

A Financial Analysis and Performance Evaluation of NVIDIA Corporation

Qihao Yu^{1,a,*}

¹College of Letters & Science, University of Wisconsin–Madison, Madison, WI 53715, The United States

a. qyu223@wisc.edu

*corresponding author

Abstract: This paper provides a financial analysis of NVIDIA Corporation, a GPU and AI company based in Santa Clara, California. Based in California, NVIDIA has impacted gaming, data centers, professional visualization and automobiles in a huge way. This analysis focuses on NVIDIA's strong financial position evidenced by the company's \$60.922 billion of sales in the FY2024, from \$27.132 billion a year earlier, mainly due to a 217% increase in the data center segment. In this investigation, the author applies a strategic management tool known as the SWOT analysis to reveal NVIDIA's opportunities in being a market leader in GPU technology and its commitment to investing in R&D, as well as threats, including overreliance on gaming revenue and geopolitical factors. AI and autonomous driving markets are analyzed in terms of growth as well as the competitive threat posed by competitors including AMD and new AI chip makers. The company has impressive financial performance through the current ratio of 4.27 and the net profit margin of 57.92%. Finally, the paper concludes that NVIDIA has made the right strategy in its R&D and partnership to prepare for constant growth in a dynamic industry of semiconductor.

Keywords: NVIDIA Corporation, Financial Analysis, SWOT Analysis, Performance Evaluation.

1. Introduction

Located in Santa Clara, California, NVIDIA Corporation was established in 1993. The corporation commands a substantial market share in the gaming industry and leads the world in GPU and AI capabilities. Professional visualization, data centers, and the automobile industry heavily depend on NVIDIA. Primary offerings are data center solutions from the Tesla and DGX series, professional Quadro graphics cards, and GeForce graphics cards. Moreover, a complete solution for autonomous vehicles is offered via the DRIVE platform. The company's emphasis on technical improvement and innovation-driven growth is seen in the 22,200 personnel that were involved in research and development as of January 2024, and the \$8.675 billion spent on research and development, or 14.2% of revenue.

Due to the soaring need for data centers, artificial intelligence, and the Internet of Things, the semiconductor industry—where NVIDIA operates—has risen fast in the past few years. Following five years of growth at a compound annual growth rate of 6.8%, the U.S. market for semiconductor manufacturing is projected to reach \$34.8 billion by 2024. Arizona is becoming a hub for

semiconductor manufacture because of the CHIPS Act, which is fueled by customer demand for smaller and more powerful CHIPS and federal government backing [1]. Reliable computer infrastructure is becoming more and more necessary due to the explosion of machine learning and artificial intelligence applications, data centers, and Internet of Things devices. In its four main markets—professional graphics, gaming, data centers, and automotive—NVIDIA is still at the forefront of innovation. More than 80% of the premium gaming market is dominated by its GeForce graphics cards; Quadro graphics are utilized in industrial design and visual effects production; deep learning and artificial intelligence are supported by Tesla and DGX technologies; and the automotive industry can benefit from autonomous driving solutions offered by the DRIVE platform. With its cutting-edge processors, NVIDIA continues to dominate the artificial intelligence market, and its stock price has hit a record high. According to Seitz (2024), NVIDIA provides hardware partners Super Micro Computer (SMCI) and DELL Technologies (DELL) with full-stack solutions encompassing software, hardware, and services. NVIDIA, despite competition, has developed artificial intelligence (AI) solutions for a variety of industries, according to Morningstar analyst Brian Colello. This has allowed NVIDIA to maintain its leadership in the technology sector despite significant obstacles to entrance [2].

In the first quarter of 2023, NVIDIA's total sales reached \$8.2 billion, rising 39% yearly, according to the company's most recent financial report. Of this, the data center sector generated \$4.2 billion in sales, a 79% increase, making it a significant source of income. The growing need for artificial intelligence and cloud computing was the primary cause. NVIDIA also revealed several technology developments and key partnerships, including the building of a virtual factory with BMW on the Omniverse platform and AI integration with Microsoft on the Azure cloud platform. These partnerships unequivocally show off NVIDIA's technological prowess and capacity to spur industry innovation.

Meanwhile, on October 7-9, 2024, NVIDIA will host the AI Summit in Washington, D.C., drawing technologists and executives from around the world to offer a forum for discussing the possibilities of AI. Even if the general conference passes are sold out, participants can still join online or by enrolling for one of the few exhibit permits available. The Summit will feature over fifty talks, interactive workshops, and live demonstrations on generative AI, cybersecurity, robotics, and industrial digitization. Bob Pette, NVIDIA's vice president of enterprise platforms, will give a keynote speech on the company's Accelerated Computing Platform on October 8th, covering topics including AI, sensor processing, digital twins, and more. The most recent technology developments will be discussed by industry experts, including Sheri Bachstein of The Weather Company, Helena Fu of the Department of Energy, and Charles Clancy of MITRE Corporation. Several vice presidents of NVIDIA will also be taking part in the conversation. AI in Healthcare, Cybersecurity, Industrial Digitization, Robotics and Edge Computing, Generative AI, Remote Sensing, AI Policy, Telecommunications, and Quantum Computing are some of the important conference themes. By presenting research and applications in areas such as AI, and sponsored by industry heavyweights such as Dell, HP, Oracle, Microsoft Azure, Google Cloud, AWS, and Deloitte, NVIDIA is consolidating its leadership in technology innovation.

As mentioned by THE ECONOMIC TIMES NEWS, the world's largest Nvidia GB200 chip manufacturing factory is being constructed by Foxconn in response to the overwhelming demand for the Nvidia Blackwell platform. For Foxconn to reap the benefits of the AI wave, this relationship is essential, particularly for the server manufacturing industry. Senior Vice President of Foxconn's Cloud Enterprise Solutions Business Group David Ding stated that the increased demand for Nvidia's technology is a result of both the company's dominant position in the market and the growing significance of AI technology. The cooperation still reflects the two businesses' strategic focus on

improving AI capabilities, even if Nvidia CEO Jen-Hsun Huang was unavailable to attend the most recent Foxconn technology presentation.

2. External Environment Analysis based on SWOT Framework

2.1. Strengths

One significant benefit is NVIDIA's strength in GPU and AI technologies. The business is still making investments in R&D and technology innovation, particularly in the fields of generative AI and machine learning (AI/ML) applications. Because of the architectural advances that NVIDIA pioneered, its GPUs are the hardware of choice for a wide range of applications. With its quick, straightforward parallel processing core, the G80 Tesla series GPU revolutionized the market when it was introduced in 2006 [3]. Furthermore, high-performance application development is made easier by NVIDIA's Software Development Kit (SDK) and CUDA programming methodology, and the demand for NVIDIA products is fueled by this ecosystem of hardware and software [3].

In the game space, Real-time Ray Tracing (RTX) technology from NVIDIA mimics light refraction and reflection to produce more lifelike gaming graphics. To accomplish the objective of next-generation graphics technology, the Turing GPU family combines ray tracing, rasterization, and deep learning capabilities. Stream multiprocessor (SM) efficiency is increased, ray tracing is faster, and Turing GPUs is more efficient [4]. By executing matrix multiplication-cumulation operations in parallel, the Tensor Core technology allows for increased processing capacity [4]. Furthermore, Tensor Core technology with CUDA architecture's deep learning and high-performance processing advantages speed up the training and reasoning of AI models. Holding nearly 80% of the worldwide GPU market, NVIDIA enjoys greater leeway in terms of pricing and product strategy. The launch of products like A100 GPUs and Orin SoCs enhances its standing in the market. Globally, NVIDIA is a well-known brand, particularly among high-end and professional gamers. With its GeForce Now platform, NVIDIA showcased the enormous potential of cloud gaming. It also increased brand awareness by organizing events like GTC and the GeForce Gaming Celebration [5].

2.2. Weaknesses

NVIDIA depends on gaming revenue even though it has diversified its business, which leaves it open to market swings that could cause financial instability. Furthermore, NVIDIA's large expenditure in R&D—more than 20% of total revenue in 2022—has put a great deal of financial strain on the company. Such a large expenditure greatly raises financial risk and jeopardizes the company's profitability if R&D results fall short of expectations or if market demand changes [6]. Due to its reliance on Asian supply networks for a large portion of its manufacturing, NVIDIA is susceptible to geopolitical risks and supply disruptions. Manufacturing costs may increase due to tight global semiconductor supply chains, increased raw material prices, and production disruptions at major chipmakers. Furthermore, NVIDIA's expensive costs are occasionally blamed for deterring potential customers. For instance, the \$1,299 price tag of the newly released GTX 4090 graphics card deters many buyers.

2.3. Opportunities

NVIDIA has a large market opportunity in AI and deep learning because of the technology's rapid development. It is anticipated that the global AI market will expand quickly, and NVIDIA's GPUs are essential to these applications. The A100 GPU is widely utilized in data centers and cloud computing platforms to provide effective computing support for AI models, and the Jetson platform is used for edge computing. Analysts at Melius Research believe that Nvidia, AMD, and Broadcom

will outperform shortly, mostly as a result of the faster adoption of more advantageous AI technology by OpenAI, Microsoft, Google, and Meta [7]. The development of autonomous driving technology has also opened up new markets for NVIDIA. NVIDIA's DRIVE platform and its partnership programs with automakers demonstrate significant market potential.

2.4. Threats

Externally, AMD and other rivals pose a threat to NVIDIA. AMD is attempting to take the second spot in the AI market with its most recent Instinct accelerator and acquisition program. Additionally, a few AI chip-focused businesses are developing semiconductor goods to rival NVIDIA, including Cerebras Systems, Groq, and SambaNova Systems [2].

Internally, understanding and reducing potential security concerns is crucial as the use of GPUs in cloud computing, artificial intelligence, and high-performance computing keeps growing. In a thorough analysis, ten distinct GPU attack types were found, and their probability and possible effects were evaluated across several domains [8]. GPU-side channel attacks, for instance, carry a high-risk rating because of their potential to result in large-scale data leaks and security flaws in shared environments. Sensitive inference data in AI applications and sensitive computational output in high-performance computing environments are highly vulnerable to these attacks. Furthermore, GPU rootkits can seriously disrupt cloud services by undermining system integrity and avoiding detection, while being less common in situations that are closely watched. A major danger of system compromise and data tampering is also posed by API misuse and kernel tampering [8].

3. Financial Performance

Through its prudent financial management and strong market position, NVIDIA has demonstrated superior liquidity, debt servicing, and profitability. According to the financial data from 2018 to 2023, the Harvard analysis framework is used to analyze the company from four perspectives: strategy, accounting, finance, and prospects, showing that the company has good solvency, profitability, operating ability, and growth ability [9]. According to the 2024 annual report, NVIDIA's fiscal year sales were \$60.922 billion, an increase of 126% over the previous year. The data center business grew 217%, driven by strong demand for enterprise software and consumer Internet applications. Gaming industry revenue was \$10.4 billion, up 15% year-over-year; The automotive and professional visualization industries grew 21% and 1%, respectively. Total gross margin rose to 72.7% due to higher data center revenue and lower inventory reserves. Despite a 2% increase in operating expenses, net income reached \$29.76 billion, an increase of 581% year-over-year, with diluted earnings per share of \$11.93. NVIDIA has solidified its global leadership in accelerated computing solutions through rapid innovation and product launches, results that demonstrate the company's strong performance and efficient cost management across multiple markets [10].

3.1. Liquidity

With a current ratio of 4.27 as of 2024, NVIDIA shows that its current assets far outweigh its current liabilities [10]. The company's strong operating foundation and efficient cash management strategy allowed it to effectively handle its short-term financial demands and weather market volatility. NVIDIA guarantees timely cash flow by putting in place efficient inventory control and accounts receivable procedures. Through the optimization of the supply chain and the shortening of the time between product manufacturing and sales, the company has increased market flexibility, operational efficiency, and capital usage efficiency.

3.2. Profitability

NVIDIA is a profitable company that has done well. Nvidia's net profit margin for the fourth fiscal quarter of 2024 was 57.92% as a result of its successful cost control and marketing plan [10]. NVIDIA has successfully lowered production costs by streamlining the supply chain and enhancing production effectiveness. For instance, current manufacturing techniques and automation technologies have greatly increased the efficiency of production lines. Simultaneously, NVIDIA has unveiled high-value additions like DGX systems and RTX graphics cards, which satisfy consumer demand for high performance while maintaining solid profit margins. NVIDIA has effectively consolidated its market competitiveness and built its technological leadership in the industry through its distinctive product strategy. The company also actively develops software and services to boost recurring income streams and boost profitability even more.

3.3. Market Value and Investment Return

With a market valuation of \$2.52 trillion by 2024, NVIDIA solidified its leadership in the world of technology. The company's price-to-earnings ratio (P/E) of 48.21 indicates that the market recognizes its potential for future growth even if it has a smaller market capitalization than some of its rivals [10]. There is a lot of room for growth given the company's aggressive expansion into the AI and data center industries. NVIDIA is bolstering its market position using technological innovation and strategic relationships. Its broad business structure allows it to efficiently handle the risk of market volatility across a variety of industries, including professional visualization, gaming, data centers, and the automobile industry.

With an equity market beta of 1.67, NVIDIA's stock is very volatile in comparison to the market [10]. The cost of equity for the company is 14.5%, as determined by the Capital Asset Pricing Model (CAPM). This is a reflection of the high return expectations investors have for its promising development possibilities. Beyond just its financial results, NVIDIA is a desirable investment due to its ongoing innovation and position as a leader in the market for cutting-edge technologies. Investors continue to have faith in the company's prospects despite market dangers. To stay ahead of the curve in a field that is evolving quickly, the corporation continues to invest heavily in research and development.

3.4. Comparative Advantage

NVIDIA's primary competitive advantage is its technological superiority, which allows the company to position itself in the market and offer high-value goods and services. Its effective parallel computing capabilities offer notable benefits in data processing and analysis, and its CUDA architecture finds widespread application in scientific computing, artificial intelligence, and deep learning. The NVIDIA Volta GPU microarchitecture contains dedicated Tensor Core units for performing multiplication and accumulation operations on 4x4 matrices. Tensor Cores on Tesla V100 GPUs may achieve up to 83 Tflops/s in mixed-precision mode, according to experimental results. This is three times faster than single- and half-precision performance, respectively. While the accuracy loss resulting from half-precision inputs can be more severe for many high-performance computing (HPC) applications, it can be mitigated by increasing the processing load [11].

With its exceptionally high performance in AI model training and inference, NVIDIA's Tensor Core technology has given the business a dominant position in the AI market. In data centers and inference, the Tensor Core and CUDA technologies combined in the A100 GPUs are frequently employed. Data centers and AI research employ A100 GPUs extensively. Globally, NVIDIA is well-known, particularly among professional users and high-end gamers. Many players and fans of e-sports gravitate toward the GeForce brand since it is regarded as the industry standard for gaming

graphics cards. In the professional visualization industry, Quadro is a well-known brand with a broad range of applications, including scientific computing, industrial design, and special effects for cinema and television. To increase the brand's influence, NVIDIA hosts events like the GeForce Gaming Celebration and the GTC to retain strong ties with the industry and community.

4. Risks

4.1. Changes in Technology

The semiconductor business is experiencing rapid technical change, and any technological gap could lead to a loss of market share. For instance, traditional semiconductors may be disrupted by quantum computing, and NVIDIA will need to keep funding research and development to stay on top of technological advancements. IBISWorld reports that technological development is accelerating in the worldwide semiconductor business and that enterprises must keep innovating to stay competitive [1]. NVIDIA's strength is its robust research and development (R&D) skills. The firm invests more than 20% of its total sales in R&D annually, allowing it to introduce cutting-edge products and quickly respond to technological changes.

4.2. Fluctuating Market Demand

Another major risk is fluctuating market demand, which is impacted by industry trends, technical advancements, and economic cycles. A worldwide recession, for instance, may cause firms to spend less on AI and IT, which would hurt NVIDIA's data center and AI businesses. Furthermore, market volatility is caused by shifts in consumer demand for high-performance PCs and next-generation gaming consoles. To adapt its strategy quickly and effectively in response to these shifts, NVIDIA will need to maintain both product diversity and market flexibility.

4.3. Supply Chain Disruptions

Geopolitical or supply chain disruptions may affect NVIDIA's manufacturing and delivery because it relies on Asian manufacturers. For instance, the production capacity of its two primary chip makers, TSMC and Samsung, would be adversely affected in the event of a natural disaster or geopolitical crisis, which might affect NVIDIA's supply. In light of the limitations on the global supply chain, this risk is very serious. NVIDIA has taken several steps to diversify its risk to address these possible obstacles, including strengthening its relationships with other manufacturers and diversifying its sourcing approach. Specifically, NVIDIA can swiftly adapt its supply chain if issues develop in one place because it collaborates with suppliers across other countries. To further enhance responsiveness and transparency, NVIDIA has invested in a cutting-edge supply chain management system. Thanks to its real-time data analysis and forecasting capabilities, this system assists the business in promptly identifying and mitigating possible supply chain issues.

Furthermore, the global chip supply chain may be strained as a result of climate change-related extreme weather events like typhoons and floods that disrupt operations at significant production locations. It is also affected by the global environment, important weaknesses in the global supply chain have been brought to light by the COVID-19 epidemic. The scarcity of NVIDIA graphics cards, for instance, resulted from both the epidemic and pre-existing weaknesses in the supply chain architecture. These weaknesses included problems with transportation, supply capacity, and unanticipated spikes in demand. These vulnerabilities were made worse by the pandemic, which was the catalyst that turned them into serious threats [12]. NVIDIA is strengthening the resilience of its supply chain by implementing innovative technologies and green energy solutions to lower its sensitivity to environmental changes.

4.4. R&D Failures

R&D failure is still a possibility even though NVIDIA dedicates more than 20% of its yearly income to this endeavor to promote innovation. The company's financial situation will suffer if a new product or technological venture fails. According to the NVIDIA Annual Report 2020, despite a technological breakthrough, the company's 2019 development of the "Volta" GPU architecture fell short of market expectations.

The Risk Management Association advises NVIDIA to improve its risk assessment procedure for R&D projects to lessen the risks connected with R&D failures. This entails keeping a close eye on technology advancements and market trends as well as enhancing R&D success through tight partnerships with academic institutions and business partners. Working along with academic institutions and research centers. NVIDIA will have more access to cutting-edge ideas and technology, which will increase the likelihood of success. The organization can foster creativity and teamwork by instituting interdepartmental cooperation and internal invention contests. This approach guarantees that technology stays at the forefront of the business, giving the market solutions that suit evolving needs while also improving the success rate of R&D initiatives.

5. Conclusion

All things considered, NVIDIA's technological innovation and industry expansion have helped it establish a strong position in the worldwide semiconductor and artificial intelligence sectors. The company has a strong platform for growth thanks to its leadership in technology, powerful brand influence, and varied business structure. But the business also has to contend with issues including supply chain concerns, intense market competition, and expensive R&D expenses. To adapt to the shifting market conditions, NVIDIA should keep bolstering its technological innovation and grabbing hold of chances in the data center and artificial intelligence sectors. For the business to guarantee steady and sustainable growth in the global market, supply chain management and risk control must also be further optimized. It is anticipated that NVIDIA will continue to generate more wealth for shareholders and hold its dominant position in the semiconductor and artificial intelligence businesses through ongoing technological innovation and commercial growth.

References

- [1] IBISWorld. (2024). *Semiconductor Machinery Manufacturing in the US - Market Size, Industry Analysis, Trends and Forecasts (2024-2029)*. Retrieved from <https://www.ibisworld.com/united-states/market-research-reports/semiconductor-machinery-manufacturing-industry/#FrequentlyAskedQuestions>
- [2] Seitz, P. (2024). *How Nvidia Is Building A Competitive Moat To Fend Off AI Challengers*. Investor's Business Daily. Retrieved from <https://www.investors.com/news/technology/how-nvidia-is-building-a-competitive-moat-to-fend-off-ai-challengers/>
- [3] Cusumano, M. A. (2024). *Nvidia at the Center of the Generative AI Ecosystem—For Now*. *Communications of the ACM*.
- [4] Burgess, J. (2020). *RTX on—The NVIDIA Turing GPU*. *IEEE Micro*, 40(2), 36-44.
- [5] Shrivastava, P., & Damle, M. (2022). *Investment decision in cloud gaming-based businesses opportunities: An analysis of the cloud gaming industry*. In *2022 International Conference on Decision Aid Sciences and Applications (DASA)*. IEEE.
- [6] Zhao, M. (2022). *NVIDIA's Investment Feasibility and Weighted SWOT Model*. *Highlights in Business, Economics and Management*, MSIED.
- [7] Dattilo, E. (2024). *Why AI Chip Stocks Are the 'Place to Be,' Says Analyst*. *Barron's*. Retrieved from https://www.marketwatch.com/articles/ai-chip-stocks-wall-street-f686a044?mod=mw_quote_news
- [8] Huq, N., Lin, P., Reyes, R., & Perine, C. (2022). *A Survey of Cloud-Based GPU Threats and Their Impact on AI, HPC, and Cloud Computing*. *Trend Micro*.
- [9] Qin, Z. and Tian, S. (2024). *Financial Analysis of NVIDIA Enterprises based on Harvard Analytical Framework*, *Highlights in Business, Economics and Management*.

- [10] *NVIDIA Corp: Financials Overview. Retrieved from <https://www.globaldata.com/company-profile/nvidia-corp/financials/>*
- [11] Markidis, S., Chien, S. W. D., Laure, E., Peng, I. B., & Vetter, J. S. (2018). *NVIDIA Tensor Core Programmability, Performance & Precision. In Proceedings of the 2018 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW) (pp. 91-100). IEEE.*
- [12] Hajdu, N. (2021). *COVID-19 pandemic and managing supply chain risks: NVIDIA's graphics card shortage case analysis (Bachelor's thesis). Degree Programme in Logistics.*