Taiwan Semiconductor Manufacturing Company Ltd.

[TWSE: 2330]

Stock Rating	Industry View	Price Target
Buy	In-Line	NT$802.00

Summary. We are setting our price target for Taiwan Semiconductor Manufacturing Company (TSMC) at NT$802, accounting for the stock's strong performance in recent months. We maintain a 'buy' recommendation as the company's robust revenue growth and technological leadership in advanced semiconductors suggest it remains undervalued by the market.

Investment Theses. Renowned for its cutting-edge technology and commitment to research and development, TSMC leads in process technology, enabling advancements in chip production. Strategic partnerships with industry giants like Apple and Nvidia bolster TSMC's position. The company's strong management ensures operational excellence and strategic vision, positioning the company as a leader in the semiconductor industry.

Sector Analysis. The semiconductor industry is set for substantial growth in the next decade, spurred by rapid technological progress in computing, consumer electronics, AI, and autonomous vehicles. TSMC, as a front-runner in the market, stands to gain from these developments.

Financial Analysis. TSMC's February 2024 revenues show a YoY 11.3% increase, with a confident boost in capital expenditures due to anticipated AI-driven demand and global expansion. After reducing expenditures in 2023 amidst demand challenges, the company is focused on capturing substantial growth and advancing its manufacturing capacity in 2024.

Valuation. Our DCF model sets TSMC's target price at NT$802, factoring in its aggressive investments in semiconductor manufacturing, notably 5nm and 3nm nodes. Our conservative valuation, using a 2.5% perpetual growth rate and 7.9x EBITDA exit model, supports a 'buy' rating, aligning with street consensus target of approximate NT$796.

Risks & Catalysts. Huawei's return to the smartphone market poses a risk to TSMC customers, notably Apple, as Huawei now produces its own chips after US sanctions. TSMC faces competition from emerging rivals like Intel and Samsung, while the possibility of China shifting to local chip production could further impact its revenue. However, TSMC stands to benefit from the AI sector's growth and continues to lead in technological innovation with the launch of its 2nm technology, attracting demand from major players like Apple and Nvidia.

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Market Data	
Market Capitalization	20.20T
Net Debt	765bn
Enterprise Value	19.50T
Basic Shares S/O	25.90bn
Fully Diluted Shares S/O	24.18bn
Avg. Daily Volume (K)	42,550
52 Week Range	489.00-796.00
Dividend Yield	1.80%

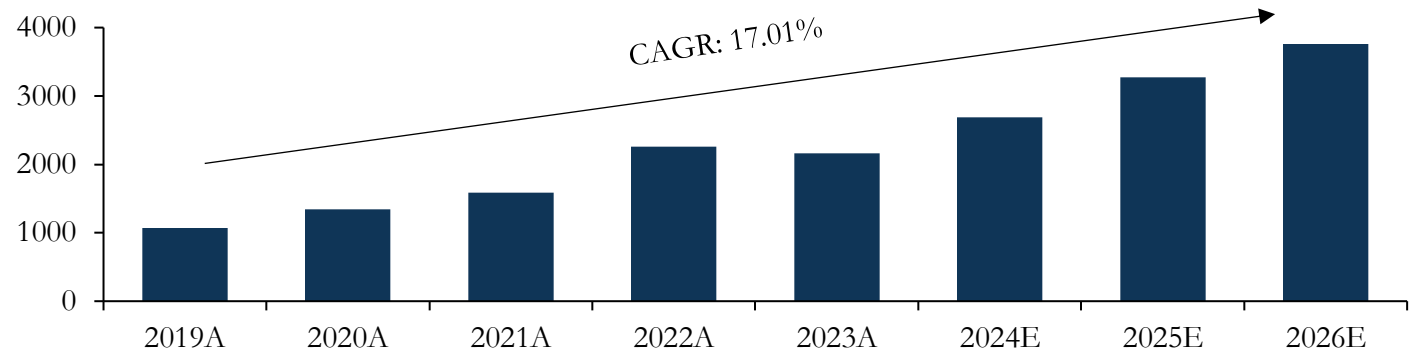
Financial & Valuation Data			
FYE Dec-31	2023A	2024E	2025E
Revenue	2,160bn	2,660bn	3,170bn
EBITDA	1,450bn	1,810bn	2,200bn
EPS	32.34	38.42	47.38
EV/Sales	9.00x	7.25x	6.09x
EV/EBITDA	13.4x	10.68x	8.79x
P/E	23.81x	20.28x	16.44x

Company Overview

Founded in 1987, TSMC is the world's first and largest semiconductor foundry, specializing in the manufacturing of semiconductors used in a wide array of technological fields. As a pure-play foundry, TSMC offers its services to fabless manufacturers through the use of contracts, and its clientele comprises many high-profile electronics companies, such as AMD, Amazon, Apple, Nvidia, Qualcomm, Sony, and Intel.

TSMC operates worldwide, maintaining a presence in Taiwan, the US, China, Japan, the Netherlands, and South Korea. This network positions the company to effectively meet its customers' demands, contributing to robust earnings and a strong position in the market. The company's compound annual growth rate (CAGR) of 17.01% reflects past performance and is projected to sustain through to 2026.

Figure 1: TSMC Revenue in NT$ millions, 2019—2026



Source: S&P Capital IQ, TFS Investment Group

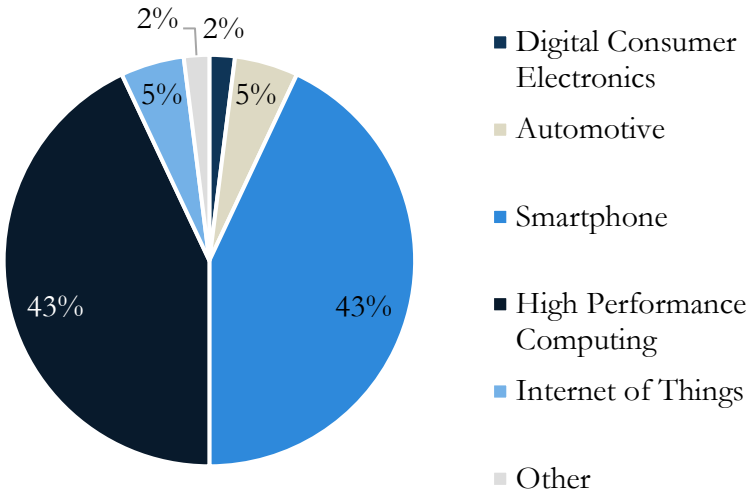
TSMC generates revenue across five key segments: Digital Consumer Electronics, Smartphones, Internet of Things (IoT) Technology, High-Performance Computing, and Automotive Technology.

The High-Performance Computing segment is currently a key driver for TSMC's growth, comprising 43% of the company's total revenue. By providing advanced chips, TSMC can increase their clientele's computing performance and energy efficiency while reducing latency. This is vital for the development of central processing units (CPUs), graphics processing units (GPUs), and networking chips used in 5G and 6G infrastructure.

TSMC also specializes in the production of advanced smartphone chips, a sector continously advancing with firms' persistent innovation. Together, smartphone and consumer electronics chips account for approximately 86% of the company's total earnings. TSMC also provides a range of specialty products created for computing in IoT applications, automobiles, and consumer electronics.

The company's technology is applied across a broad spectrum of applications, fueling ongoing innovation through diverse revenue streams.

Figure 2: TSMC revenue breakdown, Q4 2023



Source: TSMC Quarterly Report, Q4 2023

Recent Developments

3nm Node Globally Available. In 2022, TSMC launched the 3nm process, the most powerful semiconductor process available at the time. This was originally reserved for use by Apple, who bought out the company's manufacturing capacity for a year for the development of A17 and M3 chips. In March 2024, TSMC expanded its 3nm chip production to include orders from customers like Intel and AMD, a move expected to substantially boost the company's revenue.

Recent Hiring Surge. Following recent geographical expansions, TSMC has undertaken a mass recruitment effort of new talent, with the goal of increasing its workforce by approximately 23,000 employees. This will assist the company in meeting the high demand for semiconductors it currently faces.

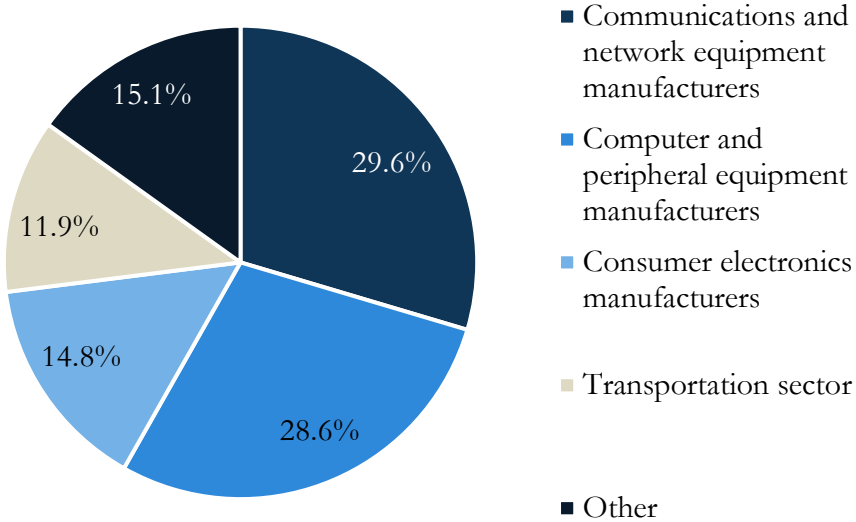
TSMC Gains US$6.6 Billion United States Subsidy. As of April 2024, the company is set to receive a US$6.6 billion subsidy from the United States for its semiconductor production in Arizona. This comes alongside a significant expansion of its investment in the state, upping the total to US$65 billion and adding a third fabrication plant by 2030. TSMC will start production with advanced 2nm technology by 2028. This move is a part of the Unites States' effort to revitalize its domestic chip production capabilities under the Chips and Science Act.

Sector Analysis

TSMC operates in the semiconductor industry, which, with a projected CAGR of 3.8% from 2023 to 2028, is considered to be in a mature phase. The industry is expected to achieve a total revenue of US$1.6 trillion by 2028.

Figure 3: Semiconductor industry segmentation, 2023

The semiconductor industry is central to producing chips for a vast array of electronic devices, spanning consumer electronics, electronic and autonomous vehicles, and IoT technologies. These components are also vital for the advancement of sectors such as AI and machine learning, as well as military and healthcare. As a result, they are indispensable for the future development of modern society. Figure 3 showcases the principal segments comprising this industry, demonstrating a split between communications equipment, computing equipment, consumer electronics, and devices used in the transportation sector.
The largest industry manufacturers are headquartered in the United States, Japan, South Korea, Taiwan, and the Netherlands.

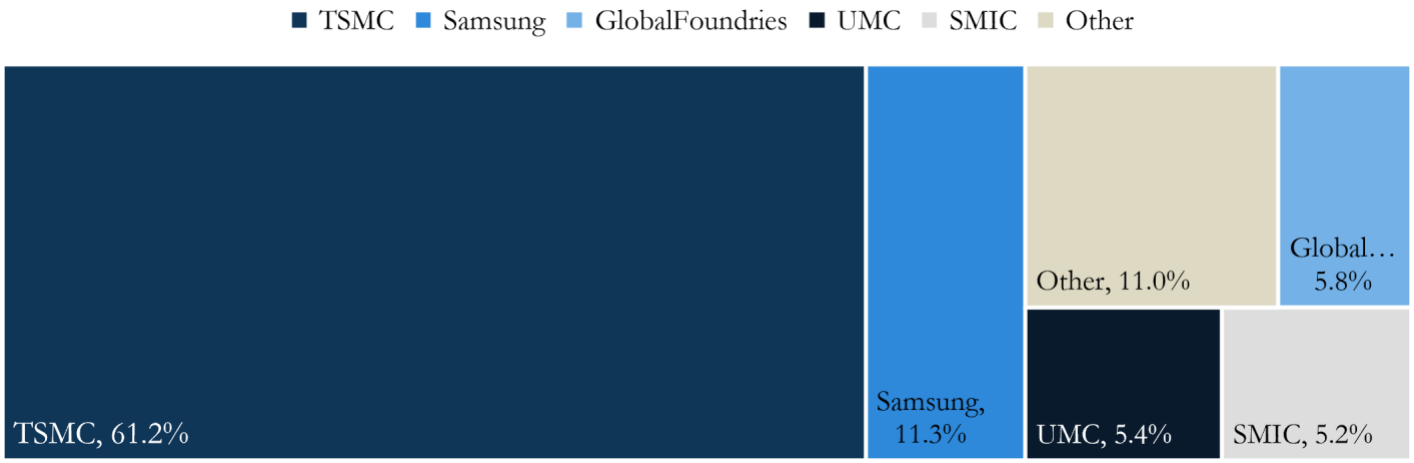


Source: IBIS World

While the industry operates globally, manufacturing is concentrated in Asia due to lower production costs and favourable workplace and environmental policies. Many fabrication plants, or fabs, are found in countries such as Vietnam, Malaysia, and Singapore. As the geopolitical landscape shifts, countries are looking to bolster their internal industries, leading to an increase in regionalization. This has led to many countries, particularly the United States and China, increasing the number of fabrication plants they operate on their territory.

The industry is also heavily fragmented, with most companies specializing in a few niche products. There are high costs associated with R&D and capital expenditure, which render the diversification of one's product line difficult, and deter potential market entrants. Figure 4 displays the revenue share for major semiconductor manufacturers in Q4 2023. As it stands, TSMC dominates the market, having earned 61.2% of the quarter's total revenue.

Figure 4: Semiconductor industry revenue share, Q4 2023



Source: Statista

The semiconductor industry's projected growth throughout the outlook period can be attributed to technological advancements, the increase in global GDP, and internet adoption, causing an intensification in demand. The adoption of 5G networks is on the rise, as is the development of autonomous vehicle technology, and improvements in the field of AI are furthering productivity in many sectors. These events require the manufacturing of increasingly advanced chips, creating opportunities for innovation. The industry presents barriers to entry due to significant fixed costs and existing client loyalty, providing an advantage to established names such as TSMC. Furthermore, governments in many nations, such as Taiwan, China, the United States, and Japan, are investing heavily in the industry by offering grants to incentivize development.

Though the potential for revenue growth is high, there are challenges and uncertainties companies in the industry must face. The industry has proven to be relatively volatile so far, with fluctuations in demand caused by economic uncertainties and government regulations affecting semiconductor sales. Price fluctuations are equally present, due to shortages caused by demand exceeding supply. The geopolitical tensions between the United States and China are an additional factor changing the market's landscape, as the sanctions imposed by both countries are impacting businesses within their borders and those in allied nations. Despite these challenges, the semiconductor industry remains lucrative, as there are no replacements for semiconductor technology. This provides a clear advantage to TSMC, the current market leader.

Peer Comparison

Figure 5: Table 1: tier 1 public comparable companies – foundries. Table 2: tier 2 public comparable companies – tech conglomerates with semiconductor manufacturing segments

Foundries

Company Name	Share Price 29-Mar-24	Market Cap	TEV	LTM Revenue	LTM EBITDA Margin	TEV / Revenue LTM	TEV / Revenue NTM	TEV / EBITDA LTM	TEV / EBITDA NTM
TSMC	$ 24.36	631,817	610,646	67,611	67%	9.0x	7.3x	13.5x	10.8x
SMIC	$ 01.94	23,591	35,130	6,322	41%	5.6x	5.1x	13.5x	10.3x
GLOBALFOUNDRIES	$ 52.11	28,827	27,358	7,392	36%	3.7x	4.0x	10.3x	11.3x
UMC	$ 01.63	20,455	18,442	6,960	43%	2.6x	2.5x	6.2x	5.9x
Nexchip	$ 01.85	3,715	4,046	1,003	37%	4.0x	3.2x	10.9x	7.7x
VIS	$ 02.67	4,383	3,900	1,197	35%	3.3x	3.0x	9.4x	8.5x
PSMC	$ 00.81	3,297	3,747	1,377	6%	2.7x	2.3x	**43.1x**	9.8x
Tower Semiconductor	$ 33.45	3,707	2,697	1,423	32%	1.9x	1.9x	5.9x	6.2x
Hua Hong Semiconductor	$ 01.95	4,296	2,549	2,286	28%	1.1x	1.2x	4.0x	4.3x
DB HiTek	$ 32.18	1,341	896	859	35%	1.0x	1.1x	3.0x	3.9x
			Adjusted Mean		**36%**	**3.5x**	**3.2x**	**8.5x**	**7.9x**
			Median		**35%**	**2.7x**	**2.5x**	**9.4x**	**7.7x**

Note: Figures in bold have been excluded from the adjusted mean, all figures in US$ millions unless indicated

As a leading foundry, TSMC's investment in R&D, particularly in 5nm and 3nm nodes, contributes to a slight premium in its multiples.

Tech Conglomerates

Company Name	Share Price 29-Mar-24	Market Cap	TEV	LTM Revenue	LTM EBITDA Margin	TEV / Revenue LTM	TEV / Revenue NTM	TEV / EBITDA LTM	TEV / EBITDA NTM
Broadcom	$ 1325.41	614,223	678,260	38,865	53%	17.5x	12.9x	33.2x	21.2x
Samsung	$ 61.31	407,657	356,109	192,669	17%	1.8x	1.6x	10.9x	6.2x
Intel	$ 44.17	188,026	215,906	54,228	18%	4.0x	3.8x	22.4x	13.3x
			Mean		**29%**	**7.8x**	**6.1x**	**22.2x**	**13.6x**
			Median		**18%**	**4.0x**	**3.8x**	**22.4x**	**13.3x**

Note: All figures in US$ millions unless indicated

Figure 6: 10-year historical LTM EV/Revenue multiples, foundry and tech conglomerate mix

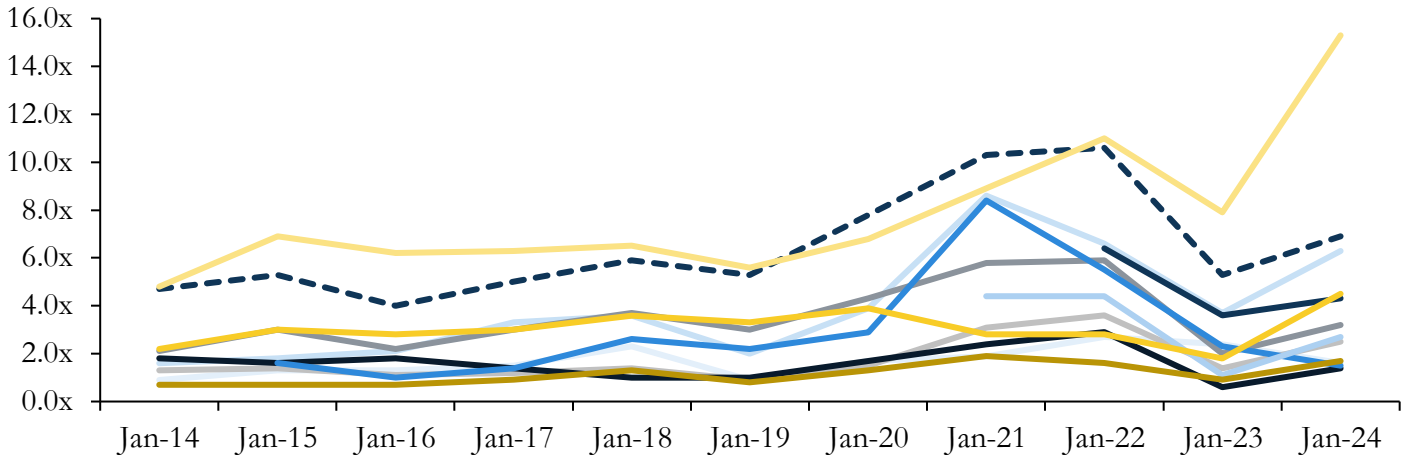
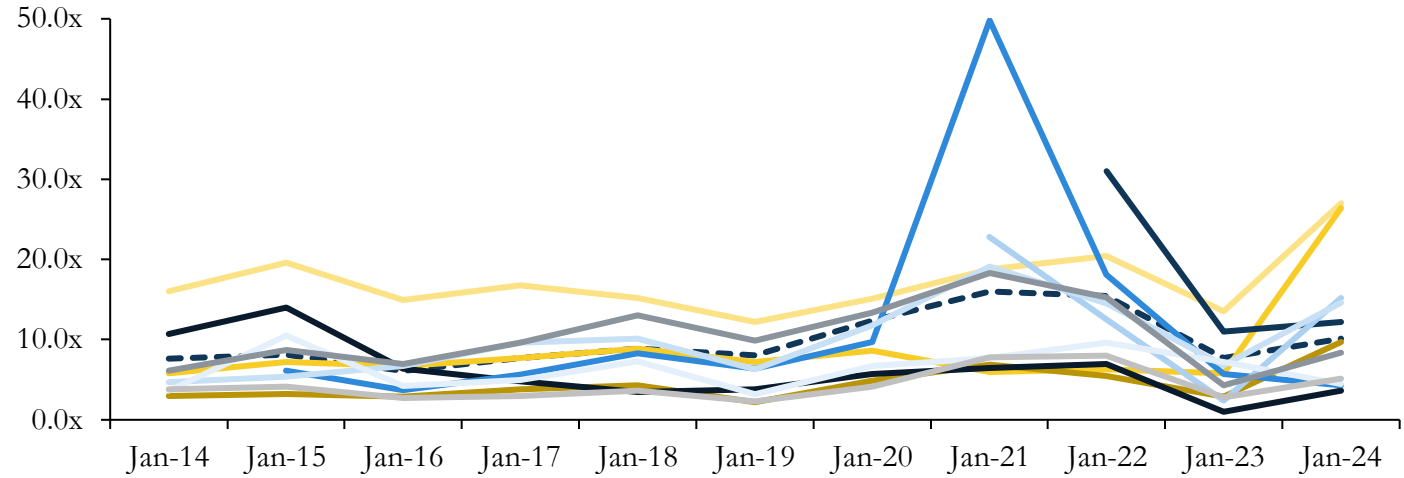


Figure 7: 10-year historical LTM EV/EBITDA multiples, foundry and tech conglomerate mix



- Taiwan Semiconductor Manufacturing Company Limited (TWSE:2330)
- Broadcom Inc. (NasdaqGS:AVGO)
- Intel Corporation (NasdaqGS:INTC)
- Samsung Electronics Co., Ltd. (KOSE:A005930)
- DB HiTek CO., LTD. (KOSE:A000990)
- GLOBALFOUNDRIES Inc. (NasdaqGS:GFS)
- Hua Hong Semiconductor Limited (SEHK:1347)
- Nexchip Semiconductor Corporation (SHSE:688249)
- Powerchip Semiconductor Manufacturing Corp. (TWSE:6770)
- Semiconductor Manufacturing International Corporation (SEHK:981)
- Tower Semiconductor Ltd. (NasdaqGS:TSEM)
- United Microelectronics Corporation (TWSE:2303)
- Vanguard International Semiconductor Corporation (TPEX:5347)

TSMC's EV/Revenue and EV/EBITDA multiples remain relatively consistent, with moderate fluctuations over time. The peaks between 2020 and 2022 can be attributed to heightened demand for advanced semiconductors and supply chain constraints during the COVID-19 pandemic. Sharp movements across the industry can often be attributed to unique events, such as the acquisition of Hua Hong Semiconductor Limited from NEC Corporation in 2021 and Broadcom's US$69 billion acquisition of VMware in 2023 and announced US$4 billion sell-off of its End-User Computing division to KKR.

Investment Theses

I. Innovation and Collaboration

Characterized by consistent investments in R&D to maintain its forefront position in chip-making technology, TSMC is well-poised to produce chips with smaller nodes and heightened performance capabilities. Through its pioneering efforts, the company has continually spearheaded the development and manufacturing of chips with smaller process nodes, exemplified by advancements in 7nm, 5nm, and even 3nm technologies. Such endeavours have strategically positioned the company, fostering competitiveness in power efficiency, overall performance, and chip density. Moreover, TSMC remains at the forefront of innovation with active involvement in the R&D of 2nm nodes, slated for introduction by 2025. The 2nm chip will boast a 25-30% power improvement compared to the 3nm chip. The reduction in power consumption coupled with higher transistor density makes the 2nm a significant step-up from the 3nm chip.

TSMC maintains robust partnerships with various semiconductor design companies, fostering long-term agreements and collaborative ventures in technology development. These strategic alliances serve as formidable barriers to entry for potential competitors seeking market entry. Notably, TSMC's relationships extend to industry giants like Apple and NVIDIA, with significant implications for the semiconductor landscape. In a notable example, Apple's substantial utilization of TSMC's foundry, initially at 90% capacity, is now projected to escalate to 100%. This shift is attributed to delays in Intel's wafer demands, stemming from alterations to its CPU platform design plans. Similarly, NVIDIA, renowned for its leadership in AI chip designs, maintains a close collaboration with TSMC, driven by the limited number of alternative sources and the exceptional quality of production offered by TSMC. These partnerships underscore TSMC's pivotal role in enabling technological advancements and solidifying its position as a cornerstone of the semiconductor industry.

II. Strong Management

TSMC's leadership, featuring figures like Mark Liu and C.C. Wei, renowned for their profound technical expertise in semiconductor manufacturing, enables the company to navigate complex technological landscapes and remain at the forefront of advancements. This expertise is complemented by a commitment to operational excellence, evident in the efficient manufacturing processes, robust supply chain management, and stringent quality control measures, all contributing to TSMC's ability to deliver high-quality semiconductor products at scale. Moreover, the leadership's strategic vision has been instrumental in anticipating industry trends, investing in emerging technologies, and setting long-term goals, positioning TSMC as a leader in semiconductor manufacturing and driving its continued success.

Figure 8: Growth Figures of TSMC

Metric	2021	2022	2023
Revenue Growth	18.5%	42.6%	(4.5)%
Operating Cash Flow Growth	35.8%	44.8%	(22.9)%
Return on Equity	29.8%	39.6%	26.0%
Capital Expenditure Growth	65.4%	29.0%	(12.3)%

Source: S&P Capital IQ

Risks & Catalysts

Risks

The Re-Entry of Huawei into the Smartphone Market Poses a Risk to TSMC Customers. Huawei, having been cut off from TSMC chip supplies due to Unites States sanctions, has begun manufacturing its own chips. This development coincides with the release of Huawei's new smartphone, which challenges Apple—an important TSMC client and iPhone chip buyer—which has seen its market share grow in China since the hiatus of Huawei. The extent to which TSMC will be affected by Huawei's rise from the dead will depend on how much market share Huawei can claw back, globally and in the Chinese market, where the company is a national pride.

New Rival Foundries Will Make Life Difficult for TSMC. TSMC may face threats to its foundry-service market share by companies like Intel and Samsung. The former aims to become the world's second-largest foundry service provider in the world by 2030. As previously mentioned, China can manufacture its own chips. If China decides to produce locally, causing it to stop buying from TSMC, it will considerably impact the company, considering it derives about 10% of its revenue from China.

China's Invasion of Taiwan Looms Over TSMC Operations. If China, led by President Xi, is to execute its plan of reunification for which its military will be ready by 2027, Taiwan will be under major threat. It is suggested that the most likely period for China to act on its reunification plan is before 2030. The global interconnection of TSMC's operations is highly sensitive to geopolitical disruptions. In the event of a sudden annexation attempt by China, TSMC's operations could be severely compromised. Such a scenario would likely sever TSMC's logistical and supply chains, disrupt its operations, and potentially halt production, with far-reaching consequences for the global tech industry reliant on its semiconductors. While TSMC has not directly addressed the specifics of a potential invasion plan, the company's chairman, Mark Liu, confirms this point by stating in an interview that if a military conflict were to occur, it could render TSMC's operations non-operable.

Catalysts

TSMC is Poised to Benefit Significantly from the Advancement of AI. The prominent adoption of AI in nearly all sectors of the economy represents a huge opportunity for TSMC, which already manufactures more than half of the world's most advanced chips, the lifeblood of AI. Datacentre AI and Edge AI are expected to proliferate in the coming years as AI infrastructure expands, resulting in higher demand for chips. TSMC expects its AI revenue to grow at a 50% CAGR over the next five years.

TSMC is at the Forefront of Technological Innovation. The expected launch of its 2nm technology in the first quarter of 2025 has been met with significant demand from companies such as Apple and Nvidia, which are expected to take up all the production capacity. Further development will see TSMC release its 2nm chip with backside power delivery, tailored for higher computational needs, in the second half of 2025.

Financial Analysis

In February 2024, the company reported consolidated net revenue of approximately NT$181.65 billion, an 11.3% increase YoY, despite a 15.8% decrease from January 2024. Revenue for January through February 2024 totalled NT$397.43 billion, which is a 9.4% increase compared to the same period in 2023.

Looking ahead, the company has signalled optimism for the global tech recovery in 2024, planning to raise its capital expenditures to between NT$898 billion and NT$1,026 billion, up from about NT$949 billion in 2023. This adjustment reflects the company's anticipation of a rebound in demand for smartphones and computing, fueled partly by the boom in AI development worldwide. TSMC is also advancing its international presence with new chipmaking facilities in Japan, Arizona, and Germany, expected to start mass production by the end of 2024. These developments have contributed to a significant surge in TSMC's share price recently.

In 2023, the company reduced its capital expenditure outlook to below its approximately NT$1,026 billion to NT$1,155 billion forecast. This recalibration was in response to a challenging demand environment for smartphones and computing chips. Despite these adjustments, TSMC remains focused on capturing substantial growth in 2024 and increasing its manufacturing capacity.

Figure 9: Historical and projected revenues

In Millions of NT$	2021A	2022A	2023A	2024E	2025E	2026E
Revenues	1,587,415.0	2,263,891.3	2,161,735.8	2,691,361.1	3,270,003.8	3,760,504.3
% Growth	*18.5%*	*42.6%*	*(4.5%)*	*24.5%*	*21.5%*	*15.0%*

Our revenue forecasts emphasize the expected strong growth in 2024 and a broader recovery in the semiconductor sector, drawing from management's outlook. The company expects revenue growth to reach low to mid-20% during 2024.

Figure 10: Historical and projected capital expenditures

In Millions of NT$	2021A	2022A	2023A	2024E	2025E	2026E
Capex	839,195.7	1,082,672.1	949,816.8	928,519.6	1,030,051.2	977,731.1
% of Revenue	*52.9%*	*47.8%*	*43.9%*	*34.5%*	*31.5%*	*26.0%*

In the projected years, our estimates reflect an adjustment in spending aligning with the company's maturity and industry trends. Our projections closely match street consensus and our 2024 capital expenditure estimate directly reflects management's expectations as stated earlier.

Valuation

Our DCF model, with a target price of NT$802, emphasizes the company's capital investments towards maintaining its dominance in semiconductor manufacturing technology. These investments focus on advanced nodes like 5nm and 3nm essential for high-performance computing, 5G, and AI. TSMC's distinct advantages, such as its technology leadership, extensive IP ecosystem, and mass production capabilities, are projected to bolster revenue and margins in light of the growing demand for sophisticated manufacturing processes. Moreover, TSMC's strategic global expansion efforts, especially in the United States, aim to mitigate geopolitical and supply chain risks, ensuring its position as a crucial supplier to technology companies.

The target price of NT$802 reflects TSMC's pivotal role in the global technology infrastructure, underpinning its strategy to meet the escalating demand for semiconductors and capability to uphold its market leadership.

The model adopts a perpetual growth rate of 2.5% and EBITDA exit multiple of 7.9x, chosen based on a NTM average of TSMC and its foundry peers, also adhering closely to historical performance and smoothing out any anomalies. This multiple underpins a conservative approach to TSMC's valuation, building a margin of safety into our analysis. Our valuation suggests a buy despite this conservative assumption given our strong conviction in the underlying value and growth prospects of the company.

Figure 11: Implied share price by perpetual growth and EBITDA exit method

Perpetuity Growth Method	
Final Year FCFF	1,632,007.1
Perpetual Growth Rate	2.5%
Terminal Value	22,359,996.5
PV of Terminal Value	15,653,508.3
Terminal Value as % of EV	*77%*
PV of FCFF	4,633,796.3
Forecast Period as % of EV	*23%*
Enterprise Value	**20,287,304.6**
(+) Cash	1,465,427.8
(-) Debt	(942,632.0)
Net Debt	522,795.7
Equity Value	**20,810,100.3**
Diluted Shares Outstanding	25,930.4
Implied Share Price	**802.5**
Current Share Price	770.0
Implied Upside (Downside)	4.23%

EBITDA Exit Multiple Method	
EBITDA Multiple	7.9x
Terminal Year EBITDA	2,754,810.1
Terminal Value	21,762,999.7
PV of Terminal Value	16,756,270.6
Terminal Value as % of EV	*83%*
PV of FCFF	3,491,281.1
Forecast Period as % of EV	*17%*
Enterprise Value	**20,247,551.7**
(+) Cash	1,465,427.8
(-) Debt	(942,632.0)
Net Debt	522,795.7
Equity Value	**20,770,347.4**
Diluted Shares Outstanding	25,930.4
Implied Share Price	**801.0**
Current Share Price	770.0
Implied Upside (Downside)	4.03%

Note: Current share price as of April 1, 2024

Our target price aligns closely with consensus among analysts, hovering around the average street target of approximately NT$796 as of April 1, 2024.

Figure 12: WACC sensitivity – base case

		WACC				
		9.0%	9.5%	10.0%	10.5%	11.0%
Terminal Growth Rate	2.00%	868.76	811.90	762.18	718.36	679.44
	2.25%	895.22	834.59	781.83	735.51	694.51
	2.5%	923.71	858.91	802.79	753.73	710.48
	2.75%	954.50	885.03	825.20	773.13	727.42
	3.00%	987.86	913.17	849.21	793.83	745.42

		WACC				
		9.0%	9.5%	10.0%	10.5%	11.0%
EBITDA Exit Multiple	6.9x	735.49	727.30	719.24	711.32	703.54
	7.4x	777.43	768.72	760.15	751.72	743.43
	7.9x	819.37	810.13	801.05	792.11	783.33
	8.4x	861.31	851.55	841.95	832.51	823.23
	8.9x	903.25	892.97	882.85	872.90	863.12

TFS Investment Group