

# Analyzing Asset Investment: Taking Three Large Semiconductor Companies as Examples

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**Abstract.** This article provides a comprehensive financial analysis of three major semiconductor companies: ASML, TSMC and AMD. These companies occupy a very high position in semiconductor manufacturing, design and innovation and form an ecosystem of advanced semiconductor technology products. The objective of this study is to assess the attractiveness of these companies to different types of investors in terms of investment strategies such as value investing, income investing, PEG investing, index investing, ratio analysis investing, momentum investing, insider buying investing, stocks buyback and smart money investing. Analysis of the latest financial data shows that index investors, stocks buyback investors and smart investors are more likely to invest in these three companies. According to the financial data ratio analysis, investors who favour ASML include investors who use momentum strategies and investors who use ratio analysis. The same is true for TSMC, where bullish investors include those using ratio analysis, momentum, valuation and income investing. The results of this study can be used to recommend individual investment strategies to investors to help them achieve optimal financial returns in the technology sector. In addition, the study can be used as a valuable source of information for first-time investors and provide them with guidance on how to navigate the sector.

**Keywords:** Semiconductor; Risk; Profitability; Markets; Strategy.

## 1. Introduction

The benefits of investing are manifold. One very important point that investors need to learn is the allocation of financial resources among different asset classes, including equities, debt instruments and real estate. An optimal allocation strategy can provide investors with a higher source of income, can mitigate the effects of inflation on investors, and can facilitate the long-term accumulation of wealth and prepare for the realisation of future financial goals. In China, more and more people are recognising the importance of financial management. This has led to a corresponding increase in the number of households involved in investment activities, a phenomenon that reflects a growing awareness of financial management [1]. In addition, investing creates additional cash flow and diversifies assets. By constructing a diversified investment portfolio, investors can reduce the risks posed to them by market fluctuations, enhance their ability to cope with risks, and reap the dividends of economic growth, thus playing an important role in comprehensive financial planning [2]. In short, investment is an effective financial strategy, and good investment can bring investors a safer and more desirable economic future.

In addition, semiconductors play an important role in the future development of electronic chips, and the strategic significance of semiconductor processing technology is indisputable [3]. In addition, The advancement of the semiconductor industry can be significantly facilitated by governmental policies and incentives, which serve a pivotal function in the contemporary economy [4]. Semiconductor materials and devices are widely used in smartphones, computers, automobiles, medical equipment and many other products that drive digitalization and automation. The advent of pioneering technologies such as artificial intelligence (AI), the Internet of Things (IoT), and 5G is inaugurating a revolutionary epoch for the manufacturing industry in general and the semiconductor industry in particular. This is accompanied by an exponential surge in demand for semiconductors, which serve as a pivotal catalyst for innovation, productivity, and the sustenance of global economic growth [5].



The semiconductor industry plays an indispensable role in modern society, serving as the foundation for a vast array of electronic devices. Semiconductors are utilized in processors and memories in smartphones and computers, enabling high-speed computing and data storage. They are also employed in electric power systems, in-vehicle infotainment, and advanced driver-assistance systems in automobiles, facilitating simultaneous improvements in automotive safety and convenience [6]. Additionally, medical devices also rely on semiconductor technology can create intelligent skin electronic systems to achieve accurate medical testing and in the field of creating prosthetic limbs have greater potential [7].

Therefore, in this study, three well-known companies that are representative of the semiconductor industry are purposely selected to thoroughly analyze the investment behavior of different types of investors and the investment potential of the stocks of these three companies using their financial data and models. Through rational investment portfolios and risk management, investors can improve their financial literacy and decision-making ability in the process of achieving their financial goals.

## **2. Profiles**

ASML, TSMC and AMD are regarded as the archetypal organisations within the semiconductor industry. However, each of these companies occupies a distinct position in the technological landscape, offering unique contributions to the advancement of the industry. The following section delineates the key differentiating factors between these companies.

ASML is a prominent global entity within the semiconductor equipment manufacturing sector, with a particular focus on the provision of cutting-edge integrated key equipment and professional technical services to the IC industry. ASML's lithography technology is of paramount importance to the field of semiconductor manufacturing, with the TWINSCAN series of lithography models offered by ASML representing the pinnacle of precision, productivity, and widespread adoption in the domain of high-end lithography machines. In addition, ASML has successfully developed EUV technology and is the only manufacturer of EUV equipment. In terms of shipments, ASML will account for 62% of the total market share in 2020 [8]. ASML's technology is instrumental in the advancement of the semiconductor industry's advanced manufacturing technologies, offering customers highly sophisticated and innovative manufacturing tools.

TSMC is the preeminent foundry in the world, providing advanced and specialized integrated circuit technology and manufacturing services to customers on a global scale. TSMC's sophisticated technological expertise and manufacturing proficiency have established it as a preeminent foundry, exerting substantial influence over the global semiconductor market. Furthermore, within the context of the novel coronavirus, TSMC occupies a pivotal position within the global semiconductor supply chain, having established production facilities in nations where the requisite semiconductor technological capabilities exist, including the United States and Japan [9]. TSMC's product range is utilized in a diverse array of smart devices, including supercomputers, application processors for smartphones, chips for home devices, and chips for automotive electronics.

AMD is a globally recognized semiconductor company best known for its high-performance computing and graphics processing units (GPUs) AMD develops GPUs and CPUs for a diverse array of potential applications in gaming, data centers and content creation, and conducts research and development in artificial intelligence. AMD's status as a leading semiconductor company is attributable to its pioneering role in the development of high-specification and adaptive computing technologies, and over the past several years, AMD has made a substantial impact on the global semiconductor research and development industry by gaining competitive advantage and market share from its competitors through its innovative line of EPYC and Ryzen processors and its line of Radeon graphics [10].

### 3. Financial Indicators of the Companies

The financial metrics for each company are derived in their entirety from Yahoo Finance as well as the financial statements of each company, and the designated timeframe for these financial metrics is the first half of 2024.

#### 3.1. Risk

The concept of risk pertains to the potential for deviations in projected returns or direct financial losses associated with the investment of funds across a range of investment assets in the context of uncertain future developments. In this study, the Market Cap, Beta, Debt Ratio and Current Ratio are employed as indicators of risk. In the following illustrations, the term “market cap” is used to denote the total market value of a company's issued shares on the stock market, and “market cap” can be used to measure the size and value of the company in question. The term “beta”, on the other hand, is used to quantify the price volatility of a stock relative to a broad market index. In addition, in finance, the term “debt ratio” is used to express the relationship between a company's finances and its total assets, and this ratio can be used to assess the extent to which a company uses financial leverage in its operations. Lastly, the “current ratio”, which is a financial ratio derived by dividing a company's current assets by its current liabilities, can be used to assess a company's financial position. It can reflect a company's ability to repay its debts in a shorter period of time. Table 1 below shows the indicators for the three companies.

**Table 1.** Risk.

|      | Market cap | Beta | Debt Ratio | Current Ratio |
|------|------------|------|------------|---------------|
| ASML | 355.55B    | 1.10 | 63.89%     | 1.52          |
| TSMC | 769.99B    | 1.29 | 36.14%     | 2.47          |
| AMD  | 245.00B    | 1.68 | 17.23%     | 2.64          |

In terms of market capitalisation, all three semiconductor companies have a market capitalisation of over \$50 billion, indicating that they are all large companies. As for the beta coefficient, it can be seen that AMD has the highest beta coefficient, which indicates that AMD is the riskiest among the three companies. Ranking the riskiest companies based on the beta coefficient, the companies are ranked as follows: AMD, TSMC and ASML. It is also worth noting that ASML has the highest debt ratio, which means that it may have the riskiest debt among the three companies. In order to assess ASML's ability to manage short-term debt, it is necessary to examine its current ratio. While ASML's current ratio is greater than 1, this figure indicates that ASML has a strong ability to service its debt.

#### 3.2. Profitability

In these data below, profitability can be defined as the ability of a firm or portfolio to generate profits at specified intervals and profitability can be used as a measure of the efficiency of a firm's operations and its competitiveness in the market. And the profitability indicators selected for this study include total asset turnover, profit margin, return on assets and return on equity. Among these indicators, total asset turnover (TATO) is a financial ratio used to measure the sales revenue generated per unit of total assets of a firm, and this ratio can reflect the ability of the management team to effectively utilise the total assets to achieve sales revenue. In addition, profit margin is a financial ratio that can be used to quantify the profit generated by a business in relation to sales revenue. Finally, return on assets (ROA) is a financial metric that assesses a business entity's ability to utilise its total assets to generate profit. Similarly, return on equity (ROE) is a financial metric used to measure the profitability of a business relative to shareholders' equity. This ratio shows the efficiency with which a business returns its investment to shareholders over the course of its operations. Table 2 shows the above indicators for the three companies.

**Table 2. Profitability.**

|      | Total Asset T/O | Profit Margin | ROA    | ROE    |
|------|-----------------|---------------|--------|--------|
| ASML | 0.29            | 26.5%         | 12.12% | 48.57% |
| TSMC | 0.22            | 37.85%        | 11.50% | 26.25% |
| AMD  | 0.08            | 4.9%          | 0.54%  | 2.01%  |

As evidenced by the data presented in the table above, all three companies exhibit a total asset turnover ratio of less than 1, indicating a lack of efficiency in converting assets into revenue. The ROA of ASML and TSMC are both notably high, at 12.12% and 11.5%, respectively, suggesting that ASML and TSMC possess a slightly superior operational capability compared to the AMD. Furthermore, AMD exhibits the lowest ROA, at 0.54%. The ROE data indicates that ASML has a ROE of 48.57%, while TSMC has a ROE of only 26.25%. Consequently, ASML offers investors a higher return and is the most profitable of the three companies in comparison to TSMC.

### 3.3. Market Ratio

Shown below are the market ratios, which are ratios used to value a company's stock or assets. In this study, the selection of market ratios is based on the P/E Ratio, P/B Ratio, Dividend Yield, PEG Ratio, 200-day moving average and current share price of the three companies. Among these data, Price/Earnings Ratio (P/E Ratio) is the ratio used to assess the correlation between the current share price of the company and earnings per share. And Price/Book Ratio (P/B Ratio) is a financial ratio that measures the relationship between a company's market price and book value per share. In addition, Dividend Yield is a measure of the relationship between the annual cash dividend paid on a company's stock and the current stock price, which can be used to evaluate the return on an investor's investment in a company's stock. And there's also the price-to-earnings ratio (PEG), which can be used to assess whether a company's stock is growing in line with its expectations, and is calculated by dividing the P/E ratio by the annual earnings per share growth rate. Finally, the 200-day moving average (200 MA) is a statistical technique that mitigates price fluctuations by calculating the average of the closing prices of the last 200 trading days. It is employed in the assessment of long-term trends. The term "current stock price" is defined as the price at which the recent sale or purchase of a particular stock was executed in the market. Insider buying refers to the act of senior executives or other key insiders within a company purchasing shares of their company's stock, which is often viewed as a positive sign by investors. A stock buyback is when a company uses cash flow or borrows money to buy its own stock from the broader market. Smart money refers to investors or funds that are considered to have a deep understanding and insight into the market. In this study, PE ratio, P/B ratio, dividend yield, PEG ratio, 200-day moving average and current stock price were selected as the market reaction ratio. Tables 3 and 4 below show the indicators for the three companies mentioned above.

**Table 3. Market Ratio.**

|                     | ASML   | TSMC   | AMD    |
|---------------------|--------|--------|--------|
| PE Ratio            | 47.78  | 32.12  | 219.68 |
| PB Ratio            | 21.88  | 7.69   | 4.36   |
| Dividend Yield      | 0.50%  | 4.07%  | 0.00%  |
| PEG Ratio           | 2.37   | 1.48   | 1.39   |
| 200 MA              | 850.92 | 129.85 | 152.53 |
| Current Stock Price | 895.37 | 165.77 | 151.58 |

The high P/E and P/B ratios of these companies reflect the fact that they are growth stocks. In terms of dividends, TSMC's dividend yield is 4.07% and ASML's is only 0.5%, which is very close to AMD's dividend yield of 0%. In addition, the PEG ratios of all three companies are greater than 1. Comparing the 200 MA to the current stock price, as shown, only AMD's current stock price is below its 200-day moving average.

**Table 4.** Insider Buying, Stock Buyback and Smart money.

|                | ASML                                  | TSMC                                  | AMD                                  |
|----------------|---------------------------------------|---------------------------------------|--------------------------------------|
| Insider Buying | NO. -0.65%                            | NO.0%                                 | NO. -0.07%                           |
| Stock Buyback  | 496 million                           | 309 million                           | 352 million                          |
| Smart money    | Bank of New York Mellon Corp(+11.44%) | Bank of New York Mellon Corp(+12.34%) | Bank of New York Mellon Corp(+0.35%) |

Notably, none of these three companies have implemented insider buying programs. In addition, both ASML and AMD have seen insiders reduce their shareholdings. However, all three companies have implemented some form of stock buyback program.

#### 4. Asset Selection

This paper analyzes the choice of these three stocks by different types of investor. A value investor is an investor who seeks to purchase stocks that are undervalued by the market in order to achieve capital appreciation over an extended period of time. They typically select stocks with a price-to-earnings ratio of less than 10 and a price-to-book ratio of less than 1. The primary goal of an income investor is to obtain a reliable and stable cash flow from their investments, a result usually obtained by investing in assets such as dividend-paying stocks, bonds, or real estate. Next in line is the PEG investor, which refers to investors who use PEG ratios to value stocks. These investors typically look for stocks with PEG ratios of less than 1, which they believe have significant future growth potential and are relatively undervalued. The other is the ratio analyst investor, which is an investor who uses financial ratio analysis to evaluate the financial health and operational efficiency of a company, looking at ratios such as those used to calculate Return on Assets (ROA), Return on Equity (ROE) and Net Profit Margin. Next is the index investor, which is an investor who makes investment decisions based on stock indices such as the S&P 500 Index, which tends to favour stocks that have a large weighting in the S&P 500 Index rankings. Next are momentum investors, which are investors who make investment decisions based on asset price trends and believe that the future performance of a stock will continue the previous stock trend, so they choose to invest in stocks whose current price is above the 200-day moving average. And valuation investor is an investor who seeks undervalued stocks by analyzing the intrinsic value of the asset and the company's fundamentals, such as the company's dividends and bonus payments. Insider buying refers to the practice of insiders purchasing their own company's stock. The term "insider buying" refers to the practice of company insiders purchasing their own company's stock. This behavior is frequently regarded as an encouraging indication that a company's stock is currently undervalued or is poised to demonstrate favorable performance in the future. Stock buyback is defined as a corporate action whereby a company uses its own funds to repurchase outstanding shares in the market, thereby reducing the number of shares in circulation. This strategy is often viewed as a positive indicator by investors, who perceive it as a reflection of a company's confidence in its future growth prospects. The term "smart money" is used to describe investors or institutions that are perceived to possess the expertise, information advantage, or market insight to make superior investment decisions. Their investment choices can often influence other investors to make more informed decisions. The results of the study are shown in Table 5 below.

**Table 5.** Investing Selection.

| Types of investor       | ASML | TSMC | AMD |
|-------------------------|------|------|-----|
| Value investor          | ×    | ×    | ×   |
| Income Investor         | ×    | √    | ×   |
| PEG Ratio Investor      | ×    | ×    | ×   |
| Ratio Analysis Investor | √    | √    | ×   |
| Index Investor          | √    | √    | √   |
| Momentum Investor       | √    | √    | ×   |
| Valuation Investor      | ×    | √    | ×   |
| Insider Buying          | ×    | ×    | ×   |
| Stock Buybacks          | √    | √    | √   |
| Smart money             | √    | √    | √   |

The study shows that all three companies have P/E ratios in excess of 10, suggesting that these companies are currently overvalued by the market and therefore unlikely to attract the attention of value investors. TSMC has a dividend yield exceeding 4%, which would prompt an income investor to consider investing in this company. Although ASML's dividend yield is not 0%, it is nevertheless insufficient to attract income investors. The PEG ratio of all three companies is greater than 1, indicating that all three stocks are overvalued. Consequently, PEG ratio investors will not purchase these stocks. It is noteworthy that ASML's ROA and ROE are both relatively high and approach those of TSMC. This is a positive indicator for ratio analysis investors who may be inclined to purchase both stocks. Conversely, AMD's ROA and ROE values are relatively low, suggesting that ratio analysis investors may be disinclined to purchase this stock. However, index investors may be inclined to invest in these three companies given their substantial representation in the S&P 500 Index. For the momentum investor, only AMD's current stock price is below its 200-day moving average. Consequently, the momentum investor may be disinclined to purchase AMD's stock in favor of ASML and TSMC. For the valuation investor, the lack of dividends for ASML and AMD would reduce the attractiveness of these two companies. In contrast, the valuation investor is more inclined to purchase TSMC. With regard to insider buying, insiders at all three companies are reducing their holdings to varying degrees. All three companies have stock repurchase programs to varying degrees, which may be interpreted as a positive indicator for investors. In terms of smart money, each company has attracted investments from several prominent management firms. This indicates that all three companies are supported by a substantial amount of investment capital from knowledgeable and sophisticated investors.

## 5. Conclusion

This paper provides a detailed financial and stock analysis of three prominent semiconductor companies: ASML, TSMC and AMD, three leaders in the semiconductor industry that occupy important positions in different segments of the semiconductor industry. The purpose of this study is to evaluate the attractiveness of these companies from the perspective of various investment strategies such as Value Investing, Income Investing, PEG Investing, Index Investing, Ratio Analysis Investing, Momentum Investing, Insider Buyout Investing, Stock Buybacks and Smart Money Investing. These strategies are used to analyze in depth the decisions that ten investor types might make when faced with three stocks. The study shows that the Momentum Investor and the Ratio Analysis Investor would choose ASML. The same is true for TSMC, where the Momentum Investor, the Ratio Analysis Investor, the Valuation Investor and the Income Investor show a preference for TSMC. The conclusions drawn from the analysis help provide tailor-made investment strategy recommendations to investors to help them achieve optimal financial returns in the technology sector. In addition, it provides a valuable resource for novice investors on how to effectively enter and navigate the industry.

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