Comparative Analysis of Three Semiconductor Technology Companies

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Abstract. This paper presents a meticulous financial analysis of Nvidia, Intel, and Texas Instruments, three leading companies in the semiconductor industry. And these three companies also operate in different section in the semiconductor industry. The study aims to provide insights into effective investment strategies of these companies. The investigation encompasses an analysis of recent financial indicators for these companies like exploring the meaning of various data, along with an exploration of asset selection challenges faced by nine distinct investor profiles including Value, Income, PEG, Index, Ratio analysis, DCF, Momentum, Insider buying and Stock buyback investors. Leveraging established financial models, the research reveals that Index, Momentum, Insider Buying, and Stock Buyback investors are inclined to invest in all three stocks. Additionally, Ratio Analysis and Discounted Cash Flow (DCF) investors are inclined towards investing Texas Instruments. The insights gained from this analysis contribute to the development of tailored investment strategies, ultimately aiming to optimize financial gains within the semiconductor sector.

Keywords: Semiconductor, Risk, Profitability, Ratio, Strategy.

1. Introduction

Investing offers numerous advantages that can help individuals achieve their financial goals and provide an avenue for growing wealth over time. Due to inflation, people must invest their assets to prevent them from shrinking [1]. By generating returns that outpace inflation, investors can maintain or increase their real wealth. Given the increased stability of the stock market, it's natural that a majority of individuals opt to invest in it. Furthermore, the stock market offers a relatively low investment threshold, and its information is readily available and transparent to the public [2]. Given the attributes of high risk and high potential yield in the stock market, investors aspire to employ scientific methods for predicting its movements [3].

Furthermore, with companies continuously investing in research and development to create new products and stay competitive, the semiconductor industry is at the forefront of technological innovation, driving advancements in computing, communication, automation, and more, which is also combined with some popular topic like artificial intelligence, 5G communication, renewable energy systems and autonomous vehicles. Certainly, in recent years, there has been a widespread trend of utilizing a diverse range of machine learning methods driven by the significant potential benefits of artificial intelligence. These methods are being employed to enhance decision-making processes and to uncover intricate patterns in various domains [4]. Leveraging extensive generative AI algorithms, AIGC employs these tools to aid or even substitute human efforts in producing vast amounts of top-notch, incredibly lifelike content more swiftly and economically. This process is carried out by utilizing prompts provided by users to achieve these results [5]. As these technologies continue to remodel industries and society, the semiconductor industry becomes a main driver of economic progress and market opportunities. For example, Conversational agents are the practical implementation of Al technology in industries or businesses [6].

For this reason, this study has meticulously selected three representative companies which are prominent companies in the semiconductor industry and meticulously conducted a comprehensive analysis of the investment behaviors demonstrated by nine distinct investor profiles through their financial data and models. Portfolio diversification is a widely employed tactic aimed at reducing risk

and optimizing returns through investments in an assortment of assets characterized by minimal correlations with one another [7].

2. Profile of the Selected Companies

NVIDIA, Intel and Texas Instruments are three prominent companies in the semiconductor industry, but they differ in terms of their focus, product offerings, and target markets. Here are some key differences between them:

Nvidia: Nvidia is primarily known for its advanced graphics processing units (GPUs), which are widely used in gaming, artificial intelligence, data centers, and autonomous vehicles. They are a leader in the field of high-performance computing and are known for their graphics and AI-focused hardware. They have developed specialized hardware, such as CUDA cores and Tensor Cores, optimized for parallel processing tasks, making them popular choices for AI, machine learning, and gaming applications.

Intel: Intel is one of the world's largest manufacturers of central processing units (CPUs), which are the brains of computers. They have a dominant presence in the PC and server markets, with their processors being used in a wide range of devices, from laptops and desktops to data centers and servers. They have been expanding into other areas like AI and autonomous vehicles, but CPUs remain their core business.

Texas Instruments: Texas Instruments is known for its broad range of analog and embedded processing products. They manufacture various types of semiconductors, including analog chips, micro controllers, and digital signal processors. Their chips are commonly used in consumer electronics, industrial applications, and automotive systems. They provide analog and embedded processing solutions for a wide range of applications.

3. Financial Indicators

The financial indicators are obtained from the financial statements of each company, encompassing the year 2023 as the specified time frame for these financial.

3.1. Risk

Risk refers to the potential for financial loss or unfavorable outcomes associated with investing capital into various assets, such as stocks, bonds, real estate, or other financial instruments. Studies on stock market risk utilizing agent-based technology predominantly revolve around analyzing fluctuations in stock prices and establishing simulated artificial stock markets [8]. For the following data, Market Cap is a measure used to indicate a metric to portray the comprehensive value encompassing a company's outstanding shares within the stock market. Beta is a measure that indicates how a particular stock's price tends to move in relation to movements in a broader market index. The Total Debt Ratio is a financial indicator designed to gauge the extent to which a company's overall assets are funded through debt. This metric offers valuable insights into the degree of leverage a company utilizes to support its operational activities and investment endeavors. Details of these indicators are shown in Table 1.

Table 1. Risk.

Risk	Market Cap	Beta	Total Debt Ratio
Nvidia	1.155Trillion	1.75	0.463
Intel	154.2Billion	0.88	0.433
Texas instruments	161.95Billion	1.01	0.464

According to the table, all of them are big companies since their market capitalization are more than 100 billion.

The Beta of Nvidia is 1.75 which is highest one, so it is the highest risk to invest. The Beta of Texas instruments is 1.01 and it is on average. Intel has the lowest risk of investment because their beta ratio is 0.88.

Total Debt Ratios of three companies are quite similar. Texas instruments is 0.464 and it's bigger than Nvidia which is 0.463. The total debt ratio of Intel is the lowest which is 0.433.

3.2. Profitability

Profitability refers to their ability to generate profits or positive financial returns from their business operations. It provides insights into the company's ability to generate value for its shareholders and sustain its operations over the long term. For the following data, Total assets (TA) refer to the sum of all valuable resources owned by a company or individual. Profit Margin is a financial ratio that is the difference between revenue and cost. Return on Assets (ROA) refers to a financial ratio that measures a company's ability to earnings. Return on Equity (ROE) is a financial ratio that measures a company's profitability in relation to the ownership interests of its shareholders. Details of these indicators are shown in Table 2.

Table 2. Profitability.

Profitability	TA	Profit Margin(year)	ROA	ROE
Nvidia	41,182,000	18.52%	6.27%	18.85%
Intel	182,103,000	-5.06%	-0.76%	-2.81%
Texas instruments	27,207,000	38.34%	26.98%	56.26%

Profit Margin of Texas instruments is 38.34% which is the greatest one. Profit Margin of Nvidia is 18.52%. Profit Margin of Intel is -5.06% which is the lowest one.

ROA of Texas instruments is 6.98% which is the greatest one. ROA of Nvidia is 6.27% ROA of Intel is -0.76% which is the lowest one.

ROE of Texas instruments is 56.26% which is the highest one. ROE of Nvidia is 18.85%. ROE of Intel is -2.81% which is the smallest one.

Texas instruments is the highest one in Profit Margin, Return of Assets and Return of Equity. This companies earn more money than others.

3.3. Market Ratio

Market ratio refers to different ratios used in the context of evaluating a company's performance and market value.

For following data, Price-to-Earnings (P/E) ratio is a kind of index used to assess value of the companies. Price-to-Book (P/B) ratio is a kind of book value. The dividend yield represents a financial proportion that quantifies the yearly dividend earnings an investor can anticipate generating from a specific stock investment in relation to its prevailing market value. Price/Earnings to Growth (PEG) ratio is a financial metric that assesses the relationship between a company's price-to-earnings (P/E) ratio and its projected earnings growth rate. Discounted Cash Flow (DCF) is a valuation method used in finance to estimate the intrinsic value of an investment, such as a stock, bond, or company. Momentum (Mom) is a trading strategy when stocks rise or fall sharply. Details of these indicators are shown in Table 3.

Table 3. Market Ratio.

Market Ratio	P/E	PB	Dividend yield	PEG	DCF	Mom
Nvidia	244.76	4.04	0.04%	4.04	39.63	1.89
Intel	18.71	1.53	1.45%	12.69	31.53	1.18
Texas instruments	20.02	10.62	2.69%	1.99	91.48	1.45

All of the companies are growth stocks because of the high PE and PB ratio.The Dividend yield of these companies are lower than 3%. These three companies' PEG are greater than 1. The greatest

DCF among three companies is Texas instruments. Momentum of current price divided by 200 day's average price of these companies is greater than 1.

4. Asset Selection

This paper analysis the selection of 9 types of investors in these three stocks, and the results of the study are presented in the Table 4 below:

Table 4. Investing Selection.

Types of investors	Nvidia	Intel	Taxes instruments
Value			
Income			
PEG			
Index	√	√	√
Ratio analysis			√
DCF			√
Momentum	√	√	√
Insider buying	√	√	√
Stock buyback	√	√	√

Fundamental analysis involves the examination of a company's earnings and the dividends it provides, while also factoring in projections concerning interest rates and appraising the level of risk linked to the company [9]. In finance, where numerous factors exert influence on the market, making investment decisions becomes even more complex [10].

The semiconductor industry's prominence as a driving force in technology underscores its appeal to diverse investors. According to our research, Value invests will not buy these three companies because of high PE and PB ratio, which is overvalued. Income investors will not be interested in three companies because dividend yield is less than 3%. PEG investors will not buy these since PEG is less than 1. These three companies are all in US500 so index investor will buy it. Ratio analysis investors will buy Texas instruments since ROE of this is the greatest one. DCF investors will invest Texas instruments because DCF of this is highest. Momentum of 3 companies is greater than 12 so momentum investors will invest it.

5. Conclusion

This paper conducts a detailed financial analysis of three prominent semiconductor companies: Nvidia, Intel, and Texas Instruments, operating in different segments of the industry. The research aims to offer valuable investment strategies for these companies by examining recent financial indicators and delving into the challenges faced by nine investor profiles. These profiles encompass various strategies such as Value, Income, PEG, Index, Ratio Analysis, DCF, Momentum, Insider Buying, and Stock Buyback. The study reveals that Index, Momentum, Insider Buying, and Stock Buyback investors are inclined to invest in all three stocks. Furthermore, Ratio Analysis and Discounted Cash Flow (DCF) investors show a preference for Texas Instruments. The insights derived from this analysis contribute to the creation of customized investment approaches and maximized the profit.

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