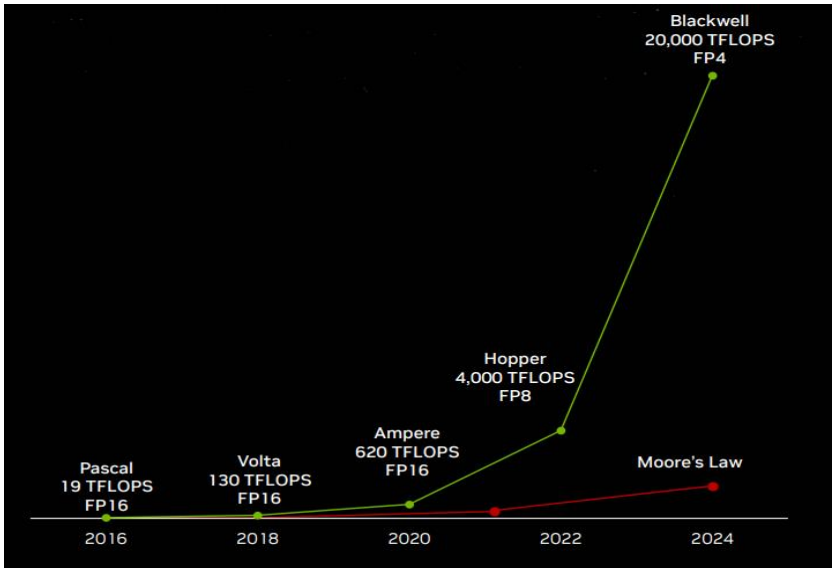
Exhibit 28: Global AI chip market will increase significantly



Source(s): Market US, ABCI Securities

The significant upgrade in chip performance has notably stimulated major technology companies' investments in the AI sector. According to NVIDIA, its AI chip computing power has increased 1,000 times over the past eight years. We believe that the competition among tech giants in the AI field is still in its early stages, and these companies will continue to increase their investment in computing power chips to stay competitive.

Exhibit 29: NVIDIA's AI chip computing power has increased faster than Moore's law



Source(s): NVIDIA

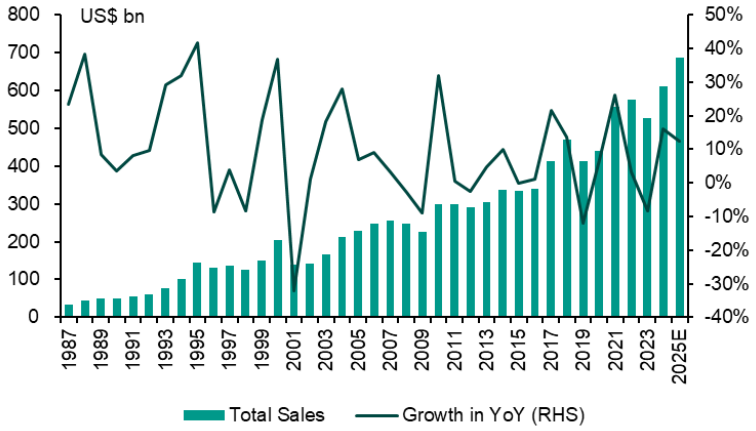
Driven by global tech giants, global demand for computing power is expected to grow significantly in the future. These tech giants are currently locked in an AI arms race, each striving to outpace the others in developing advanced AI technologies. Since no single company or application has yet achieved a decisive victory in this space, tech giants will continue to invest heavily in AI to secure a leading position. This ongoing competition ensures that AI innovation and development will remain a top priority, further accelerating the demand for advanced computing power and high-performance chips.

Advanced packaging technologies, such as Chip-on-Wafer-on-Substrate (CoWoS), will further improve chip performance and stimulate market demand. By enabling higher levels of integration and better thermal management, CoWoS allows for more efficient and powerful chips essential for high-performance computing, AI, and data processing applications. As these technologies advance, they will play a crucial role in meeting the growing need for faster, more efficient semiconductors, ultimately pushing the semiconductor industry toward new levels of innovation and market expansion.

The semiconductor industry is in a cyclical boom

The semiconductor industry is characterized by significant cyclical patterns. Semiconductor sales experience peaks and troughs every few years, with varying intervals between cycles and relatively short durations of downturns. Different types of chips may have varying cycles depending on their application scenarios. Currently, the industry is entering a favorable phase.

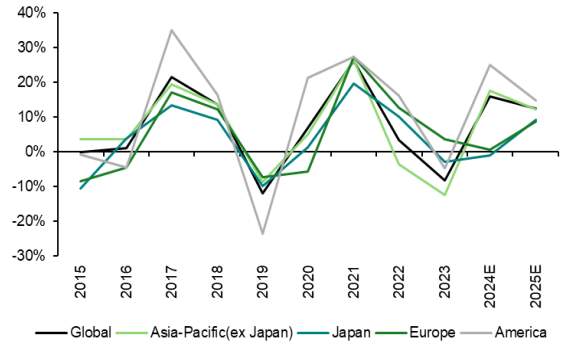
Exhibit 30: Total sales of semiconductor industry increased sharply in past years



Source(s): WSTS, ABCI Securities

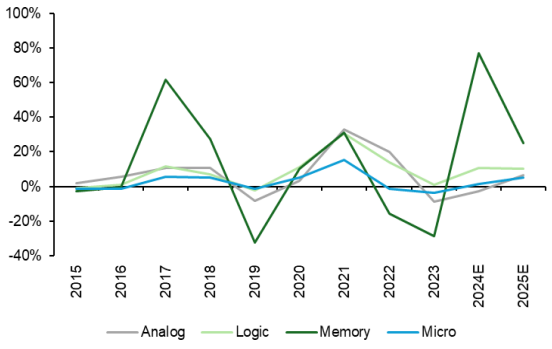
While AI is currently the most prominent driver of semiconductor applications, we can not overlook the broader recovery of the semiconductor industry. Beyond AI, other sectors such as automotive, consumer electronics, and industrial automation, are also experiencing renewed demand for semiconductors. The growing need for more sophisticated chips in electric vehicles, 5G devices, and Internet of Things (IoT) applications contributes to this widespread recovery. As global supply chain issues ease and demand rises across multiple industries, the semiconductor sector is poised for robust and sustained growth, with AI being just one of the key catalysts.

Exhibit 31: Global sales change YoY in semiconductor market



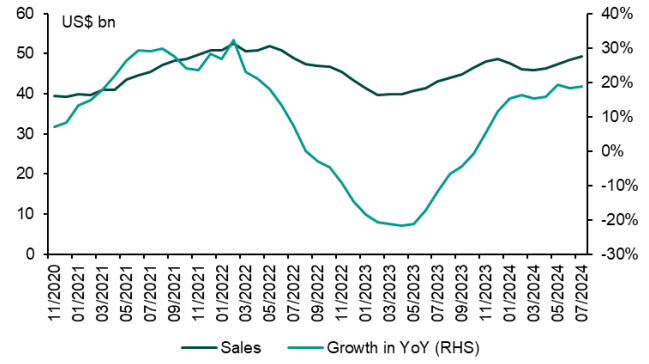
Source(s): WSTS, ABCI Securities

Exhibit 32: Global sales change YoY in semiconductor market by product



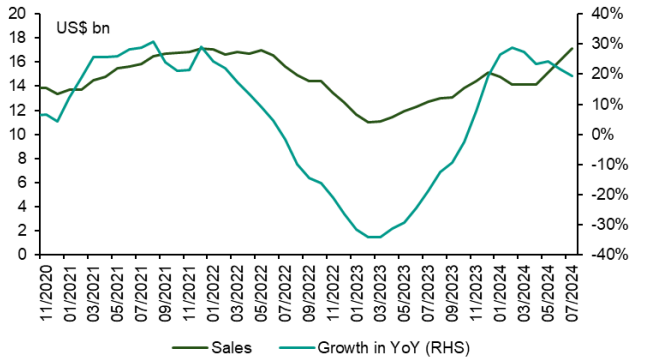
Source(s): WSTS, ABCI Securities

Exhibit 33: Monthly sales of global semiconductor markets



Source(s): SIA, ABCI Securities

Exhibit 34: Monthly sales of Chinese semiconductor markets



Source(s): SIA, ABCI Securities

The semiconductor industry is expected to improve in 2024, with sustained growth in demand for high-end chips. According to the World Semiconductor Trade Statistics (WSTS) organization, the global semiconductor market size is projected to increase by 16.0% to US$ 611.2bn in 2024, and further grow by 12.5% to US$ 687.4bn in 2025. The Asia-Pacific region remains the largest market by share. Benefiting from the demand for AI computing power, the market size for memory chips is expected to grow rapidly.

In 2024, consumer electronics industry recovers, driving a short-term resurgence in chip demand, indicating a turning point in overall global chip demand. The Chinese market remains a major market for the chip industry, with short-term demand staying robust. Consequently, Chinese semiconductor companies are expected to maintain their growth.

Driven by the rise of AI, we expect the semiconductor industry's boom cycle to continue. The rapid expansion of AI applications across various sectors, from cloud computing to autonomous systems, has created an unprecedented demand for high-performance chips, likely sustaining the industry's growth momentum. Beyond AI, advancements in 5G, electric vehicles, and IoT are also driving the need for more advanced semiconductors. As these technologies evolve, they will further fuel demand for cutting-edge chips, supporting long-term growth. Given these factors, we remain optimistic about the semiconductor industry's long-term performance and its capacity to meet future technological demands.

Risk factors

Geopolitical risk

As competition between the US and China intensifies, TSMC faces increasing geopolitical risks. Due to TSMC's current leadership in the wafer foundry sector, global tech companies are increasingly relying on the Company. TSMC's production capacity has a significant impact on the chip industry. Both the US and China may employ various political measures to protect their domestic enterprises' interests, which could, in turn, affect TSMC's business operations.

Demand risk

The long-term development of the AI industry depends on sustained AI-related capital expenditure from global tech giants. Although we remain optimistic about the prospects of AI industry, the current low return on AI applications remains a challenge. As a result, there is uncertainty over whether tech giants will continue to increase capital spending in the AI field in the long run. If downstream demand growth slows, it could impact the Company's performance.

Competition risk

TSMC's leadership in the wafer foundry sector is unquestionable. However, many competitors such as Samsung Electronics (SSNGY US), Intel (INTC US) are eager to capture the vast market for advanced node chips. If competitors achieve technological breakthroughs and attain capabilities comparable to TSMC, it could weaken the competitiveness of TSMC's products, potentially impacting its gross margins.

The ADR’s price premium fluctuates

TSMC is traded on the US market in the form of ADRs, with each ADR representing 5 common shares. Based on the current exchange rate of US$ to NT$ at 32.0, the ADR price carries a premium of around 15%. We believe this premium may arise from various reasons such as market liquidity and investor preferences. In the future, the ADR premium could fluctuate significantly, which may negatively affect investors.

Financial statements

Consolidated income statement

As of Dec 31 (NT$ bn, except for per share data)	2022A	2023A	2024E	2025E	2026E
Total revenue	**7,273**	**6,322**	**7,844**	**9,167**	**10,197**
Cost of sales	(4,512)	(5,104)	(6,535)	(7,624)	(8,235)
Gross profit	**2,762**	**1,218**	**1,309**	**1,542**	**1,962**
Research and development expense	(733)	(707)	(846)	(971)	(1,059)
Administrative and marketing expense	(34)	(36)	(45)	(52)	(58)
Other operating income and expense	335	366	425	567	629
Operating profit	**1,121**	**921**	**1,214**	**1,571**	**1,948**
Finance income and costs - net	11	48	44	27	24
Others	12	9	11	(1)	(8)
Profit before tax	**2,214**	**1,187**	**775**	**984**	**1,041**
Income tax	(16)	(63)	(40)	(37)	(49)
Profit after tax	**1,017**	**838**	**1,098**	**1,381**	**1,693**
Non-controlling interest	0	(1)	0	1	1
Shareholders' profit	1,017	838	1,098	1,381	1,692
Basic EPS (NT$)	39.20	32.34	42.34	53.25	65.26

Note: items may not sum up due to rounding
Source(s): The Company, ABCI Securities estimates

Consolidated balance sheet

As of Dec 31 (NT$ bn, except for per share data)	2022A	2023A	2024E	2025E	2026E
Property, plant and equipment	2,694	3,064	3,454	3,879	4,274
Right-of-use assets	42	40	43	47	52
Intangible assets	26	23	24	26	27
Others	150	211	227	246	266
Total non-current assets	**2,912**	**3,338**	**3,748**	**4,197**	**4,619**
Cash & cash equivalents	1,343	1,465	1,735	1,943	2,426
Inventories	221	251	299	349	409
Trade and other receivables	230	201	255	332	376
Others	259	276	261	284	312
Total current assets	**2,053**	**2,194**	**2,550**	**2,908**	**3,523**
Total assets	**4,965**	**5,532**	**6,297**	**7,106**	**8,143**
Trade and other payables	55	56	75	81	79
Borrowings	19	9	9	9	9
Other payables	515	474	502	452	412
Others	355	375	397	417	437
Total current liabilities	**944**	**914**	**983**	**958**	**937**
Current assets less current liabilities	1,109	1,280	1,566	1,950	2,586
Total assets less current liabilities	4,021	4,619	5,314	6,147	7,205
Bonds payable	834	914	941	970	999
Others	226	222	219	213	223
Total non-current liabilities	**1,060**	**1,136**	**1,160**	**1,182**	**1,221**
Total liabilities	**2,004**	**2,049**	**2,144**	**2,141**	**2,159**
Total shareholders' equity	**2,946**	**3,459**	**4,129**	**4,939**	**5,957**
Minority interest	15	24	25	25	26
Total equity	**2,960**	**3,483**	**4,154**	**4,965**	**5,984**
Total liabilities and equity	**43,808**	**47,787**	**50,160**	**52,996**	**55,054**

Note: items may not sum up due to rounding
Source(s): The Company, ABCI Securities estimates

Consolidated cash flow statement

As of Dec 31 (NT$ bn, except for per share data)	2022A	2023A	2024E	2025E	2026E
Operating activities					
PBT	1,144	979	1,098	1,381	1,693
DD&A	428	523	733	909	1,144
Working capital changes	123	(57)	(68)	(111)	(74)
Income tax and interest paid	(87)	(160)	(86)	(189)	(219)
Others	2	(43)	(33)	(50)	(45)
Cash from operating activities	**1,611**	**1,242**	**1,643**	**1,941**	**2,498**
Investing activities					
Purchase of PP&E	(1,083)	(950)	(1,128)	(1,343)	(1,549)
Others	(108)	44	13	(26)	(30)
Cash from investing activities	**(1,191)**	**(906)**	**(1,115)**	**(1,370)**	**(1,579)**
Financing activities					
Net change in borrowings	86	114	27	28	29
Dividends paid	(285)	(292)	(332)	(417)	(488)
Others	(1)	(27)	46	26	23
Cash from financing activities	**(200)**	**(205)**	**(259)**	**(363)**	**(436)**
Net changes in cash	**219**	**131**	**270**	**208**	**484**
Effect of FX rate changes	58	(8)	-	-	-
Cash at beginning of year	1,065	1,343	1,465	1,735	1,943
Cash at end of year	**1,343**	**1,465**	**1,735**	**1,943**	**2,426**

Note: items may not sum up due to rounding
Source(s): The Company, ABCI Securities estimates

Key operating and financial ratios

As of Dec 31	2022A	2023A	2024E	2025E	2026E
Gross margin (%)	59.6	54.4	54.0	56.0	56.5
Operating margin (%)	49.5	42.6	43.4	45.2	45.8
Net margin (%)	44.9	38.8	39.2	39.7	39.8
ROE (%)	39.8	26.2	28.9	30.5	31.1
ROA (%)	23.6	16.2	18.8	20.8	22.4
Current ratio	2.2	2.4	2.6	3.0	3.8
Quick ratio	1.9	2.1	2.3	2.7	3.3
Cash ratio	1.4	1.6	1.8	2.0	2.6
Total debt/ equity(%)	27.6	31.0	32.2	34.6	35.4
Net debt/ equity(%)	30.0	27.5	23.7	20.4	17.4
Total liabilities/ total assets(%)	40.4	37.0	34.0	30.1	26.5

Note: items may not sum up due to rounding
Source(s): The Company, ABCI Securities estimates

Disclosures

Analyst Certification

The analyst, Alex Bai Ge, primarily responsible for the content of this research report, in whole or in part, hereby certify that all of the views expressed in this report accurately reflect my personal view about the subject company or companies and its or their securities. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this report. I and/or my associates have no financial interests in relation to the listed company(ies) covered in this report, and I and/or my associates do not serve as officer(s) of the listed company (ies) covered in this report.

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Definition of equity rating

Rating	Definition
Buy	Stock return rate≥ Market return rate (~7%)
Hold	- Market return rate (~-7%) ≤ Stock return rate < Market return rate (~+7%)
Sell	Stock return < - Market return (~-7%)

Stock return rate: expected percentage change of share price plus gross dividend yield over the next 12 months

Market return rate: average market return rate since 2005 (HSI total return index 2005-23 averages at 7.4%)

Time horizon of share price target: 12-month

Stock rating, however, may vary from the stated framework due to factors including but not limited to: corporate governance, market capitalization, historical price volatility relative to corresponding benchmark index, average daily turnover of the stock relative to market capitalization of the stock, competitive advantages in corresponding industry, etc.

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