Taiwan Semiconductor Manufacturing Company Ltd.

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Industry / Company Business Report

Giving insight and analysis on TSM's past 3 years of financial statements

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Professor Wang

Aliya Jackson - Luke Michaels - Noah Skopas

I. Company Overview

About the Company:

Taiwan Semiconductors Manufacturing Company Ltd. is the world's largest and most advanced contract semiconductor foundry. As of 2023, TSM manufactures chips for a broad range of industries, from consumer electronics and computing to automotive, telecommunications, and industrial applications.

- Founded: 1987 (Morris Chang)
- Headquarters: Hsinchu, Taiwan
- CEO: C.C. Wei (as of 2023)

Industry:

The Semiconductor & Electronic Parts Manufacturing industry is crucial to the global electronics sector, producing semiconductors (microchips, ICs), passive components (resistors, capacitors), active components (transistors, diodes), and optoelectronics (LEDs, lasers). These components are used in a variety of applications, including consumer electronics, automotive systems, telecommunications, and industrial machinery. Dominated by major players like TSM, Intel, Samsung, and Qualcomm, the industry is capital-intensive, requiring heavy investments in R&D and advanced facilities. Driven by digital transformation, IoT, AI, and 5G, the industry faces challenges like supply chain disruptions and raw material shortages. However, demand is expected to remain strong, particularly with growth in electric vehicles, renewable energy, and next-gen communications.

Major Business Processes:

- **Customer Collaboration**: Works with fabless companies (e.g., Apple, Qualcomm) to optimize chip designs for manufacturing.
- **R&D & Innovation**: Invests heavily in advanced process technologies (e.g., 5nm, 3nm) and next-gen packaging.
- **Manufacturing**: Executes wafer fabrication, advanced packaging, and testing with cutting-edge lithography.
- **Supply Chain & Logistics**: Manages global sourcing, just-in-time manufacturing, and efficient delivery.
- **Quality & Testing**: Ensures high yields and performance through rigorous quality control and testing.
- **Ecosystem Partnerships**: Collaborates with tool vendors, IP providers, and universities for ongoing innovation.
- **Sustainability**: Focuses on green manufacturing and reducing environmental impact.

Products/Services:

- **Logic Chips**: Used in smartphones, computers, networking, and data centers; includes processors for gaming, AI, and mobile devices.
- **Memory Chips**: TSM manufactures some memory products, though it's not a major producer of DRAM and NAND.
- **System-on-Chip (SoC)**: Combines multiple functions (processing, networking, graphics) in a single chip; e.g., Apple A-series, Qualcomm Snapdragon.
- **Power Management & Analog Chips**: Manages power usage and chip-environment interfaces.
- **Automotive Chips**: Supplies chips for EVs, autonomous vehicles, and automotive safety systems.
- **Wafer Fabrication**: Offers various processes for CMOS logic, mixed-signal, RF, embedded memory, and bipolar CMOS mixed-signal.
- **Support & Services**: Provides customer and engineering support, photomasks, and engages in research, design, development, packaging, testing, and sales of color filters.
- **End Markets**: Chips used in high-performance computing, smartphones, IoT, automotive, and digital consumer electronics.

Company Size:

TSM employs approximately 80,000 people globally. Its workforce consists of engineers, researchers, production staff, and executives who all come from different work backgrounds including semiconductor design, manufacturing, sales, and logistics. TSM focuses heavily on R&D, advanced manufacturing techniques, and recruitment from top universities worldwide.

In terms of revenue, TSM constantly ranks among the top semiconductor companies by revenue globally. In 2023, its revenue reached approximately $69.30 billion USD, making it the largest semiconductor foundry by revenue.

In terms of profitability, TSM has a high gross margin and net profit margin due to its efficient manufacturing processes, economies of scale, and strong customer base. In 2023, its net income exceeded $26.88 billion USD which reflects a strong demand for its advanced semiconductor manufacturing services.

As of late 2024, TSM's market capitalization stands at around $806.67 billion USD which positions the company as one of the largest companies in the world by market value.

TSM's Top 3 Competitors:

Samsung Electronics Company Ltd:

- ***Sector:*** Semiconductor Foundry, Memory, Consumer Electronics

- ***Overview:*** Samsung is one of the largest and most significant competitors to TSM in the semiconductor manufacturing space. While Samsung is also a major player in memory chips (e.g., DRAM, NAND), it operates a foundry business that directly competes with TSM in advanced logic chip manufacturing.
- ***Manufacturing:*** Samsung is known for producing chips using 7nm, 5nm, and 3nm nodes, and it has also announced plans to ramp up 2 nm and smaller nodes.
- ***Key Differences:*** Samsung offers a combination of memory and logic chips, while TSM primarily focuses on logic chips. Samsung has strong technology capabilities in areas such as 3D NAND and memory integration, but TSM still leads in terms of advanced process nodes and overall foundry market share.
- ***Key Clients:*** Samsung also manufactures chips for companies like Apple (though TSM is Apple's dominant supplier) and Qualcomm, and it has a significant share of the mobile processor market.

Intel Corporation:

- ***Sector:*** Semiconductor Design, Foundry (recently expanding)
- ***Overview:*** Intel is traditionally known for designing and manufacturing its own microprocessors, but in recent years, it has sought to transition into a foundry model, competing directly with TSM. Intel announced its Intel Foundry Services (IFS) to offer contract manufacturing of semiconductors for external clients, aiming to compete with TSM and Samsung.
- ***Manufacturing:*** Intel's manufacturing processes, however, have struggled with delays in moving to smaller nodes (e.g., 10nm and 7nm), putting it behind TSM in terms of advanced technology. Intel's flagship process nodes, such as 7nm, have not been as successful or timely as TSM's corresponding 5nm and 3nm processes.
- ***Key Differences:*** Intel has a legacy of designing both CPUs and integrated circuits, whereas TSM exclusively operates as a foundry, producing chips for other companies. Intel's efforts to become a third-party foundry are still in the early stages, and TSM remains the clear leader in advanced manufacturing.
- ***Key Clients:*** Intel still primarily serves its own designs (processors for PCs, data centers, etc.), but its foundry business is aimed at attracting external clients like Qualcomm and Amazon.

Global Foundries:

- ***Sector:*** Semiconductor Foundry
- ***Overview:*** U.S.-based semiconductor foundry that was originally part of AMD before spinning off into its own independent company in 2009. GlobalFoundries produces chips for a variety of industries, including telecommunications, automotive, and consumer electronics.

- ***Manufacturing:*** GlobalFoundries operates primarily in the 14nm and 12nm process nodes and is gradually expanding into 7nm. While it is not as technologically advanced as TSM or Samsung in cutting-edge nodes, it competes in more mature node processes.
- ***Key Differences:*** GlobalFoundries focuses on more mature nodes (such as 14nm and 12nm) and has a smaller share of the market for leading-edge semiconductors. However, it is a major supplier in markets where advanced nodes are not critical, such as automotive and consumer electronics.
- ***Key Clients:*** GlobalFoundries works with companies like Qualcomm, AMD (for some chips), NXP Semiconductors, and Broadcom.

Key Customers and Partners:

- Apple: One of TSM's most important customers, Apple has relied on TSM for the production of its custom A-series chips used in iPhones, iPads, and Macs. TSM manufactures these chips using some of the world's most advanced process technologies.
- NVIDIA: TSM manufactures Nvidia's GPUs, which are crucial for AI, gaming, and data center applications.
- AMD: TSM produces chips for AMD, including its Ryzen processors and Radeon GPUs, which are popular in gaming and high-performance computing.
- Qualcomm: TSM manufactures Qualcomm's Snapdragon chips, which power many smartphones, including high-end Android devices.
- Intel: Though Intel designs its own chips, it has increasingly turned to TSM for manufacturing. Intel has partnered with TSM for the production of its specialized chips and some of its future products.
- Automotive Clients: TSM is growing its footprint in the automotive sector, providing chips for electric vehicles, autonomous driving systems, and in-car infotainment.

II. Industry Analysis (Porter's Five Forces)

Threat of New Entrants:

- The semiconductor industry presents significant barriers to entry, including substantial capital requirements for advanced manufacturing facilities, extensive research and development (R&D) investments, and the need for specialized technical expertise. Establishing a state-of-the-art manufacturing facility can exceed $10 billion. DCFM Additionally, the industry is characterized by economies of scale and established brand reputations, making it challenging for new entrants to compete effectively.

Bargaining Power of Suppliers:

- TSM relies on a large network of suppliers for essential raw materials, including silicon and rare earth metals. However, the bargaining power of these suppliers is moderate to low due to TSM's significant purchasing volume and influence. The high supplier-to-firm concentration ratio, with numerous suppliers relative to a few major foundries, gives TSM flexibility and options, reducing the power of individual suppliers. Additionally, TSM's high volume of purchases makes suppliers reliant on its business, as losing TSM as a client would represent a substantial financial loss.

Bargaining Power of Buyers:

- TSM's customers have limited alternatives due to its dominance in advanced semiconductor manufacturing, with few competitors like Samsung and Intel able to match its capabilities in leading-edge nodes. Switching suppliers is costly and complex, so customers generally stick with TSM despite high prices. Although some buyers are price-sensitive, particularly in competitive markets, TSM's technology and reliability often justify its premium pricing, making customers less sensitive to costs when seeking cutting-edge chips.

Threat of Substitutes:

- There are few true alternatives to TSM's offerings, especially for cutting-edge semiconductor manufacturing at advanced nodes like 3nm and 5nm. While companies like Samsung and Intel compete in this space, TSM remains the leader in efficiency, yield, and innovation, especially for high-performance and custom chips. Some companies could theoretically bring production in-house, but the immense costs, technical challenges, and time required make it difficult. Thus, for many customers, TSM's offerings are irreplaceable in the short to medium term.

Rivalry Among Existing Competitors:

- The semiconductor foundry market is highly competitive, with several key players striving for market share. As of the first quarter of 2024, Taiwan Semiconductor Manufacturing Company (TSM) led the market with a 61.7% share, followed by Samsung at 11%. Other notable competitors include United Microelectronics Corporation (UMC), GlobalFoundries, and Semiconductor Manufacturing International Corporation (SMIC). While TSM maintains a significant lead, competitors are actively investing in advanced technologies to close the gap. For instance, Samsung has been enhancing its semiconductor capabilities, aiming to increase its market presence. Similarly, Intel is pursuing a turnaround strategy to regain its position in the semiconductor industry. Despite TSM's current dominance, the competitive landscape is dynamic, with rivals striving to innovate and capture a larger market share.

III. Company Life Cycle Stage

Current Stage: Mature

Market Leadership: TSM commands a leading position within the semiconductor industry, with a large client base of around 465 customers and an extensive product portfolio exceeding 9,920 products across various sectors, such as high-performance computing, smartphones, and automotive electronics.

- **Financial Stability:** The company has shown consistent revenue growth and sustained profitability over time. In 2022, TSM achieved a 33.5% year-over-year revenue increase in U.S. dollar terms, marking its thirteenth year of record revenue.
- **Technological Innovation:** Despite being in the mature stage, TSM continues to innovate, particularly through its investment in advanced technologies like 3DFabric™ and specialized semiconductor processes. This ongoing innovation enables TSM to maintain its competitive advantage and relevance in an industry that demands continual advancement, a characteristic often seen in mature tech companies.
- **Corporate Governance:** TSM's strong governance structure, including a dedicated Board of Directors and various oversight committees, reflects a mature organization's need for effective governance and strategic direction. This structured governance approach supports long-term stability and accountability.

IV. Financial Statements Analysis

Key Observations:

What trends did you notice in the common size analysis?

- For the Income Statement, TSM showcased its ability to be highly profitable. It has a very high Net Income, at 39.37%, 43.88%, and 37.35% over the past three years. This is due to them keeping costs very low and the margins they have achieved. Their gross profit margin was 54.36%, 59.56%, and 51.63%, which is usually an excellent number for a company to achieve. They also kept operational costs very low, only at 11.74%, 10.01%, and 10.66%. This allows the company to turn a large percentage of Revenue into Net Income. This lets TSM aggressively reinvest and grow.
- For the Balance Sheet, TSM shows a similar picture. It holds large cash reserves, at 26.49% and 27.05% of total assets. The most significant portion of assets is held in PP&E, at 55.39% and 54.26%. It shows how strong the company's manufacturing base is, controlling its production lines. This would raise concerns regarding how difficult it is to

make PP&E liquid in times of hardship. Still, the company's massive cash reserves allow for confidence it will be able to pay back its debts and inject capital when needed. This again allows the company to be aggressive with its growth and expansion strategy. Most of the company's liabilities are in Bonds Payable. These interactions are meant to raise capital and give the company more cash. Equity is around 60% each year, almost all in Retained Earnings. This relates to the income statement, as the company proved incredibly profitable.

What trends did you notice in the percentage change analysis?

Income Statement

TSM experienced massive growth from 2021 to 2022. It increased its revenue by 42.61%, with only a 19.23% increase in COGS. The company's ability to grow revenues on a large scale while having a disproportionate rise in COGS shows its massive growth. It also kept its operational costs under the increase in revenue at a 30.56% increase. They have created higher margins and diluted operational costs per unit sold. This is again translated into the Net Income, in which the company has a 67.54% increase. In 2023, the company faced stagnation, marked by a 4.51% drop in revenue and a 7.76% rise in COGS. They also had a disproportionate increase in operating expenses, at 10.66%. TSM also experienced a decrease of 14.32% in net income. Although it was still a good year for the company, they could not compound the growth they achieved in the last fiscal year.

Balance Sheet

The balance sheet shows modest gains. Their two major asset accounts, cash and PP&E, had modest increases of 9.13% and 7.76%, respectively. This shows the company’s push for growth while maintaining liquid assets. The other accounts, with over 3% of assets, accounts receivable, and inventories, had differing changes. Accounts receivable decreased 12.38%, and inventories increased 13.50%. These trends are positive as the reduced accounts receivable suggest improved cash collection efficiency, while the inventory buildup positions the company for anticipated future sales. The only two significant accounts for liabilities were accrued expenses and bonds payable. They both saw increases of 1.19% and 9.54%. The increased accrued expenses show they gained obligations, likely showing a difference in the payment period. The increase in bonds payable is essential to show the company's strategy. They are looking to raise additional capital, which is likely to assist in expanding PP&E to maintain its liquidity ratios. For equity, retained earnings increased 20.57%. This is due to the massive profits the company has received over the last few years. These changes show a company poised to continue its exponential growth while maintaining the proper safeguards to ensure it can continue operation if hardships arise.

V. Important Financial Ratios

Earnings Per Share (EPS):

Net Income Available to Common Shareholders	Weighted-Average Number of Common Shares Outstanding
$851,027.70 million (TWD)	(25,930.3+25,932)/2=25,931.15

Calculation

Basic EPS - $\$851,027.70/25,931.15=\$32.82$

Conclusion:

TSM did not have the items to calculate Diluted EPS, so Basic EPS was used. Each share of the company's stock made $32.85. This shows the company's extremely high profitability and the earnings a shareholder can expect for each share.

Return on Assets (ROA):

Net Income Available to Common Shareholders	Interest Earned	Noncontrolling Interest in Earnings	Average Total Assets
$851,027.70 million (TWD)	$60,293.90*(1-0.1310)=$52,395.50 million (TWD)	$-712.3 million (TWD)	(5,532,196.60+4,964,459.10)/2=$5,248,327.85 million (TWD)

$ROA=(851,027.70+52395.50139+(-712.3))/5,248,327.85=17.20\%$

Conclusion:

A ROA of 17.2% shows the company's efficiency with its assets. Due to its asset-intensive industry, it is even more impressive. It is able to utilize its assets to a high level and make $0.17 of profit for every dollar the company has as an asset. It has a huge portfolio of assets, and being able to keep an ROA of 17.2% shows the company's profitability.

Assets Turnover:

Sales	Average Total Assets
$2,161,735.80 million (TWD)	(5,532,196.60+4,964,459.10)/2=$5,248,327.85 million (TWD)

Assets Turnover=$2,161,735.80/5,248,327.85 = 41.19\%$

Conclusion:

An asset turnover ratio of 41.19% reinforces the company's ability to use its assets properly. TSM makes $0.41 of revenue for every dollar of assets it owns. Its operation is very asset-intensive, so it overperforms industry expectations. It uses its assets to generate consistent revenue.

Return on Capital Employed (ROCE):

$$\underbrace{\frac{\text{Net Income Attributable to Common Shareholders}}{\text{Average Common Shareholders' Equity}}}_{\textbf{ROCE}} = \underbrace{\frac{\text{Net Income Attributable to Common Shareholders}}{\text{Sales}}}_{\textbf{Profit Margin for ROCE}} \times \underbrace{\frac{\text{Sales}}{\text{Average Total Assets}}}_{\textbf{Assets Turnover}} \times \underbrace{\frac{\text{Average Total Assets}}{\text{Average Common Shareholders' Equity}}}_{\textbf{Capital Structure Leverage}}$$

Table 1: ROCE for 2021 (in millions)

ROCE	Profit Margin for ROCE	Assets Turnover	Capital Structure Leverage
Net Income Attributable to Common Shareholders	Net Income Attributable to Common Shareholders = **$596,540.01 million (TWD)**	Sales = **$1,587,415.04 million (TWD)**	Average Total Assets = **$3,725,503.46 million (TWD)**
Average Common Shareholders' Equity	Sales = **$1,587,415.04 million (TWD)**	Average Total Assets = **$3,725,503.46 million (TWD)**	Average Common Shareholder's Equity= **$2,170,733.21 million (TWD)**

Calculation:

ROCE (2021) = $\frac{\$596{,}540.01\ million\ (TWD)}{\$1{,}587{,}415.04\ million\ (TWD)} \times \frac{\$1{,}587{,}415.04\ million\ (TWD)}{\$3{,}725{,}503.46\ million\ (TWD)} \times \frac{\$3{,}725{,}503.46\ million\ (TWD)}{\$2{,}170{,}733.21\ million\ (TWD)}$

= 0.3758 × 0.4261 × 1.72 = **0.275**

Conclusion:

A return on capital employed (ROCE) of 27.5% indicates strong capital efficiency, with the company generating 27.5 cents for every dollar of capital invested. This is generally a good performance, especially in capital-intensive industries, and suggests effective use of capital to generate profit.

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Table 2: ROCE for 2022 (in millions)

ROCE	**Profit Margin for ROCE**	**Assets Turnover**	**Capital Structure Leverage**
Net Income Attributable to Common Shareholders	Net Income Attributable to Common Shareholders = **$1,016,530.25 million (TWD)**	Sales = **$2,263,891.29 million (TWD)**	Average Total Assets = **$4,964,778.88 million (TWD)**
Average Common Shareholders' Equity	Sales = **$2,263,891.29 million (TWD)**	Average Total Assets = **$4,964,778.88 million (TWD)**	Average Common Shareholder's Equity= **$2,960,488.87 million (TWD)**

ROCE (2022) = $\frac{\$1{,}016{,}530.25\ million\ (TWD)}{\$2{,}263{,}891.29\ million\ (TWD)} \times \frac{\$2{,}263{,}891.29\ million\ (TWD)}{\$4{,}964{,}778.88\ million\ (TWD)} \times \frac{\$4{,}964{,}778.88\ million\ (TWD)}{\$2{,}960{,}488.87\ million\ (TWD)}$

= 0.449 × 0.456 × 1.677 = **0.3434**

Conclusion:

A return on capital employed (ROCE) of 34.34% indicates excellent capital efficiency, meaning the company generates 34.34 cents for every dollar of capital employed. This is a strong performance, reflecting effective management and operational efficiency. It suggests the company is likely creating significant value for shareholders, especially if the return exceeds its cost of capital.

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Table 3: ROCE for 2023 in (millions)

ROCE	Profit Margin for ROCE	Assets Turnover	Capital Structure Leverage
Net Income Attributable to Common Shareholders	Net Income Attributable to Common Shareholders = **$838,497.66 million (TWD)**	Sales = **$2,161,735.84 million (TWD)**	Average Total Assets = **$5,532,371.22 million (TWD)**
Average Common Shareholders' Equity	Sales = **$2,161,735.84 million (TWD)**	Average Total Assets = **$5,532,371.22 million (TWD)**	Average Common Shareholder's Equity= **$3,483,262.85 million (TWD)**

$$\text{ROCE (2023)} = \frac{\$838{,}497.66\ million\ (TWD)}{\$2{,}161{,}735.84\ million\ (TWD)} \times \frac{\$2{,}161{,}735.84\ million\ (TWD)}{\$5{,}532{,}371.22\ million\ (TWD)} \times \frac{\$5{,}532{,}371.22\ million\ (TWD)}{\$3{,}483{,}262.85\ million\ (TWD)}$$

$$= 0.3879 \times 0.3907 \times 1.588 = \mathbf{0.2407}$$

Conclusion:

A return on capital employed (ROCE) of 24.07% indicates that the company is effectively using its capital to generate profit, with a return of 24.07 cents for every dollar of capital employed. This is generally considered a strong performance, suggesting efficient capital utilization and profitability. However, the significance of this ROCE depends on the industry context—higher capital-intensive industries may have lower expectations, while capital-light sectors might view this as particularly high. A ROCE above the company's cost of capital (typically 6-10%) is a good sign, as it suggests value creation for shareholders. Overall, the ROCE shows good financial health and solid performance, though it should be compared to industry peers for a full assessment.

Capital Structure Leverage:

Capital Structure Leverage = $\frac{Average\ Total\ Assets}{Average\ Common\ Shareholders'\ Equity}$						
	2021		**2022**		**2023**	
Average Total	$3,725,503.4	**1.72**	$4,964,778.88	**1.677**	$5,532,371.22	**1.588**

Assets	6 million (TWD)		million (TWD)		million (TWD)	
Average Common Shareholders ' Equity	$2,170,733.21 million (TWD)		$2,960,488.87 million (TWD)		$3,483,262.85 million (TWD)	

Conclusion:

- **Year: 2021**
  - *A capital leverage structure of 1.72 means the company is using $1.72 in debt for every $1 of equity. This indicates a moderate level of financial leverage, where the company is borrowing to finance its operations and growth, but not excessively so. While leverage can enhance returns when the company performs well, it also increases financial risk, as the company must meet its debt obligations regardless of its performance. A ratio of 1.72 suggests that the company is balancing debt and equity reasonably, but it should be monitored for sustainability, especially in periods of economic downturn or rising interest rates.*
- **Year: 2022**
  - *A capital leverage ratio of 1.677 means the company has $1.677 in debt for every $1 of equity, indicating a moderate level of leverage. This suggests the company is using debt to finance its activities and growth, which can amplify returns when times are good. However, it also introduces financial risk, as the company must service its debt regardless of its performance. A ratio of 1.677 is not excessive, but it does indicate a reliance on borrowed capital, which should be carefully managed, particularly in periods of economic uncertainty or rising interest rates.*
- **Year: 2023**
  - *A capital leverage ratio of 1.588 means the company has $1.588 in debt for every $1 of equity, indicating a moderate reliance on debt to finance its operations. This level of leverage can enhance returns when the company performs well, but also exposes it to financial risk if earnings fluctuate or if economic conditions worsen. While the ratio is not excessive, it suggests a balanced approach to financing, though the company must manage its debt carefully to avoid strain on its finances.*

Current Ratio:

$$\text{Current Ratio} = \frac{Current\ Assets}{Current\ Liabilities}$$

	2021		2022		2023	
Current Assets	$1,607,072.90 million (TWD)	**2.12**	$2,052,896.70 million (TWD)	**2.08**	$2,194,032.90 million (TWD)	**2.33**
Current Liabilities	$758,352.80 million (TWD)		$986,563.60 million (TWD)		$942,805.10 million (TWD)	

Conclusion:

- **Year: 2021**
  - *TSM's current ratio of 2.12 indicates a strong liquidity position, suggesting that the company has more than enough short-term assets to cover its short-term liabilities. This ratio reflects the company's ability to handle potential financial obligations without significant risk of liquidity issues. A current ratio above 2 is generally seen as healthy, providing TSM with financial stability and flexibility in its operations. This solid liquidity position supports the company's continued growth and resilience in the competitive semiconductor industry.*
- **Year: 2022**
  - *TSM's current ratio of 2.08 reflects a solid liquidity position, indicating that the company has sufficient short-term assets to cover its short-term liabilities. While slightly lower than 2.12, this ratio is still considered healthy and suggests that TSM remains financially stable with the ability to meet its immediate obligations.*
- **Year: 2023**
  - *TSM's current ratio of 2.33 reflects a strong liquidity position, indicating that the company has ample short-term assets to cover its short-term liabilities. This ratio is well above the generally accepted benchmark of 2, signaling that TSM is in a healthy financial state with the ability to manage its immediate obligations comfortably. The robust liquidity provides TSM with financial flexibility, supporting its ongoing growth and stability in the highly competitive semiconductor industry.*

Accounts Receivable Turnover:

Accounts Receivable Turnover = Sales / Average Accounts Receivable

AR Turnover	2023
Net Revenue 2023	2,161,735.80

Accounts Receivable 2023	201,313.90
Accounts Receivable 2022	229,755.90
AR Turnover	10.03

Conclusion:

The AR Turnover ratio measures how effectively a company collects payments from its customers. In 2022, the AR Turnover was 9.43 times, calculated using total revenue of $2,161,735.80 and an average accounts receivable of $229,755.90. This indicates that the company collected its receivables slightly less frequently than in 2023, where the ratio improved to 10.03 times. The increase suggests enhanced efficiency in credit management and collection processes, enabling the company to convert receivables into cash faster in 2023 compared to the prior year.

Accounts Payable Turnover:

Accounts Payable Turnover = Inventory Purchases / Average Accounts Payable

AP Turnover	
Purchases 2023	958,183.20
Accounts Payable 2023	55,726.80
Accounts Payable 2022	54,879.70
AP Turnover 2023	17.33

Conclusion:

The AP Turnover ratio evaluates the speed at which a company pays its suppliers. In 2022, the ratio was 17.45 times, based on purchases of $958,183.20 and an average account payable of $54,879.70. This is very close to the 17.33 times recorded in 2023, indicating consistency in the company's ability to manage and settle its supplier obligations. While the slight decline may reflect changes in payment terms or timing, both years demonstrate strong supplier payment practices, ensuring reliable supply chain operations.

Inventory Turnover:

Inventory Turnover = Cost of Goods Sold / Average Inventories

Inventory Turnover	
COGS 2023	986,625.20
Inventory 2023	250,997.10
Inventory 2022	221,149.10
Inventory Turnover 2023	4.18

Conclusion:

The Inventory Turnover ratio assesses how efficiently a company manages inventory to support sales. In 2022, the Inventory Turnover ratio was 4.46 times, calculated using a cost of goods sold (COGS) of $986,625.20 and an average inventory of $221,149.10. This slightly decreased to 4.18 times in 2023, indicating a marginal slowdown in inventory turnover. The reduction could suggest higher inventory levels or slower sales in 2023, but both years reflect reasonable inventory management, minimizing excess stock while meeting demand.

Operating Cash Flow to Current Liabilities:

Operating Cash Flow to Current Liabilities Ratio = Cash Flow from Operations / Average Current Liabilities

Operating Cash Flow to Current Liabilities	
Net Cash Generated by Operating Activities 2023	1,241,967.30
Total Current Liabilities 2023	942,805.10
Total Current Liabilities 2022	986,563.60
Operating Cash Flow to Current Liabilities 2023	1.29

Conclusion:

This ratio highlights the company's ability to meet its short-term liabilities using cash from operations. In 2022, the ratio was slightly higher than in 2023, reflecting a stronger capacity to cover current liabilities at the time. A decrease in the ratio between 2022 and 2023 may suggest increased current liabilities, reduced operating cash flow, or a combination of both. Maintaining a high ratio in both years underscores the company's sound liquidity position and operational stability.

Operating Cash Flow to Total Liabilities:

Operating Cash Flow to Current Liabilities Ratio = Cash Flow from Operations / Average Total Liabilities

Operating Cash Flow to Total Liabilities	
Net Cash Generated by Operating Activities 2023	1,241,967.30
Total Liabilities 2023	2,078,330.10
Total Liabilities 2022	2,046,626.70
Operating Cash Flow to Total Liabilities 2023	0.60

Conclusion:

The Operating Cash Flow to Total Liabilities ratio for 2023 was 0.60, indicating that the company generated cash flow sufficient to cover 60% of its total liabilities through operations. This reflects reasonable solvency and the ability to manage obligations without heavy reliance on external funding. However, a slight decline compared to 2022 suggests either an increase in liabilities or slower growth in operational cash flow. While the ratio remains moderately strong, close monitoring is essential to ensure liabilities do not outpace the company's cash flow generation, maintaining financial stability.

Interest Coverage Ratio (Net Income Basis):

Interest Coverage Ratio (Net Income Basis) = Net Income + Interest Expense + Income Tax Expenses + Net Income Attributable to Noncontrolling Interests / Interest Expense

Interest Coverage Ratio (Net Income Basis)	
Net Income 2023	851,027.70
Finance Costs 2023	-11,999.40
Income Tax Expense 2023	128,288.80
Non-Controlling Interest	-712.30
Interest Coverage Ratio (Net Income Basis) 2023	-80.55

Conclusion:

The Interest Coverage Ratio (Net Income Basis) measures the company's ability to meet its interest obligations using net income, adjusted for interest and tax expenses. In 2023, the ratio was -80.55, calculated using a net income of $851,027.70, finance costs of $-11,999.40, income tax expense of $128,288.80, and non-controlling interest of $-712.30. The negative ratio reflects an unusual scenario, likely due to negative finance costs (potential interest income offsetting expenses), which distorts the traditional interpretation of this metric. While such a result might not signify immediate financial distress, it warrants closer examination of the company's financial structure, particularly its financing and tax strategies, to understand the underlying factors influencing this performance.

Interest Coverage Ratio (Cash Flow Basis):

Interest Coverage Ratio (Cash flow Basis) = Cash Flow from Operations + Cash Payments for Interest (including imputed interest) and Income Taxes / Cash Payments for Interest

Interest Coverage Ratio (EDITDA)	
Income from Operations 2023	921,276.90
Depreciation Expenses 2023	522,932.70
Amortization Expense 2023	9,258.20
Finance Costs 2023	-11,999.40
Interest Coverage Ratio (EDITDA) 2023	-121.13

Conclusion:

The Interest Coverage Ratio (EBITDA Basis) evaluates the company's ability to meet interest obligations using its earnings before interest, taxes, depreciation, and amortization (EBITDA). In 2023, the ratio was -121.13, derived from income from operations of $921,276.90, depreciation expenses of $522,932.70, amortization expense of $9,258.20, and finance costs of $-11,999.40. The negative ratio suggests that finance costs were offset, likely due to interest income exceeding interest expenses, which distorts the standard interpretation of this metric. While this may indicate a favorable financing arrangement or significant interest income, it also highlights the need to carefully review the company's financial and operational structure to ensure sustainable cash flow management and alignment with debt servicing obligations.

VI. Forecasting

Balance Sheet:
For the balance sheet, we used a 9.13% increase in cash. This is the previous year's increase, which projects the company to continue its growth. Accounts such as receivables, inventory, and payables were found using the connected ratios. Other increases were made to balance the sheet and realistically increase the necessary accounts. TSMC is projected to continue its growth and maintain its manufacturing base.

Income Statement:
Due to revenue fluctuations over the past two years, a wider perspective was necessary to forecast projected growth. This was done by calculating the average revenue growth for the last ten years, which was 13%. The revenue cost was forecasted using 2023's common size percentage of 45.64%. Operating expenses were forecasted the same way, at 11.74%. This led to the forecasted 2024 net income return to 2022 standards, with consistent growth afterward. After 2024, net income is projected to rise consistently until 2028. This is because the semiconductor industry is one of the most important manufacturers of the near future, and TSMC has a stranglehold on the market share. The company has consistently positioned itself for growth and has proven capable of making massive jumps in revenue. In 2018, the company reported $1,031,361m in revenue and has more than doubled it in 2023. It is not unrealistic that this company has the potential to continue these trends over the next five years. The current growth, innovations, and market share of TSMC all indicate that they can continue these trends.

Cash Flows:
For the cash flow forecasting, we used a growth rate of 14.28%, which reflects the increase seen in the previous year. This rate is applied to cash flow from operations, as we expect TSMC's strong performance and efficient operations to continue driving cash generation. The projected growth aligns with TSMC's historical ability to consistently generate cash flow from its core semiconductor business. We have forecasted $122 million FCF in 2024, $140 million FCF in 2025, $160 million FCF in 2026, $184 million FCF in 2027, and $210 million FCF in 2028. To figure out our forecast percentages we calculated the percent change on the balance sheet and used that percentage to give us out forecasted year totals.

In conclusion, our cash flow forecast for TSMC is based on a solid foundation of historical performance and a growth rate of 14.28%, which reflects the company's proven ability to generate strong cash flow from operations. By applying this growth rate to projected free cash flow (FCF), we expect TSMC to continue its upward trajectory, with FCF growing from $122 million in 2024 to $210 million in 2028. This forecast is built on the assumption that TSMC's efficient operations and dominant position in the semiconductor industry will sustain its robust cash generation. The forecasted percentages, derived from the balance sheet's percent changes, further reinforce the accuracy and reliability of these projections, providing a clear outlook for the company's financial health in the coming years.

VII. Conclusion

Summary of Key Findings:

TSM's financial analysis from 2021 to 2023 shows strong profitability, solid growth, and efficient asset management. Its common size analysis highlights consistent net income above 37%, driven by high gross profit margins and low operational costs, enabling significant reinvestment. The balance sheet reflects strong asset management, with notable cash reserves and PP&E, while liabilities mainly stem from bonds for expansion. Equity is largely retained earnings, reflecting profitability. Despite a slight slowdown in 2023, with reduced revenue and higher operational costs, TSM maintained a solid financial position.

TSM showed strong profitability and operational efficiency across key financial metrics. Its earnings per share (EPS) of $32.82 and return on assets (ROA) of 17.2% reflect solid performance. The asset turnover ratio of 41.19% and return on capital employed (ROCE), which rose from 27.5% in 2021 to 34.34% in 2022 before dipping to 24.07% in 2023, indicate efficient capital use. TSM's capital leverage ratio decreased slightly from 1.72 in 2021 to 1.588 in 2023, showing moderate debt reliance. With a current ratio above 2, strong liquidity, and good receivables and payables management, the company remains financially healthy, despite a slight slowdown in inventory turnover in 2023.

TSM also demonstrates strong operational efficiency, with improvements in accounts receivable turnover from 9.43 in 2022 to 10.03 in 2023, reflecting enhanced credit management and faster cash flow conversion. Accounts payable turnover remained consistent, decreasing slightly from 17.45 to 17.33, highlighting reliable supplier payment practices. While inventory turnover declined marginally from 4.46 to 4.18, it still indicates reasonable inventory management. Liquidity ratios, including operating cash flow to current liabilities (1.29) and total liabilities (0.60), show the company's ability to meet short-term and overall obligations with cash generated from operations, maintaining a stable financial position.

However, the interest coverage ratios present an unusual picture due to negative finance costs, likely driven by significant interest income offsetting expenses. The -80.55 net income-based ratio and -121.13 EBITDA-based ratio require deeper analysis to understand the company's financial strategies and their implications. While these results do not indicate immediate financial distress, careful monitoring of liability growth, cash flow alignment, and financial structuring will be crucial for sustaining TSM's operational stability and long-term solvency.

Implications for Investors:

Geopolitical Risks:

- **Taiwan-China Tensions:** Political instability between Taiwan and China could disrupt TSMC's operations and the global semiconductor supply chain.

Supply Chain and Operational Risks:

- **Supply Chain Disruptions:** Natural disasters or geopolitical events could impact production and material availability.
- **Technology Advancements:** Delays in adopting cutting-edge manufacturing technologies could hurt TSM's competitive edge.

Competition Risks:

- **Rising Competition:** Competitors like Samsung and Intel could erode TSM's market share and profit margins.

Regulatory and Trade Risks:

- **Government Regulations:** Export controls and changing trade policies, particularly with the US and China, could impact TSM's market access.

Environmental and Natural Disaster Risks:

- **Environmental Impact:** TSM's energy-intensive operations face potential regulatory challenges, while Taiwan's vulnerability to natural disasters poses operational risks.

Economic and Market Risks:

- **Economic Slowdown:** Global economic downturns or reduced demand for electronics could negatively affect TSM's sales and profitability.

Recommendation:

Our DCF model values the company at $247.46 per share. The current market value of around $203 is underpriced due to the future growth the company has forecasted. This is the reasoning behind our buy recommendation. The company is currently discounted by over 20% in today's market, and investors can achieve reasonable gains from holding TSM's stock. TSM has proven its ability to grow aggressively and maintain strong liquidity. Although they had a slight down year in 2023, we expect them to bounce back and sustain previous growth. TSM has historically had strong financials and has maintained a track record of impressive performance. Forecasts expect cash flows to surpass the 2022 highs and continue to prove why TSM is an excellent investment. They have become the dominant company and will remain the most

significant player in one of the most important industries for the next ten years. These factors give us confidence in our recommendation to buy TSM.

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