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EQUITY RESEARCH
NVIDIA: EMPOWERING TOMORROW'S
TECHNOLOGY

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Abstract

Nvidia Corporation is a semiconductor company, headquartered in the United States, and a global leader manufacturer of graphics processing units (GPUs).

This report is part of an Equity Research on Nvidia Corporation, and it aims to allow for a deep understanding of the company, as well as its industry and competitive landscape. Additionally, a multiples valuation is presented.

Taking into account the analysis mentioned and the overall results of the valuation carried out, the target share price for FY25 of \$560.82 leads to a **BUY** recommendation, with an expected total shareholder return of 11.99%.

Keywords: Nvidia, Equity Research, Artificial Intelligence, Semiconductors

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This report is part of the Equity Research – Nvidia: Technology Giant Disrupts the Market report (annexed), developed by Ana Filipa Vieira and António Calabote and should be read as an integral part of it.

Table of Contents

- COMPANY OVERVIEW6**
 - BUSINESS AND MARKET SEGMENTS6
 - SHAREHOLDER STRUCTURE9
 - SUPPLY CHAIN ANALYSIS10
 - SWOT ANALYSIS11
- INDUSTRY OVERVIEW AND COMPETITIVE POSITIONING13**
 - MACROECONOMIC ANALYSIS13
 - INDUSTRY TRENDS.....14
 - COMPETITIVE LANDSCAPE15
 - PORTER’S FIVE FORCES.....17
- MULTIPLES VALUATION.....19**

Introduction

The joint Equity Research on Nvidia Corporation aims to estimate the company's equity value and make an insightful recommendation for potential investors.

This individual report is part of the "Equity Research – NVIDIA: Technology Giant Disrupts the Market", and it covers some sections that are indispensable to estimate the company's future prospects and achieve its accurate valuation. Concretely, it includes the company overview, providing an understanding of the company, its segments and markets, as well as their main drivers and evolution. This part also comprises the company's shareholder structure, supply chain processes' analysis, and a SWOT analysis.

Subsequently, it is encompassed an in-depth analysis of NVIDIA's industry and competitive positioning, such as the macroeconomic outlook, industry trends, competitive landscape, and a Porter's Five Forces analysis. The analysis presented undertakes a deep overview of the market and recent trends, both on a global scale and within the United States, and a competitive landscape analysis inside each of the different markets in which Nvidia operates. Lastly, this part also contains a section concerning the valuation of NVIDIA through the multiples methodology, to assess how the company's value compares to its peers.

The remaining sections which are covered in the joint report, and in the individual report of my pair, comprises a financial analysis of NVIDIA's cash flow management, liquidity and capital structure, sales, costs and invested capital value drivers, and profitability ratios. Additionally, it includes the reformulation and assumptions of the financial statements, forecasts of revenues, costs, and invested capital, WACC calculation, DCF analysis, the market value of the stock, and a sensitivity analysis. To conclude, it is provided a final recommendation.

Taking into account the expected future performance of NVIDIA, its industry and the market, as well as the Discounted Cash Flows (DCF) methodology, this research suggests a buy position on NVIDIA's stock, with a target price of \$560.82 for FY25. The current share price is \$500.77 (as of December 18th, 2023), implying a return of 11.99%.

Company Overview

Figure 1: NVIDIA Logotipo



Source: NVIDIA Website

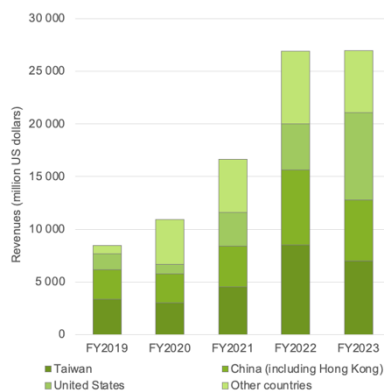
Nvidia Corporation (NASDAQ:NVDA), headquartered in Santa Clara, California, is a leading company in the semiconductor industry, specializing in the design of graphics processing units (GPUs), application programming interfaces (APIs) for high-performance computing and data science, and system-on-chip units (SoCs) for the automotive market and mobile computing. It was founded in 1993, by Jensen Huang, Chris Malachowsky, and Curtis Priem, with the purpose of solving complex problems in computer science.

NVIDIA started by focusing on GPUs, which have gained renown for their exceptional performance and adaptability, in a wide spectrum of applications, such as scientific research, data analysis, and self-driving vehicles, thanks to their unparalleled computational capabilities. Then, following the digital revolution, NVIDIA has expanded to meet the demanding computational requirements of artificial intelligence (AI) and machine learning tasks. Moreover, the company is deeply entrenched in the evolution of autonomous driving technology, outfitting self-driving vehicles with the computational might and sensor capabilities essential for safe and efficient navigation.

NVIDIA follows a platform strategy that incorporates diverse elements like hardware, software, algorithms, libraries, and services to create unique value for different markets. They achieve this by using a unified architecture based on GPUs and software stacks, which can adapt to the specific needs of various industries. This flexibility allows them to serve multiple billion-dollar markets with the same core technology while leveraging different software stacks developed internally or by partners.

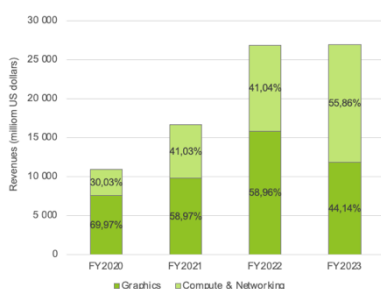
In terms of geographical distribution, NVIDIA attributes its revenue to specific countries based on the locations where customers place their orders. The company manages its operations across four primary geographic regions: Taiwan, China (including Hong Kong), the United States, and other countries (Figure 2). Over the past five fiscal years, approximately half of the company's total revenue has been derived from Taiwan and China. The United States follows closely behind, with its share showing an increase during the pandemic years. Regarding the other countries, they still contribute around 25% to the company's total revenue, but their proportion has been decreasing over time.

Figure 2: Revenues by Geographic Region from FY2019 to FY2023



Source: NVIDIA Reports

Figure 3: Revenues by Business Segment from FY2020 to FY2023



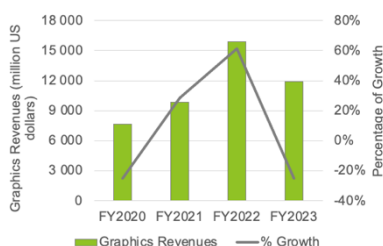
Source: NVIDIA Reports

Business and Market Segments

NVIDIA operates in two main business segments (Figure 3):

Graphics

This segment contributes for 44% of the revenues, and includes GPUs for various applications, namely the GeForce Now, which allows users to stream games from the cloud, GRID, that enables virtual desktops and applications, Omniverse, a platform for collaborative

Figure 4: Graphics Revenues from FY2020 to FY2023

Source: NVIDIA Reports

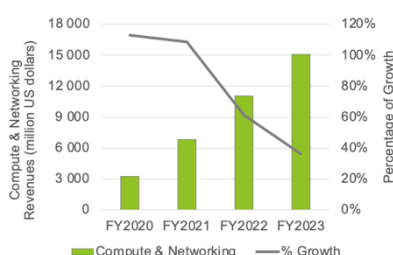
3D creation, and automotive platforms, which power infotainment systems and autonomous driving.

Although graphics revenues have grown at compound annual growth rate (CAGR) of 16% from FY2020 to FY2023 (Figure 4), their weight in NVIDIA's total revenue is on a declining trajectory, as a result of the rising prominence of the Compute & Networking segment.

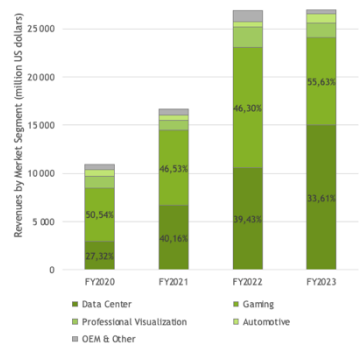
The main growth drivers in this segment are the expanding gaming industry, the increased demand for AI and machine learning applications, as well as automotive solutions, and the rise of edge computing.

Compute & Networking

Representing 56% of total revenue, the compute & networking segment comprises data center platforms and systems for AI, high performance computing (HPC), Mellanox networking and interconnect solutions, automotive AI, electric vehicle computing, robotics, software, and cryptocurrency mining processors (CMP). This segment revenues have showed a high growth in last years, from \$3 279 million in FY2020 to \$15 068 million in FY2023 (Figure 5), which represents a CAGR of 66,25%, driven by the increasing demand for computing power, self-driving cars, artificial intelligence, cloud and edge computing, as well as the development of the cryptocurrency market.

Figure 5: Compute & Networking Revenues from FY2020 to FY2023

Source: NVIDIA Reports

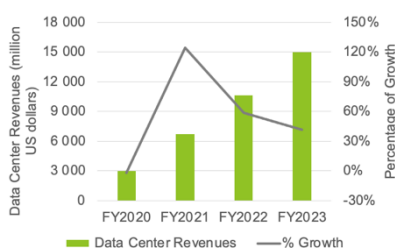
Figure 6: Revenues by Market Segment from FY2020 to FY2023

Source: NVIDIA Reports

Regarding the market segments in which NVIDIA operates (Figure 6), the company focus on the following core sectors: Data Center, Gaming, Professional Visualization, and Automotive. Furthermore, the company includes an additional segment labeled as OEM & Others in its financial reports to account for other business activities.

Data Center

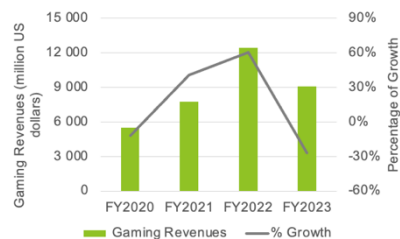
NVIDIA's Data Center segment has emerged as the company's most promising growth market and the one that currently contributes the most, representing 56% of total revenues. From FY2020 to FY2023, revenues registered a CAGR of 71,34% (Figure 7). NVIDIA's acquisition of Mellanox was crucial for solidifying its presence in the market, particularly in advancing the AI industry and improving HPC and machine learning. Beyond that, the growing demand for cloud and edge computing are driving the huge increase of revenues. Within this segment, the company provides data centers with the means to accelerate deep learning, machine learning, and high-performance computing while maintaining energy efficiency. Some of NVIDIA's data center customers are major cloud providers, such as Google Cloud, Azure, AWS, and Alibaba.

Figure 7: Data Center Revenues from FY2020 to FY2023

Source: NVIDIA Reports

Gaming

This market segment has historically been on the foundation of NVIDIA's development, however it now accounts for just 34% of the company's total revenues. This weight has been gradually decreasing since FY2020 (when it comprised 51% of the company's revenues),

Figure 8: Gaming Revenues from FY2020 to FY2023


Source: NVIDIA Reports

which can be explained by the remarkable growth of the Data Center market, which is the dominant source of the company's revenues.

In the two past years, this market has benefited from the impact of the COVID-19 pandemic on the demand for entertainment, growing at a CAGR of 18% from FY2020 to FY2023 (Figure 8).

NVIDIA has been making impressive progress in GPU architectures, which boosts its processing power and keeps it ahead of the competition. Its advanced architecture, Ada, powers the 40 series GPUs, offering better performance because it uses TSMC's 5nm process, which has more capacity than the 7nm or 8nm processes used by other companies.

Professional Visualization

Professional Visualization represents 6% of total revenues, and its sales have grown at a CAGR of 8,40% in the last 4 years (Figure 9). This segment consists on partnerships with independent software vendors, optimizing software compatibility with Nvidia GPUs to empower industries as automotive, media and entertainment, architectural engineering, and medical imaging.

The key products in this market include Quadro, DesignWorks software, and Omniverse, which is used by giant such as Pixar, Adobe, Autodesk, and Siemens. The NVIDIA Avatar Cloud engine, housed within Omniverse, is a cloud-native AI model and service enabling businesses to create intelligent assistants and avatars proficient in multiple languages. In healthcare, NVIDIA has contributed to accelerating cancer research, diagnosis, and overall quality of care.

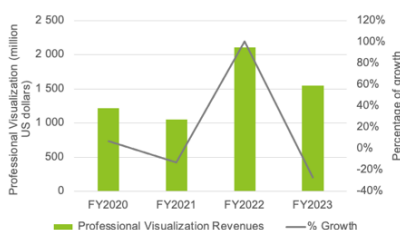
Currently, NVIDIA dominates the graphics market for workstations, providing graphics for over 90% of HPC dedicated to handling complex tasks.

Automotive

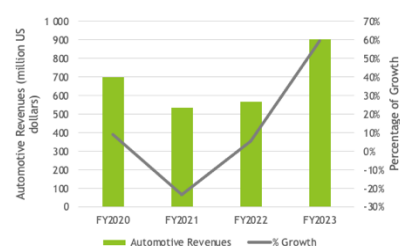
While the Automotive market currently contributes only 3% of total revenues, it is in the midst of a significant transformation. The focus has shifted from legacy infotainment to AI cockpit and autonomous vehicles, and significant investments have been made in self-driving software and hardware. NVIDIA has forged partnerships with automakers, truck manufacturers, suppliers, and startups to develop AI systems, namely Volvo, Toyota, Jaguar, Land Rover, and Mercedes-Benz. Thus, this market is expected to keep growing in the future.

NVIDIA's DRIVE collection includes hardware (AGX Pegasus, AGX Xavier, Atlan, Hyperion) for processing data from cameras, radars, and sensors in autonomous vehicles, enabling tasks such as environment perception, vehicle localization, path planning, and safe path execution. The collection also features software products (Drive OS, DriveWorks, Drive AV, Drive IX) for a broad autonomous driving system.

From FY2020 to FY2023, this segment revenues have grown at a CAGR of 8,86% (Figure 10).

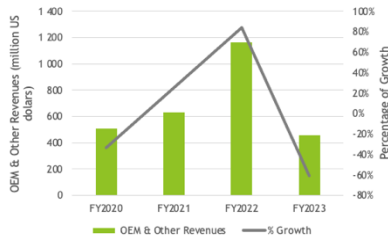
Figure 9: Professional Visualization Revenues from FY2020 to FY2023


Source: NVIDIA Reports

Figure 10: Automotive Revenues from FY2020 to FY2023


Source: NVIDIA Reports

Figure 11: OEM & Others Revenues from FY2020 to FY2023



Source: NVIDIA Reports

OEM & Others

The OEM & Others market represents only 2% of total revenues, beside a CAGR of -3,42% between FY2020 and FY2023 (Figure 11) .

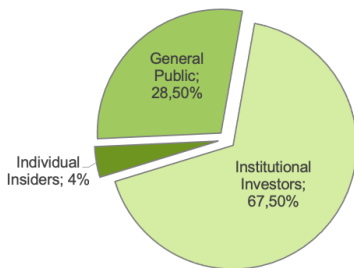
This segment encompasses products designed for equipment manufacturers rather than direct consumer sales. Over the years, NVIDIA has reduced its emphasis on OEM products and introduced CMPs, which serve to differentiate crypto-mining demand from gaming products, ensuring a consistent supply for gamers. This led to the decline registered in FY2023 revenues.

While OEMs are intended for inclusion in final devices sold by companies like Dell or Lenovo, they do not serve as the primary focus.

This sustained trend of loss is expected to remain, as the company investment in this market is diminishing.

Shareholder Structure

Figure 12: NVIDIA's Shareholder Structure



Source: Yahoo Finance and Authors' Estimates

NVIDIA's shareholder structure affects how the company is governed and managed. The company has 2.47 billion shares outstanding, which are owned by different types of shareholders.

Looking at Figure 12, the majority of NVIDIA's shares (67.5%) are held by institutional investors, which can represent some risks. Firstly, these investors sometimes are more interested in short-term goals than in the long-term performance, and can influence the board of directors' decisions in ways that not align with the best interests of the company, such as push for higher dividends or actions to boost the short-term price, which can compromise the long-term growth. Secondly, institutional investors often react to market trends, news, and analysts' reports, and adjust their positions accordingly, causing volatility in the stock price. Figures 13 illustrates who are the main institutional holders of NVIDIA shares.

Figure 13: Main NVIDIA's Institutional Shareholders

Institutional Holder	% of Shares Outstanding
Vanguard Group Inc	8,25%
Blackrock Inc.	7,28%
FMR, LLC	5,22%
State Street Corporation	3,59%
Price (T.Rowe) Associates Inc	2,16%
GEODE CAPITAL MANAGEMENT, LLC	1,96%
JPMORGAN CHASE & CO	1,41%

Source: Yahoo Finance

Regrading individual insiders (Figure 14), mainly the founder and CEO Jen-Hsun Huang, they own around 4% of outstanding shares. While insider ownership can align interests with long-term company goals, significant insider trading activity, such as buying or selling shares, could signal to the market insiders' confidence levels, affecting the stock's performance.

The remaining shares are held by the general public (28.5%), private companies (0.005%) and the state or government (0.04%).

Figure 14: Main NVIDIA's Insider Shareholders

Inside Holder	Position	% of Shares Outstanding
Jen-Hsun Huang	President and CEO	3,25%
Mark A. Stevens	Director	0,52%
Colette M. Kress	EVP & CFO	0,20%
Debora Shoquist	EVP, Operations	0,08%
Harvey C. Jones	Director	0,06%

Source: Yahoo Finance

To address potential risks tied to institutional investor concentration, NVIDIA's governance structure features a board consisting of 13 directors, including CEO Jen-Hsun Huang. This board is organized into four committees: the Audit, Nominating & Corporate Governance, Compensation, and Finance committees, aimed at safeguarding shareholders' interests by overseeing management performance and corporate practices.

Supply Chain Analysis

Figure 15: Supply and Demand Analysis of GPU



Source: GPU Utils

NVIDIA has a fabless manufacturing process, which means that it does not produce its own semiconductors, but relies on third-party foundries to supply them. These fabricators use silicon wafers as raw materials to make the chips that NVIDIA needs for its GPU. These chips are then sent to independent Outsourced Semiconductor Assembly and Test (OSAT) that assemble, test and package the products. Lastly, products is either distributed to third-party retailers who deliver to the final customers, or it is directly sold to end customers (Figure 15). In instances involving large-volume products, partnerships play a significant role in direct sales, particularly in sectors like Data Center or Automotive.

Through the years, NVIDIA made strong partnerships with reliable suppliers, such as the Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest semiconductor foundry, which ensures a stable and high-quality supply of chips. However, this high dependency on third-party foundries has some risks, as Nvidia's production capacity fully relies on them, and it is subject to supply disturbances.

One threat to Nvidia's supply chain is the current U.S.–China trade war started in 2018, when then-President Donald Trump imposed increasing tariffs on a range of imported goods from China, and, as response, China retaliated by raising duties on products imported from the United States. This war caused a shortage of wafers and disrupted the global supply of semiconductors, affecting both the foundries and NVIDIA, as they had to reduce their production and cope with the rising costs and delays.

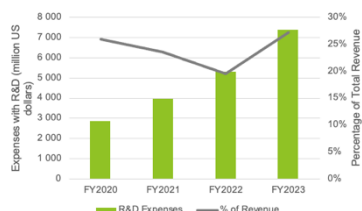
Another challenge in the company supply chain is the fluctuating demand for GPUs, which surged during the covid-lockdowns as more people worked from home and sought entertainment options. In addition to that, quarantine measures led to production disruptions, including shutdowns of semiconductor factories, and restrictions at major ports in China (such as Shanghai and Shenzhen), caused delays in the distribution of these crucial components. This created a cycle characterized by low supply and high demand, worsening the semiconductor shortage. The huge gap between supply and demand naturally resulted in increased semiconductor prices, impacting various industries and highlighting the vulnerability of NVIDIA's supply chain.

To enhance the efficiency of its supply chain, NVIDIA is using AI and simulation solutions to optimize its logistics and supply chain management, such as forecasting, inventory management, package tracking, and last-mile delivery.

However, the company still faces some potential threats that could affect its supply chain in the future. One of them is the political tension between China and Taiwan, which could escalate into a conflict and disrupt the operations of TSMC and other foundries in the region. Another one is the possible shortage of copper, which is a key material for making semiconductors and could become scarce and expensive by the 2030s.

Swot Analysis

Figure 16: Research and Development Expenses from FY2020 to FY2023



Source: NVIDIA Reports

Figure 17: NVIDIA Market Capitalization in the last 10 years



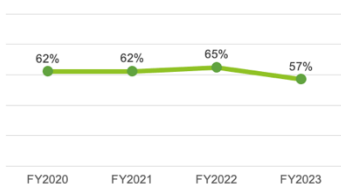
Source: Finance Charts

Figure 18: NVIDIA Main Partners



Source: Partnerbase

Figure 19: NVIDIA Gross Margin Profit from FY2020 to FY2023



Source: NVIDIA Reports

This analysis contributes to a better perception of NVIDIA's strategic position in the dynamic technological landscape, and which factors may influence its future success or pose challenges.

Strengths:

Focus on Research and Development: NVIDIA's commitment to innovation is evident in its substantial investment in R&D, representing an average of 24.06% of its annual revenue in the last four fiscal years.

In FY 2023, NVIDIA intensified its R&D efforts by allocating \$7 339 million, a substantial increase of 39.31% from the previous year, and representing 27.21% of the total revenue (Figure 16). Currently, the company holds a substantial portfolio of 11 214 patents, out of which 6 973 were granted. This emphasis on advanced R&D capabilities remains a key driver behind NVIDIA's ability to consistently introduce innovative products.

Strong Brand and Dominant Market Position: NVIDIA is the global leader in the world of GPU, with a current market share exceeding 80%, enjoying the benefits of a first-mover advantage and maintaining an unrivaled brand image. The company has also a dominant role in the supply of AI hardware and software, leading to a market capitalization surpassing \$1 trillion in May, 2023 (Figure 17).

Strategic Partnerships: With 1247 partners across the world, the company collaborates with various entities to enhance cloud and professional services. NVIDIA's partnerships extend across different industries and sectors, promoting the adoption of its products, technologies, and platform solutions. These strategic partnerships play a pivotal role in amplifying its influence and maintaining its position as a technological leader.

Diverse Product Portfolio: NVIDIA strategically diversifies its business across five high-growth markets (data center, gaming, professional visualization, automotive, and OEM & Others), mitigating risks and fostering versatile revenue streams. Moreover, NVIDIA's diverse product portfolio facilitates its platform strategies, which contributes to create a semi-closed product ecosystem that effectively enhances brand loyalty, customer engagement, and repeat sales activities.

Strong Financial Performance: NVIDIA's solid financial situation, marked by an average gross profit margin of 62% in the last 4 fiscal years (Figure 19), demonstrates its profitability in the face of market changes, and also enables sustained investment in research and development of cutting-edge technologies, reinforcing the company's market leadership.

Weaknesses:

Fabless Manufacturing Process: NVIDIA's outsourcing its manufacturing process to a third-party, while cost-effective, poses risks to product quantity, quality, and delivery schedules, as the company has almost no control over that. Therefore, there is no ability to scale up its

supply chain in response to increased demand, and it can affect negatively its operations and financial results.

Centralized Decision-Making: The company has a centralized decision-making structure, meaning that the decisions have to be approved by top-level management. This approach limits the organization's ability to quickly respond to situations that demand prompt decisions.

Opportunities:

Growth in Gaming: The gaming market is rapidly growing, driven by the constant demand for high-quality graphics and real-time performance. This market is anticipated to grow at a CAGR of 13.1%, from 2023 to 2030 (Figure 20), and NVIDIA's strong market position puts it well to leverage this ongoing expansion.

Expansion in Data Centers: NVIDIA stands to benefit from the rising need for data centers in our increasingly digital era. As high-performance computing becomes more crucial, data centers are in demand for various applications such as blockchain operations, artificial intelligence model processing, cloud computing, on-demand streaming services, and scientific research. The data center market is forecasted to grow at a CAGR of 6.12% from 2023 to 2028.

Growth in AI and Machine Learning: Advances in AI, machine learning, and deep learning are driving its wide application in various industries. With an estimated CAGR of 17.30%, this market is projected to have a volume of \$738.80 billion by 2030 (Figure 21). NVIDIA will benefit significantly from this trend, as demand for its GPUs and AI infrastructures is expected to increase.

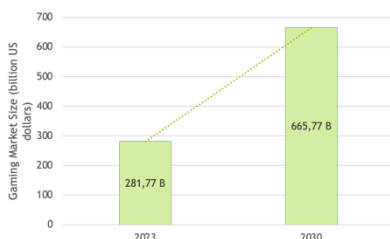
Autonomous Vehicles: The global automotive manufacturing market is expected to reach \$614.87 billion by 2030, growing at a CAGR of 8% from 2023. This growth is driven mainly by the electric vehicles market. NVIDIA is actively investing in autonomous vehicle technology, particularly in collaboration with Mercedes-Benz, to develop advanced computing architecture for vehicles.

Cryptocurrency Market: As the cryptocurrency industry continues to grow, NVIDIA is well-positioned to capture a significant share of this market. In 2021, the company introduced the CMP, which utilize the architecture of its GPUs for optimal professional mining performance and efficiency. Until 2030, the cryptocurrency market is projected to reach \$13.17 billion, representing a CAGR of 30.80% (Figure 22)

Threats:

Intense Competitive Market: NVIDIA operates in a competitive landscape with strong growth potential, and faces competition from established players like AMD and Intel, as well as potential new entrants. Additionally, there is a risk of alliances forming between Nvidia's competitors to weaken the company's position. These factors could lead to price pressure and reduced profitability.

Figure 20: Gaming Market Size in 2023 and 2030



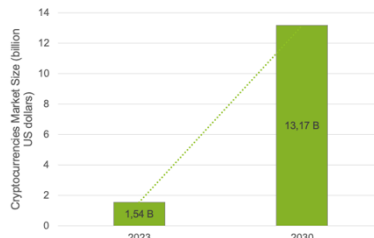
Source: Yahoo Finance

Figure 21: AI Market Size in 2023 and 2030



Source: Statista

Figure 22: Cryptocurrency Market Size in 2023 and 2030



Source: Yahoo Finance

Figure 23: Summary of the SWOT Analysis

STRENGTHS
• Focus on R&D • Strong Brand and Market Position • Strategic Partnerships • Diverse Product Portfolio • Strong Financial Performance
WEAKNESSES
• Fabless Manufacturing Process • Centralized Decision-Making
OPPORTUNITIES
• Growth in Gaming • Expansion in Data Centers • Growth in AI and Machine Learning • Autonomous Vehicles • Cryptocurrency Markets
THREATS
• Intense Competitive Market • Economic and Market Volatility • Technological Shifts • Regulatory Environment

Source: Authors' Elaboration

Economic and Market Volatility: NVIDIA's business, particularly its gaming segment, is susceptible to economic downturns and market volatility. When the economy slows down, consumers and businesses tend to prioritize essential purchases, leading to decreased demand for NVIDIA's products, as they are typically considered non-essential. Additionally, macroeconomic factors like inflation, interest rates, and global supply chain disruptions can also impact NVIDIA's financial performance and operational efficiency.

Technological Shifts: The tech industry is constantly evolving, with new technologies and architectures emerging all the time. One potential disruption that could significantly impact NVIDIA is the rise of quantum computing. If quantum computers become commercially viable, they could render traditional GPUs obsolete, forcing NVIDIA to pivot to a new business model.

Regulatory Environment: The company's operations and products have attracted scrutiny from regulators in several countries, including China. Its entry into artificial intelligence has further intensified these regulatory concerns, mainly due to the privacy and security implications of AI applications. In addition, the company faces antitrust and intellectual property litigation, further aggravating its regulatory challenges.

Industry Overview and Competitive Positioning

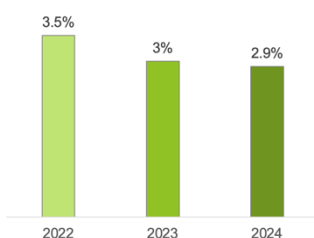
NVIDIA operates in the semiconductor industry, which makes essential components for many electronic devices, including TVs, smartphones, computers, video games, and advanced medical diagnostic equipment. In this fast-paced industry, companies often specialize in specific types of semiconductors, aiming to become market leaders in those particular niches, which is the case of NVIDIA, that focuses on selling GPUs.

Macroeconomic Analysis

Global outlook

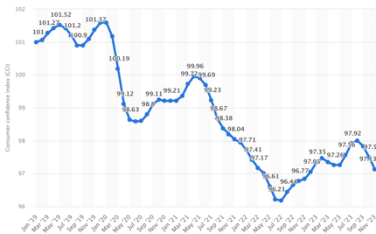
The global economy is facing a prolonged period of uncertainty and weakness, as the recovery from the Covid-19 pandemic is overshadowed by the military conflict between Russia and Ukraine. Inflation has surged to high levels, as a result of low interest rates, strong demand, supply congestions, and rising energy and food costs. This has forced central banks to tighten monetary policy, which is expected to slow down economic activity and investment. According to the IMF, global economy growth is projected to decline from 3.5% in 2022 to 3.0% in 2023, and 2.9% in 2024, well below the historical average of 3.8% (Figure 24).

Figure 24: Global Economy Growth Prospects



Source: IMF

Figure 25: Consumer Confidence Index



Source: Statista

United States economy

Compared to Europe, the U.S. economy has higher levels of inflation, with a rate of 3.1% in November 2023. Europe, on the other hand, faced a inflation rate of 2.4% in the same month. The Consumer Confidence Index in the US, which is a measure of how optimistic the consumers are about the current and future economic conditions, has been on a decreasing trend since the pandemic, and in November 2023 it was 97.13 (Figure 25). This value means that consumers are pessimistic and reluctant to spend money, affecting the overall demand, including for semiconductor products.

Taiwan economy

The Taiwan economy is one of the most important and influential in the semiconductor industry, as it is home to Nvidia's main supplier, the TSMC.

It is expected to grow by 3.15% in 2024, supported by the strong external demand for its exports, especially semiconductors, as well as the domestic consumption and investment. However, the semiconductor industry in Taiwan is also facing the challenges of the capacity constraints, the power shortages, the water scarcity, and the security threats, as Taiwan is under the constant pressure and provocation from China, which claims Taiwan as part of its territory.

US-China trade war

As referred in the NVIDIA's supply chain analysis, the US-China trade war has disrupted the global semiconductor supply chain, as the US has restricted the access of some Chinese companies, such as Huawei and SMIC, to the US technology and equipment. These restrictions have blocked NVIDIA's sales to some of its major customers, namely Huawei. China has responded to the US sanctions by increasing its investment and support for its domestic chip industry, which has been compromising NVIDIA's sales to China (and Hong Kong), with a 19% decrease in FY2023, compared to FY2022 (Figure 2).

Industry Trends

The semiconductor industry is dependent on diverse consume trends that influence the demand for its products. The main contributing factors include the increasing digitalization, use of AI, 5G and IoT applications and the concern for sustainability.

Increased digitalization

The pandemic accelerated the adoption of digital technologies across various sectors, such as remote work, distance learning, entertainment, and e-commerce. This boosted the need for high-performance computing, data processing, and artificial intelligence, which rely on advanced semiconductor chips.

In our post-pandemic world, the demand for semiconductors is expected to remain high, as consumers continue to embrace digital lifestyles and services, mainly with the increasingly adoption of remote or hybrid work, and online shopping.

Artificial intelligence

AI is transforming various industries and applications, such as health care, education, transportation, and entertainment, by enabling new capabilities and efficiencies. AI also requires a large amount of computing power and data processing, which drives the demand for specialized and advanced semiconductors, such as GPUs. Semiconductor companies are investing heavily in research and development of AI chips, as well as collaborating with AI software and hardware providers, to capture the growing market opportunity. As mentioned in the SWOT analysis, this market is forecasted to have a strong growth in the next years.

Development of 5G and IoT

5G and IoT technologies are two of the most important drivers of growth and innovation for the semiconductor industry. With the increased demand for faster, more reliable, and more efficient wireless communication, the need for advanced chips that can enable 5G and IoT applications rise.

Sustainability

As consumers become more conscious of the environmental and social consequences of their purchasing decisions, they demand products that are not only energy-efficient and long-lasting, but also ethically produced. This creates a challenge for semiconductor companies, which must lower their emissions, water consumption, and waste production, while also respecting the labor rights and human dignity of their workers and suppliers. However, this challenge also presents an opportunity, as the growing interest in sustainability boosts the market for electric vehicles, which rely on semiconductors.

Competitive Landscape

The GPU landscape is evolving, characterized by rapid technological change. NVIDIA faces intense competition across its four main business markets:

Data Center

Data Center is NVIDIA's largest and most profitable segment, accounting for more than half of its total revenues. NVIDIA's main competitors in this market are Intel and AMD. Intel dominates the CPU market and also offers data center GPUs and AI solutions. Recently, Intel acquired Habana Labs, an AI chip startup, and has been developing its own AI platform.

Concerning AMD, its EPYC processors are increasingly adopted by cloud providers, such as AWS, Azure, and Google Cloud, as well as server vendors, namely Dell, HP, and Lenovo. AMD has been gaining market share in this segment, thanks to its technological advantages, such as higher core counts, lower power consumption, and better price-performance ratio.

Gaming

Gaming is NVIDIA's second largest segment, and the main competitor in this market is AMD. This company has been gaining market share in recent years, thanks to its Ryzen and Radeon products that offer competitive performance and price, as well as the Xilinx purchase.

However, NVIDIA still maintains a strong position in this high-end segment, where its GeForce RTX series dominates the market. NVIDIA's gaming GPUs also support ray tracing, a technology that enhances the realism and quality of graphics, which is becoming more popular among gamers and developers, as it enables more immersive and lifelike gaming experiences.

Intel holds a strong position in the integrated graphics market, where GPUs are embedded directly into processors. Nevertheless, its discrete GPUs, which are separate graphics cards that can be added to systems, are not as competitive compared to those offered by NVIDIA and AMD. Despite this, Intel's investment in research and development, along with its Alchemist GPU, could allow it to gain ground in the discrete GPU market.

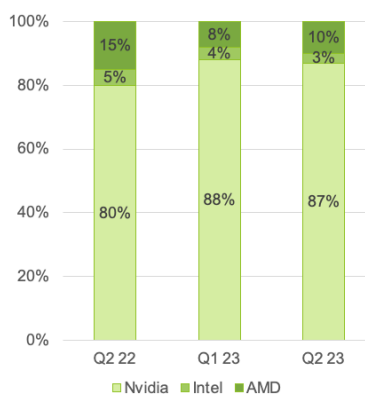
In terms of market share of discrete GPU, NVIDIA leads with 87%, followed by AMD with 10% of share, and Intel's 3% (Figure 26). However, Intel has 68% of the total PC GPU shipments, compared to 18% of NVIDIA, due to the integrated graphic market, in which Intel dominates (Figure 27).

NVIDIA's advantage in this technology is expected to help it maintain its leadership in the gaming market.

Automotive

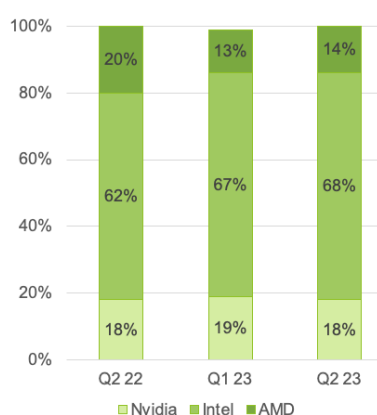
Automotive is one of NVIDIA's fastest-growing segments, and the main competitors in this market are Intel, Qualcomm, and Tesla. Intel acquired Mobileye, a leader in computer vision and driver assistance systems, in 2017, and has been developing its own self-driving platform. Qualcomm, a leader in mobile chipsets, also offers automotive solutions, such as Snapdragon Ride, a platform that supports advanced driver assistance systems and autonomous driving. Tesla, a pioneer in electric and autonomous vehicles, has been developing its own custom chips and software for its cars.

Figure 26: Discrete GPU Market Share



Source: Jon Peddie Research

Figure 27: Total PC GPU Shipments



Source: Jon Peddie Research

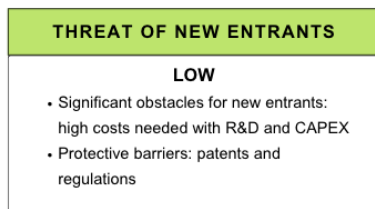
Professional Visualization

Professional Visualization is NVIDIA's smallest but most stable segment. The main competitors in this market are AMD and Intel. While AMD offers its Radeon Pro WX series, and Intel has entered the space with the Arc Pro A40 and A50 graphics cards, NVIDIA competes with the Quadro RTX lineup. This series is tailored for applications in various industries.

Porter's Five Forces

The Porter's Five Forces framework provides a systematic and comprehensive analysis of the competitive dynamics of NVIDIA's industry.

Figure 28:



Source: Authors' Elaboration

Threat of new entrants – Low

There are significant obstacles for new entrants, minimizing the risk of fresh competition. Firstly, innovation is crucial for staying competitive, but it demands substantial investments in research and development, often beyond the financial capabilities of many companies. Then, establishing one's chip production involves colossal capital expenditure (except for fabless manufacturing, such as NVIDIA) and fierce competition with established giants like TSMC and Samsung.

NVIDIA's ability to set industry standards, coupled with its recognized quality and loyal customer base, makes it challenging for new players to achieve economies of scale. Additionally, factors such as patents, regulations, and licensing serve as protective barriers for existing companies against potential newcomers. However, in emerging markets like automotive and professional visualization, where development is still in its early stages, there is a higher likelihood of facing increased competition.

Suppliers' Power – High

The semiconductor industry is highly dependent on the supply of raw materials from a few reliable sources, especially TSMC (Taiwan Semiconductor Manufacturing Company), which holds more than 50% of the market share (Figure 30). TSMC's competitive advantage is based on its cost-efficiency and high quality, which makes it the preferred supplier for many firms, such as NVIDIA.

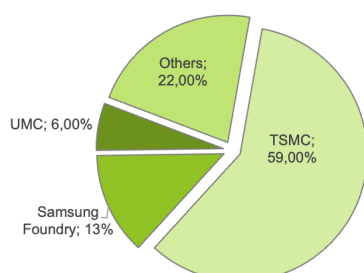
The recent chip shortage, caused by the pandemic, has increased the demand for semiconductors and the bargaining power of suppliers, who can charge higher prices and exert more influence on the industry. The products offered by suppliers are mostly standardized, which reduces the differentiation and switching costs for customers. It is unlikely that suppliers would forward integrate and compete with their customers, such as NVIDIA, who have a strong position in the GPU market.

Figure 29:



Source: Authors' Elaboration

Figure 30: Global Semiconductor Foundry Market Share



Source: Counterpoint

Figure 31:

BUYERS POWER
MEDIUM • Buyers have low switching costs • Unique features distinguish brands and retain loyal customers • OEMs have a high bargaining power, as they purchase large quantities

Source: Authors' Elaboration

Buyers' Power – Medium

In this industry, most buyers are retailers who sell NVIDIA's products to final consumers, except some software solutions and products for companies. These buyers have low switching costs and can easily compare prices and features of different GPU brands, making it harder to retain loyal customers. The price of the products is an important factor for the final consumer, however there are unique characteristics and exclusive features that distinguish brands and maintain regular clients.

Original equipment manufacturers (OEMs) in the gaming industry, such as Sony, Microsoft, and Nintendo have greater bargaining power than other buyers, as they purchase large quantities of GPUs for their gaming consoles and have more influence over the pricing and terms of the contracts. NVIDIA has to compete with other GPU suppliers, such as AMD, to win the orders from these buyers, which may result in lower margins and higher risks.

NVIDIA has been able to mitigate some of the negative effects of buyer power by creating products with exclusive characteristics and disruptive solutions, which differentiate it from its competitors and increase its customer loyalty.

Figure 32:

THREAT OF SUBSTITUTION
LOW • There are no viable alternatives to GPUs: CPUs don't perform the same tasks; FPGAa and ASICs are harder to program and more expensive to produce

Source: Authors' Elaboration

Threat of Substitution - Low

The threat of substitute products in this industry is low, as there are no viable alternatives to GPUs in the market. CPUs cannot perform the same tasks as GPUs, making these indispensable. Some potential substitutes for GPUs are field-programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs), which are specialized chips that can be customized for specific purposes. These chips could offer better performance, but they also have limitations, such as being harder to program, less flexible, or more expensive to produce. Nevertheless, it's important to acknowledge the possibility of new technologies emerging that could pose a threat to GPUs, especially if they are safeguarded by patents.

To mitigate the risk of substitution, NVIDIA has been developing specialized GPU's that offer enhanced performance in specific applications, like Virtual Reality, gaming, and AI.

Figure 33:

RIVALRY AMONG EXISTING COMPETITORS
HIGH • High fixed costs in semiconductors industry that make companies to operate at full capacity • Increasing popularity of AI drives intensified competition • Main competitors are Intel and AMD

Source: Authors' Elaboration

Rivalry among existing competitors – High

The semiconductor industry is severely competitive, driven by factors such as the high fixed costs, which makes the companies to operate at full capacity, the pricing and performance of products, and the rapid pace of technological change. NVIDIA faces intense competition from AMD and Intel, particularly in emerging segments. The struggle for market share and the push for technological advancements lead to challenges like inventory management, known as the Osborne effect, where unsold products become harder to sell due to newer, improved versions available in the market.

So, NVIDIA's success hinges on its ability to anticipate client needs and deliver high-quality products at fair prices. The industry's future points to intensified competition, with companies

striving to offer better-performing products at lower costs. Potential new alliances and the entry of new players, such as China's efforts to establish a domestic semiconductor industry, could disrupt market dynamics and impact Nvidia's market share.

Furthermore, the rise of AI has spurred demand for advanced computing and software, positioning NVIDIA as a leader in this space. However, the increasing popularity of AI technologies invites more competitors, like Google, which claims to have developed faster chips. To maintain its leadership, NVIDIA must continue to innovate and enhance its offerings, as failure to adapt could result in significant market share and financial losses.

Conclusion: Although NVIDIA faces intense competition, mainly from Intel and AMD, and handle some macroeconomics downsides, such as the global chip shortage and geopolitical tensions, the company has a strong competitive position in the market. In addition, the semiconductor industry prospects are very positive and NVIDIA is well-positioned to capitalize on the growing demand for GPUs and AI platforms.

Multiples Valuation

To better understand how NVIDIA's fair price relate to peers, it was conducted a multiples valuation approach (Figure 34).

Firstly, it was selected suitable comparables companies, based on its geographical exposure, market segments, business model, market capitalization, and correlation with NVIDIA. The considered peers for valuation were Qualcomm, Intel, AMD, and Texas Instruments.

When deciding the most appropriate multiples to use, it was chosen the Enterprise Value to Revenues ratio (EV/Revenues), Enterprise Value to EBITDA (EV/EBITDA), and Price to Earnings ratio (P/E). These three multiples were computed using the median of peers multiples, as it reduces the impact of extreme values (outliers) in the data, providing a more balanced and representative valuation.

The EV to Revenues ratio of NVIDIA is 27.57x, which is very high related to all its peers. This multiple implies a share price of \$169.35, that is 66% below the current share price (Figure 35).

Regarding the EV to EBITDA multiple, the implied price per share is \$481.24, suggesting that Nvidia is overvalued by 4% comparing to its peers.

Based on P/E ratio, NVIDIA's target price is \$212.39, a value that is 58% below its current price per share. The company has a P/E multiple of 65.98x, while its peers median is 27.98x. All the multiples computed suggest that NVIDIA is trading at a premium compared to its peers. However, it is important to note that this valuation approach is limited and has some flaws, such as the fact that it relies on historical financial data, that not fully predict the

Figure 34: NVIDIA and Comparables Multiples

Comparables	EV/Revenue	EV/EBITDA	P/E
NVIDIA Corporation	27.57x	54.24x	65.98x
QUALCOMM Incorporated	15.46x	26.94x	34.25x
Intel Corporation	4.10x	26.04x	-117.15x
Advanced Micro Devices, Inc.	10.12x	54.32x	1262.73x
Texas Instruments Incorporated	8.52x	16.22x	21.71x

High	15.46x	54.32x	1262.73x
Average	9.55x	30.88x	300.38x
Median	9.32x	26.49x	27.98x
Low	4.10x	16.22x	-117.15x

Source: Authors Calculations

Figure 35: Implied Price from Multiples Valuation

NVIDIA	EV/Revenue	EV/EBITDA	P/E
Implied EV (in billion \$)	418.29	1188.67	524.59
Shares Outstanding (in billions)	2.47	2.47	2.47
Implied Price per Share	\$169.35	\$481.24	\$212.39

Difference to Current Price -66% -4% -58%

Source: Authors Calculations

company's future performance. Moreover, the comparable companies do not reflect all NVIDIA's characteristics and potential.

So, we conclude that the DCF is a more reliable model to determine NVIDIA target share price, although this relative valuation helps to perceive how the company's value compares to its peers.

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NVIDIA CORPORATION

SEMICONDUCTORS

ANA FILIPA VIEIRA & ANTÓNIO CALABOTE

COMPANY REPORT

20 DECEMBER 2023

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Equity Research - NVIDIA

Technology Giant Disrupts the Market

- Industry trends, such as the increasing digitalization and the use of advanced technologies powered with **AI**, **5G**, and **IoT**, create a strong basis for a **future sustainable growth** of NVIDIA.
- Despite the intense competitive landscape that NVIDIA faces, the company has a **strong presence**, leading the GPU market, with a **market share of 82%**.
- NVIDIA's valuation through the Discounted Cash Flow method originated a **BUY** recommendation with a Price Target of 560.82\$ for the fiscal year of 2025.
- The company's **artificial intelligence** and **autonomous driving endeavours** are expected to develop very rapidly in the coming years, especially with AI gaining increasing importance across the economy due to productivity gains, thus **boosting** the firm's **"Compute & Networking"** segment.

Company description

NVIDIA Corporation is an American company which stands as a globally recognized leader in the semiconductor sector, primarily specializing in cutting-edge graphics processing units (GPUs) and breakthroughs in artificial intelligence (AI) and deep learning technologies. NVIDIA's product range is strategically crafted to serve four major market sources: Gaming, Data Center, Professional Visualization, and Automotive applications.

Recommendation: **BUY**

Price Target FY25: **560.82\$**
(FY ends in Jan-25)

Price (as of 18-12-2023) **500.77\$**

Reuters: NVDA.O, Bloomberg: NVDA

52-week range (\$) **138.84 – 505.48**

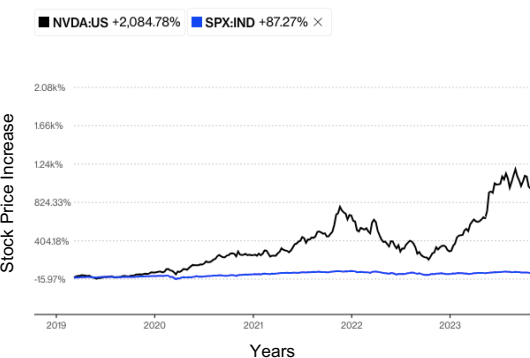
Market Cap (\$m) **1 237 000**

Outstanding Shares (m) **2 470**

Other (...)

Source: Yahoo Finance

Comparison between NVDA and SPX for 2019-2023



Source: Bloomberg

(Values in \$ millions)	2022	2023E	2024F
Revenues	26 974	58 858	113 212
EBITDA	4 224	20 786	39 981
Net Profit	4 336	17 455	32 648

Source: Own Projections

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY ANA FILIPA VIEIRA AND ANTÓNIO CALABOTE, A MASTER IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

Table of Contents

COMPANY OVERVIEW.....	3
BUSINESS AND MARKET SEGMENTS	3
SHAREHOLDER STRUCTURE	6
SUPPLY CHAIN ANALYSIS	7
SWOT ANALYSIS	8
INDUSTRY OVERVIEW AND COMPETITIVE POSITIONING	11
MACROECONOMIC ANALYSIS	11
INDUSTRY TRENDS	12
COMPETITIVE LANDSCAPE.....	14
PORTER'S FIVE FORCES	15
MARKET OVERVIEW AND MAIN DRIVERS.....	18
CASH FLOW MANAGEMENT	18
LIQUIDITY	19
CAPITAL STRUCTURE.....	20
REFORMULATION OF FINANCIAL STATEMENTS AND ASSUMPTIONS	22
SALES' AND COSTS' VALUE DRIVERS	23
INVESTED CAPITAL VALUE DRIVERS	23
ROE AND ROIC	24
VALUE CREATION ANALYSIS AND GROWTH RATE OF SALES	25
VALUATION.....	26
CORE REVENUES FORECAST	26
CORE COSTS FORECAST	27
CORE INVESTED CAPITAL.....	28
WACC	28
DCF ANALYSIS	30
LONG-TERM VALUE DRIVERS	31
MARKET VALUE OF STOCK	31
SENSITIVITY ANALYSIS	31
MULTIPLES VALUATION	32
FINAL RECOMMENDATION	32
APPENDIX	34

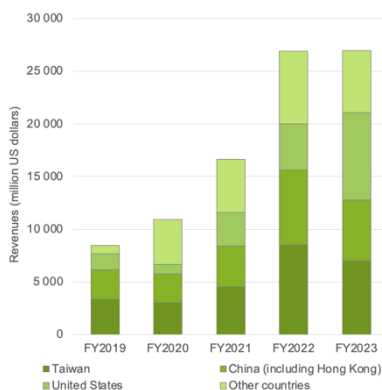
Company Overview

Figure 1: NVIDIA Logotipo



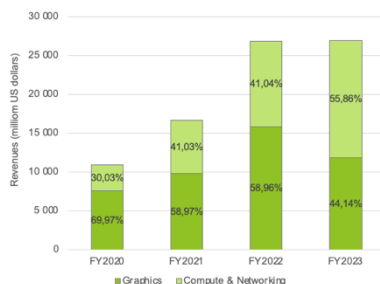
Source: NVIDIA Website

Figure 2: Revenues by Geographic Region from FY2019 to FY2023



Source: NVIDIA Reports

Figure 3: Revenues by Business Segment from FY2020 to FY2023



Source: NVIDIA Reports

Nvidia Corporation (NASDAQ:NVDA), headquartered in Santa Clara, California, is a leading company in the semiconductor industry, specializing in the design of graphics processing units (GPUs), application programming interfaces (APIs) for high-performance computing and data science, and system-on-chip units (SoCs) for the automotive market and mobile computing. It was founded in 1993, by Jensen Huang, Chris Malachowsky, and Curtis Priem, with the purpose of solving complex problems in computer science.

NVIDIA started by focusing on GPUs, which have gained renown for their exceptional performance and adaptability, in a wide spectrum of applications, such as scientific research, data analysis, and self-driving vehicles, thanks to their unparalleled computational capabilities. Then, following the digital revolution, NVIDIA has expanded to meet the demanding computational requirements of artificial intelligence (AI) and machine learning tasks. Moreover, the company is deeply entrenched in the evolution of autonomous driving technology, outfitting self-driving vehicles with the computational might and sensor capabilities essential for safe and efficient navigation.

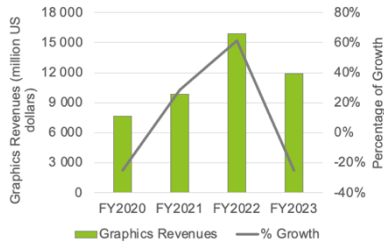
NVIDIA follows a platform strategy that incorporates diverse elements like hardware, software, algorithms, libraries, and services to create unique value for different markets. They achieve this by using a unified architecture based on GPUs and software stacks, which can adapt to the specific needs of various industries. This flexibility allows them to serve multiple billion-dollar markets with the same core technology while leveraging different software stacks developed internally or by partners.

In terms of geographical distribution, NVIDIA attributes its revenue to specific countries based on the locations where customers place their orders. The company manages its operations across four primary geographic regions: Taiwan, China (including Hong Kong), the United States, and other countries (Figure 2). Over the past five fiscal years, approximately half of the company's total revenue has been derived from Taiwan and China. The United States follows closely behind, with its share showing an increase during the pandemic years. Regarding the other countries, they still contribute around 25% to the company's total revenue, but their proportion has been decreasing over time.

Business and Market Segments

NVIDIA operates in two main business segments (Figure 3):

Figure 4: Graphics Revenues from FY2020 to FY2023



Source: NVIDIA Reports

Graphics

This segment contributes for 44% of revenue, and includes graphics processing units (GPUs) for various applications, namely the GeForce Now, which allows users to stream games from the cloud, GRID, that enables virtual desktops and applications, Omniverse, a platform for collaborative 3D creation, and automotive platforms, which power infotainment systems and autonomous driving.

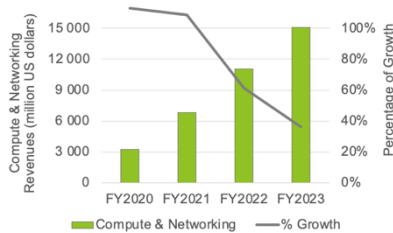
Although graphics revenues have grown at a compound annual growth rate (CAGR) of 16% from FY2020 to FY2023 (Figure 4), their weight in NVIDIA's total revenue is on a declining trajectory, as a result of the rising prominence of the Compute & Networking segment.

The main growth drivers in this segment are the expanding gaming industry, the increased demand for AI and machine learning applications, as well as automotive solutions, and the rise of edge computing.

Compute & Networking

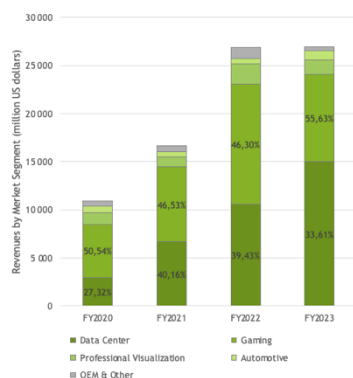
Representing 56% of total revenue, the compute & networking segment comprises data center platforms and systems for AI, high performance computing (HPC), Mellanox networking and interconnect solutions, automotive AI, electric vehicle computing, robotics, software, and cryptocurrency mining processors (CMP). This segment revenues have showed a high growth in last years, from \$3 279 million in FY2020 to \$15 068 million in FY2023 (Figure 5), which represents a CAGR of 66.25%, driven by the increasing demand for computing power, self-driving cars, artificial intelligence, cloud and edge computing, as well as the development of the cryptocurrency market.

Figure 5: Compute & Networking Revenues from FY2020 to FY2023



Source: NVIDIA Reports

Figure 6: Revenues by Market Segment from FY2020 to FY2023

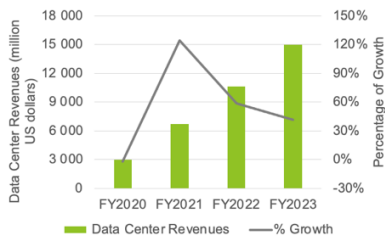


Source: NVIDIA Reports

Regarding the market segments in which NVIDIA operates (Figure 6), the company focus on the following core sectors: Data Center, Gaming, Professional Visualization, and Automotive. Furthermore, the company includes an additional segment labeled as OEM & Others in its financial reports to account for other business activities.

Data Center

NVIDIA's Data Center segment has emerged as the company's most promising growth market and the one that currently contributes the most, representing 56% of total revenues. From FY2020 to FY2023, revenues registered a CAGR of 71.34% (Figure 7). NVIDIA's acquisition of Mellanox was crucial for solidifying its presence in the market, particularly in advancing the AI industry and improving

Figure 7: Data Center Revenues from FY2020 to FY2023


Source: NVIDIA Reports

high-performance computing and machine learning. Beyond that, the growing demand for cloud and edge computing are driving the huge increase of revenues.

Within this segment, the company provides data centers with the means to accelerate deep learning, machine learning, and high-performance computing while maintaining energy efficiency. Some of NVIDIA's data center customers are major cloud providers, such as Google Cloud, Azure, AWS, and Alibaba.

Gaming

This market segment has historically been on the foundation of NVIDIA's development, however it now accounts for just 34% of the company's total revenues. This weight has been gradually decreasing since FY2020 (when it comprised 51% of the company's revenues), which can be explained by the remarkable growth of the Data Center market, which is the dominant source of the company's revenues.

In the two past years, this market has benefited from the impact of the COVID-19 pandemic on the demand for entertainment, growing at a CAGR of 18% from FY2020 to FY2023 (Figure 8).

NVIDIA has been making impressive progress in GPU architectures, which boosts its processing power and keeps it ahead of the competition. Its advanced architecture, Ada, powers the 40 series GPUs, offering better performance because it uses TSMC's 5nm process, which has more capacity than the 7nm or 8nm processes used by other companies.

Professional Visualization

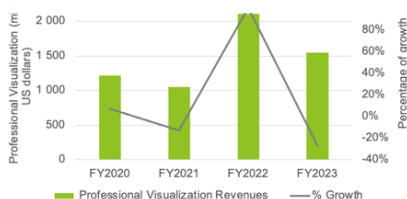
Professional Visualization represents 6% of total revenues, and its sales has been growing at a CAGR of 8,40% in the last 4 years (Figure 9). This segment consists of partnerships with independent software vendors, optimizing software compatibility with Nvidia GPUs to empower industries as automotive, media and entertainment, architectural engineering, and medical imaging.

The key products in this market include Quadro, DesignWorks software, and Omniverse, which is used by giants such as Pixar, Adobe, Autodesk, and Siemens. The NVIDIA Avatar Cloud engine, housed within Omniverse, is a cloud-native AI model and service enabling businesses to create intelligent assistants and avatars proficient in multiple languages. In healthcare, NVIDIA has contributed to accelerating cancer research, diagnosis, and overall quality of care.

Currently, NVIDIA dominates the graphics market for workstations, providing graphics for over 90% of HPC dedicated to handling complex tasks.

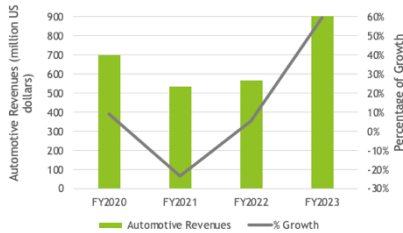
Figure 8: Gaming Revenues from FY2020 to FY2023


Source: NVIDIA Reports

Figure 9: Professional Visualization Revenues from FY2020 to FY2023


Source: NVIDIA Reports

Figure 10: Automotive Revenues from FY2020 to FY2023



Source: NVIDIA Reports

Automotive

While the Automotive market currently contributes for only 3% of total revenues, it is in the midst of a significant transformation. The focus has shifted from legacy infotainment to AI cockpit and autonomous vehicles, and significant investments have been made in self-driving software and hardware. NVIDIA has forged partnerships with automakers, truck manufacturers, suppliers, and startups to develop AI systems, namely Volvo, Toyota, Jaguar, Land Rover, and Mercedes-Benz. Thus, this market is expected to keep growing in the future.

NVIDIA's DRIVE collection includes hardware (AGX Pegasus, AGX Xavier, Atlan, Hyperion) for processing data from cameras, radars, and sensors in autonomous vehicles, enabling tasks such as environment perception, vehicle localization, path planning, and safe path execution. The collection also features software products (Drive OS, DriveWorks, Drive AV, Drive IX) for a broad autonomous driving system.

From FY2020 to FY2023, this segment revenues have grown at a CAGR of 8.86% (Figure 10).

OEM & Others

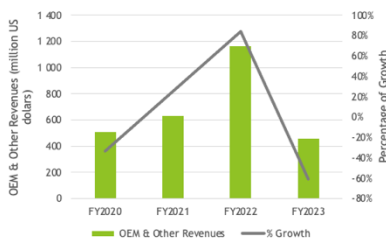
The OEM & Others market represents only 2% of total revenues, beside a CAGR of -3.42% between FY2020 and FY2023 (Figure 11).

This segment encompasses products designed for equipment manufacturers rather than direct consumer sales. Over the years, NVIDIA has reduced its emphasis on OEM products and introduced CMPs, which serve to differentiate crypto-mining demand from gaming products, ensuring a consistent supply for gamers. This led to the decline registered in FY2023 revenues.

While OEMs are intended for inclusion in final devices sold by companies like Dell or Lenovo, they do not serve as the primary focus.

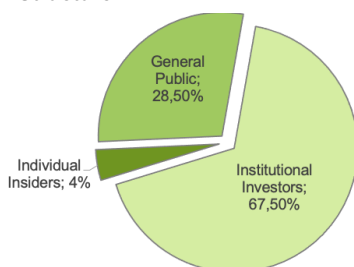
This sustained trend of loss is expected to remain, as the company investment in this market is diminishing.

Figure 11: OEM & Others Revenues from FY2020 to FY2023



Source: NVIDIA Reports

Figure 12: NVIDIA's Shareholder Structure



Source: Yahoo Finance and Authors' Estimates

Shareholder Structure

NVIDIA's shareholder structure affects how the company is governed and managed. The company has 2.47 billion shares outstanding, which are owned by different types of shareholders.

Looking at Figure 12, the majority of NVIDIA's shares (67.5%) are held by institutional investors, which can represent some risks. Firstly, these investors are sometimes more interested in short-term goals than in the long-term performance,

Figure 13: Main NVIDIA's Institutional Shareholders

Institutional Holder	% of Shares Outstanding
Vanguard Group Inc	8,25%
Blackrock Inc.	7,28%
FMR, LLC	5,22%
State Street Corporation	3,59%
Price (T.Rowe) Associates Inc	2,16%
GEODE CAPITAL MANAGEMENT, LLC	1,96%
JPMORGAN CHASE & CO	1,41%

Source: Yahoo Finance

Figure 14: Main NVIDIA's Insider Shareholders

Inside Holder	Position	% of Shares Outstanding
Jen-Hsun Huang	President and CEO	3,25%
Mark A. Stevens	Director	0,52%
Colette M. Kress	EVP & CFO	0,20%
Debora Shoquist	EVP, Operations	0,08%
Harvey C. Jones	Director	0,06%

Source: Yahoo Finance

and can influence the board of directors' decisions in ways that do not align with the best interests of the company, such as push for higher dividends or actions to boost the short-term price, which can compromise the long-term growth. Secondly, institutional investors often react to market trends, news, and analysts' reports, and adjust their positions accordingly, causing volatility in the stock price. Figures 13 illustrates who are the main institutional holders of NVIDIA shares.

Regrading individual insiders (Figure 14), mainly the founder and CEO Jen-Hsun Huang, they own around 4% of outstanding shares. While insider ownership can align interests with long-term company goals, significant insider trading activity, such as buying or selling shares, could signal to the market insiders' confidence levels, affecting the stock's performance.

The remaining shares are held by the general public (28.5%), private companies (0.005%) and the state or government (0.04%).

To address potential risks tied to institutional investor concentration, NVIDIA's governance structure features a board consisting of 13 directors, including CEO Jensen Huang. This board is organized into four committees: the Audit, Nominating & Corporate Governance, Compensation, and Finance committees, aimed at safeguarding shareholders' interests by overseeing management performance and corporate practices.

Supply Chain Analysis

Figure 15: Supply and Demand Analysis of GPU


Source: GPU Utils

NVIDIA has a fabless manufacturing process, which means that it does not produce its own semiconductors but relies on third-party foundries to supply them. These fabricators use silicon wafers as raw materials to make the chips that NVIDIA needs for its GPU. These chips are then sent to independent Outsourced Semiconductor Assembly and Test (OSAT) that assemble, test and package the products. Lastly, products are either distributed to third-party retailers who deliver to the final customers, or it is directly sold to end customers (Figure 15). In instances involving large-volume products, partnerships play a significant role in direct sales, particularly in sectors like Data Center or Automotive.

Through the years, NVIDIA made strong partnerships with reliable suppliers, such as the Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest semiconductor foundry, which ensures a stable and high-quality supply of chips. However, this high dependency on third-party foundries has some risks, as Nvidia's production capacity fully relies on them, and it is subject to supply disturbances.

One threat to Nvidia's supply chain is the current U.S.–China trade war started in 2018, when then-President Donald Trump imposed increasing tariffs on a range of imported goods from China, and, as response, China retaliated by raising duties on products imported from the United States. This war caused a shortage of wafers and disrupted the global supply of semiconductors, affecting both the foundries and NVIDIA, as they had to reduce their production and cope with the rising costs and delays.

Another challenge in the company supply chain is the fluctuating demand for GPUs, which surged during the covid-lockdowns as more people worked from home and sought entertainment options. In addition to that, quarantine measures led to production disruptions, including shutdowns of semiconductor factories, and restrictions at major ports in China (such as Shanghai and Shenzhen), caused delays in the distribution of these crucial components. This created a cycle characterized by low supply and high demand, worsening the semiconductor shortage. The huge gap between supply and demand naturally resulted in increased semiconductor prices, impacting various industries, and highlighting the vulnerability of NVIDIA's supply chain.

To enhance the efficiency of its supply chain, NVIDIA is using AI and simulation solutions to optimize its logistics and supply chain management, such as forecasting, inventory management, package tracking, and last-mile delivery.

However, the company still faces some potential threats that could affect its supply chain in the future. One of them is the political tension between China and Taiwan, which could escalate into a conflict and disrupt the operations of TSMC and other foundries in the region. Another one is the possible shortage of copper, which is a key material for making semiconductors and could become scarce and expensive by the 2030s.

SWOT Analysis

This analysis contributes to a better perception of NVIDIA's strategic position in the dynamic technological landscape, and which factors may influence its future success or pose challenges.

Strengths:

Focus on Research and Development: NVIDIA's commitment to innovation is evident in its substantial investment in R&D, representing an average of 24.06% of its annual revenue in the last four fiscal years.

In FY 2023, NVIDIA intensified its R&D efforts by allocating \$7 339 million, a substantial increase of 39.31% from the previous year, and representing 27.21%

Figure 16: Research and Development Expenses from FY2020 to FY2023



Source: NVIDIA Reports

Figure 17: NVIDIA Market Capitalization in the last 10 years



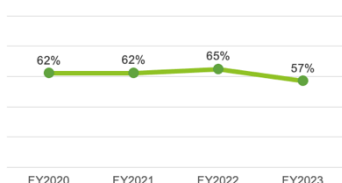
Source: Finance Charts

Figure 18: NVIDIA Main Partners



Source: Partnerbase

Figure 19: NVIDIA Gross Margin Profit from FY2020 to FY2023



Source: NVIDIA Reports

of the total revenue (Figure 16). Currently, the company holds a substantial portfolio of 11 214 patents, out of which 6 973 were granted. This emphasis on advanced R&D capabilities remains a key driver behind NVIDIA's ability to consistently introduce innovative products.

Strong Brand and Dominant Market Position: NVIDIA is the global leader in the world of GPUs, with a current market share exceeding 80%, enjoying the benefits of a first-mover advantage and maintaining an unrivaled brand image. The company has also a dominant role in the supply of AI hardware and software, leading to a market capitalization surpassing \$1 trillion in May 2023 (Figure 17).

Strategic Partnerships: With 1247 partners across the world, the company collaborates with various entities to enhance cloud and professional services. NVIDIA's partnerships extend across different industries and sectors, promoting the adoption of its products, technologies, and platform solutions (Figure 18). These strategic partnerships play a pivotal role in amplifying its influence and maintaining its position as a technological leader.

Diverse Product Portfolio: NVIDIA strategically diversifies its business across five high-growth markets (data center, gaming, professional visualization, automotive, and OEM & Others), mitigating risks and fostering versatile revenue streams. Moreover, NVIDIA's diverse product portfolio facilitates its platform strategies, which contributes to create a semi-closed product ecosystem that effectively enhances brand loyalty, customer engagement, and repeat sales activities.

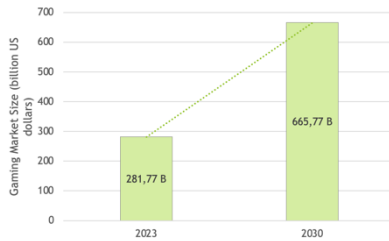
Strong Financial Performance: NVIDIA's solid financial situation, marked by an average gross profit margin of 62% in the last 4 fiscal years (Figure 19), demonstrates its profitability in the face of market changes, and also enables sustained investment in research and development of cutting-edge technologies, reinforcing the company's market leadership.

Weaknesses:

Fabless Manufacturing Process: NVIDIA's outsourcing its manufacturing process to a third-party, while cost-effective, poses risks to product quantity, quality, and delivery schedules, as the company has almost no control over that. Therefore, there is no ability to scale up its supply chain in response to increased demand, and it can negatively affect its operations and financial results.

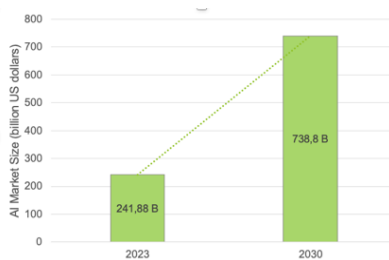
Centralized Decision-Making: The company has a centralized decision-making structure, meaning that the decisions have to be approved by top-level management. This approach limits the organization's ability to quickly respond to situations that demand prompt decisions.

Figure 20: Gaming Market Size in 2023 and 2030



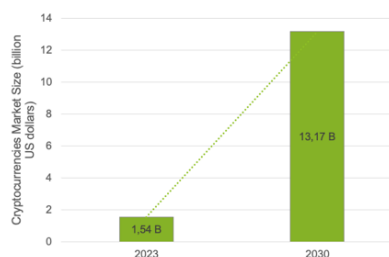
Source: Yahoo Finance

Figure 21: AI Market Size in 2023 and 2030



Source: Statista

Figure 22: Cryptocurrency Market Size in 2023 and 2030



Source: Yahoo Finance

Opportunities:

Growth in Gaming: The gaming market is rapidly growing, driven by the constant demand for high-quality graphics and real-time performance. This market is anticipated to grow at a CAGR of 13.1%, from 2023 to 2030 (Figure 20), and NVIDIA's strong market position puts it well to leverage this ongoing expansion.

Expansion in Data Centers: NVIDIA stands to benefit from the rising need for data centers in our increasingly digital era. As high-performance computing becomes more crucial, data centers are in demand for various applications such as blockchain operations, artificial intelligence model processing, cloud computing, on-demand streaming services, and scientific research. The data center market is forecasted to grow at a CAGR of 6.12% from 2023 to 2028.

Growth in AI and Machine Learning: Advances in AI, machine learning, and deep learning are driving its wide application in various industries. With an estimated CAGR of 17.30%, this market is projected to have a volume of \$738.80 billion by 2030 (Figure 21). NVIDIA will benefit significantly from this trend, as demand for its GPUs and AI infrastructures is expected to increase.

Autonomous Vehicles: The global automotive manufacturing market is expected to reach \$ 614.87 billion by 2030, growing at a CAGR of 8% from 2023. NVIDIA is actively investing in autonomous vehicle technology, particularly in collaboration with Mercedes-Benz, to develop advanced computing architecture for vehicles.

Cryptocurrency Market: As the cryptocurrency industry continues to grow, NVIDIA is well-positioned to capture a significant share of this market. In 2021, the company introduced the CMP, which utilize the architecture of its GPUs for optimal professional mining performance and efficiency. Until 2030, the cryptocurrency market is projected to reach \$13.17 billion, representing a CAGR of 30.80% (Figure 22).

Threats:

Intense Competitive Market: NVIDIA operates in a competitive landscape with strong growth potential and faces competition from established players like AMD and Intel, as well as potential new entrants. Additionally, there is a risk of alliances forming between NVIDIA's competitors to weaken the company's position. These factors could lead to price pressure and reduced profitability.

Economic and Market Volatility: NVIDIA's business, particularly its gaming segment, is susceptible to economic downturns and market volatility. When the economy slows down, consumers and businesses tend to prioritize essential purchases, leading to decreased demand for NVIDIA's products, as they are

Figure 23: Summary of the SWOT Analysis

STRENGTHS
• Focus on R&D • Strong Brand and Market Position • Strategic Partnerships • Diverse Product Portfolio • Strong Financial Performance
WEAKNESSES
• Fabless Manufacturing Process • Centralized Decision-Making
OPPORTUNITIES
• Growth in Gaming • Expansion in Data Centers • Growth in AI and Machine Learning • Autonomous Vehicles • Cryptocurrency Markets
THREATS
• Intense Competitive Market • Economic and Market Volatility • Technological Shifts • Regulatory Environment

Source: Authors' Elaboration

typically considered non-essential. Additionally, macroeconomic factors like inflation, interest rates, and global supply chain disruptions can also impact NVIDIA's financial performance and operational efficiency.

Technological Shifts: The tech industry is constantly evolving, with new technologies and architectures emerging all the time. One potential disruption that could significantly impact Nvidia is the rise of quantum computing. If quantum computers become commercially viable, they could render traditional GPUs obsolete, forcing NVIDIA to pivot to a new business model.

Regulatory Environment: The company's operations and products have attracted scrutiny from regulators in several countries, including China. Its entry into artificial intelligence has further intensified these regulatory concerns, mainly due to the privacy and security implications of AI applications. In addition, the company faces antitrust and intellectual property litigation, further aggravating its regulatory challenges.

Industry Overview and Competitive Positioning

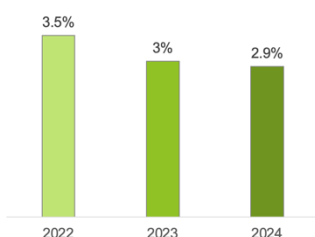
NVIDIA operates in the semiconductor industry, which makes essential components for many electronic devices, including TVs, smartphones, computers, video games, and advanced medical diagnostic equipment. In this fast-paced industry, companies often specialize in specific types of semiconductors, aiming to become market leaders in those particular niches, which is the case of NVIDIA, that focuses on selling GPUs.

Macroeconomic Analysis

Global outlook

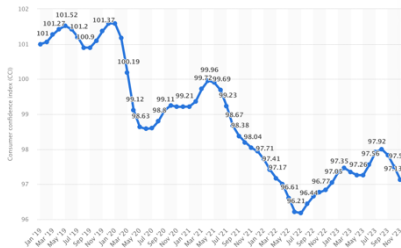
The global economy is facing a prolonged period of uncertainty and weakness, as the recovery from the Covid-19 pandemic is overshadowed by the military conflict between Russia and Ukraine. Inflation has surged to high levels, as a result of low interest rates, strong demand, supply congestions, and rising energy and food costs. This has forced central banks to tighten monetary policy, which is expected to slow down economic activity and investment. According to the IMF, global economy growth is projected to decline from 3.5% in 2022 to 3.0% in 2023, and 2.9% in 2024, well below the historical average of 3.8% (Figure 24).

Figure 24: Global Economy Growth Prospects



Source: IMF

Figure 25: Consumer Confidence Index



Source: Statista

United States economy

Compared to Europe, the U.S. economy has higher levels of inflation, with a rate of 3.1% in November 2023. Europe, on the other hand, faced an inflation rate of 2.4% in the same month.

The Consumer Confidence Index in the US, which is a measure of how optimistic the consumers are about the current and future economic conditions, has been on a decreasing trend since the pandemic, and in November 2023 it was 97.13 (Figure 25). This value means that consumers are pessimistic and reluctant to spend money, affecting the overall demand, including for semiconductor products.

Taiwan economy

The Taiwan economy is one of the most important and influential in the semiconductor industry, as it is home to NVIDIA's main supplier, the TSMC. It is expected to grow by 3.15% in 2024, supported by the strong external demand for its exports, especially semiconductors, as well as the domestic consumption and investment.

However, the semiconductor industry in Taiwan is also facing the challenges of the capacity constraints, the power shortages, the water scarcity, and the security threats, as Taiwan is under the constant pressure and provocation from China, which claims Taiwan as part of its territory.

US-China trade war

As referred in the NVIDIA's supply chain analysis, the US-China trade war has disrupted the global semiconductor supply chain, as the US has restricted the access of some Chinese companies, such as Huawei and SMIC, to the US technology and equipment. These restrictions have blocked NVIDIA's sales to some of its major customers, namely Huawei. China has responded to the US sanctions by increasing its investment and support for its domestic chip industry, which has been compromising NVIDIA's sales to China (and Hong Kong), with a 19% decrease in FY2023, compared to FY2022 (Figure 2).

Industry Trends

The semiconductor industry is dependent on diverse consume trends that influence the demand for its products. The main contributing factors include the increasing digitalization, use of AI, 5G and IoT applications and the concern for sustainability.

Increased digitalization

The pandemic accelerated the adoption of digital technologies across various sectors, such as remote work, distance learning, entertainment, and e-commerce. This boosted the need for high-performance computing, data processing, and artificial intelligence, which rely on advanced semiconductor chips.

In our post-pandemic world, the demand for semiconductors is expected to remain high, as consumers continue to embrace digital lifestyles and services, mainly with the increasingly adoption of remote or hybrid work, and online shopping.

Artificial intelligence

AI is transforming various industries and applications, such as health care, education, transportation, and entertainment, by enabling new capabilities and efficiencies. AI also requires a large amount of computing power and data processing, which drives the demand for specialized and advanced semiconductors, such GPUs. Semiconductor companies are investing heavily in research and development of AI chips, as well as collaborating with AI software and hardware providers, to capture the growing market opportunity. As mentioned in the SWOT analysis, this market is forecasted to have a strong growth in the next years.

Development of 5G and IoT

5G and IoT technologies are two of the most important drivers of growth and innovation for the semiconductor industry. With the increased demand for faster, more reliable, and more efficient wireless communication, the need for advanced chips that can enable 5G and IoT applications rise.

Sustainability

As consumers become more conscious of the environmental and social consequences of their purchasing decisions, they demand products that are not only energy-efficient and long-lasting, but also ethically produced. This creates a challenge for semiconductor companies, which must lower their emissions, water consumption, and waste production, while also respecting the labor rights and human dignity of their workers and suppliers. However, this challenge also presents an opportunity, as the growing interest in sustainability boosts the market for electric vehicles, which rely on semiconductors.

Competitive Landscape

The GPU landscape is evolving, characterized by rapid technological change. NVIDIA faces intense competition across its four main business markets:

Data Center

Data Center is NVIDIA's largest and most profitable segment, accounting for more than half of its total revenues. NVIDIA's main competitors in this market are Intel and AMD. Intel dominates the CPU market and also offers data center GPUs and AI solutions. Recently, Intel acquired Habana Labs, an AI chip startup, and has been developing its own AI platform.

Concerning AMD, its EPYC processors are increasingly adopted by cloud providers, such as AWS, Azure, and Google Cloud, as well as server vendors, namely Dell, HP, and Lenovo. AMD has been gaining market share in this segment, thanks to its technological advantages, such as higher core counts, lower power consumption, and better price-performance ratio.

Gaming

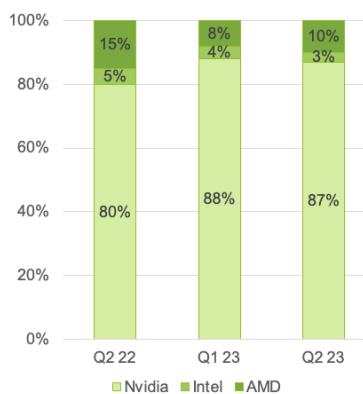
Gaming is NVIDIA's second largest segment, and the main competitor in this market is AMD. This company has been gaining market share in recent years, thanks to its Ryzen and Radeon products that offer competitive performance and price, as well as the Xilinx purchase.

However, NVIDIA still maintains a strong position in this high-end segment, where its GeForce RTX series dominates the market. Nvidia's gaming GPUs also support ray tracing, a technology that enhances the realism and quality of graphics, which is becoming more popular among gamers and developers, as it enables more immersive and lifelike gaming experiences.

Intel holds a strong position in the integrated graphics market, where GPUs are embedded directly into processors. Nevertheless, its discrete GPUs, which are separate graphics cards that can be added to systems, are not as competitive compared to those offered by NVIDIA and AMD. Despite this, Intel's investment in research and development, along with its Alchemist GPU, could allow it to gain ground in the discrete GPU market.

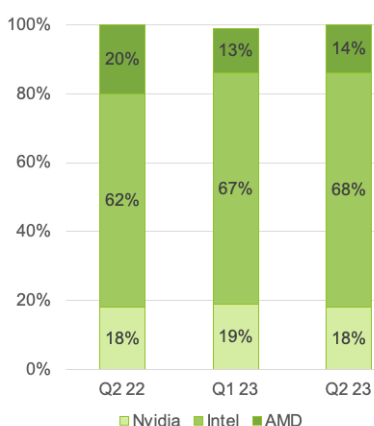
In terms of market share of discrete GPU, NVIDIA leads with 87%, followed by AMD with 10% of share, and Intel's 3% (Figure 26). However, Intel has 68% of the total PC GPU shipments, compared to 18% of NVIDIA, due to the integrated graphic market, in which Intel dominates (Figure 27).

Figure 26: Discrete GPU Market Share



Source: Jon Peddie Research

Figure 27: Total PC GPU Shipments



Source: Jon Peddie Research

NVIDIA's advantage in this technology is expected to help it maintain its leadership in the gaming market.

Automotive

Automotive is one of NVIDIA's fastest-growing segments, and the main competitors in this market are Intel, Qualcomm, and Tesla. Intel acquired Mobileye, a leader in computer vision and driver assistance systems, in 2017, and has been developing its own self-driving platform. Qualcomm, a leader in mobile chipsets, also offers automotive solutions, such as Snapdragon Ride, a platform that supports advanced driver assistance systems and autonomous driving. Tesla, a pioneer in electric and autonomous vehicles, has been developing its own custom chips and software for its cars.

Professional Visualization

Professional Visualization is NVIDIA's smallest but most stable segment. The main competitors in this market are AMD and Intel. While AMD offers its Radeon Pro WX series, and Intel has entered the space with the Arc Pro A40 and A50 graphics cards, NVIDIA competes with the Quadro RTX lineup. This series is tailored for applications in various industries.

Porter's Five Forces

The Porter's Five Forces framework provides a systematic and comprehensive analysis of the competitive dynamics of NVIDIA's industry.

Threat of new entrants – Low

There are significant obstacles for new entrants, minimizing the risk of fresh competition. Firstly, innovation is crucial for staying competitive, but it demands substantial investments in research and development, often beyond the financial capabilities of many companies. Then, establishing one's chip production involves colossal capital expenditure (except for fabless manufacturing, such as NVIDIA) and fierce competition with established giants like TSMC and Samsung.

NVIDIA's ability to set industry standards, coupled with its recognized quality and loyal customer base, makes it challenging for new players to achieve economies of scale. Additionally, factors such as patents, regulations, and licensing serve as protective barriers for existing companies against potential newcomers. However, in emerging markets like automotive and professional visualization, where development is still in its early stages, there is a higher likelihood of facing increased competition.

Figure 28:

THREAT OF NEW ENTRANTS
LOW
• Significant obstacles for new entrants: high costs needed with R&D and CAPEX • Protective barriers: patents and regulations

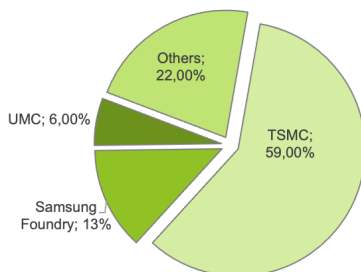
Source: Authors' Elaboration

Figure 29:



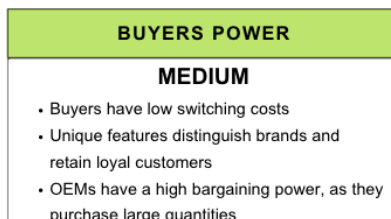
Source: Authors' Elaboration

Figure 30: Global Semiconductor Foundry Market Share



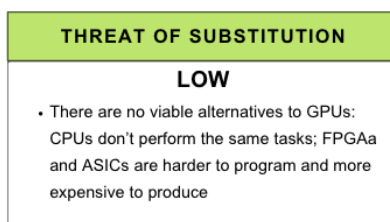
Source: Counterpoint

Figure 31:



Source: Authors' Elaboration

Figure 32:



Source: Authors' Elaboration

Suppliers' Power – High

The semiconductor industry is highly dependent on the supply of raw materials from a few reliable sources, especially TSMC (Taiwan Semiconductor Manufacturing Company), which holds more than 50% of the market share (Figure 30). TSMC's competitive advantage is based on its cost-efficiency and high quality, which makes it the preferred supplier for many firms, such as NVIDIA.

The recent chip shortage, caused by the pandemic, has increased the demand for semiconductors and the bargaining power of suppliers, who can charge higher prices and exert more influence on the industry. The products offered by suppliers are mostly standardized, which reduces the differentiation and switching costs for customers. It is unlikely that suppliers would forward integrate and compete with their customers, such as NVIDIA, who have a strong position in the GPU market.

Buyers' Power – Medium

In this industry, most buyers are retailers who sell NVIDIA's products to final consumers, except some software solutions and products for companies. These buyers have low switching costs and can easily compare prices and features of different GPU brands, making it harder to retain loyal customers. The price of the products is an important factor for the final consumer, however there are unique characteristics and exclusive features that distinguish brands and maintain regular clients.

Original equipment manufacturers (OEMs) in the gaming industry, such as Sony, Microsoft, and Nintendo have greater bargaining power than other buyers, as they purchase large quantities of GPUs for their gaming consoles and have more influence over the pricing and terms of the contracts. NVIDIA has to compete with other GPU suppliers, such as AMD, to win the orders from these buyers, which may result in lower margins and higher risks.

NVIDIA has been able to mitigate some of the negative effects of buyer power by creating products with exclusive characteristics and disruptive solutions, which differentiate it from its competitors and increase its customer loyalty.

Threat of Substitution - Low

The threat of substitute products in this industry is low, as there are no viable alternatives to GPUs in the market. CPUs cannot perform the same tasks as GPUs, making these indispensable. Some potential substitutes for GPUs are field-programmable gate arrays (FPGAs) and application-specific integrated circuits (ASICs), which are specialized chips that can be customized for specific purposes. These chips could offer better performance, but they also have limitations, such as

being harder to program, less flexible, or more expensive to produce. Nevertheless, it's important to acknowledge the possibility of new technologies emerging that could pose a threat to GPUs, especially if they are safeguarded by patents.

To mitigate the risk of substitution, NVIDIA has been developing specialized GPU's that offer enhanced performance in specific applications, like Virtual Reality, gaming, and AI.

Figure 33:

RIVALRY AMONG EXISTING COMPETITORS	
HIGH	
• High fixed costs in semiconductors industry that make companies to operate at full capacity • Increasing popularity of AI drives intensified competition • Main competitors are Intel and AMD	

Source: Authors' Elaboration

Rivalry among existing competitors – High

The semiconductor industry is severely competitive, driven by factors such as the high fixed costs, which makes the companies to operate at full capacity, the pricing and performance of products, and the rapid pace of technological change. NVIDIA faces intense competition from AMD and Intel, particularly in emerging segments. The struggle for market share and the push for technological advancements lead to challenges like inventory management, known as the Osborne effect, where unsold products become harder to sell due to newer, improved versions available in the market.

So, NVIDIA's success hinges on its ability to anticipate client needs and deliver high-quality products at fair prices. The industry's future points to intensified competition, with companies striving to offer better-performing products at lower costs. Potential new alliances and the entry of new players, such as China's efforts to establish a domestic semiconductor industry, could disrupt market dynamics and impact NVIDIA's market share.

Furthermore, the rise of AI has spurred demand for advanced computing and software, positioning NVIDIA as a leader in this space. However, the increasing popularity of AI technologies invites more competitors, like Google, which claims to have developed faster chips. To maintain its leadership, NVIDIA must continue to innovate and enhance its offerings, as failure to adapt could result in significant market share and financial losses.

Conclusion: Although NVIDIA faces intense competition, mainly from Intel and AMD, and handle some macroeconomics downsides, such as the global chip shortage and geopolitical tensions, the company has a strong competitive position in the market. In addition, the semiconductor industry prospects are very positive, and NVIDIA is well-positioned to capitalize on the growing demand for GPUs and AI platforms.

Market Overview and Main Drivers

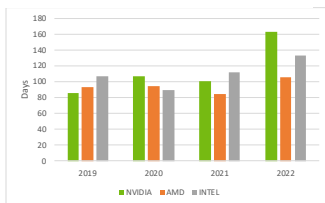
Initially, how NVIDIA has conducted its inflows and outflows across the years, as to ensure a liquid situation in more dire times, will be addressed in this section. Consequently, the distribution between equity and debt has been within the firm (capital structure) and how the most relevant drivers in both sales and costs have impacted the ratio in the past few accounting periods are going to be considered. Furthermore, the relevance of the company's invested capital, stemming from already existent to invested capital related to new opportunities, as well as the return originating from it and from equity itself will be discussed. Moreover, how sales are expected to grow in the future and how value is perceived to be created will be approached¹.

The following figures have also been computed for AMD² and Intel³, two of NVIDIA's biggest competitors, to perform a comparative analysis.

Cash Flow Management

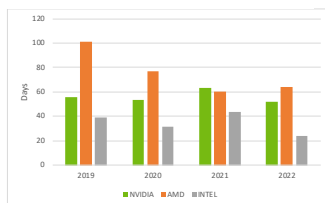
First, an indirect analysis was performed, by combining multiple captions from the firm's financial statements into a few ratios that aid in explaining what the company's cash flow management has been in the last years. Even though there are some limitations to ratio analysis, it still provides a fair diagnosis of the company's financial performance.

Figure 34: NVIDIA and Peers' Average Holding



Source: Authors' Calculations

Figure 35: NVIDIA and Peers' Average Collection



Source: Authors' Calculations

The number of days, on average, that inventories remain in the firm before being sold (Average Holding Period) were studied (Figure 34). During the analysed period (2019 to 2022) this figure has doubled, having gone from 86 days to 162. Looking at their competitors, namely AMD and Intel, they have both increased (from 93 to 106 and from 107 to 133, respectively), but not with the significance registered in NVIDIA's case, thus meaning that the stress on the company's liquidity might be higher, that is, the probability of needing and resorting to external financing is higher, increasing financing costs as well.

Furthermore, the number of days, on average, that it has been taking the company to gather sales from clients (Average Collection Period) has been computed (Figure 35). NVIDIA has observed a reduction of this ratio, although not being a substantial one (from 55 to 52 over the analysed timeframe, recording a high in 2021 with 63 days, in average). Compared with its

¹ Information collected from the 2021, 2022 and 2023 "NVIDIA Corporation Annual Review" Reports (2022 refers to the fiscal year ending in January 2023; the same logic applies in the remaining years).

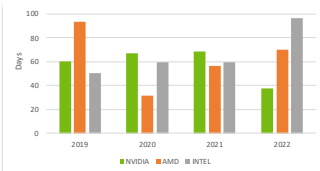
² Information collected from AMD's 2021, 2022 and 2023 Form 10-K.

³ Information collected from Intel's 2021, 2022 and 2023 Form 10-K.

competition, NVIDIA's reduction is less significant: AMD reduced from 101 to 64 (NVIDIA still has a smaller ratio, despite AMD's considerable decrease) and Intel from 39 to 24 (best overall ratio). Having registered this decrease, this ratio describes a better scenario than the first one did.

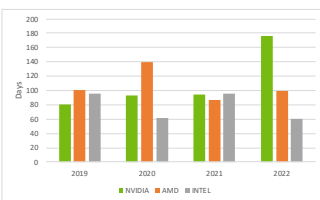
Additionally, a third calculation was addressed: Average Payable Period, that is, on average, the number of days that it has been taking the firm to reimburse its suppliers (Figure 36). NVIDIA has decreased this figure from 60 to 37 over the analysed period, whereas AMD decreased from 93 to 70 and Intel, on the other hand, has observed an increase from 51 to 97. For NVIDIA, this when Average Payable Period is lower, stress on liquidity is higher.

Figure 36: NVIDIA and Peers' Average Payable



Source: Authors' Calculations

Figure 37: NVIDIA and Peers' Cash Conversion



Source: Authors' Calculations

To sum up, Cash Conversion Cycle was quantified from the three previous ratios (Figure 37). Cash Conversion Cycle refers to the number of days that, on average, has been taking the company to carry out its normal trade cycle. NVIDIA has observed an increase from 81 days to 176 in this ratio. Given that it should be as low as attainable, this does not portend a particularly good sign for the firm in what concerns its activity, as risk is not minimized, and liquidity (see ahead) is resorting to external means and thus increasing debt.

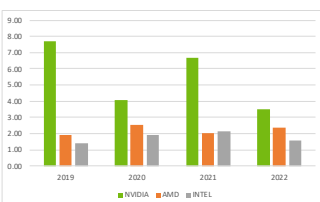
Whereas AMD's Cash Conversion Cycle has remained unaltered during this timeframe, the same cannot be said for Intel, since it has decreased from 95 to 61, describing a better overall trajectory than NVIDIA.

Liquidity

Following what was done regarding Cash Flow Management, an analysis through select ratios was carried out in order to verify NVIDIA's ability to comply with its short-term liabilities, considering the company's current activity scope.

Firstly, the Current Ratio was computed, establishing the firm's ability to cover its short-term liabilities using all of its short-term assets (Figure 38). So, NVIDIA's current assets proportion in terms of current liabilities has decreased substantially, going from 7.67 in 2019 to 3.52 in 2022. AMD and Intel's Current Ratios are considerably smaller than that of NVIDIA's (both never surpass 3 during the aforementioned period for analysis). However, both have increased: AMD's from 1.95 to 2.36 and Intel's from 1.40 to 1.57 (both with some intermittence). NVIDIA's value always is above 1. Therefore, the firm has financial short-term equilibrium, at least. When analysing these years, it could be seen that cash and cash equivalents decreased, thus affecting negatively current assets. On the other hand, for instance, Property and Equipment (Net) described an increase, so perhaps there was a strategic shift to allocate a part of Cash and

Figure 38: NVIDIA and Peers' Current Ratio



Source: Authors' Calculations

Cash Equivalents to these non-current assets, thus decreasing the proportion of current assets relative to current liabilities.

Afterwards, the company's ability to cover its short-term obligations with current assets was addressed, assuming that inventories are unsellable in the short run: Quick Ratio (Figure 39). Concerning this figure, the trend from Current Ratio continued, with NVIDIA's values having decreased (from 7.13 to 2.73), whereas AMD's (from 1.53 to 1.77) and Intel's (from 1.01 to 1.16) increased. Given all the values above, at least, NVIDIA has met the minimum financial short run equilibrium criterium.

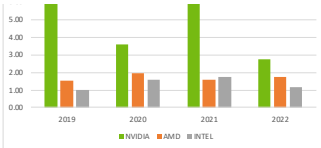
Additionally, the Cash Ratio was computed, that is, the company's capacity to cover its short-term liabilities using only cash and cash equivalents at its disposal (Figure 40). NVIDIA's value has decreased greatly over the observed timeframe, going from 6.11 to 0.52, a particularly low number. Considering its competitors, this figure has increased in both cases. However, the values are low as well (AMD's Cash Ratio increased from 0.62 to 0.76 and Intel's also from 0.19 to 0.35). Regarding NVIDIA, this decrease might be related to a worsening of its liquidity position, taking into account that the first two ratios also decreased, which means that NVIDIA is probably more subject to its capacity to realize current assets in the short run in order to cover its short-term liabilities (higher risk). These liquidity ratios have an ambiguous analysis. Whereas they should be as high as possible, firms also should not have too much money on demand if it is not being used.

Moreover, a fourth figure was calculated: Net Working Capital, which consists of the difference between current assets and current liabilities and represents the quantity of money that the firm requires to function properly and conduct its daily business (Figure 41). NVIDIA's Net Working Capital, with some instability in the middle of this timeframe, has increased between 2019 and 2022. Following the same pattern, AMD and Intel also saw their Net Working Capital increase over the mentioned period. It has already been seen that NVIDIA's stress on liquidity had grown during the activity ratio analysis, beyond the ideal point, which is now verified by its higher Net Working Capital, since it increasingly needs more liquidity, that is, higher current assets when compared to its current liabilities, to run its daily operations.

Capital Structure

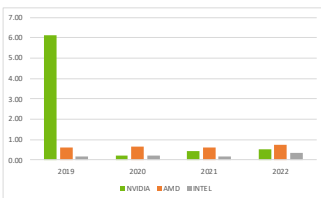
To commence the third ratio analysis of this Equity Research, the Gearing Ratio was studied, which is a measure for Capital Structure (Figure 42). The Gearing Ratio analyses the proportion of Net Debt to Invested Capital, which is the sum of

Figure 39: NVIDIA and Peers' Quick Ratio



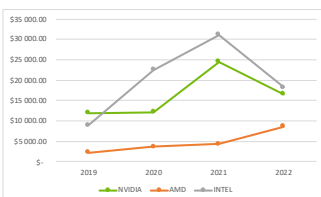
Source: Authors' Calculations

Figure 40: NVIDIA and Peers' Cash Ratio



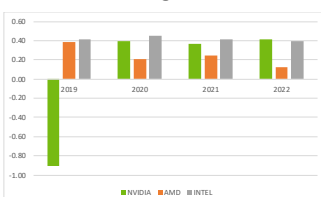
Source: Authors' Calculations

Figure 41: NVIDIA and Peers' Net Working Capital



Source: Authors' Calculations

Figure 42: NVIDIA and Peers' Gearing Ratio



Source: Authors' Calculations

Net Debt and Equity. In NVIDIA's case, the value has increased over the years, which means that the percentage of Net Debt has grown in terms of Invested Capital. The same has not occurred with its competitors since AMD and Intel saw their Stockholders' Equity increase in the same timeframe, for instance.

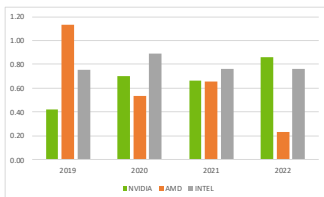
In a similar sense, the Debt-to-Equity ratio was computed, which, as the name states, evaluates the percentage of Debt in terms of Equity (Figure 43). The trend observed in Net Working Capital continued in Debt-to-Equity, with NVIDIA having increased, and AMD decreased. The one outlier is Intel, which remained the same, with some fluctuation in between. Nevertheless, it is noteworthy that all three companies reached the end of 2022 with a Debt-to-Equity ratio inferior to 1, which means that Equity is higher than Net Debt in all instances (not the case in 2019, when AMD had a value of 1.13).

Given that these two ratios have grown over the years for NVIDIA, it means that it is more likely that the company will not be able to meet payment obligations in the near future, as Debt's portion in terms of Equity has risen, so the amount that has to be paid back enlarges proportionally. On the other hand, this shift in capital structure (increase from 0.42 to 0.86 in the Debt-to-Equity ratio) may indicate that the firm uses more debt to increase its savings in taxes (tax shield), which can indeed be seen in NVIDIA's Consolidated Statement of Income, with Interest Expense having increased (in absolute terms) between 2019 and 2022, from 52M\$ to 262 M\$. One explanation can be the physical nature of NVIDIA's assets that may contribute to the obtainment of debt at less expensive terms.

Furthermore, another figure was addressed: the Solvency Ratio, which measures the proportion of the Equity value in terms of Liabilities (Figure 44). This enables an overview of the company's capacity to cover its liabilities with the capital that was invested in it or that it created. NVIDIA's figure has reduced to a little less than half during this period (from 2.39 in 2019 to 1.16 in 2022). Simultaneously, AMD grew to almost five times the initial value (from 0.88 to 4.27 in the mentioned timeframe) and Intel has observed its Solvency Ratio marginally decrease in the observed timeframe (from 1.32 to 1.31).

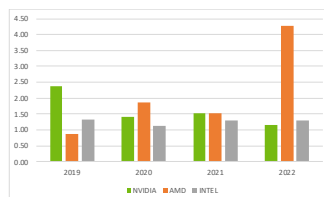
Moreover, a fourth ratio was computed: the Financial Autonomy Ratio, which assesses the firm's freedom from its creditors (Figure 45). NVIDIA's values decreased from 0.70 in 2019 to 0.54 in 2022, whereas AMD's increased, and Intel's remained unaltered (from 0.47 to 0.81 and remained at 0.57 in the observed period, respectively). Thus, NVIDIA's independence has decreased since its assets have lower coverage from its equity.

Figure 43: NVIDIA and Peers' Debt-to-Equity Ratio



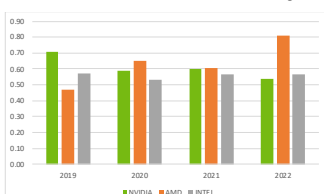
Source: Authors' Calculations

Figure 44: NVIDIA and Peers' Solvency Ratio



Source: Authors' Calculations

Figure 45: NVIDIA and Peers' Financial Autonomy



Source: Authors' Calculations

Reformulation of Financial Statements and Assumptions

In order to begin NVIDIA's valuation, a reorganization of its financial statements was performed, namely its Consolidated Statements of Income and Consolidated Balance Sheets. Both these documents were divided into three segments: Core Operations, Non-Core Operations, and Financial Items.

Considering the firm's Reformulated Consolidated Statements of Income, Core Operations entail captions directly linked with its day-to-day operations, such as Revenue, Cost of Revenue, Research and Development Costs, Sales, General and Administrative Expenses, and Acquisition Termination Cost, as well as Statutory Taxes and Taxes Adjustments. Regarding Non-Core Operations, items that are not believed to be absolutely linked to daily business were included. Finally, a caption that contributes to the company's means of financing in the "Financial" section of the Reformulated Consolidated Statements of Income was set aside, with Interest Expense, for instance.

On the other hand, now looking into NVIDIA's Reformulated Consolidated Balance Sheets, Core Operations encompass items like Operating Cash, Accounts Receivable, Inventories, Prepaid Expenses and Other Current Assets, Property and Equipment, Operating Lease Assets, Goodwill (once it is linked to the company's core value), Intangible Assets, Other Assets, Accounts Payable, Accrued and Other Current Liabilities, Short-Term Debt, and Long-Term Operating Lease Liabilities.

Additionally, "Operating Cash" is one remarkable caption. It is not mentioned in NVIDIA's original financial statements. It is a self-computed caption in this reorganization that derives from the initial caption "Cash and Cash Equivalents", due to the unnecessary amount present in the original item, as only a part of it (part linked with liquidity) should be associated with Core Operations. To that purpose, a rule establishing that Operating Cash should be 5 percent ⁴of the amount of Revenues was designed, with the rest being reallocated into the caption "Excess Cash". Moreover, Non-Core Operations are composed of captions that are auxiliary to the ones addressed above, such as Excess Cash, Marketable Securities, and Deferred Income Tax Assets. To conclude, the financial part of the Reformulated Consolidated Statements included Long-Term Debt, as a means of financing the company.

⁴ Source: Morgan Stanley's Counterpoint Global, October 2022.

Sales' and Costs' Value Drivers

In order to address Sales' and Costs' Value Drivers a line item analysis was performed, which enables an overview of the forces behind the increase or decrease of each caption over time. In both cases revenues were considered the main driver for these items. Being that stated, sales and costs were divided, as well as their driver's influence on them, according to NVIDIA's designated operational segments: Compute & Networking, Graphics, and All Other. It is noteworthy that the "All Other" segment is only relevant in costs because there is not any mention of it along the sales process.

In Sales' Value Drivers (Figure 46), the "Compute & Networking" segment has gained particular importance over the years, having grown from 30.03% of Total Revenues in 2019 to 55.86% in 2022. Contrarily, the "Graphics" segment has had the opposite trajectory: its proportion in terms of Total Revenue has decreased from 69.97% to 44.14% during the mentioned timespan. Due to these evolutions, "Compute & Networking" segment was considered the main driver for Sales and was largely taken into account in the following revenue projections.

Figure 46: Evolution of Sales' Value Drivers in NVIDIA

NVIDIA: EVOLUTION OF SALES' VALUE DRIVERS				
	2020	2021	2022	CAGR
Compute & Networking	108.63%	61.47%	36.41%	66.25%
Graphics	28.73%	61.36%	-24.97%	15.94%

Source: Authors' Calculations

Figure 47: Evolution of Costs' Value Drivers in NVIDIA

NVIDIA: EVOLUTION OF COSTS' VALUE DRIVERS				
	2020	2021	2022	CAGR
Compute & Networking	69.82%	50.20%	54.85%	58.07%
Graphics	19.44%	41.25%	-0.30%	18.93%
All Other	124.23%	16.02%	77.47%	66.51%

Source: Authors' Calculations

Costs' Value Drivers (Figure 47) have described a similar trend over the years, with the "Compute & Networking" segment having increased in terms of Total Revenues (growth from 23.15% in 2019 to 37.02% in 2022) and the "Graphics" segment going in the opposite direction (decrease from 40.04% to 27.26% over the studied period). Moreover, the "All Other" operational segment percentage in terms of Total Revenue has increased from 10.73% to 20.06% in these years.

Additionally, it is important to state that all these segments, be it in sales or costs, have increased in absolute terms across the aforementioned timeframe, with particular highlight for the "Compute & Networking" segment, which had Compound Annual Growth Rates of 66.25% in Sales and 58.07% in Costs.

Invested Capital Value Drivers

As in the case of Sales' and Costs' Value Drivers, a line item analysis for Invested Capital Value Drivers was performed. In most instances revenues were the driver, such as: Operating Cash, Accounts Receivable, Inventories, Prepaid Expenses and Other Current Assets, Operating Lease Assets, and Other Assets, in Core Operations, as well as Marketable Securities, in Non-Core Operations. Furthermore, in Core Operations, "Inventories" were identified as the driver for "Property and Equipment", as an increase of the former is most likely linked to an increase of the latter in a company of this nature. Finally, through the firm's financial statements, it became clear that Research and Development is highly

linked with both Intangible Assets and Deferred Income Tax Assets, so it was considered as the main driver in the two cases.

Subsequently, it is of particular interest that the caption with the highest Compound Annual Growth Rate in Core Operations is “Intangible Assets” (224.61%), thus reinforcing the company’s innovative position in the market.

NVIDIA’s “Graphics” segment is responsible for gaming and PC GPUs (GeForce), GPUs for enterprise graphics (Quadro/NVIDIA RTX), gaming streaming platform (GeForce NOW), among others. Even though this is thought as a promising segment for the firm, the “Compute & Networking” segment is considered a far more interesting business portion for NVIDIA’s future, given that it comprises Data Center platforms for Artificial Intelligence, autonomous driving solutions, robotics platforms, etc, which are all very fast-growing markets with enormous exploration potential, and comprise the firm’s most valuable assets. To this purpose, it is considered that NVIDIA is likely to continue its path of acquisitions, such as Mellanox (in 2020), which belongs currently to the latter segment, so to speed up NVIDIA’s growth compared to its peers.

ROE and ROIC

Return on Equity (ROE) is a measure of how shareholders are duly compensated for each unit of investment taken within the company. NVIDIA’s Return on Equity has increased from 38.03% in 2020 to 59.76% in 2021. However, a much higher decrease followed, with the value going down to 17.85% in 2022. Given that Return on Equity should be as high as attainable (when ROIC is its main driver), this could be a better indicator. When Return on Equity is high, firms have more direct access to raising capital (easier to meet obligations than companies that distribute lower returns to their stockholders, and therefore are more trustworthy in terms of payback), which can help in case liquidity struggle arises. Nevertheless, its peers have also observed a decrease of their Return on Equity, and NVIDIA was only behind AMD in this indicator by a few percentage points in 2022 (AMD’s was 17.37%).

Furthermore, despite the increase in the Debt-to-Equity ratio, it can be seen that the main driver in the evolution of Return on Equity described in the studied period was the similar evolution in Return on Invested Capital (ROIC). As in Return on Equity, Return on Invested Capital was computed with a “lag” assumption, given that it is not expected an immediate yield from investments (assumption of a 1 year lag). Return on Invested Capital has increased from 31.67% in 2020 to 43.35% in 2021 but has taken a higher decrease afterwards to 12.10% in 2022, following the pattern described initially. The biggest difference to

pinpoint here is that in 2022 NVIDIA sat substantially closer to the bottom in the competition panorama in Return on Invested Capital (Intel, which is the firm with the worse ratio of the three, has a ratio of 8.17%, and AMD a ratio of 20.63%, the best out of the three), whereas in Return on Equity NVIDIA is quite close to the top.

It should be noted as a kind remark that Return on Equity and Return on Invested Capital might be subject to differences, depending on the accounting reporting nature of each enterprise, that is, for example, firms growing through acquisitions are allowed to remeasure the assets and liabilities of their target companies (in addition to eventually recording Goodwill) and to capitalize specific costs, whereas others that primarily choose internal growth and development (organic evolution) typically have a “less inflated” Consolidated Balance Sheet.

Value Creation Analysis and Growth Rate of Sales

To evaluate how NVIDIA indeed creates value, the evolution of Return on New Invested Capital (RONIC) was studied. Overall, NVIDIA's Return on New Invested Capital worsened over the considered timespan. Comparatively, AMD's also described a negative trajectory, but the difference was even bigger in percentage points. On the other hand, Intel registered a significant improvement over the analysed timeframe. It is noteworthy that Core Value Creation is distinctly the most significant driver of Value Creation within NVIDIA.

Moreover, two ratios that address the ends of Net Income were computed: Payout Rate and Investment Rate, which sum to 100%, as either Net Income is distributed as dividends to shareholders (Payout Rate) or retained by the firm to drive new investment opportunities (Investment Rate).

Over this period, NVIDIA's Investment Rate reached levels above 85% in almost every instance, which indicates that the firm prefers to reinvest its earnings in interesting business ventures rather than pay shareholders out immediately, which indicates that the shareholders themselves recognize better value in exploring said opportunities through NVIDIA than to gather their fair share of earnings at that point in time.

Furthermore, the growth of sales per operating segment was derived. Across the mentioned timespan, the “Compute & Networking” segment's sales increase in a sustained fashion, even though this growth rate has been slowing down. On the other hand, the “Graphics” segment's sales increase from 2019 to 2020 and grow even more in the following fiscal year, but then decreases considerably from

2021 to 2022, thus revealing that the former is the most accurate and reliable sales driver in what concerns NVIDIA's operational business segments.

Valuation

After reviewing and reformulating the company's financial statements, studying how cash flow is managed, how liquid the firm has been and how capital has been structured in the past few years, what captions indeed drive sales, costs and invested capital and finally the return the firm has been able to achieve in terms of equity and invested capital to create value through new investments (RONIC) and grow sales, NVIDIA's valuation was performed, which will be addressed henceforth, culminating in a final recommendation concerning what position to take regarding said firm's equity. Therefore, in this section core revenues forecast up until 2032 are computed (the end of the previsions, excluding terminal value) and also core costs to derive what core invested capital will be like over the next decade.

Moreover, the cost of capital was computed, which includes mainly capital structure, cost of debt and cost of equity assumptions in order to obtain a realistic and confident figure for the Discounted Cash Flow model, which will be the primary method for this assessment. Afterwards, core value, equity value and terminal value are derived from the previous assumptions and computations and long-term drivers of value are evaluated as to gather a conclusion for the Discounted Cash Flow analysis.

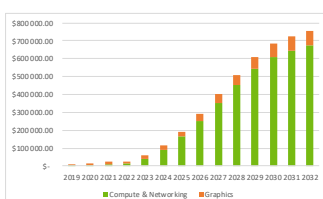
Thereafter, NVIDIA stock's recent past is described to get a fair value basis for comparison, upon which a sensitivity analysis is developed to assess any prospective future outcomes to ultimately support the final advice.

Core Revenues Forecast

Forecasting core revenues is one of the main steps in properly evaluating a company, especially one like NVIDIA. Core revenues hold a very strong importance in the midst of a valuation due to the impact they also impart on various other captions from the financial statements, given that, as it was seen previously, core revenues are the driver for many items in both Consolidated Statements of Income and Consolidated Balance Sheets, and captions were forecasted according to the portion in terms of their respective drivers.

NVIDIA registered enormous core revenues growth (Figure 48) between 2019 and 2020, and 2020 and 2021 (52.73% and 61.40%, respectively). Afterwards, it continued to grow, but with a deceleration between 2021 and 2022, having just

Figure 48: Forecast for NVIDIA's Core Revenues



Source: Authors' Calculations

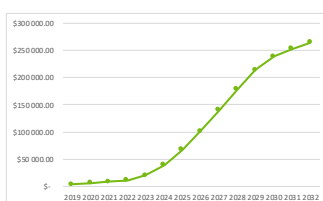
grown 0.22%. Therefore, very good perspectives of growth were considered for the company. So, an expansive position was taken. Core Revenues forecast was performed by segments, as it was assumed that both segments would grow at different rates. As stated previously, the main driver for Core Revenues is the “Compute & Networking” segment. So, a 180% “Compute & Networking” growth rate was assumed for 2023. Afterwards, the growth rate was slowly decreased: 115% for 2024, 80% for 2025, 55% for 2026, and 40% for 2027. Then, the forecasted rise in Core Revenues for the segment slows down even further to 28% in the following year (2028), after which the expansion reduces to a 20% yearly rate in 2029, 12% 2030, and 6% in 2031. Afterwards, the forecasted rate was of 3.5% for 2032 (steady state). Moving on to the “Graphics” segment, a more conservative approach was taken. Starting with a 40% growth rate for the segment in 2023 (given past values of growth within the segment), 2024 registered 35%, and 2025 30%. Then, 2026 and 2027 had a growth rate of 25%, and 2028 and 2029 one of 20%. Finally, 2030 registered a growth rate for the segment of 10%, and 2031 one of 5%, up until 2032, when it is projected to be 3%. These values will yield an overall growth rate for Core Revenues in 2032 of 3.45%.

Moreover, it is worthy of mention that this steady state growth rate was kept at around 3% to be between the historical values for the inflation rate (2-3%) and the historical GDP Growth Rate (4-5%), also to be in accordance with reviewed literature⁵.

Core Costs Forecast

Moving on from core revenues, focus went to how Core Costs were to evolve over the advanced timeframe.

Figure 49: Forecast for NVIDIA's Cost of Revenue



Source: Authors' Calculations

NVIDIA's Cost of Revenue values (Figure 49) were always somewhere between 35% and 45% from 2019 to 2022, so it was considered fitting to select 35% as the Cost of Revenue portion of revenue from 2023 to 2032.

Furthermore, Sales, General and Administrative Costs were forecasted through the simple average of the figures in terms of their driver (Revenue) between 2019 and 2022, thus remaining unaltered through the projected period, being 9.68%, proportionally. Research and Development was put constantly at 20%, so to be a value belonging to the interval of past rates (closer to the lower bound). The “Acquisition Termination Cost” line item, as the name states, is not worth

⁵ Source: Goedhart, M., Koller, T., Wessels, D., “Valuation: Measuring and Managing the Value of Companies”, McKinsey & Company, p. 92.

forecasting since it is a 2023 terminal figure with no future representation nor validity projection-wise.

Core Invested Capital

Having already addressed the main components in the forecasting process of the Consolidated Statements of Income, through the Core Result (Core Revenue minus Core Costs) projection, the Consolidated Balance Sheets were predicted, through the estimate of Core Invested Capital for the period comprised between 2023 and 2032. To that purpose, a 5% proportion in terms of Revenue for Operating Cash was kept. So, it increases at the exact same rate as Revenue throughout this timeframe.

Predictions of Accounts Receivable, Net, and Inventories were based on the simple means of Average Collection Period (52) and Average Holding Period (162) between 2019 and 2022, respectively. Moreover, Prepaid Expenses and Other Current Assets, Operating Lease Assets, and Other Assets were derived from the simple averages of these items' proportion in terms of their respective drivers in the years that have already transpired, remaining steady throughout the course of this projection. "Property and Equipment" has mainly been driven by "Inventories", so the proportion in terms of the driver decreased to 70% in 2023, remained at that level until 2026 when it became 65%, keeping at that level until 2029, when it turned to 60% (steady state). Goodwill was kept constant throughout the forecasted period. On the other hand, the future values of the caption "Intangible Assets, Net" were computed from the last available percentage regarding its driver (from 2022), which is Research and Development. So, this percentage remains unaltered throughout the forecasted period. Moreover, now addressing liability items, Accounts Payable was calculated according to the simple mean of its percentage in terms of Cost of Revenue, its driver. Additionally, Accrued and Other Current Liabilities, Short-Term Debt, Long-Term Operating Lease Liabilities, and Other Long-Term Liabilities follow the same rationale as the first Liability caption, but with another driver. This forecast was designed assuming no structural alterations in these line items.

WACC

WACC, or Weighted Average Cost of Capital, is the rate at which Cash Flows will be discounted further on in this Equity Research paper. The Weighted Average Cost of Capital is, as its name duly states, is the after-tax overall cost of capital, in average. It is used for investors to determine how much they require a

company to perform in order to gather the best possible return, that is, how much return they demand of the firm's investments, being often seen as a "hurdle rate". In this instance, it will be used to predict NVIDIA's Net Present Value (NPV).

Concluding, Weighted Average Cost of Capital is computed by multiplying cost of equity and cost of debt by their respective weights and summing them up. Therefore, the appropriate analysis of NVIDIA's Capital Structure will be done, that is, how much it is financed by equity and debt and also address how much each financing option costs in order to correctly compute WACC, thus guaranteeing a sound and complete examination for prospective investments in NVIDIA (all values were last updated on 18th December 2023).

▪ Cost of Equity

Figure 50: Regression of 5Y Daily Returns with S&P500

OLS Regression Results

Dep. Variable:	NVIDIA	R-squared:	0.507			
Model:	OLS	Adj. R-squared:	0.506			
Method:	Least Squares	F-statistic:	1288.			
Date:	Mon, 18 Dec 2023	Prob (F-statistic):	1.06e-194			
Time:	17:09:18	Log-Likelihood:	2960.0			
No. Observations:	1257	AIC:	-5916.			
Df Residuals:	1255	BIC:	-5906.			
Df Model:	1					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	0.0016	0.001	2.460	0.014	0.000	0.003
S&P 500	1.7182	0.048	35.891	0.000	1.624	1.812
Omnibus:	375.972	Durbin-Watson:	2.056			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	5001.124			
Skew:	0.999	Prob(JB):	0.00			
Kurtosis:	12.565	Cond. No.	73.8			

Source: Authors' Calculations

The first topic that was addressed within Weighted Average Cost of Capital computations was Cost of Equity, which was a relatively straightforward calculus exercise. Initially, the correct Market Risk Premium was searched, which is the rate of return when an investment as a certain degree of uncertainty involved (all that is not associated with the risk-free rate).

5% was the most accurate and updated value found for the Market Risk Premium, based on reviewed literature⁶. The Risk-Free Rate was obtained from a 10-Year Treasury Bond⁷, at valuation, originating the value of 3.95%. Finally, a regression of NVIDIA's past five years' daily returns with those of S&P500 was performed, using Python, giving an Equity Beta value of 1.7182 (Figure 50). By multiplying the above Beta with the mentioned Market Risk Premium, and then summing up the Risk-Free Rate, a Cost of Equity of 12.55% was obtained.

▪ Cost of Debt

After Cost of Equity was duly computed, a Cost of Debt analysis followed. It is noteworthy that NVIDIA has S&P Credit Rating of A⁸. Regarding Yield-to-Maturity, which is the return rate bond investors can expect if the investment is to be carried out until term/maturity, it was obtained through a Corporate Bond from NVIDIA (maturity in 2031)⁹, and Yield-to-Maturity is 4.35%.

Furthermore, NVIDIA's probability of default, that is, how likely the borrower is to fail a certain debt payment, was established at 0.75%, due to its "A" Credit Rating, according to reviewed literature. Additionally, the company's recovery

⁶ Source: Goedhart, M., Koller, T., Wessels, D., "Valuation: Measuring and Managing the Value of Companies", McKinsey & Company, p. 237.

⁷ Source: Retrieved on 18th December 2023, from: <https://finance.yahoo.com/quote/%5ETNX?p=%5ETNX>

⁸ Source: S&P Global Ratings Credit Research.

⁹ Source: Retrieved on 18th December 2023, from: <https://markets.businessinsider.com/bonds/finder?borrower=111142>

rate (estimated level of payback in case of default or bankruptcy) was put at 40%, due to the level of probability of default previously described.¹⁰ With all this data, it was possible to compute the Pre-Tax Cost of Debt (subtracting the multiplication of the probability of default by one minus the recovery rate from the yield-to-maturity), which is 3.90%. Then, excluding the portion related to marginal tax (21%), a final Cost of Debt of 3.08% was gathered.

▪ Capital Structure

Having concluded all computations concerning Cost of Equity and Cost of Debt, NVIDIA's Capital Structure assessment was performed, which entailed uncovering how much of the firm's financing is obtained through Debt and Equity (sum must be equal to 100%). The firm's Market Capitalization corresponds to NVIDIA's shares outstanding times the market value of stock, whereas the Market Value of Debt refers to the market value of NVIDIA's Corporate Bonds.

Furthermore, using equity and debts' weights in terms of firm value and Cost of Debt and Equity, it was possible to get the final figure for Weighted Average Cost of Capital, which is 12.46%, per the obtained results.

DCF Analysis

Moving on from the Weighted Average Cost of Capital, a Discounted Cash Flow analysis was performed. A Discounted Cash Flow analysis assumes that all future cash flows discounted with the investor required rate of return is the method to value a firm (NVIDIA, in this case).

Its forward-looking nature enables a less limited application of forecasting, and its focus on cash flows rather than earning allows for a better metric in terms of value creation, as a higher Return on Invested Capital is not necessarily present in earnings. To accomplish this, every yearly change in Core Invested Capital was subtracted from the yearly Core Result in order to obtain the values for the Free Cash Flows. Only then was it possible to discount every Free Cash Flow by the previously computed Weighted Average Cost of Capital of 12.46%, generating the figures for the Discounted Free Cash Flows from 2025 on.

Afterwards, when all Free Cash Flows are appropriately discounted, the Terminal Value can be computed, which assumes a going-concern perspective in forecasting situations (in this case, perpetuity). Once computed, its present value should be uncovered, thus obtaining the Core Value. Moreover, the sum of this Core Value with the Non-Core Value, which was previously gathered when

¹⁰ Common industry benchmark for the level of probability of default.

forecasting Financial Statements, gives us NVIDIA's Enterprise Value, leading to an Equity Value prediction for the firm. To conclude, an estimated price of 560.82\$ was reached for the firm's stock.

Long-Term Value Drivers

As previously done with the original items from the Financial Statements, an examination of what the value drivers were took place, particularly for the long run. Core Business grew almost annually throughout the analysed period, except for 2022, when it decreased significantly. However, it registered a tendency to stabilize from 2025 onwards. Considering total business, NVIDIA, was strongly influenced by its core operations, with the trend defined by the latter directly impacting total growth.

Market Value of Stock

NVIDIA has registered a wildly aggressive, unprecedented growth in its stock value over the last months. On the 18th December 2023, the chosen date for the last update, the stock closed at 500.77\$¹¹. This topic will be readdressed further on when a final recommendation to investors is given.

Sensitivity Analysis

Figure 51: Sensitivity Analysis of WACC with Growth Rate in Perpetuity

		Growth Rate in Perpetuity (g)					
		\$560.82	2.34%	2.84%	3.34%	3.84%	4.34%
WACC	11.46%	\$593.29	\$617.38	\$644.43	\$675.03	\$709.93	
	11.96%	\$555.86	\$576.78	\$600.12	\$626.34	\$655.99	
	12.46%	\$522.27	\$540.54	\$560.82	\$583.44	\$608.85	
	12.96%	\$491.98	\$508.02	\$525.73	\$545.39	\$567.32	
	13.46%	\$464.53	\$478.68	\$494.24	\$511.41	\$530.47	

Source: Authors' Calculations

A sensitivity analysis aims to provide and quantify the changes in output if something were to happen or impact one of its drivers. In this particular instance, a sensitivity analysis of the Discounted Cash Flow analysis was performed, through prospective variations in Weighted Average Cost of Capital and the Growth Rate in Perpetuity and their impact on the Terminal Value of the firm.

It was concluded that when the Growth Rate in Perpetuity increases, the Terminal Value follows the trend set by the former (Figure 51). However, when the Weighted Average Cost of Capital grows the opposite movement occurs in the Terminal Value, as it decreases. This were expected events, given the way Terminal Value was formalized. Nevertheless, it is noteworthy that, when both increase simultaneously by the same percentage points, Terminal Value tends to decrease steadily, which means that Weighted Average Cost of Capital indeed holds more significance and can impact more severely Terminal Value than the Growth Rate in Perpetuity.

¹¹ Source: Retrieved on 18th December 2023, from: <https://finance.yahoo.com/quote/NVDA?p=NVDA>

Multiples Valuation

Figure 52: NVIDIA and Comparables Multiples

Comparables	EV/Revenue	EV/EBITDA	P/E
NVIDIA Corporation	27.57x	54.24x	65.98x
QUALCOMM Incorporated	15.46x	26.94x	34.25x
Intel Corporation	4.10x	26.04x	-117.15x
Advanced Micro Devices, Inc.	10.12x	54.32x	1262.73x
Texas Instruments Incorporated	8.52x	16.22x	21.71x

High	15.46x	54.32x	1262.73x
Average	9.55x	30.88x	300.38x
Median	9.32x	26.49x	27.98x
Low	4.10x	16.22x	-117.15x

Source: Authors' Calculations

To better understand how NVIDIA's fair price relate to peers, it was conducted a multiples valuation approach (Figure 52).

Firstly, it was selected suitable comparable companies, based on its geographical exposure, market segments, business model, market capitalization, and correlation with NVIDIA. The considered peers for valuation were Qualcomm, Intel, AMD, and Texas Instruments.

When deciding the most appropriate multiples to use, it was chosen the Enterprise Value to Revenues ratio (EV/Revenues), Enterprise Value to EBITDA (EV/EBITDA), and Price to Earnings ratio (P/E). These three multiples were computed using the median of peers multiples, as it reduces the impact of extreme values (outliers) in the data, providing a more balanced and representative valuation.

The EV to Revenues ratio of NVIDIA is 27.57x, which is very high related to all its peers. This multiple implies a share price of \$169.35, that is 66% below the current share price (Figure 53).

Regarding the EV to EBITDA multiple, the implied price per share is \$481.24, suggesting that Nvidia is overvalued by 4% comparing to its peers.

Based on P/E ratio, NVIDIA's target price is \$212.39, a value that is 58% below its current price per share. The company has a P/E multiple of 65.98x, while its peers median is 27.98x.

All the multiples computed suggest that NVIDIA is trading at a premium compared to its peers. However, it is important to note that this valuation approach is limited and has some flaws, such as the fact that it relies on historical financial data, that not fully predict the company's future performance. Moreover, the comparable companies do not reflect all NVIDIA's characteristics and potential.

So, we conclude that the DCF is a more reliable model to determine NVIDIA target share price, although this relative valuation helps to perceive how the company's value compares to its peers.

Final Recommendation

Considering all available data, both of NVIDIA and its peers, AMD, and Intel, a BUY position for NVIDIA is recommended.

Given all inquiries, computations and analysis performed throughout this equity research, it was concluded that NVIDIA's projections are above the prices over

Figure 53: Implied Price from Multiples Valuation

NVIDIA	EV/Revenue	EV/EBITDA	P/E
Implied EV (in billion \$)	418.29	1188.67	524.59
Shares Outstanding (in billions)	2.47	2.47	2.47
Implied Price per Share	\$169.35	\$481.24	\$212.39
Difference to Current Price	-66%	-4%	-58%

Source: Authors' Calculations

the last weeks, in average. Furthermore, the estimated price for NVIDIA's stock, which was 560.82\$ surpasses that of 18th December 2023, at close, which was 500.77\$.

Being that it is a sector with a tremendous potential for innovative products and great estimated evolution in revenue over the coming decade, this is the right time to be at the forefront as an investor. Among its peers, NVIDIA is the one that stands out due to the synergies that can be created between segments, as its GPUs can complement the Artificial Intelligence assets pertaining to the company and even to others, as the AI Boom will last, with OpenAI, Google and Microsoft as important players in the market.

Appendix

Financial Statements

NVIDIA: REFORMULATED CONSOLIDATED STATEMENTS OF INCOME				
	Year Ended			
	January 26, 2020	January 31, 2021	January 30, 2022	January 29, 2023
<i>in millions \$, except per share data</i>				
Core Operations:				
Revenue:	\$ 10 918.00	\$ 16 675.00	\$ 26 914.00	\$ 26 974.00
Compute & Networking	\$ 3 279.00	\$ 6 841.00	\$ 11 046.00	\$ 15 068.00
Graphics	\$ 7 639.00	\$ 9 834.00	\$ 15 868.00	\$ 11 906.00
Cost of Revenue	\$ 4 150.00	\$ 6 279.00	\$ 9 439.00	\$ 11 618.00
Gross Profit	\$ 6 768.00	\$ 10 396.00	\$ 17 475.00	\$ 15 356.00
<i>Gross Margin</i>	<i>62%</i>	<i>62%</i>	<i>65%</i>	<i>57%</i>
Research and Development	\$ 2 829.00	\$ 3 924.00	\$ 5 268.00	\$ 7 339.00
Sales, General and Administrative	\$ 1 093.00	\$ 1 940.00	\$ 2 166.00	\$ 2 440.00
Acquisition Termination Cost	\$ -	\$ -	\$ -	\$ 1 353.00
Core Result before Taxes	\$ 2 846.00	\$ 4 532.00	\$ 10 041.00	\$ 4 224.00
Statutory Taxes	\$ 597.66	\$ 951.72	\$ 2 108.61	\$ 887.04
Taxes adjustments	\$ -450.00	\$ -849.00	\$ -1 135.00	\$ -326.00
Core Result	\$ 2 698.34	\$ 4 429.28	\$ 9 067.39	\$ 3 662.96
Non-Core Operations:				
Other, Net	\$ -2.00	\$ 4.00	\$ 107.00	\$ -48.00
Interest Income	\$ 178.00	\$ 57.00	\$ 29.00	\$ 267.00
Non-core Result before taxes	\$ 176.00	\$ 61.00	\$ 136.00	\$ 219.00
Statutory Taxes	\$ 36.96	\$ 12.81	\$ 28.56	\$ 45.99
Taxes Adjustments	\$ -	\$ -	\$ -764.00	\$ -739.00
Other Comprehensive Income (Loss), Net of Tax	\$ 13.00	\$ 18.00	\$ -30.00	\$ -32.00
Non-Core Result	\$ 152.04	\$ 66.19	\$ 841.44	\$ 880.01
Financial:				
Interest Expense	\$ -52.00	\$ -184.00	\$ -236.00	\$ -262.00
Financial Result before Taxes	\$ -52.00	\$ -184.00	\$ -236.00	\$ -262.00
Statutory Taxes	\$ 10.92	\$ 38.64	\$ 49.56	\$ 55.02
Financial Result	\$ -41.08	\$ -145.36	\$ -186.44	\$ -206.98
Total Comprehensive Income	\$ 2 809	\$ 4 350	\$ 9 722	\$ 4 336
CHECK	TRUE	TRUE	TRUE	TRUE

NVIDIA: REFORMULATED CONSOLIDATED BALANCE SHEETS				
	Year Ended			
	January 26, 2020	January 31, 2021	January 30, 2022	January 29, 2023
<i>in millions \$, except par value</i>				
Core Operations:				
Operating Cash	\$ 545.90	\$ 833.75	\$ 1 345.70	\$ 1 348.70
Accounts Receivable, Net	\$ 1 657.00	\$ 2 429.00	\$ 4 650.00	\$ 3 827.00
Inventories	\$ 979.00	\$ 1 826.00	\$ 2 605.00	\$ 5 159.00
Prepaid Expenses and Other Current Assets	\$ 157.00	\$ 239.00	\$ 366.00	\$ 791.00
Total Current Assets	\$ 3 338.90	\$ 5 327.75	\$ 8 966.70	\$ 11 125.70
Property and Equipment, Net	\$ 1 674.00	\$ 2 149.00	\$ 2 778.00	\$ 3 807.00
Operating Lease Assets	\$ 618.00	\$ 707.00	\$ 829.00	\$ 1 038.00
Goodwill	\$ 618.00	\$ 4 193.00	\$ 4 349.00	\$ 4 372.00
Intangible Assets, Net	\$ 49.00	\$ 2 737.00	\$ 2 339.00	\$ 1 676.00
Other Assets	\$ 118.00	\$ 2 144.00	\$ 3 841.00	\$ 3 820.00
Total Assets	\$ 6 415.90	\$ 17 257.75	\$ 23 102.70	\$ 25 838.70
Accounts Payable	\$ 687.00	\$ 1 149.00	\$ 1 783.00	\$ 1 193.00
Accrued and Other Current Liabilities	\$ 1 097.00	\$ 1 777.00	\$ 2 552.00	\$ 4 120.00
Short-Term Debt	\$ -	\$ 999.00	\$ -	\$ 1 250.00
Total Current Liabilities	\$ 1 784.00	\$ 3 925.00	\$ 4 335.00	\$ 6 563.00
Long-Term Operating Lease Liabilities	\$ 561.00	\$ 634.00	\$ 741.00	\$ 902.00
Other Long-Term Liabilities	\$ 775.00	\$ 1 375.00	\$ 1 553.00	\$ 1 913.00
Total Liabilities	\$ 3 120.00	\$ 5 934.00	\$ 6 629.00	\$ 9 378.00
Invested Capital Core Business	\$ 3 295.90	\$ 11 323.75	\$ 16 473.70	\$ 16 460.70
Non-Core Operations:				
Excess Cash	\$ 10 350.10	\$ 13.25	\$ 644.30	\$ 2 040.30
Marketable Securities	\$ 1.00	\$ 10 714.00	\$ 19 218.00	\$ 9 907.00
Deferred Income Tax Assets	\$ 548.00	\$ 806.00	\$ 1 222.00	\$ 3 396.00
Invested Capital Non-Core Business	\$ 10 899.10	\$ 11 533.25	\$ 21 084.30	\$ 15 343.30
Financial:				
Long-Term Debt	\$ 1 991.00	\$ 5 964.00	\$ 10 946.00	\$ 9 703.00
Net Financial Result	\$ 1 991.00	\$ 5 964.00	\$ 10 946.00	\$ 9 703.00
Total Equity	\$ 12 204.00	\$ 16 893.00	\$ 26 612.00	\$ 22 101.00
CHECK	TRUE	TRUE	TRUE	TRUE

NVIDIA: FORECASTED REFORMULATED CONSOLIDATED STATEMENTS OF INCOME															
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Core Result															
Revenue		\$ 10 918	\$ 16 675	\$ 26 914	\$ 26 974	\$ 58 858.80	\$ 113 211.70	\$ 192 529.89	\$ 289 645.42	\$ 400 018.64	\$ 508 367.23	\$ 610 040.67	\$ 681 929.17	\$ 722 120.90	\$ 753 476.02
Compute & Networking	(Growth Rate)		52.73%	61.40%	0.22%	118.21%	92.34%	70.06%	50.44%	38.11%	27.09%	20.00%	11.78%	5.89%	4.34%
Graphics	(Growth Rate)		108.63%	61.47%	36.41%	180%	115%	80%	55%	40%	28%	20%	12%	6%	4.5%
	(Growth Rate)		7639.00	9834.00	15868.00	111906.00	166658.00	225032.40	35566.30	45707.88	56819.45	65819.34	76121.68	76021.34	78401.98
			28.73%	61.36%	-24.97%	40%	35%	30%	25%	25%	20%	20%	10%	5%	3%
Cost of Revenue	(% Revenue)		\$ 4 150	\$ 6 279	\$ 9 439	\$ 11 618	\$ 20 600.58	\$ 39 624.10	\$ 67 385.46	\$ 101 375.90	\$ 140 006.52	\$ 177 928.53	\$ 213 514.24	\$ 238 675.21	\$ 263 716.61
			38.01%	37.66%	35.07%	43.07%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%	35.00%
Gross Profit	Gross Margin		\$ 6 768	\$ 10 396	\$ 17 475	\$ 15 356	\$ 38 258.22	\$ 73 587.61	\$ 125 144.43	\$ 188 269.52	\$ 260 012.11	\$ 330 438.70	\$ 396 526.44	\$ 443 253.96	\$ 469 738.59
			62%	62%	65%	57%	65%	65%	65%	65%	65%	65%	65%	65%	65%
Research and Development	(% Revenue)		\$ 2 829	\$ 3 924	\$ 5 268	\$ 7 339	\$ 11 771.76	\$ 22 642.34	\$ 38 505.98	\$ 57 929.08	\$ 80 003.73	\$ 101 673.45	\$ 122 008.13	\$ 136 385.83	\$ 144 424.18
			25.91%	23.53%	19.57%	27.21%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
Sales, General and Administrative	(% Revenue)		\$ 1 093	\$ 1 940	\$ 2 166	\$ 2 440	\$ 7 700.29	\$ 10 964.21	\$ 18 645.93	\$ 28 051.27	\$ 38 740.58	\$ 49 233.81	\$ 59 080.58	\$ 66 042.76	\$ 69 935.20
			10.01%	11.63%	8.05%	9.05%	9.68%	9.68%	9.68%	9.68%	9.68%	9.68%	9.68%	9.68%	9.68%
Acquisition Termination Cost	(% Revenue)		\$ -	\$ -	\$ -	\$ 1 353.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
			0.00%	0.00%	0.00%	5.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total Operating Expenses			\$ 3 922	\$ 5 864	\$ 7 434	\$ 11 132	\$ 17 472.05	\$ 33 606.55	\$ 57 151.91	\$ 85 980.36	\$ 118 744.31	\$ 150 907.26	\$ 181 088.71	\$ 202 428.59	\$ 214 359.38
Core Result before Taxes			\$ 2 846	\$ 4 532	\$ 10 041	\$ 4 224	\$ 20 786.17	\$ 39 981.06	\$ 67 992.52	\$ 102 289.16	\$ 141 267.80	\$ 179 531.44	\$ 215 437.73	\$ 240 825.37	\$ 255 019.20
Statutory Taxes	(Tax Rate)		\$ 597.66	\$ 951.72	\$ 2 108.61	\$ 887.04	\$ 4 365.09	\$ 8 396.02	\$ 14 278.43	\$ 21 480.72	\$ 29 666.24	\$ 37 701.60	\$ 45 241.92	\$ 50 573.33	\$ 53 554.03
			21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%
Taxes Adjustments			\$ -450	\$ -849	\$ -1 135	\$ -326	\$ -690	\$ -750	\$ -725	\$ -622	\$ -697	\$ -686	\$ -676	\$ -689	\$ -687
Total Core Result			\$ 2 698.34	\$ 4 429.28	\$ 9 067.39	\$ 3 662.96	\$ 17 111.07	\$ 32 335.04	\$ 54 439.34	\$ 81 431.25	\$ 112 298.58	\$ 142 528.61	\$ 170 881.77	\$ 190 928.18	\$ 202 154.64
Non-Core Result															
Other, Net			\$ -2.00	\$ 4.00	\$ 107.00	\$ -48.00	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25	\$ 15.25
Interest Income			\$ 178.00	\$ 57.00	\$ 29.00	\$ 267.00	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15	\$ 112.15
	(% of Marketable Securities)		17800%	1%	0%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Non-Core Result before Income Taxes			\$ 176.00	\$ 61.00	\$ 136.00	\$ 219.00	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40	\$ 127.40
Non-Core Result Tax Expense	(Tax Rate)		\$ 36.96	\$ 12.81	\$ -735.44	\$ -693.01	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64	\$ -259.64
			21.00%	21.00%	-540.76%	-316.44%	-203.80%	-203.80%	-203.80%	-203.80%	-203.80%	-203.80%	-203.80%	-203.80%	-203.80%
Other Comprehensive Income (Loss), Net of Tax			\$ 13.00	\$ 18.00	\$ -30.00	\$ -32.00	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75	\$ -7.75
Total Non-Core Result			\$ 152.04	\$ 66.19	\$ 841.44	\$ 880.01	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29
Financial Result															
Interest Expense	(% Financial Debt)		\$ -52.00	\$ -184.00	\$ -236.00	\$ -262.00	\$ -45.23	\$ -84.09	\$ -145.47	\$ -217.00	\$ -300.97	\$ -381.68	\$ -458.51	\$ -512.27	\$ -542.60
			-2.61%	-3.09%	-2.16%	-2.70%	-2.89%	-2.80%	-2.84%	-2.82%	-2.83%	-2.83%	-2.83%	-2.83%	-2.83%
Financial Result before Income Tax			\$ -52.00	\$ -184.00	\$ -236.00	\$ -262.00	\$ -45.23	\$ -84.09	\$ -145.47	\$ -217.00	\$ -300.97	\$ -381.68	\$ -458.51	\$ -512.27	\$ -542.60
Financial Result Tax Expense	(Tax Rate)		\$ -10.92	\$ -38.64	\$ -49.56	\$ -55.02	\$ -9.50	\$ -17.66	\$ -30.55	\$ -45.57	\$ -63.20	\$ -80.15	\$ -96.29	\$ -107.58	\$ -118.88
			21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%
Total Financial Result			\$ -41.08	\$ -145.36	\$ -186.44	\$ -206.98	\$ -35.73	\$ -66.44	\$ -114.92	\$ -171.43	\$ -237.77	\$ -301.53	\$ -362.22	\$ -404.69	\$ -428.66
Total Comprehensive Income			\$ 2 809.30	\$ 4 350.11	\$ 9 722.39	\$ 4 335.99	\$ 17 454.63	\$ 32 647.89	\$ 54 703.71	\$ 81 639.11	\$ 112 440.10	\$ 142 606.37	\$ 170 898.84	\$ 190 902.78	\$ 202 105.28
			\$ 2 809.30	\$ 4 350.11	\$ 9 722.39	\$ 4 335.99	\$ 17 454.63	\$ 32 647.89	\$ 54 703.71	\$ 81 639.11	\$ 112 440.10	\$ 142 606.37	\$ 170 898.84	\$ 190 902.78	\$ 202 105.28
NVIDIA: FORECASTED REFORMULATED CONSOLIDATED BALANCE SHEETS															
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Core Business															
Operating Cash	(% Revenue)		\$ 545.90	\$ 833.75	\$ 1 345.70	\$ 1 348.70	\$ 2 942.94	\$ 5 660.59	\$ 9 626.49	\$ 14 482.27	\$ 20 000.93	\$ 25 418.36	\$ 30 502.03	\$ 34 096.46	\$ 37 673.80
			5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Accounts Receivable, Net	Average Collection Period		\$ 1 657.00	\$ 2 429.00	\$ 4 650.00	\$ 3 827.00	\$ 8 350.73	\$ 16 062.18	\$ 27 315.63	\$ 41 094.13	\$ 56 753.59	\$ 72 125.80	\$ 86 550.96	\$ 96 750.31	\$ 106 901.19
			55	53	63	52	52	52	52	52	52	52	52	52	52
Inventories	Average Holding Period		\$ 979.00	\$ 1 826.00	\$ 2 605.00	\$ 5 159.00	\$ 9 147.74	\$ 17 595.17	\$ 29 922.67	\$ 45 016.20	\$ 62 170.22	\$ 79 009.58	\$ 94 811.49	\$ 105 984.28	\$ 117 103.98
			86	106	101	162	162	162	162	162	162	162	162	162	162
Prepaid Expenses and Other Current Assets	(% Revenue)		\$ 157.00	\$ 239.00	\$ 366.00	\$ 791.00	\$ 1 054.10	\$ 2 027.51	\$ 3 448.03	\$ 5 187.27	\$ 7 163.95	\$ 9 104.37	\$ 10 925.24	\$ 12 932.49	\$ 13 494.03
			1.44%	1.43%	1.36%	2.93%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%	1.79%
Total Current Assets			\$ 3 338.90	\$ 5 327.75	\$ 8 966.70	\$ 11 125.70	\$ 21 495.51	\$ 41 345.45	\$ 70 312.82	\$ 105 779.87	\$ 146 088.69	\$ 185 658.11	\$ 222 789.73	\$ 249 043.75	\$ 275 173.00
Property and Equipment, Net	(% Inventories)		\$ 1 674.00	\$ 2 149.00	\$ 2 778.00	\$ 3 807.00	\$ 6 403.41	\$ 12 316.62	\$ 20 945.87	\$ 29 260.53	\$ 40 410.65	\$ 51 356.23	\$ 56 886.90	\$ 63 590.57	\$ 70 262.39
			170.95%	117.69%	106.64%	73.79%	70.00%	70.00%	70.00%	65.00%	65.00%	65.00%	60.00%	60.00%	60.00%
Operating Lease Assets	(% Revenue)		\$ 618.00	\$ 707.00	\$ 829.00	\$ 1 038.00	\$ 2 476.28	\$ 4 762.98	\$ 8 100.02	\$ 12 185.81	\$ 16 829.37	\$ 21 387.76	\$ 25 665.31	\$ 28 689.76	\$ 31 699.85
			5.66%	4.24%	3.08%	3.85%	4.21%	4.21%	4.21%	4.21%	4.21%	4.21%	4.21%	4.21%	4.21%
Goodwill	(% of Intangible Assets)		\$ 618.00	\$ 4 193.00	\$ 4 349.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00	\$ 4 372.00
			1261.22%	153.20%	185.93%	260.86%	162.63%	84.55%	49.72%	33.05%	23.93%	18.83%	15.69%	14.04%	13.26%
Intangible Assets, Net	(% Research and Development)		\$ 49.00	\$ 2 737.00	\$ 2 339.00	\$ 1 676.00	\$ 2 688.30	\$ 5 170.81	\$ 8 793.57	\$ 13 229.21	\$ 18 270.37	\$ 23 219.06	\$ 27 862.87	\$ 31 146.29	\$ 32 982.00
			1.73%	69.75%	44.40%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%
Other Assets	(% Revenue)		\$ 118.00	\$ 2 144.00	\$ 3 841.00	\$ 3 820.00	\$ 8 200.00	\$ 11 992.38	\$ 20 394.46	\$ 30 681.79	\$ 42 373.50	\$ 53 850.73	\$ 64 620.88	\$ 72 235.94	\$ 79 814.82
			1.08%	12.86%	14.27%	14.16%	10.59%	10.59%	10.59%	10.59%	10.59%	10.59%	10.59%	10.59%	10.59%
Total Assets			\$ 6 415.90	\$ 17 257.75	\$ 23 102.70	\$ 25 838.70	\$ 41 255.51	\$ 79 960.24	\$ 132 918.74	\$ 195 509.21	\$ 268 344.58	\$ 339 843.89	\$ 402 197.69	\$ 449 078.32	\$ 495 736.16
Accounts Payable	(% Cost of Revenue)		\$ 687.00	\$ 1 149.00	\$ 1 783.00	\$ 1 193.00	\$ 3 296.69	\$ 6 341.00	\$ 10 783.62	\$ 16 223.08	\$ 22 405.09	\$ 28 473.71	\$ 34 168.45	\$ 38 194.94	\$ 40 446.08
			16.55%	18.30%	18.89%	10.27%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%
Accrued and Other Current Liabilities	(% Revenue)		\$ 1 097.00	\$ 1 777.00	\$ 2 552.00	\$ 4 120.00	\$ 6 689.35	\$							

NVIDIA: FORECASTED FREE CASH FLOW MAP														
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Core Business														
Core Result	\$ 2 698.34	\$ 4 429.28	\$ 9 067.39	\$ 3 662.96	\$ 17 111.07	\$ 32 335.04	\$ 54 439.34	\$ 81 431.25	\$ 112 298.58	\$ 142 528.61	\$ 170 881.77	\$ 190 928.18	\$ 202 154.64	\$ 210 900.55
Depreciation and Amortization	\$ 381.00	\$ 1 098.00	\$ 1 174.00	\$ 1 544.00	\$ 1 613.10	\$ 3 763.41	\$ 5 821.22	\$ 7 734.13	\$ 10 774.74	\$ 14 131.76	\$ 16 420.12	\$ 19 204.94	\$ 21 402.21	\$ 23 370.36
Gross Free Cash Flow	\$ 3 079.34	\$ 5 527.28	\$ 10 241.39	\$ 5 206.96	\$ 18 724.17	\$ 36 098.44	\$ 60 260.56	\$ 89 165.39	\$ 123 073.32	\$ 156 660.37	\$ 187 301.88	\$ 210 133.12	\$ 223 556.86	\$ 234 270.91
Capex	\$ 1 573.00	\$ 1 803.00	\$ 2 573.00	\$ 4 209.52	\$ 9 676.61	\$ 14 450.47	\$ 16 048.80	\$ 21 924.85	\$ 25 077.34	\$ 21 950.79	\$ 25 908.62	\$ 25 150.13	\$ 26 294.26	\$ 26 294.26
Change in NWC	\$ 846.85	\$ 2 229.95	\$ 1 181.00	\$ 5 696.77	\$ 10 628.37	\$ 15 510.18	\$ 18 990.34	\$ 21 582.80	\$ 21 186.89	\$ 19 881.61	\$ 14 057.35	\$ 7 859.24	\$ 6 131.30	\$ 6 131.30
Changes in Intangible Assets	\$ 2 688.00	\$ -398.00	\$ -663.00	\$ 1 012.30	\$ 2 482.50	\$ 3 622.76	\$ 4 435.63	\$ 5 041.16	\$ 4 948.69	\$ 4 643.81	\$ 3 283.42	\$ 1 835.71	\$ 1 432.11	\$ 1 432.11
Change in Operating Lease Assets	\$ 89.00	\$ 122.00	\$ 209.00	\$ 1 438.28	\$ 2 286.71	\$ 3 337.03	\$ 4 085.79	\$ 4 643.56	\$ 4 558.38	\$ 4 277.55	\$ 3 024.45	\$ 1 690.93	\$ 1 319.16	\$ 1 319.16
Change in Goodwill	\$ 3 575.00	\$ 156.00	\$ 23.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Change in Other Assets	\$ 2 026.00	\$ 1 697.00	\$ -21.00	\$ -	\$ 8 172.38	\$ 8 402.08	\$ 10 287.33	\$ 11 691.70	\$ 11 477.24	\$ 10 770.15	\$ 7 615.06	\$ 4 257.46	\$ 3 321.41	\$ 3 321.41
Change in Long-Term Operating Lease Liabilities	\$ 73.00	\$ 107.00	\$ 161.00	\$ 1 310.73	\$ 2 043.34	\$ 2 981.88	\$ 3 650.96	\$ 4 149.36	\$ 4 073.25	\$ 3 822.31	\$ 2 702.57	\$ 1 510.97	\$ 1 178.76	\$ 1 178.76
Change in Other Long-Term Liabilities	\$ 600.00	\$ 178.00	\$ 360.00	\$ 2 237.50	\$ 3 832.76	\$ 5 593.22	\$ 6 848.22	\$ 7 783.10	\$ 7 640.33	\$ 7 169.63	\$ 5 069.31	\$ 2 834.17	\$ 2 211.04	\$ 2 211.04
Change in Short-Term Debt	\$ 999.00	\$ -999.00	\$ 1 250.00	\$ 313.45	\$ 1 443.76	\$ 2 106.91	\$ 2 579.65	\$ 2 931.82	\$ 2 878.04	\$ 2 700.73	\$ 1 909.56	\$ 1 067.60	\$ 832.88	\$ 832.88
Core Free Cash Flow	\$ -3 598.57	\$ 3 917.44	\$ 3 675.96	\$ 10 228.99	\$ 10 171.73	\$ 25 620.05	\$ 48 396.32	\$ 73 053.52	\$ 104 003.44	\$ 139 470.63	\$ 165 925.65	\$ 188 176.12	\$ 199 995.37	\$ 199 995.37
Non-Core Business														
Non-Core Result	\$ 152.04	\$ 66.19	\$ 841.44	\$ 880.01	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29	\$ 379.29
Change in Non-Core Invested Capital	\$ 634.15	\$ 9 551.05	\$ -5 741.00	\$ 1 097.71	\$ 2 972.59	\$ 4 337.95	\$ 5 311.30	\$ 6 036.37	\$ 5 925.64	\$ 5 560.57	\$ 3 931.62	\$ 2 198.11	\$ 1 714.83	\$ 1 714.83
Non-Core Free Cash Flow	\$ -567.96	\$ -8 709.61	\$ 6 621.01	\$ -718.42	\$ -2 593.30	\$ -3 958.66	\$ -4 932.01	\$ -5 657.08	\$ -5 546.35	\$ -5 181.28	\$ -3 552.33	\$ -1 818.82	\$ -1 335.54	\$ -1 335.54
Financial														
Financial Result	\$ -41.08	\$ -145.36	\$ -186.44	\$ -206.98	\$ -35.73	\$ -66.44	\$ -114.92	\$ -171.43	\$ -237.77	\$ -301.53	\$ -362.22	\$ -404.69	\$ -428.66	\$ -447.21
Debt	\$ -1 991.00	\$ -5 964.00	\$ -10 946.00	\$ -9 703.00	\$ 1 353.48	\$ 14 555.71	\$ 52 316.50	\$ 132 013.36	\$ 268 416.56	\$ 478 181.44	\$ 772 611.11	\$ 1 134 997.20	\$ 1 545 609.55	\$ 1 988 385.46
Changes in Debt	\$ -3 973.00	\$ -4 982.00	\$ 1 243.00	\$ 11 056.48	\$ 13 202.24	\$ 37 760.78	\$ 79 696.87	\$ 136 403.20	\$ 209 764.88	\$ 294 429.67	\$ 362 386.08	\$ 410 612.35	\$ 442 775.91	\$ 442 775.91
Debt Cash Flows	\$ 3 827.64	\$ 4 795.56	\$ -1 449.98	\$ -11 092.21	\$ -13 268.67	\$ -37 875.71	\$ -79 868.30	\$ -136 640.97	\$ -210 066.41	\$ -294 791.89	\$ -362 790.77	\$ -411 041.01	\$ -443 223.12	\$ -443 223.12
Changes in Equity	\$ 4 689.00	\$ 9 719.00	\$ -4 511.00	\$ 19 036.27	\$ 38 338.13	\$ 70 918.03	\$ 118 043.09	\$ 181 684.63	\$ 254 215.69	\$ 331 401.38	\$ 391 320.23	\$ 426 788.98	\$ 455 395.93	\$ 455 395.93
Comprehensive Income	\$ 2 809.30	\$ 4 350.11	\$ 9 722.39	\$ 4 335.99	\$ 17 454.63	\$ 32 647.89	\$ 54 703.71	\$ 81 639.11	\$ 112 440.10	\$ 142 606.37	\$ 170 898.84	\$ 190 902.78	\$ 202 105.28	\$ 210 832.63
Equity Cash Flows	\$ 338.89	\$ -3.39	\$ -8 846.99	\$ 1 581.63	\$ 5 690.24	\$ 16 214.33	\$ 36 403.99	\$ 69 244.53	\$ 111 609.32	\$ 160 502.54	\$ 200 417.45	\$ 224 683.71	\$ 244 563.29	\$ 244 563.29
Financing Cash Flows	\$ 4 166.53	\$ 4 792.17	\$ -10 296.97	\$ -9 510.57	\$ -7 578.43	\$ -21 661.38	\$ -43 464.31	\$ -67 396.44	\$ -98 457.09	\$ -134 289.35	\$ -162 373.32	\$ -186 357.30	\$ -198 659.83	\$ -198 659.83
CHECK	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE

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