TICKER: NVDA

SECTOR: Technology

INDUSTRY: Semiconductor

DATE: 21st December 2020

TARGET PRICE: $592.25

RECOMMENDATION: SELL

ITIC

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1. BASIC INFORMATION

Beatriz Pereira

Research Department

It was in 1999 that the personal computer gaming market started growing without any expectation to stop, and it was then that Nvidia introduced a term which would become very popular by creating what they called the "world's first GPU", the GeForce 256. Since then, the company has been focused in continuously improving their offer while meeting the technology market's demand and providing sophisticated and evolved GPUs (Graphics Processing Unit), which allow the creation of more complex graphics and visual effects, with realistic features.

2. INVESTMENT SUMMARY

Nvidia's market capitalization has had an upwards trend since March 2019, achieving on the 11th of December 2020 a total of $320.17 billion. The same behaviour is visible in the company's stock price, which increased from 144.15 in June 2019 to 520.53 on the 11th of December 2020.

The time when these major increases started occurring was the beginning of the COVID-19 crisis, that led people to focus more on indoor activities and needing technology for both their professional obligations and their personal entertainment. With one of its main competitors, Advanced Micro Devices (AMD), having the same growing behaviour, the company must focus on taking its goal even further, by presenting products with quality and characteristics that make them the number one choice in the market.

With a current Enterprise Value of $333.24 billion and an expected PEG ratio of 3.01% and an estimated P/E ratio of 48.08, Nvidia promises to keep increasing its value. Its average price target is $599.92, and analysts' consensus is to buy, based on estimations that lead to a favourable future situation for the company.

3. BUSINESS DESCRIPTION

Ruslan Pushkar

Research Department

Nvidia Corporation (NASDAQ: NVDA) is a hardware and software technology giant mostly known for its GPUs, created in 1993 in Santa Clara, CA. At that time, they saw that graphics-based computing could solve issues that general-purpose computing could not solve. On top of that, there was a surge in demand for video games, a field that could use that technology the most at that time. A combination of those factors created an environment with much potential for success.

Nvidia had secured their position as the market leader in GPUs by focusing on Gaming, the most important segment of their business, and by creating and offering premium products. This strategy was a massive success since people purchase with their emotions and not with pure logic. Thus, the products that had more status had a bigger appeal to the target consumer, even if it was more expensive and sometimes not as advanced compared to the competition.

Nvidia focuses on 2 segments: Graphics and Compute & Networking:

- Graphics are aimed at the specialized markets in core areas of business such as gaming, professionals and designers, data scientists, and cloud based visual computing. In 3Q of 2020, it represented 59% of total revenues.
- Compute & Networking is a segment aimed to integrate an entire computer into one chip (system on a chip - SoCs). This helps to create supercomputing for self-driving cars, gaming consoles, and mobile devices as well as systems and platforms for AI, Networks, and High Performing Computing. In 3Q 2020 it accounted for 41% of total revenues.

When it comes to the total market share for the GPU shipments, Nvidia is currently in second place with a market share of 19%, following Intel with a market share of 64% as of 2Q of 2020. Yet this accounts for all the CPUs (central processing units) that come equipped with the built-in GPU, a market dominated by Intel. So, if we look at the dedicated GPU, a different segment from the total market, Nvidia has 80% market share followed by AMD with 20% for the same period, placing them way ahead of their competition.

With the recent pandemic, the company had a surge in demand for both gaming and Data Center related products. This increase has led to a large growth in both revenues and profits. We project that this demand will keep on rising in the future with development in AI, self-driving cars, Internet of Things, and the expansion of data centers, placing NVIDIA in a prime position for massive growth and expansion.

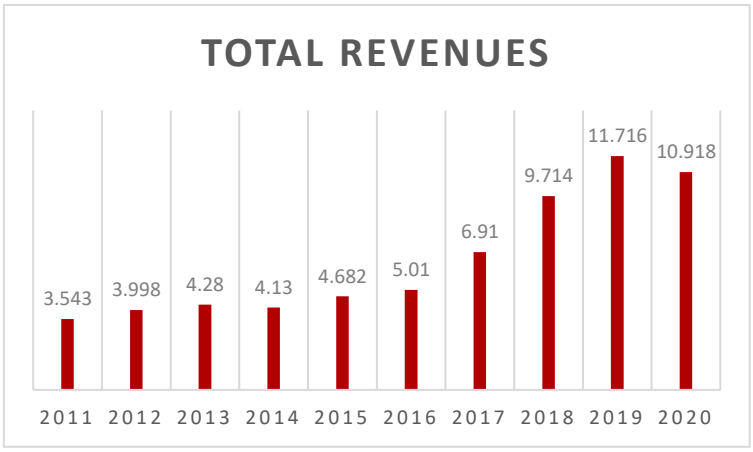

*Figure 1 - Total Revenues, in Billions of $. (**SOURCE**: Morningstar)*

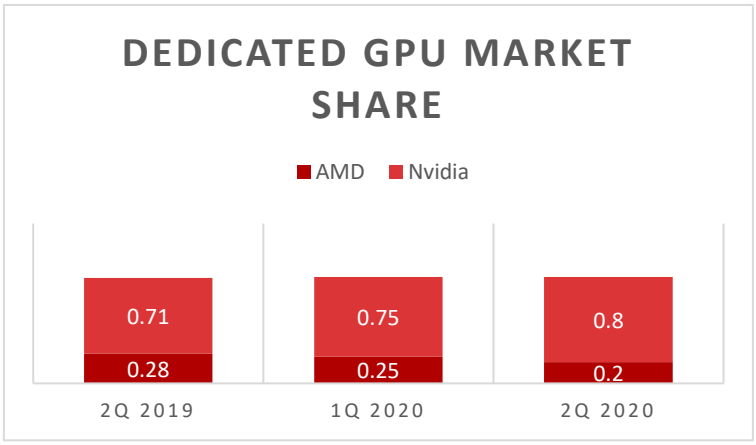

*Figure 2 - Dedicated GPU Market Share for PC Market. (**SOURCE**: Jon Peddie Research)*

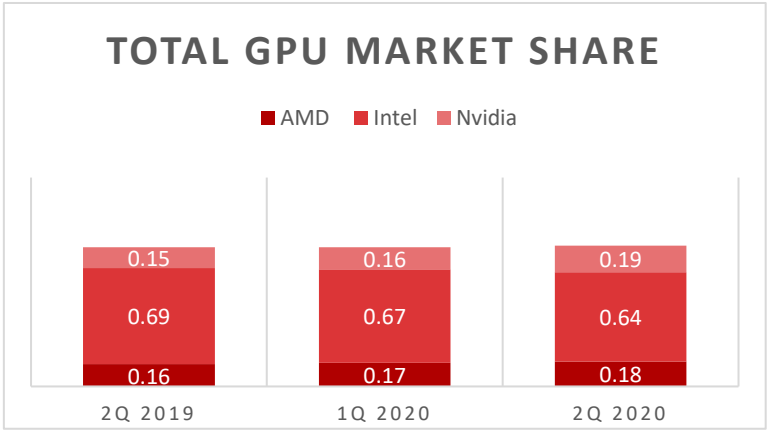

*Figure 3 - Total GPU Market Share for PC Market. (**SOURCE**: Jon Peddie Research)*

4. MANAGEMENT & GOVERNANCE

4.1. Management & Governance

Tomás Estiveira

Research Department

Name	***Title***
Rob Burgess	Independent Consultant
Tench Coxe	Managing Director, Sutter Hill Ventures
John Dabiri	Centennial Professor of Aeronautics and Mechanical Engineering, California Institute of Technology
Persis S. Drell	Provost, Stanford University
Jensen Huang	Co-founder, President, and CEO of NVIDIA
Dawn Hudson	Independent Consultant
Harvey C. Jones	Managing Partner, Square Wave Ventures
Michael G. McCaffery	Managing Partner and Managing director, Makena Capital Management
Stephen C. Neal	Chairman Emeritus and Senior Counsel, Cooley LLP
Mark Perry	Independent Consultant
Brooke Seawell	Venture Partner, New Enterprise Associates
Aarti Shah	Senior Vice President and Chief Information Officer, Eli Lilly and Company
Mark A. Stevens	Managing Partner, S-Cubed Capital

4.2. Institutional Ownership

Institutional Holder	***Number of Shares Held***	***%S/O***
Vanguard Group, Inc. (The)	48,498,024	7.83%
FMR, LLC	44,653,916	7.21%
Blackrock Inc.	43,968,050	7.10%
State Street Corporation	25,375,605	4.10%
Price (T.Rowe) Associates Inc	12,220,544	1.97%
Geode Capital Management, LLC	9,342,310	1.51%
Jennison Associates LLC	8,302,556	1.34%
Northern Trust Corporation	7,217,078	1.17%
Bank of America Corporation	6,477,907	1.05%
JP Morgan Chase & Company	6,381,701	1.03%

Nvidia has 2,156 institutional holders, with a total of 414,315,278 shares held by them. This translates to 66.93% of the shares outstanding, which is in-line with Nvidia's industry average. The institutional ownership structure is mainly divided into mutual funds and institutions, with *The Vanguard Group, Inc.* being the largest holder of them.

Insider Ownership is currently responsible for 4.18% of the shares outstanding. When compared to some of Nvidia's competitors, it is more than 4 times bigger. This shows a stronger insider ownership comparatively to its rivals.

Analysing Nvidia insider activity in the last 12 months, there were 1,346,535 insider shares traded, with most of them being sold. As of the quantity of them, 1,296,326 were sold and 50,209 were bought.

5. RISK FACTORS

Carolina Marques

Research Department

Dependence on third parties

The company depends on third parties to manufacture, assemble, test and/or package their products which presents a risk to its quality control. Nvidia is mainly dependent on Taiwan Semiconductor Manufacturing Company Limited and Samsung Electronics Co, Ltd as these are responsible for the manufacture of the company's semiconductors wafers with their own fabrication equipment and procedures. This and the absence of long-term commitment contracts with foundries and subcontractors could lead to lack of direct control over delivery schedules, product quality, and higher expenses if these prioritize competitors' orders.

Failure in acquiring ARM

In September 2020, Nvidia announced the intention to purchase Arm from SoftBank. This is a strategic move since Arm Processors' sensor chips are included in over 90% of the world's smartphones which would allow Nvidia to become a far greater player in the IoT and cloud-based computing, possibly the single most influential player. However, and besides the market buzz, the deal could be blocked by either the U.K government or the Competition and Markets Authority (CMA) which could crush the companies' hope to do a combination between Arm's R&D capacity and Nvidia's world-leading GPU and AI technology.

AMD's market share climb

Even though Nvidia continues to be the dominant force in the GPU market, AMD has been threatening that position in the last few years. This is mainly due to the success of its Radeon Processors which have been competing with Nvidia's GeForce GPUs. In the 4th quarter of 2019 AMD GPU shipments surged by 22.6% leading to a market share of 32%. Nvidia saw its market share decline 13% from the previous year, going from 81.23% in 2018 to 68% in 2019. In 2020, Nvidia has been fighting back to recover its market share, but with the pandemic and the prospect of not being able to acquire ARM, the company might be stuck in a market where the competitor is developing efficient but cheaper products than their own.

6. INDUSTRY OVERVIEW & COMPETITIVE POSITIONING

6.1. Industry Overview

Duarte Oliveira

Research Department

Nvidia is one of the biggest multinationals in the technological industry. The brand is mainly known for its graphic cards. Although, besides the cards, Nvidia also sells laptops and other products as well. This technological industry grew very fast in the last couple of years and the constant evolution enabled Nvidia to ascend and develop high-tech products. As the gaming industry rose unexpectedly, Nvidia saw a chance to diversify their products and invest in this segment. However, Nvidia was not alone. Competitors like AMD and Intel also took part in the race.

João Reis

Research Department

The future of this industry is very predictable. The constant development of humanity leads to higher demand by the technological industry. New games with higher definition and detail, will require even higher speed and performance by, for example, the graphic cards.

Let's take a deeper analysis using the PESTEL model:

Political

Political terms have a strong influence in the long term and, recently, we have seen tensions and instabilities growing in the global political environment. These tensions can limit the growth opportunities available to the market. One example to illustrate this is the Huawei restriction to sell in the United States as a consequence of the trade war between the US and China. Tech companies are very subject to this type of conflict since they have a big role in technology development which can, in a certain way, have consequences in a nation's evolution.

Moreover, bureaucracy and corruption are also one possible aspect to look for that affects negatively the business environment.

Economic

In fast-growing economies, there are better opportunities for companies to expand their business and the GDP growth rate will determine their ability to pursue their long-term

growth strategies. Furthermore, operating where the financial markets are efficient will determine the capacity to raise the capital at fair prices.

In the Asian countries, the companies benefit from lower wages derived from the very large workforce and the consequent high supply. When analysing the European and American markets, it is the opposite case. There are fewer people to work and they look for bigger wages.

Normally, tech companies need a lot workforce and, consequently, they have their factories located in Asian countries to benefit from the lower wages.

Social

In the last years, we have been facing high growth in e-commerce and online shopping. It is a good factor for some companies whose products are connected to the internet and technology. Furthermore, the consumers' spending patterns are influenced by their purchasing power of money which has been growing alongside the countries' GDP and GDP per capita.

We can also say the people's higher education leads to better development of social lifestyle, for example, the use of AI in healthcare is a good consequence of evolution.

Technology

The rapid technological advancement and technology diffusion across the globe has increased the importance of understanding technological factors during the strategic decision-making process.

Companies should carefully consider investments in technological innovations to stay ahead of competition. A close eye should be kept on the 5G, cloud-based visual computing, data mining, Ai, Internet of Things, and many others in order to stay ahead in a very competitive environment. Continuous investments should take place in areas such as "Data storage".

Environmental

The rise of the environmental pollution demand coupled with technological advancements has made business organizations adopt innovative recycling waste management practices.

Legal

Companies cannot enter a new market without studying in detail the legal environment. A careful evaluation of legal aspects is required to avoid getting into some serious trouble. Corporations must follow the employee/labour health and safety laws as some countries have strict regulations to ensure labour safety. Besides these laws, data protection should also gain its deserved attention. In the EU, for example, the data protection package adopted in May 2016 aims at making Europe fit for the digital age. Taking these facts into account, every company should have a closer look to the new data protection regulations.

Conclusion

Analysing the situation of the Nvidia company, they present in different countries, and so the company is subject to different political systems. However, Nvidia is mainly present in growing economies which will determine the company's ability to pursue its long-term growth strategies. Nvidia's capacity to raise the capital at fair prices is related to the stability of the financial markets where they're in. Regarding the social patterns, Nvidia benefits from the AI evolution in healthcare services while it is the company that supplies the components.

Using **Porter's "Five Forces"** model we can have a better insight of how lots of companies are getting lured to this industry:

Power of Buyers: As not only the gaming industry is growing, a life out of it can also be an option. Moreover, we see people becoming professional players and being able to sustain from it. The buyer's power is slowly ascending, thanks to the gaming industry attraction.

Power of Suppliers: Semiconductor companies are known for buying their raw materials from numerous suppliers. Powerful suppliers in the Technology sector use their negotiating power to extract a higher price from the firms in this segment.

Threats of New Entrants: The semiconductors and technology industries are known to be very expensive. New entrants require a good amount of capital and lots of innovation, the latter, not being necessarily hard.

Threats of Substitute Products: The threat of substitute products is very high. If a new product shows up in the market and meets the client requirements, a new competitor joins the market share.

Rivalry Among Existing Firms: The number of competitors in the graphical cards industry is very few and, therefore, all the companies from the sector have a large market share. This means that they will engage in competitive actions to gain a position and become market leaders.

To sum up, nowadays, good games require high-performance specs, which can be obtained from companies such as Nvidia. As there are only three main companies in the sector, the bargaining power of buyers is considered low. Regarding suppliers, the suppliers power lowers the overall profitability of Nvidia.

The industry where Nvidia is inserted is known to be very expensive which helps avoiding new entrants. In the company's technological sector new ways of doing things are yet to be found, therefore Nvidia has to manage new challenges and build effective barriers to safeguard its competitive edge and their high market share. Concerning the substitute goods, in this segment, Nvidia can be affected if a new product comes to the market which is, however, improbable.

Consumers – Market

Nvidia's main market, the GPU market was valued at $18.2 billion in 2019. Furthermore, the market value has been increasing continuously and in the last five years, it grew more than 120% from $8.1 billion in 2015. In the future, it is expected to grow about 94% until 2025 reaching the $35 billion mark, according to Forbes.

This market has been constantly developing better products that are capable to deliver the best graphic processing in AI platforms, supercomputers, and VR systems. Therefore, this market's growth can be explained by the steady demand growth, and rising selling prices caused by better technological innovations.

In terms of geography, according to Statista, at the end of 2019 Nvidia's revenues were higher in the Taiwanese market which topped up $3.36 billion followed by China and Other Asia Pacific countries representing, respectively, $2.8 billion and $2.37 billion. The United States was just the fourth biggest market generating $1.5 billion while Europe was the fifth returning $0.91 billion to the company.

Goods and services – substitutes

On his main market, Nvidia has just one substitute for their physical GPUs which is the integrated GPUs on Intel's CPUs. The company is also present on the virtual GPUs market with NVIDIA virtual GPU which is a technology that uses the power of Nvidia

GPUs and Nvidia virtual GPU software to accelerate every virtual workflow – from AI to virtual desktop infrastructure (VDI). Nevertheless, their virtual GPUs follow the same path and there are no true substitutes for them.

The Intel integrated graphics card (GPUs) on their processors (CPUs) are a great alternative for Nvidia's products although they are just applicable in a recreative use. With recreative use, we can include watching videos and movies, surfing the web, and occasionally gaming. If the user wants to edit images and videos, play more intensive games, or use heavy computer software, Intel graphic cards are not adequate. In that case, people should have a dedicated graphics card to ensure better performance.

6.2. Competitive Positioning

Competitors

The physical GPUs market has very few contenders and is very concentrated. The probability of new competitors joining the market is low because of the high entry costs and the high costs of developing better products. All these three companies are investing heavily in R&D activities to develop next-generation graphics processors to meet the needs of computing-intensive applications. In this market, Nvidia's competitors are:

- **AMD:** is the biggest Nvidia competitor although it has less than half the market share (26%). This company sells mainly Radeon graphics cards for gamers and Radeon Pro for workstations. They are also on the CPUs market similar to Intel.
- **Intel:** third and last market player. Their main focus is on CPUs and not GPUs. However, they have been developing integrated graphics on their processors which can relegate Nvidia's products to second place when talking about low price computers destined for recreative usage.

These are the world's main competitors in this market. Something that benefits Nvidia's power is the high investments and advancements in artificial intelligence, neural networks, deep learning, and intelligent applications built around them. All the evolution is backed by Nvidia's hardware. Moreover, Nvidia made a massive push in general-purpose GPU-accelerated computing via their CUDA platform years ago, making them the most used platform for the majority of machine learning equipment. AMD's new Radeon GPUs for gaming may be equal or even better, although Nvidia is destined to be the number one player and dominate the market if none of AMD nor Intel can't catch up on machine learning.

Suppliers

Nvidia has a vast number of suppliers, owing to the fact their products require lots of raw materials. Amongst the most important are Taiwan Semiconductor Manufacturing Co Ltd, International Business Machines Corporation, and Dow Company.

Firstly, their main supplier is Taiwan Semiconductor Manufacturing. This company can meet NVIDIA's requirements in terms of materials for their products. As the name mentions, the company's headquarters in are Taiwan, which is Nvidia's most valuable market. Yearly, Taiwan Semiconductor Manufacturing has revenue of $35.77 billion directly from Nvidia.

Secondly, their second main supplier is International Business Machines. Nvidia often requires consulting services in which IBM answers effectively. IBM is Nvidia's most expensive supplier. This year it is estimated that NVIDIA bought $75.03 billion in services from IBM.

Thirdly, Dow Company is Nvidia's third most important supplier. The company supplies NVIDIA with chemical products to be implemented in the company products. This year Dow Company has got $35,426 billion of revenue just from Nvidia.

7. FINANCIAL ANALYSIS

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Research Department

7.1. Revenues

In **figure 4** we can see that that Nvidia's total revenues have been continuously growing over the years, specially between 2016 and 2019, with the latter's next year seeing a significant fall of almost 7% on a year-over-year basis reaching a total value of almost $11 billion. However, this scenario will most probably change in 2021 with the projected revenues to reach $16.50 billion and $19.85 billion in 2022 (according to team estimates and Eikon by Reuters). With this said, it is expected a growth of 51% between the current year and the next one mainly due to positive projections regarding yearly boost of tech industry and operation of vaccination regarding COVID-19 virus. After this a constant growth is expected for the following years.

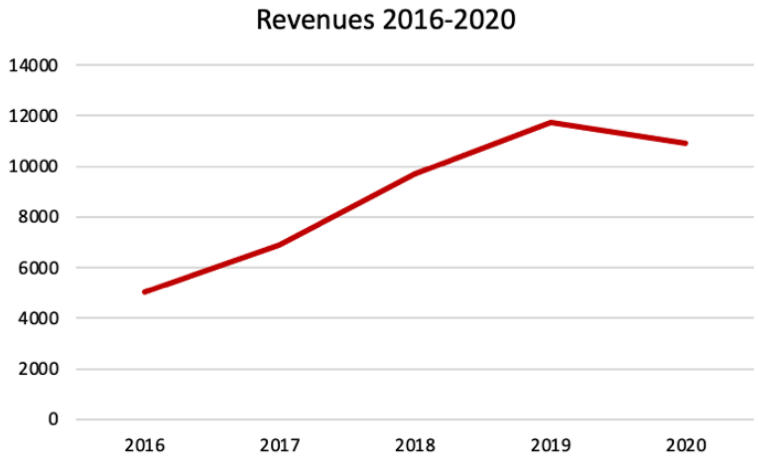

*Figure 4 - Total Revenues, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

7.2. Net Income

The net income reflects the relation between revenues and the company's costs. With tis said, Nvidia's net income evolution may be divided into two scenarios in the year of 2019: the first one accounts for the period between 2016 and 2019 and the second to years 2019 and 2020 (see ***figure 5***). In fact, during the first scenario we can see a constant consecutive growth reaching a value of $4.14 billion in 2019 and an impressive positive change of 74.91% between 2017 and 2018.

For the subsequent years, we may expect high decimal digits of growth with special emphasis on increase of 70.31% between the present year and the year of 2021 to reach $6.10 billion. For 2022 and 2023 the growth will still be under special analysis with percentage changes of 20.76% and 16.28%, respectively. This may indicate a growth's pace decreasing due to ease in revenues, high fixed costs or necessary investments in the operating systems.

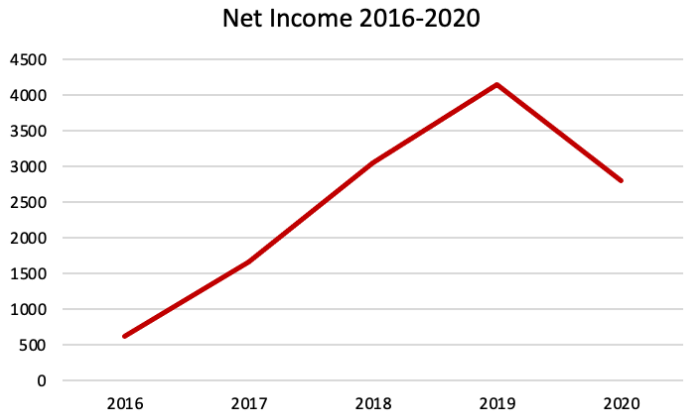

*Figure 5 - Total Net Income, in millions of US dollars, between 2016 and 2020 (**SOURCE**: Eikon)*

7.3. Profitability

The profitability sections of a company, this is Net Income divided by Total Revenues in that specific year, shows its efficiency in generating profits at the ned of the day. That is, the percentage of revenues that the firm's business may turn into net income. The evolution of this indicator follows an upward trend until 2019 and downward trend for the following year (see ***figure 6***). In this exact year the profitability value decreases from 35.34% to 25.61% on a year basis. Accordingly, both the revenues and net income decrease from 2019 2020 so no surprise presented here. In the following year, this is the year of 2021, this measure is expected to reach similar values to 2019 accounting 36.98% as forecasted previously and keep it constant afterwards.

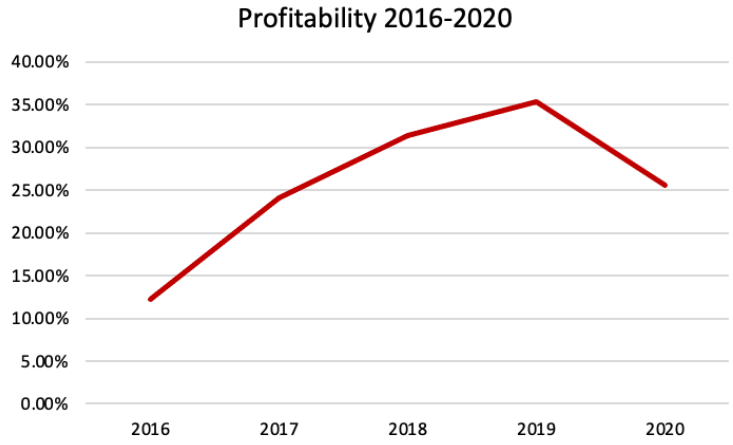

*Figure 6 - Firm's Profitability, in percentage, between 2016 and 2020 (**SOURCE:** Eikon)*

7.4. Earnings per Share (EPS)

The measure of earnings per share is a company's net profit divided by the number of common shares it has outstanding, indicating how much money a company makes for each share of its stock and is a widely used metric to estimate corporate value. As we can see through ***figure 7***, the firm's earnings per share has shown to perform on a consecutive constant growth until the last year with a significant fall afterwards reaching a value of $4.52 and decrease of up to $2.00 comparing with the previous year. Between 2016 and 2019 the firm saw a cumulative growth of almost 515% and a registered average of $5.32 between the years of 2018 and 2020. On a forecast basis, it is expected that for the next three years the EPS continues to grow at a fast pace for the first year and slowing down for the next two years to reach $13.57 in 2023 meaning a cumulative growth of 200% between 2020 and 2023 according to Eikon and Bloomberg sources.

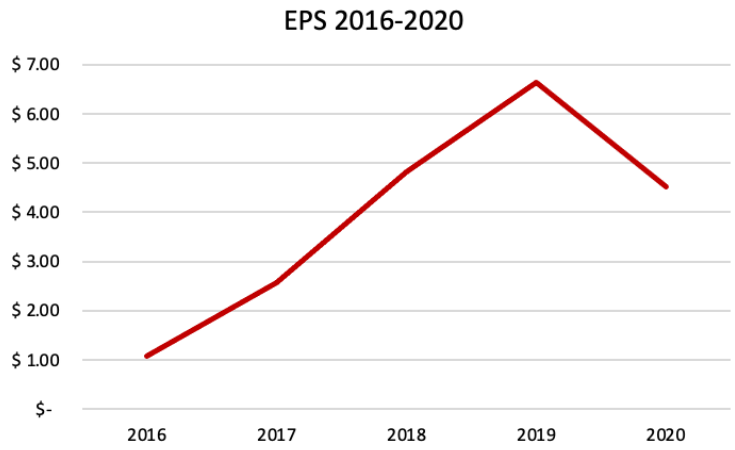

*Figure 7 - Firm's Earnings Per Share (EPS), in US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

7.5. Liquidity

One of the most important measures of any firm, liquidity refers to how much cash is readily available or how quickly something can be converted to cash. It can be divided into market liquidity or accounting liquidity, where the former applies to how easy it is to sell an investment or how big and constant a market there is for it and the latter refers to the amount of ready money a company has on hand and investors use it to gauge a firm's financial health. Overall, the firm has shown a good performance liquidity wise. The analysis leans over the current ratio, quick ratio and cash ratio (see ***figure 8*** and ***figure 9***).

For the past four years the firm has consistently reported higher current assets then current liabilities by a significant difference. In 2020 the reported *current ratio* was 7.67, meaning that the company was able to cover its current liabilities not once but almost eight times. Only taking into consideration highly liquid assets, the firm reported a 111.0 *cash ratio* in 2020, showing that the company is way more than suited to face its current liabilities even without less liquid assets. Between 2016 and 2018, this ratio kept with similar values along the way. On the side of *quick ratio*, has shown quite significant changes since 2016 to stop growing in 2018 similarly to the current ratio and reaching a value of 7.13 in 2020.

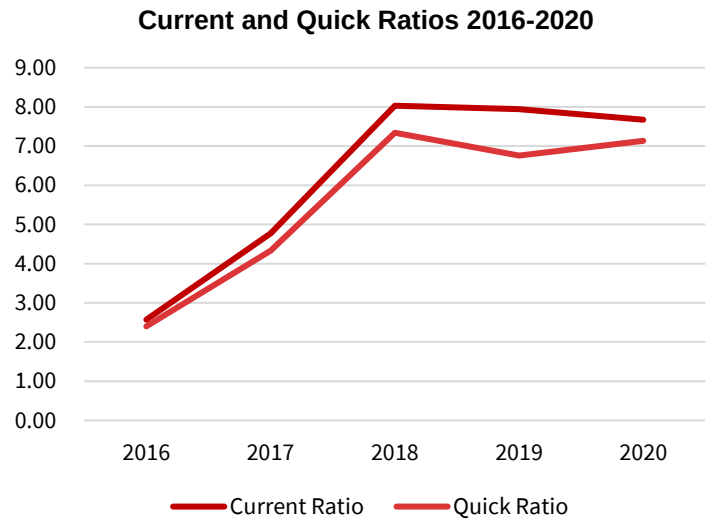

*Figure 8 - Firm's Current Ratio and Quick Ratio between 2016 and 2020 (**SOURCE:** Eikon)*

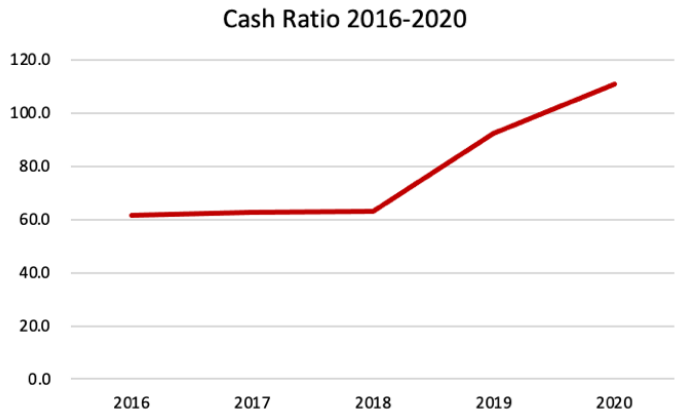

*Figure 9 - Firm's Cash Ratio between 2016 and 2020 (**SOURCE:** Eikon)*

7.6. Solvability

Solvency is the ability of a company to meet its long-term debts and financial obligations, turning out to be an important measure of financial health since its one way of demonstrating a company's ability to manage its operations into the foreseeable future. The formula used in this case was the percentage of long-term debt to firm's total capital. If we look to ***figure 10***, we can see that on the first two years the jump is notorious with an impressive growth of 1369% to reach a value of 23.50% in 2017. After that, the firm's solvability shows a downward slope to end up on 14% by the year of 2020. This makes the company very resilient and very unlikely to default. The firm's debt-to-equity ratio is looking healthy, with the firm reporting a ratio of 0.21 in 2019 meaning a slight fall from those 0.27 registered in 2018. On a forecasting basis, it is important to notice a ratio value of 0.40 in 2021 and 0.27 in 2022 to end with no value in the year after.

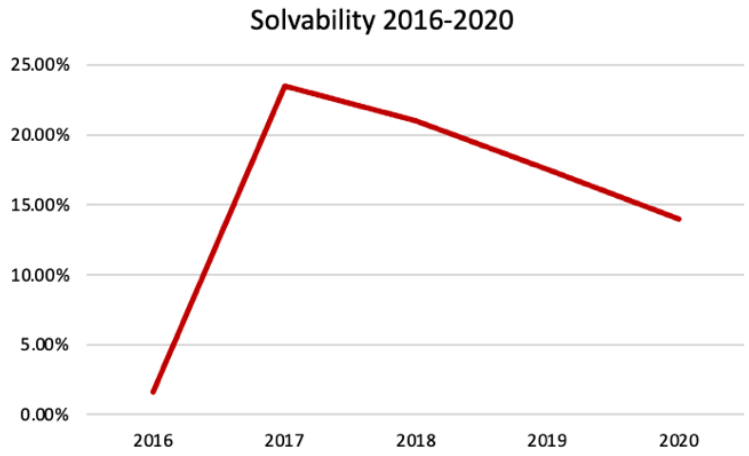

*Figure 10 - Firm's Solvability, in percentage, between 2016 and 2020 (**SOURCE**: Eikon)*

8. BALANCE SHEET ANALYSIS

8.1. Assets

During the period of 2016-2020, firm's total assets grew about 135% going from $7.37 billion to $17.33 billion as we can see through ***figure 11***. This is mainly explained by the exponential increase of bot noncurrent and current assets, with special emphasis on the former ones. Cash and Short-Term Investments was the metric that most contributed to this growth along the path with a percentage of 116% in the previously referred period. However, the gross metric Property, Plant & Equipment also played a role in the total

value of assets. On a forecasting basis for the period of 2021-2023, it is expected a growth of 46.72% to reach a value, in the last year, of $39.79 billion.

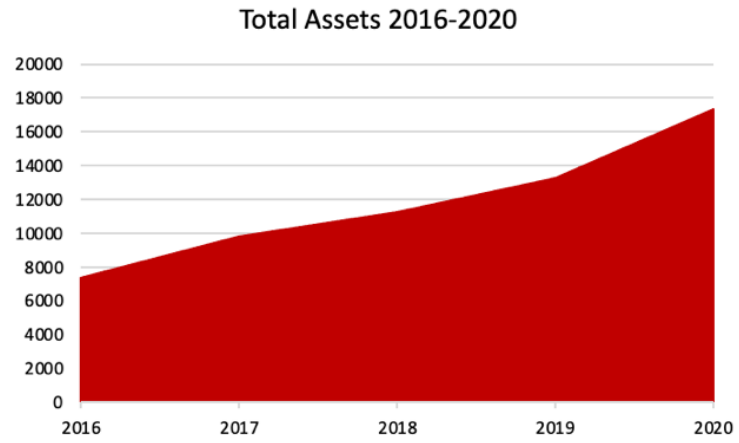

*Figure 11 - Total Assets, in millions of US dollars, between 2016 and 2020 (**SOURCE**: Eikon)*

8.2. Debt

Firm's total liabilities between the period of 2016 and 2020 show an ascendant wave, with rises between the first two years and from 2018 on to reach $5.11 billion (see ***figure 12***). Both increases were motivated by long-term debt, accounts payable and other liabilities. The first one shows some red flags, with the firm to struggle decreasing long-term debt. Overall, the increase of total liabilities was boosted by a growth of 76% from 2016 to 2020. On a forecasting basis for the period 2021-2023, it is expected a larger increase to 2021 and 2022 reaching $6.46 billion and $5.96 billion, respectively. For the last year, the firm may be subjected to no or few debts. At no level the equity was surpassed by total liabilities.

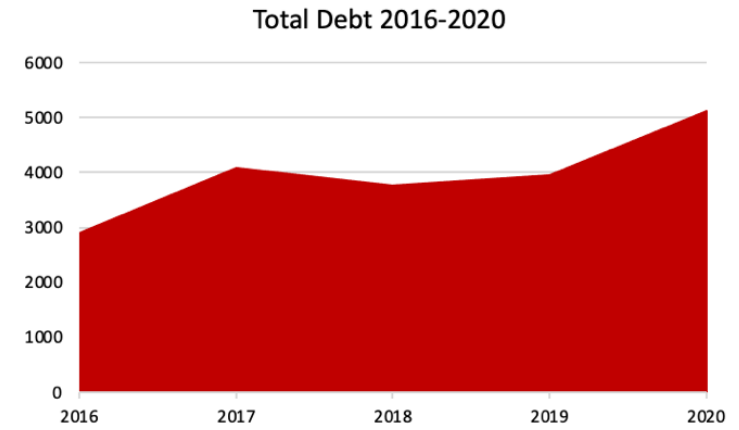

*Figure 12 - Total Debt, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

8.3. Equity

When it counts to equity, we can see a consecutive constant growth, between the period of 2016-2020, of 173% to end up accounting for $12.20 billion in the last year (see ***figure 13***). Most of this significant boost resulted from the increase of retained earnings and additional paid-in capital. On the negative side, we can notice the increase of treasury of common stock. Furthermore, other equity changed from negative to positive side in the very end of 2020. On a forecasting basis, the expectations rise even more from 2021 to 2023 to end up on $27.92 billion and a growth of 73.39% when compared to 2021. Thus, it is expected that the equity will continue to surpass the firm's total liabilities.

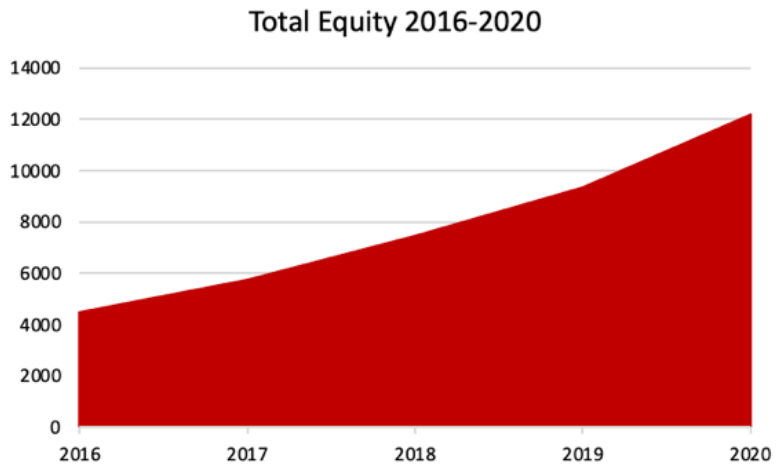

*Figure 13 - Total Equity, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

NOTE: FOR ADDITIONAL INFORMATION AND DATA ON FINANCIAL ANALYSIS PLEASE SEE APPENDIX 1, APPENDIX 2 AND APPENDIX 3 ON OFFICIAL FINANCIAL STATEMENTS REPORTED BY THE FIRM BETWEEN THE YEARS OF 2016 AND 2020

9. VALUATION

Mélissa Assaf

Research Department

9.1. Overview

As of December, the 16th of 2020, Nvidia's market capitalization was recorded at $327,884.3 million against the 116,471 million of AMD and $207,564 million of Intel, a difference of 188,23% with the market capitalization of the first and of 61,73% with the second one. Based on Bloomberg data, Nvidia has returned 132,91% so far this year comparing to its competitors AMD (128.94%) and Intel (-9.21%).

Pedro Galriça

Research Department

According to Nvidia's annual report, the weighted average price per share at the year-end was $21.24 in 2018 and $148.76 in 2020. To sum up, Nvidia's price per share increased by 600.37%, a multiplication of seven times in two years. Nvidia has 618,999,502 shares outstanding, which represents 1,141,370.57 shares sold in 2020 (618,999,502 / $542.33).

9.2. Stock Performance & Multiples Comparison

Nvidia appears well-positioned to weather the COVID-19-led downturn, thanks to an increase in video-gaming activity on account of people staying indoors. Indeed, with the restrictions and quarantines all around the world, people are using more internet for gaming or even following courses by Zoom (check our previous Equity Report on Zoom).

The pandemic creates an ideal situation for Nvidia to sell more graphics cards, and this explains the sudden price change during the first quarantine period in March 2020 as we can see on the graph.

*Figure 14 - Nvidia Stock Price and Chart. (**SOURCE:** TradingView)*

Firm peer groups include companies in the same industry sector and competitors of a similar size in order to establish a peer group analysis. In investment research, peer group analysis is a vital part of establishing a valuation for a stock (Investopedia.com). Nvidia peer group 2020 includes companies such as AMD and Intel Corporation.

Valuation Multiples of Nvidia and the main peers according to Nasdaq industry notation. Computed using historical data from the past 12 months. Values in billions of USD, except for percentages.

Name	Market Cap (Billion of $)	Enterprise Value (EV) (Billion of $)	EV/Revenues	EV/EBIT	EV/EBITDA Ratio	P/E Ratio	EPS	PEGY ratio	Price to sales	Price to book value	1-y return
NVDA	$ 335,702	$ 340,016	22,2	78	44,5876	75,23	$ 7,09	3,4336	22,2233	21,5423	132.91%
ADVANCED MICRO DEVICES INC	$ 116,47	$ 93,64	13,3	100,6	59,859	108,61	$ 0,89	-	13,08	30,1013	128,94%
INTEL CORPORATION	$ 213,035	$ 228,607	2,8	8,8	8,5635	10,73	$ 4,72	1,1208	2,7601	2,7841	-9,21%
Median	$ 213,0	$ 228,607	13,3	78	44,5876	75,23	$ 4,7	2,2772	13,08	21,5423	59,87%
Min	$ 116,47	$ 93,64	2,8	8,8	8,5635	10,73	$ 0,89	1,1208	2,7601	2,7841	-9,21%
Max	$ 335,702	$ 340,016	22,2	100,6	59,859	108,61	$ 7,09	3,4336	22,2233	30,1013	128,94%

*Figure 15 - Valuation Multiples of Nvidia and the main peers according to Nasdaq industry notation. Computed using historical data from the past 12 months. Values in billions of USD, except for percentages. (**SOURCE:** Finbox, Bloomberg, TradingView, MarketWatch)*

9.3. DCF Model

The *Discounted Cash Flow* model is widely used among researchers to value the business of a firm, which is a forecast of a company's unlevered free cash flow discounted back to today's value (NPV). The basic building blocks of a DCF model are the 3 financial statements, which link the financials together (*CFI, 2020*). The rate at which we discount back the cash flows is the WACC, meaning the Weighted Average Cost of Capital. This method also implied the calculation of the terminal value using the perpetuity growth (g) model to achieve the Intrinsic Value of the business in perpetuity.

For the determination of the intrinsic value throughout this method, the CAPM approach was applied to calculate the cost of debt (Kd) and the cost of equity (Ke). The steps presented next show the detailed calculations of WACC:

$$WACC=Ke*ED+E+Kd*DD+E*(1-t)$$

$$Ke=Rf+*Rm-Rf$$

$$Kd=\text{Interest Expenses/Book to Value Debt}$$

To obtain the market value of debt it was used, as a proxy, the book value of debt, which was calculated by summing the long and short-term debt, including operating leases, present in the Balance Sheet, adding to a total of $7,565 million. The market value of capital is $327,884.3 million, easily obtained by multiplying the current price per share by the total number of shares outstanding. This gives us a weight of 2.26% for debt and 97.74% for equity.

The firm has a cost of debt (Kd) of 2.65%, which was calculated using a 5-year average effective interest rate. The same process was used to obtain the effective tax rate, which adds up to 6.83%.

The Cost of equity (Ke) represents the compensation equity investors demand to possess an asset and to carry its underlying risk, for Nvidia it is equal to 11.46%, it was calculated using the CAPM formula, displayed above. For the risk-free rate (Rf) we use the 10-year US T-Bill (0.93%), we assumed a market risk premium of 7.17%, according to historical data from the US equity market return and computed a 5-year monthly Beta of 1.47.

Adding all these variables up, using the WACC formula we previously demonstrated, we can conclude the average weighted cost of capital for Nvidia stands at 11.26%. As displayed on the table below (***figure 17***), the firm's WACC is a bit distant from its main peers, since we observe a WACC 1.26% above them, justified by the bigger Beta.

Free Cash Flow and Terminal Value

During the pandemic, Nvidia saw an opportunity to grow and its returns increased considerably, being 2020 a year for its history books. Nvidia is constantly investing in the new hot tech sectors such as artificial intelligence, autonomous driving, semiconductors, data centers, robotics, virtual reality, automation, 5G, and others, showing a great ability to predict new trends and where the markets are going.

We predict that Nvidia will have a FCFF (at year 5 after 2020) of $12,118 million, showing an average YoY growth of 23.6% from the FY2021E until FY 2025E, according to Thomson Reuters and our team estimates. Finally, we assumed a perpetuity g of 6.5%. Thus, the present value of the company's business divided by the total amount of outstanding shares gives us a price target of $294.93 and a downside potential of –44.32%.

Mean Analyst Recommendations

According to individual target price valuations, the sum of the most relevant analysts gives a mean investment decision of Buy with an average Price Target of $592.25 (see ***figure 16*** and ***Appendix 4***). Based on our analysis, our advice is to SELL, justified by its current price being highly overvalued, which is aligned with the multiple's evaluation above. However, as new investment opportunities are currently being debated, like the acquisition of a company named Arm, we could see a boost in Nvidia's Fair Value, meaning that in the long-term Nvidia seems to have the potential to grow even more.

Adding to the mentioned, Nvidia's compensation demanded by investors is high due to its high inherent risk (Beta of 1.47), which could also imply greater volatility in the future.

Recommendation	September 2020	October 2020	Current
Buy	27	27	26
Outperform	4	4	4
Hold	6	5	6
Underperform	1	1	1
Sell	2	2	2

*Figure 16 - Investment decision recommendations from the most relevant Investment Bank's analysts on buying, selling or holding as of December 16th of 2020. (**SOURCE:** CNN Business)*

Ticker	Company	Market Cap (million $)	WACC (%)
NVDA	Nvidia	327,884.3	11.26%
INTC	Intel Corporation	207,564	10%
AMD	Advanced Micro Devices, Inc.	116,602	10%

*Figure 17 - Comparison among Nvidia's peers in terms of Market Capitalization and the Weighted Average Cost of Capital as of December 16th of 2020. (**SOURCE:** Yahoo Finance and FinBox)*

9.4. Sensitivity Analysis

A major part of a valuation process is the sensitivity analysis, which relies on determining how different values of two independent variables affect a specific variable that we want to emphasize (under a given set of assumptions). It is commonly used in the business world, in the field of economics and finance. As both are calculated using certain assumptions, it is almost certain that there is going to be some divergence from their real values. This method allows us to better perceive the changes in the value of the company, as these variables slightly fluctuate.

As the base scenario, we used the values that we computed before both variables – 11.26% for WACC and 6.5% for the terminal growth rate. Furthermore, we included four more cases in total, two of them above the base scenario and the other two below the, which will be used to observe different variations in three other dependents: Enterprise Value, Target Price, and Upside (or Downside) Potential.

The logic behind it is easy – as the terminal growth rate increases so do the value of the company, and vice-versa. As the WACC increases, the higher the expense to acquire capital, and so, the lower the value of the company, and vice-versa. Since the Target Price and Upside Potential are correlated to the Enterprise Value, we observe the same pattern in these two variables.

		WACC				
	187875.316	10.50%	11%	11.26%	11.50%	12%
Growth Rate (g)	6%	184786.306	167097.781	159119.42	152371.967	139924.845
	6%	202848.644	181611.576	172170.341	164251.304	149798.295
	6.50%	225426.568	199350.66	187963.052	178506.509	161466.917
	7%	254455.326	221524.514	207462.973	195929.536	175469.264
	7.50%	293160.338	250033.755	232149.042	217708.321	192583.243

		Target Price (USD)				
		WACC				
	294.929428	10.50%	11%	11.26%	11.50%	12%
Growth Rate (g)	6%	289.939105	261.363135	248.474023	237.573453	217.465017
	6%	319.118973	284.810301	269.557902	256.764627	233.415662
	6.50%	355.593809	313.467948	295.071167	279.794037	252.266425
	7%	402.490026	349.290007	326.573461	307.941092	274.887341
	7.50%	465.018316	395.346939	366.454026	343.124912	302.535126

		Upside Potential				
		WACC				
	-44.32%	10.50%	11%	11.26%	11.50%	12%
Growth Rate (g)	6%	-45.26%	-50.66%	-53.09%	-55.15%	-58.95%
	6%	-39.75%	-46.23%	-49.11%	-51.53%	-55.93%
	6.50%	-32.87%	-40.82%	-44.29%	-47.18%	-52.38%
	7%	-24.02%	-34.06%	-38.35%	-41.87%	-48.11%
	7.50%	-12.21%	-25.36%	-30.82%	-35.22%	-42.89%

*Figures 18, 19 and 20 - Sensitivity Analysis on Enterprise Value, Target Price and Upside/Downside potential caused by the variation of two independent variables which are WACC and g as of December 16th of 2020 (**SOURCE:** Team's Estimates)*

10. APPENDIXES

In Millions of USD (except Per Share) 12 Months Ending	FY 2020 31/01/2020	FY 219 31/01/2019	FY 2018 31/01/2018	FY 2017 31/01/2017	FY 2016 31/01/2016
Cash and Short Term Investments	10897.0	7422.0	7108.0	6798.0	5037.0
Accounts Receivable - Trade, Net	1657.0	1424.0	1265.0	826.0	505.0
Total Receivables, Net	1657.0	1424.0	1265.0	826.0	505.0
Total Inventory	979.0	1575.0	796.0	794.0	418.0
Prepaid Expenses	157.0	136.0	86.0	118.0	93.0
Other Current Assets, Total	--	--	--	--	0.0
Total Current Assets	**13690.0**	**10557.0**	**9255.0**	**8536.0**	**6053.0**
Property/Plant/Equipment, Total - Gross	3303.0	2171.0	1737.0	1191.0	1100.0
Property/Plant/Equipment, Total - Net	2292.0	1404.0	997.0	521.0	466.0
Goodwill, Net	618.0	618.0	618.0	618.0	618.0
Intangibles, Net	49.0	45.0	52.0	104.0	166.0
Long Term Investments	--	--	--	--	--
Note Receivable - Long Term	--	--	--	--	--
Other Long Term Assets, Total	666.0	668.0	319.0	62.0	67.0
Total Noncurrent Assets	**3625.0**	**2735.0**	**1986.0**	**1305.0**	**1317.0**
TOTAL ASSETS	**17315.0**	**13292.0**	**11241.0**	**9841.0**	**7370.0**
Accounts Payable	687.0	511.0	596.0	485.0	296.0
Payable/Accrued	--	--	--	--	--
Accrued Expenses	756.0	635.0	469.0	401.0	318.0
Notes Payable/Short Term Debt	0.0	0.0	0.0	0.0	0.0
Current Port. of LT Debt/Capital Leases	--	0.0	15.0	796.0	1413.0
Other Current liabilities, Total	341.0	183.0	73.0	106.0	324.0
Total Current Liabilities	**1784.0**	**1329.0**	**1153.0**	**1788.0**	**2351.0**
Total Long Term Debt	1991.0	1988.0	1985.0	2020.0	97.0
Total Debt	1991.0	1988.0	2000.0	2816.0	1510.0
Deferred Income Tax	29.0	19.0	18.0	141.0	301.0
Minority Interest	--	--	--	--	--
Other Liabilities, Total	1307.0	614.0	614.0	130.0	152.0
Total Noncurrent Liabilities	**3327.0**	**2621.0**	**2617.0**	**2291.0**	**550.0**
TOTAL LIABILITIES	**5111.0**	**3950.0**	**3770.0**	**4079.0**	**2901.0**
Redeemable Preferred Stock, Total	--	--	--	--	--
Preferred Stock - Non Redeemable, Net	0.0	--	0.0	0.0	0.0
Common Stock, Total	1.0	1.0	1.0	1.0	1.0
Additional Paid-In Capital	7045.0	6051.0	5351.0	4708.0	4170.0
Retained Earnings (Accumulated Deficit)	14971.0	12565.0	8787.0	6108.0	4350.0
Treasury Stock - Common	-9814.0	-9263.0	-6650.0	-5039.0	-4048.0
ESOP Debt Guarantee	--	--	--	--	--
Unrealized Gain (Loss)	--	--	--	--	--
Other Equity, Total	1.0	-12.0	-18.0	-16.0	-4.0
TOTAL EQUITY	**12204.0**	**9342.0**	**7471.0**	**5762.0**	**4469.0**
Total Liabilities & Equity	**17315.0**	**13292.0**	**11241.0**	**9841.0**	**7370.0**

*Appendix 1 - Balance Sheet Statement, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

In Millions of USD (except Per Share) 12 Months Ending	FY 2020 31/01/2020	FY 219 31/01/2019	FY 2018 31/01/2018	FY 2017 31/01/2017	FY 2016 31/01/2016
Cash Flow from Operating Activities					
Net Income	2796.0	4141.0	3047.0	1666.0	614.0
Depreciation	381.0	262.0	199.0	187.0	197.0
Amortization	--	--	--	--	--
Deferred Taxes	18.0	-315.0	-359.0	197.0	134.0
Non-Cash Items	849.0	512.0	430.0	301.0	281.0
Changes in Working Capital	717.0	-857.0	185.0	-679.0	-51.0
Cash Flow from Operating Activities	**4761.0**	**3743.0**	**3502.0**	**1672.0**	**1175.0**
Cash Flow from Investing Activities					
Capital Expenditures	-489.0	-600.0	-593.0	-176.0	-86.0
Other Investing Cash Flow Items	6634.0	-3497.0	1871.0	-617.0	-314.0
Cash Flow from Investing Activities	**6145.0**	**-4097.0**	**1278.0**	**-793.0**	**-400.0**
Cash Flow from Financing Activities					
Financing Cash Flow Items	-551.0	-1037.0	-612.0	-15.0	10.0
Total Cash Dividends Paid	-390.0	-371.0	-341.0	-261.0	-213.0
Issuance (Retirement) of Stock	149.0	-1442.0	-770.0	-748.0	-467.0
+ Issuance (Retirement) of Debt	0.0	-16.0	-821.0	1315.0	-6.0
Cash Flow from Financing Activities	**-792.0**	**-2866.0**	**-2544.0**	**291.0**	**-676.0**
Net Change in Cash	**10114.0**	**-3220.0**	**2236.0**	**1170.0**	**99.0**
Free Cash Flow	**4272.0**	**3143.0**	**2909.0**	**1496.0**	**1089.0**

*Appendix 2 – Cash Flow Statement, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

In Millions of USD (except Per Share) 12 Months Ending	FY 2020 31/01/2020	FY 219 31/01/2019	FY 2018 31/01/2018	FY 2017 31/01/2017	FY 2016 31/01/2016
Revenue	**10918.0**	**11716.0**	**9714.0**	**6910.0**	**5010.0**
Cost of Revenue	4150.0	4545.0	3892.0	2847.0	2199.0
Gross Profit	**6768.0**	**7171.0**	**5822.0**	**4063.0**	**2811.0**
Selling/General/Admin. Expenses	1093.0	991.0	815.0	663.0	602.0
Research & Development	2829.0	2376.0	1797.0	1463.0	1331.0
Unusual Expense (Income)	--	0.0	0.0	3.0	131.0
Total Operating Expense	8072.0	7912.0	6504.0	4976.0	4263.0
Operating Income	**2846.0**	**3804.0**	**3210.0**	**1934.0**	**747.0**
Interest Expense	-52.0	-58.0	-61.0	-58.0	-47.0
Interest/Invest Income - Non-Operating	178.0	136.0	69.0	54.0	39.0
Interest Income(Exp)	--	--	--	-25.0	--
Interest Inc.(Exp.)	126.0	78.0	8.0	-29.0	-8.0
Other Non-Operating Income (Expense)	-2.0	14.0	-22.0	--	4.0
Net Income Before Taxes	**2970.0**	**3896.0**	**3196.0**	**1905.0**	**743.0**
Provision for Income Taxes	174.0	123.0	282.0	239.0	129.0
Net Income After Taxes	**2796.0**	**3773.0**	**2914.0**	**1666.0**	**614.0**
Extraordinary Item	0.0	368.0	133.0	--	--
Net Income	**2796.0**	**4141.0**	**3047.0**	**1666.0**	**614.0**
Income Available to Com Excl ExtraOrd	2796.0	3773.0	2914.0	1666.0	614.0
Income Available to Com Incl ExtraOrd	2796.0	4141.0	3047.0	1666.0	614.0
Basic Weighted Average Shares	609.0	608.0	599.0	541.0	543.0
Basic EPS Excluding Extraordinary Items	4.6	6.2	4.9	3.1	1.1
Basic EPS Including Extraordinary Items	4.6	6.8	5.1	3.1	1.1
Diluted Net Income	**2796.0**	**4141.0**	**3047.0**	**1666.0**	**614.0**
Diluted Weighted Average Shares	618.0	625.0	632.0	649.0	569.0
Diluted EPS Excluding ExtraOrd Items	4.5	6.0	4.6	2.6	1.1
Diluted EPS Including ExtraOrd Items	4.5	6.6	4.8	2.6	1.1
DPS - Common Stock Primary Issue	0.6	0.6	0.6	0.5	0.4
Gross Dividends - Common Stock	390.0	371.0	341.0	261.0	213.0
Litigation Charge	15.0	44.0	--	--	--
Other Unusual Expense(Income)	30.0	2.0	--	16.0	22.0
Non-Recurring Items, Supplemental	45.0	46.0	--	16.0	22.0
Total Special Items	45.0	46.0	0.0	19.0	153.0
Normalized Income Before Taxes	3015.0	3942.0	3196.0	1924.0	896.0
Effect of Special Items on Income Taxes	3.0	1.0	0.0	2.0	27.0
Inc Tax Ex Impact of Sp Items	177.0	124.0	282.0	241.0	156.0
Normalized Income After Taxes	**2838.0**	**3818.0**	**2914.0**	**1683.0**	**740.0**
Basic Normalized EPS	4.7	6.3	4.9	3.1	1.4
Diluted Normalized EPS	4.6	6.1	4.6	2.6	1.3
Amort of Intangibles	25.0	29.0	55.0	68.0	73.0
Depreciation	356.0	233.0	144.0	119.0	124.0
Interest Expense	52.0	58.0	61.0	58.0	47.0
Rental Expense	114.0	80.0	54.0	46.0	45.0
Stock-Based Compensation	844.0	557.0	391.0	247.0	204.0
Advertising Expense	15.0	21.0	25.0	17.0	17.0
Income Taxes - Non-Recurring Tax Change	0.0	-368.0	-133.0	--	--
Research & Development Exp	2829.0	2376.0	1797.0	1463.0	1331.0
Audit Fees	--	5.0	4.0	4.0	4.0
Normalized EBIT	**2891.0**	**3850.0**	**3210.0**	**1953.0**	**900.0**
Normalized EBITDA	**3272.0**	**4112.0**	**3409.0**	**2140.0**	**1097.0**
Current Tax - Total	156.0	70.0	508.0	42.0	-17.0
Deferred Tax - Total	18.0	53.0	-226.0	197.0	134.0
Income Tax - Total	174.0	123.0	282.0	239.0	129.0
Total Pension Expense	76.0	70.0	23.0	12.0	8.0
Defined Contribution Expense - Domestic	44.0	39.0	23.0	12.0	8.0
Defined Contribution Expense - Foreign	32.0	31.0	--	--	--

*Appendix 3 – Income Statement, in millions of US dollars, between 2016 and 2020 (**SOURCE:** Eikon)*

				Target Price
Contributor	Analyst	Current Recommendation	Rec. Date	USD
Undisclosed	Undisclosed	3–NEUTRAL	30-Nov-2020	581,00
FUBON SECURITIES INVESTMENT SERVICES CO., LTD.	Yang, Weiting	3–NEUTRAL	20-Nov-2020	-
SUMMIT INSIGHTS GROUP	Chan, Kinngai	3–HOLD	14-Sep-2020	-
Undisclosed	Undisclosed	2–BUY	19-Aug-2020	605,00
CREDIT SUISSE	Pitzer, John W	2–OUTPERFORM	20-May-2020	620,00
Undisclosed	Undisclosed	2–OUTPERFORM	18-May-2020	650,00
CASCEND SECURITIES LLC	Ross, Eric	2–BUY	14-May-2020	590,00
Undisclosed	Undisclosed	2–OUTPERFORM	27-Apr-2020	610,00
DZ BANK	Wermann, Ingo	1–BUY	17-Apr-2020	600,00
CRAIG HALLUM	Shannon, Richard C	3–HOLD	13-Apr-2020	520,00
NEEDHAM & COMPANY INC.	Gill, Rajvindra S	2–BUY	24-Mar-2020	700,00
Undisclosed	Undisclosed	1–OUTPERFORM	18-Feb-2020	575,00
WELLS FARGO SECURITIES, LLC	Rakers, Aaron C	2–OVERWEIGHT	11-Dec-2019	605,00
Undisclosed	Undisclosed	2–2	21-Nov-2019	555,00
ELAZAR ADVISORS	Siegel, Chaim	3–NEUTRAL	21-Nov-2019	347,54
SMBC NIKKO SECURITIES AMERICA, INC.	Pajjuri, Srini	2–OUTPERFORM	06-Nov-2019	580,00
THE BENCHMARK COMPANY LLC	Roy, Ruben	2–BUY	21-Aug-2019	600,00
EXANE BNP PARIBAS	O'Connor, David	4–UNDERPERFORM	02-Aug-2019	370,00
WEDBUSH SECURITIES INC.	Bryson, Matthew S	1–OUTPERFORM	26-Jun-2019	600,00
PIPER SANDLER COMPANIES	Kumar, Harsh V	2–OVERWEIGHT	26-Mar-2019	575,00
ATLANTIC EQUITIES	Bhatti, Ianjit	2–OVERWEIGHT	22-Feb-2019	600,00
EDGEWATER RESEARCH	Rottinghaus, Kevin G	3–NEUTRAL	13-Feb-2019	-
UBS EQUITIES	Arcuri, Timothy M	Undisclosed	29-Jan-2019	Undisclosed
SUSQUEHANNA FINANCIAL GROUP LLLP	Rolland, Christopher	2–POSITIVE	13-Nov-2018	610,00
Undisclosed	Undisclosed	2–OVERWEIGHT	30-Oct-2018	605,00
KEYBANC CAPITAL MARKETS INC.	Twigg, Weston D	3–SECTOR WEIGHT	24-Sep-2018	-
OPPENHEIMER & CO., INC.	Schafer, Rick E	1–OUTPERFORM	17-Aug-2018	600,00
FBN SECURITIES	Seyrafi, Shebly	2–OUTPERFORM	26-Jun-2018	610,00
COWEN AND COMPANY	Ramsay, Matthew D. D	2–OUTPERFORM	17-May-2018	600,00
Undisclosed	Undisclosed	2–OVERWEIGHT	02-May-2018	550,00
TRUIST SECURITIES	Stein, William S	2–BUY	12-Jul-2017	643,00
RAYMOND JAMES	Caso, Chris	2–OUTPERFORM	15-Jun-2017	600,00
EVERCORE ISI	Muse, C.J.	2–OUTPERFORM	02-Mar-2017	675,00
ROSENBLATT SECURITIES, INC.	Mosesmann, Hans	2–BUY	07-Nov-2016	650,00
Undisclosed	Undisclosed	Undisclosed	02-Nov-2016	Undisclosed
ARGUS RESEARCH CORPORATION	Kelleher, Jim N	1–BUY	18-Mar-2016	-
Undisclosed	Undisclosed	1–BUY	17-Sep-2015	680,00
Undisclosed	Undisclosed	1–BUY	10-Mar-2015	665,00
Undisclosed	Undisclosed	3–HOLD	19-Mar-2009	515,00
MORNINGSTAR, INC.	Davuluri, Abhinav	---	-	-

*Appendix 4 - Investment recommendation (Buy, Hold or Sell) from each main/relevant institution to a maximum date of November 19th of 2020 (**SOURCE:** Thomson Reuters)*

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