

The research on the Investment Memorandum based on SWOT, Financial and Valuation Methods: Case of TSMC

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Abstract. In recent years, with the advent of technology such as artificial intelligence, the Internet of Things, autonomous vehicles, and 5G communications, the demand for high-performance semiconductors has been increasing steadily. TSMC is the world's largest dedicated independent semiconductor foundry, however, its future investment value requires further investigation. Therefore, this paper will focus on analyzing TSMC from three perspectives: SWOT analysis, valuation analysis, and financial analysis, to discuss its strengths and weaknesses. The findings of this paper indicate that TSMC's main advantages are leading technology, economies of scale, and a broad customer base, while its disadvantages are mainly reflected in the risks brought about by geopolitics. At the same time, compared to other enterprises in the information technology industry, TSMC's valuation is relatively balanced and has high growth potential. At the same time, TSMC's financial situation is very stable and shows a trend of growth, with relatively small financial risks. The research results of this article help investors to have a more comprehensive understanding of the development status and investment value of TSMC, provide certain reference for investment decision-making, and also provide a certain reference basis for TSMC to better develop itself and recognize its own shortcomings.

Keywords: Investment memorandum, semiconductor, TSMC, SWOT, valuation analysis, financial analysis.

1. Introduction

The semiconductor industry is widely regarded as a sector with potential investment value, hence this paper has chosen to analyze Taiwan Semiconductor Manufacturing Company (TSMC) as a subject of study. TSMC provides wafer fabrication services with advanced and specialty process technologies and its stock has been on an upward trend, drawing significant attention from investors. The essay will analyze the investment value of TSMC.

Regarding the analysis of investment value, scholars have also conducted research. For instance, Fama and French constructed a five-factor asset pricing model that includes market, size, value, profitability, and investment factors [1]. Based on indicators such as market capitalization, book-to-market ratio (B/M), operating profitability (OP), and investment (Inv), they constructed a series of double and triple-sorted portfolios and employed this research method to study and test the model. Woltering et al. used the net asset value (NAV) of real estate companies as a proxy for their fundamental value, calculated the discount of stock prices relative to NAV, and analyzed the risk-adjusted returns of value portfolios through time-series regression [2]. They studied the global value premium of real estate company stocks and found a significant global value premium in the real estate stock market. They also discovered that a global value investment strategy based on relative NAV discounts can achieve excess risk-adjusted returns. Zuhao Zou and Xiaoping Wang established analytical models based on the Markowitz mean-variance (MV) model, the Capital Asset Pricing Model (CAPM), and correlation models to study the investment value of China's healthcare industry in the context of the COVID-19 pandemic [3]. They found that before and after the pandemic, the actual expected return of China's healthcare industry was significantly higher than the expected return calculated by CAPM, indicating that the investment value of the healthcare industry was underestimated by the market. García et al. used empirical analysis methods and multiple financial indicators [4]. They concluded that the combination of value (selecting undervalued stocks) and quality (high ROA) investment strategies performed the best among Eurozone equity funds,

outperforming other pure value strategies. Furthermore, in the value-quality strategy, the weight of the ROA indicator should be higher than that of other indicators. Vogeley et al. employed qualitative research methods to analyze investment reports and other documents to study the relationship between 18 pairs of impact investors and investees (social entrepreneurs) [5]. They found that in impact investing, the level of value alignment and its dynamic changes have complex effects on the investor-investee relationship and outcomes. Pa 'a'ri et al. investigated the added value of investment strategies that combine traditional valuation ratios with financial statement variables [6]. The research results showed that in the German stock market, combining valuation ratios with each other or with financial statement variables yielded better results than in most other developed stock markets. Otuteye and Siddiquee proposed a heuristic approach (O-S heuristic) based on value investing principles to overcome cognitive biases in investment decision-making [7]. The approach includes companies having a good history of profitability and prospects for continued profitability, stable financial conditions, and stock prices significantly below their intrinsic value, providing a substantial margin of safety. Forner and Veira used the F_Score indicator proposed by Piotroski (2000) and Piotroski and so (2012) to measure the fundamental financial health of listed companies [8]. F_Score examines company fundamentals from three aspects: profitability, financial health, and operating efficiency. They found that in the Spanish market, investors' expectations of company fundamentals, when mismatched with their valuation levels, can lead to stock mispricing. Lavdari conducted a PEST analysis to study the political, economic, social, and technological factors faced by TSMC in the semiconductor market [9]. The conclusion was drawn that as a leader in the semiconductor industry, TSMC's future development is deeply influenced by the international political and economic situation. Through strategic positioning and balancing relationships with various parties, TSMC may continue to maintain its dominant position in future international competition. Kok et al. studied the so-called "value investing" strategies based on simple fundamentals and price ratios (such as book-to-market ratio and earnings-to-price ratio) [10]. Using empirical analysis, they investigated the performance of these strategies in the US stock market and concluded that these quantitative strategies based on simple ratios cannot replace the true value investing method of comprehensively evaluating intrinsic value.

Based on the above research, this paper further analyzes the investment value of TSMC, including both qualitative and quantitative analyses. The qualitative analysis mainly uses the SWOT analysis method to examine TSMC's strengths, weaknesses, opportunities, and threats. The quantitative analysis primarily focuses on analyzing the company through financial indicators and valuation. Through these studies, not only can practical investment reference be provided to investors regarding investment value, but it can also theoretically enrich the existing literature on value investing, especially research on TSMC. This paper will focus on the investment value of TSMC and specifically analyze TSMC through three aspects: SWOT analysis, valuation analysis, and financial analysis.

2. Method

2.1. SWOT Analysis

SWOT analysis is a strategic planning tool utilized to assist organizations in identifying and evaluating crucial factors within their business environment. The acronym SWOT represents "Strengths," "Weaknesses," "Opportunities," and "Threats," which constitute the four fundamental elements of the SWOT analysis framework. This instrument enables enterprises to assess their internal capabilities (strengths and weaknesses) and external factors (opportunities and threats) that may influence their performance and strategic trajectory. By conducting a thorough SWOT analysis, organizations can obtain valuable insights into their competitive position, potential avenues for growth, and challenges that must be addressed to achieve their objectives.

2.2. Valuation Analysis

This study also employs fundamental analysis and value investing methodologies to assess the company's investment value. By analyzing financial indicators such as the price-to-earnings ratio (P/E), earnings per share (EPS) growth rate, revenue growth rate, gross profit margin on total assets, price/earnings to growth (PEG) ratio, gross margin, operating profit margin, and after-tax return on equity (ROE), the study evaluates the company's investment potential. The investment logic behind this approach is to identify a balanced stock with growth potential and investment value, focusing on the company's long-term profitability, financial stability, and risk factors. Value investors seek to identify companies that are undervalued by the market, with strong fundamentals and a margin of safety between the current stock price and the company's intrinsic value. By combining financial analysis and valuation techniques, this study aims to provide a comprehensive assessment of the company's investment merit and potential for long-term value creation.

2.3. Financial Analysis

Financial analysis is the process of assessing and interpreting a company or organization's financial data to gain an understanding of its financial health and operational efficiency. This analysis typically involves examining financial statements, including the balance sheet, income statement, and cash flow statement. Financial analysis aids investors, management, creditors, and other stakeholders in making informed decisions by providing insights into a company's liquidity, profitability, and financial risk. In this study, financial ratios are employed to evaluate the company's liquidity, profitability, and financial risk. These ratios encompass measures such as the current ratio, quick ratio, return on assets (ROA), and return on equity (ROE), debt-to-equity ratio, and interest coverage ratio. By comparing these ratios to industry benchmarks and the company's historical performance, analysts can obtain a more comprehensive understanding of the company's financial strengths and weaknesses.

3. Results and discussion

3.1. SWOT Analysis

From a SWOT analysis perspective, TSMC's strengths include leading technology, economies of scale, a broad customer base, and a strong financial position. TSMC has a technological advantage in advanced nodes. In addition, TSMC's production capacity and market share can help it achieve economies of scale, resulting in lower costs in semiconductor manufacturing compared to other companies. More importantly, TSMC has a wide customer base and is a partner of many Fortune 500 companies such as Apple, maintaining long-term and stable relationships. TSMC is mainly responsible for manufacturing chips for these companies and charges fees. For example, the A10 processor in Apple's iPhone 7 was entirely manufactured by TSMC, bringing substantial revenue. TSMC's financial position is also very robust based on various indicators, which will be provided in the subsequent analysis.

In terms of weaknesses, due to TSMC's headquarters and core production bases being located in Taiwan, there is a high possibility of facing geopolitical risks arising from political factors. Furthermore, as a foundry, TSMC is overly dependent on downstream customers, making it susceptible to the impact of customer business fluctuations. TSMC's usage data also highlights the capital-intensive nature of the semiconductor manufacturing industry, and its high capital expenditure may affect TSMC's short-term profitability.

As for potential opportunities, with the development of technologies such as the Internet of Things, 5G, and artificial intelligence, the demand for high-performance semiconductor products is increasing. More semiconductor companies may choose to outsource chip production to reduce capital expenditure and utilize TSMC's advanced processes. This creates a larger market and development prospects for foundries like TSMC.

At the same time, TSMC also faces some threats. For example, other semiconductor companies such as Samsung and Intel are actively developing advanced process technologies, posing a competitive threat to TSMC. In addition, global trade tensions, especially the trade war between China and the United States, may affect TSMC's supply chain and market access. Natural disasters are also part of the threat; TSMC's production facilities are concentrated in Taiwan, and natural disasters or health crises (such as epidemics) could seriously impact its operations.

3.2. Valuation Analysis

In the valuation analysis, TSMC will be compared with Nvidia, NXP Semiconductors, and Qualcomm, with all valuation indicators presented in Table 1. Firstly, from the perspective of the price-to-earnings (P/E) ratio, Nvidia's trailing twelve months (TTM) P/E ratio stands at 38.182, while its next twelve months (NTM) P/E ratio is 19.753, making it an expensive stock compared to the other three, and possibly not suitable for most investors. Despite NVDA's superior performance in Earnings Per Share (EPS) growth rate, Revenue growth rate, Gross profit to asset ratio, and the Price/Earnings to Growth (PEG) ratio, it may not align with certain investment criteria. However, NVDA may be appropriate for investors who seek high growth potential and are willing to pay a premium for it.

In contrast, NXP Semiconductors (NXP) has TTM P/E ratio of about 16.37 and NTM P/E ratio of about 16.67, which are very low. However, its EPS and Revenue growth rates are -2% and -1%, which means that the company does not have a growing earning per share and revenue, both of the indexes are negative. Therefore, NXPI should be eliminated from the stock choice of investors. This brings the focus to Taiwan Semiconductor Manufacturing Company (TSMC) and Qualcomm Incorporated (QCOM).

Qualcomm presents a lower P/E ratio compared to TSMC, as its TTM P/E ratio and NTM P/E ratio are 16.45 and 14.7, while TSMC's TTM and NTM P/E ratio is 20.155 and 17.04. The result potentially signaling a more attractive investment value, and QCOM also boasts a higher Gross profit to asset ratio than TSMC. However, TSMC's shares are priced lower than those of Qualcomm and the company displays a more robust EPS growth rate and Revenue growth rate. The revenue growth rate of TSMC is 22%, which much higher than QCOM's, which means that it has more potential to grow.

Upon a comprehensive review of both quantitative and qualitative metrics, each company exhibits particular strengths and their financial statistics reveal notable parallels. However, TSMC may represent the most balanced option, offering a combination of steady growth and reasonable valuation metrics.

Table 1. valuation indicators.

	TSM	NVDA	NXP	QCOM
share price	104	495.22	229.68	144.63
TTM EPS	5.16	12.97	14.03	8.79
NTM EPS	6.1	25.07	13.78	9.82
EPS growth rate	18%	93%	-2%	12%
TTM P/E	20.155	38.182	16.3706	16.4539
NTM P/E	17.0492	19.753	16.667	14.728
PEG	1.11972	0.41056	-8.1853	1.37116

3.3. Financial Analysis

In the financial analysis, TSMC is compared with three other companies in the information technology sector, and a series of financial indicators are analyzed to determine the strengths and weaknesses of each company.

Firstly, looking at Figure 1, from the perspective of gross margin, although TSMC's annual gross margin is at a lower level, it is generally more stable and exhibits an upward trend compared to the other three companies.

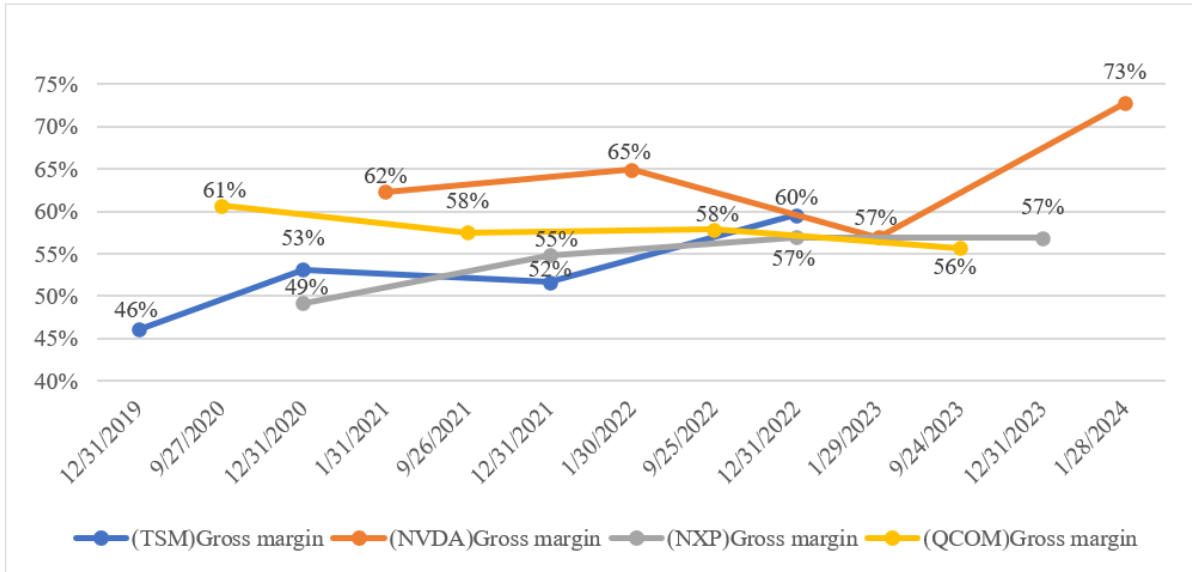


Figure 1. Annually gross margin.

Besides, operating profit margin of the four companies have also been analyzed. Operating profit margin could provide a more comprehensive perspective than gross margin, as it considers various operational expenses, including those crucial for innovation and market expansion like R&D and marketing expenses, which is more suitable for analyzing information technology companies.

From figure 2, TSM's average annual operating profit margin is the highest among the four stocks, and the ratio remains the most stable, while Qualcomm's ratio is unstable and shows a downward trend. Therefore, TSM demonstrates better profit value on an annual basis.

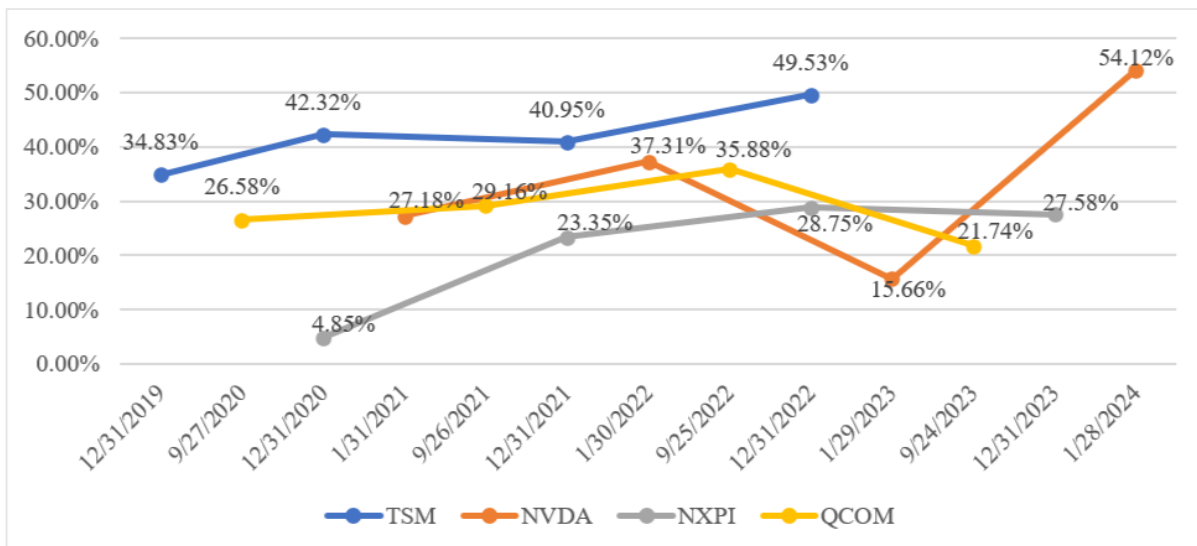


Figure 2. Operating Margin (Annual).

Furthermore, after-tax return on equity (ROE) can directly reflect a company's profitability and investment return rate. As Figure 3 shows, NXPI's after-tax ROE exhibits an upward trend from 2020 to the end of 2022 but shows a declining trend from 2022 to 2023. NVDA's after-tax ROE fluctuates significantly from early 2021 to early 2024, although it presents an overall upward trend. However, these two companies have already been excluded in the previous value analysis due to their high P/E ratios and negative growth in EPS and revenue; therefore, they will not be the focus of discussion here. As for Qualcomm and TSMC, although Qualcomm has a higher ROE than other companies in previous years, being several times higher, its after-tax ROE has rapidly declined since 2022, reaching 33% in the second half of 2023, which is significantly different from the 71.81% in the second half of 2022, indicating instability. In contrast, although TSMC's overall ROE is not high during the four-

year period, it exhibits low volatility and remains relatively stable, with an upward trend. For investors, this implies that the company has a stable return rate and relatively lower financial risk. Overall, from the perspective of financial analysis, I believe that TSMC is a well-balanced stock with growth potential and investment value, possessing good and stable profitability, as well as relatively lower financial risk.

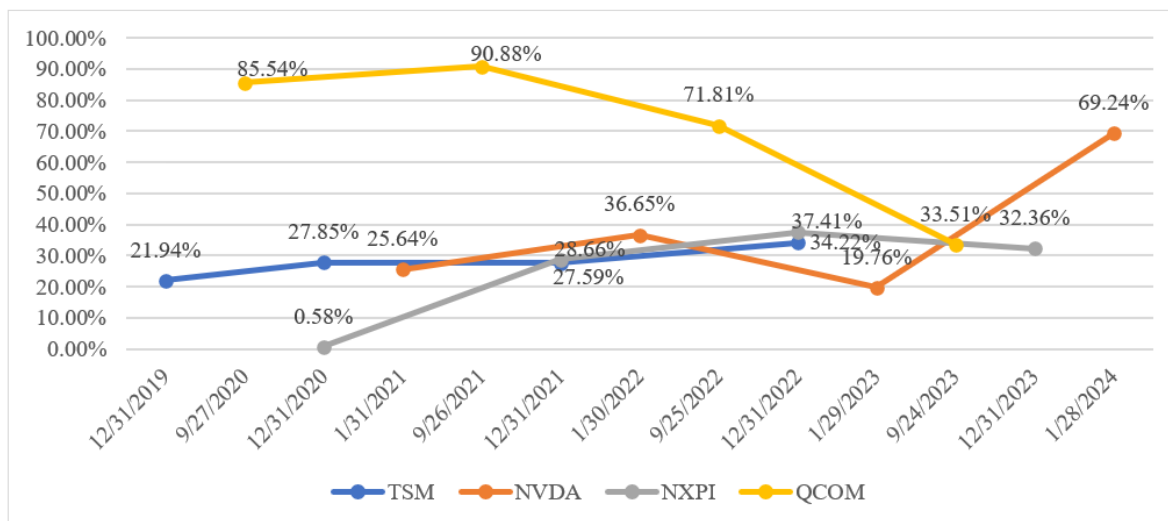


Figure 3. After Tax ROE (Annual).

4. Conclusion

This study employs SWOT analysis, financial analysis, and valuation analysis to evaluate the investment value of TSMC. From the results of the SWOT analysis, TSMC's strengths include leading technology, economies of scale, a broad customer base, and a strong financial position. Additionally, the company has opportunities in the development of technologies such as the Internet of Things (IoT), 5G, and artificial intelligence (AI), which increase the demand for semiconductor products. However, TSMC's weaknesses lie in its geographical location, susceptibility to fluctuations in customer business, and high capital expenditure. The company also faces threats such as competition from industry peers, global trade tensions, and natural disasters. From a valuation perspective, overall, TSMC's price-to-earnings (P/E) ratio and PEG ratio are not high, indicating that TSMC's investment value is not overestimated. Furthermore, TSMC has higher EPS growth rate and revenue growth rate compared to its peers, reflecting the company's rapid net profit growth and significant future earning potential, making it more valuable for investment compared to its competitors. From the perspective of financial indicators, when comparing TSMC with other companies in the information technology industry, solely examining the gross profit margin would suggest that the overall profitability level is stable but relatively low. However, when considering more comprehensive operating expenses, research and development expenses, and various other costs, as reflected by the operating profit margin, it becomes evident that TSMC's annual average operating profit margin is actually the highest and most stable among its peers, indicating that its profitability is also the best. Moreover, the after-tax ROE also reveals that although TSMC's ratio is not exceptionally high, it tends to be stable in the long run, and the lower ROE also implies lower financial risk.

The research findings presented in this study provide investors with a clearer understanding of TSMC's investment value and a more comprehensive view of the company, offering them a reference for their investment decisions. The analysis not only provides a positive assessment of TSMC's investment value but also highlights the potential investment risks associated with the company. For TSMC itself, this study reveals that although the company possesses advanced technological capabilities, a broad customer base, and a strong financial position, the geopolitical threats arising from its geographical location and its susceptibility to fluctuations in customer business can become

potential vulnerabilities. To address these issues, TSMC can mitigate its dependence on single customers or markets by expanding its customer base and the markets it serves. By doing so, even if a particular region or customer experiences problems, the company's overall business can remain stable. Establishing long-term, stable partnerships with downstream customers and collaboratively planning capacity requirements and technological development can help reduce the impact of market fluctuations. Furthermore, TSMC can actively monitor geopolitical developments and make corresponding adjustments to its business strategies to minimize the potential impact of geopolitical risks on its operations. This may involve diversifying production locations, strengthening supply chain resilience, and enhancing communication and coordination with relevant stakeholders. By proactively addressing these challenges, TSMC can maintain its competitive edge and sustain its long-term growth, thereby enhancing its investment value and providing investors with more stable and promising returns.

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