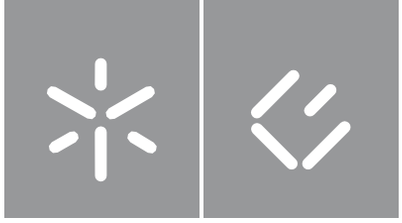
Universidade do Minho
Escola de Economia e Gestão

João Davide Figueiredo Martins

Equity Research: Intel Corporation

May 2023

Equity Research: Intel Corporation
João Martins
UMinho | 2023



Universidade do Minho
Escola de Economia e Gestão

João Davide Figueiredo Martins

Equity Research: Intel Corporation

Master's Project
Master's in Finance

Work performed under the supervision of
Professor Doutor Artur Rodrigues

May 2023

Acknowledgements

I would like to take this opportunity to thank the people who were involved in the realization of this project, directly or indirectly.

Firstly, I want to start by expressing my sincere gratitude to all the professors involved in this Master, especially to my supervisor, Artur Rodrigues, for all the advice and time he provided during this project.

To my family, thank you for all your efforts over not only the last year but over more than a decade of uninterrupted encouragement, this one is for you.

To my friends, thank you for all the pit stops during this tough race.

Finally, and most importantly, to my girlfriend, thank you for being the best friend I could ever ask for and thank you for challenging me to be a better person every single day, I couldn't have done it without you. This is only the beginning of a greater journey.

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Disclaimer

This Equity Research Report was prepared for academic purposes only by João Davide Figueiredo Martins, a student of the Master in Finance at the University of Minho. The report was supervised by a faculty member acting merely as an academic mentor. Neither the author of this report nor the supervisor are certified investment advisors. This report should be read as a pure academic exercise of a master student. The information used to produce this report is generically available to the public from different sources and believed to be reliable by the student. The student is the sole responsible for the information used in this report, as well as the estimates and forecasts, application of valuation methods, and views expressed. The UMinho and its faculty members have no unique nor formal position on those matters and do not take responsibility for any consequences of the use of this report.

Resumo

No âmbito do projeto de trabalho final de mestrado em Finanças da Universidade do Minho, foi realizada uma avaliação da Intel Corporation. Este relatório foi elaborado de acordo com as diretrizes da CFA. A Intel Corporation opera numa indústria que ganhou grande destaque na última década e promete ser uma das indústrias mais cruciais para os avanços tecnológicos da próxima geração. A empresa está a atravessar uma fase única na sua história. Devido ao ambiente altamente competitivo e à rápida evolução do sector nos últimos anos, a empresa foi forçada a alterar a sua estratégia e a investir mais do que nunca. A empresa tem sido líder de mercado quase desde a sua criação, mas isso mudou em 2021. Atualmente, esta indústria está muito concentrada em Taiwan e na China e a Intel está a tentar diferenciar-se investindo e criando novas fábricas na Europa e nos EUA. Para o desenvolvimento deste relatório, apenas foi considerada informação pública disponível até 28 de Março de 2023. Para avaliar a empresa, foram implementados três métodos diferentes. O preço estimado de $33,98 foi alcançado através do método Discount Cash Flow, complementado pelo Dividend Disocunt Model e Avaliação Relativa através dos múltiplos dos seus competidores. Com base num potencial de subida de 16%, esta avaliação sugere uma recomendação de COMPRA. Para confirmar a robustez da avaliação e incluir os riscos do investimento foi também efetuada uma análise de sensibilidade e uma análise de cenários, obtendo-se uma empresa com perfil de Alto Risco, pois apesar de a empresa ser madura e estar bem estabelecida no mercado, a Intel está a atravessar um período de considerável investimento e incerteza.

Palavras-Chave: Avaliação; Discounted Cash Flow; Equity Research; Avaliação de Múltiplos; Indústria de Semicondutores; Intel Corporation; Dividend Discount Model.

Executive Summary

As part of the University of Minho master's in Finance final work project, it was performed an evaluation of Intel Corporation. This report has been written according to the CFA guidelines. Intel Corporation operates in an industry that has gained much prominence in the last decade and promises to be one of the most crucial industries for next-generation technology advancements. The company is going through a unique phase in the company's history. Due to the highly competitive environment and rapidly evolving industry in recent years, the company has been forced to change its strategy and invest more than ever before. The company has been a market leader almost since its inception, but that changed in 2021. Currently, this industry is very concentrated in Taiwan and China and Intel is trying to differentiate itself by investing and creating new fabs in Europe and in the US. For the development of this report, it was only considered public information available until 28th March 2023. In order to evaluate the company, it was implemented three different methods. The price target of $33.98 was reached through the Discount Cash Flow method, complemented by the Dividend Discount Model and Relative Valuation through Peer's Multiples. Based on an upside potential of 16% this valuation suggests a BUY recommendation. To confirm the robustness of the valuation and to include the investment risks was also performed a sensitivity analysis and a scenario analysis, achieving a High-Risk profile company, even though the company is mature and well-established in the market, Intel is going through a period of considerable expenditure and uncertainty.

Keywords: Valuation; Discounted Cash Flow; Equity Research; Multiples Valuation; Semiconductor Industry; Intel Corporation; Dividend Discount Model.

List of contents

List of Figures

List of Tables

Intel Corporation

BUY

High-Risk

28 March 2023

1. Research Snapshot

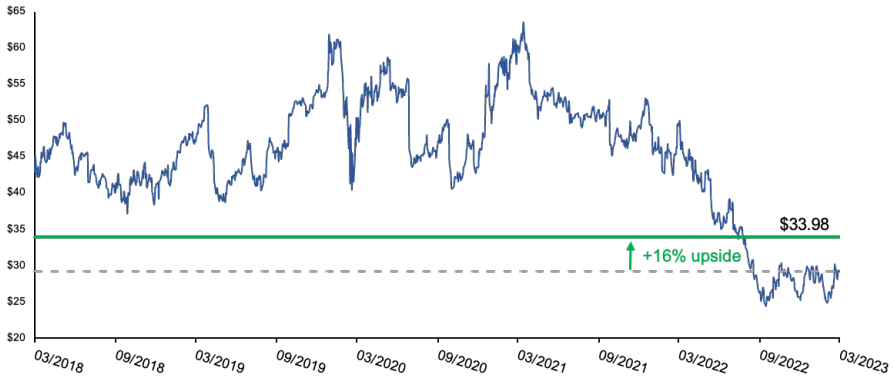
Through the Discounted Cash Flow (DCF) method and based on a forecast period of 10 years (2023YE-2032YE) **Buy** is the recommendation for Intel Corporation (INTC) with a price target of **$33.98**, implying an upside potential of **16%** as of the closing price of $29.29 on 28th March 2023, with **High-Risk**.

Table 1 – Intel's Market Profile (28/03/2023)

Market Profile (NASDAQ: INTC)	
Close Price (28th March 2023)	**$29.29**
Price Target	**$33.98**
52-Week price range	$24.59 - $49.23
#Shares Outstanding	4140M
Market Cap	121B
Dividend & Yield	$1.46 (5.14%)
Upside Potential	**16%**
Recommendation	**Buy**
Risk Assessment	**High-Risk**

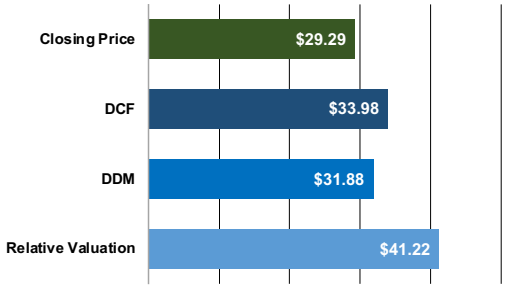
Source: Refinitiv Eikon

Figure 1 – INTC Historical Share Price (2018-2023)



Source: Refinitiv Eikon

Figure 2 – Intel Price Targets

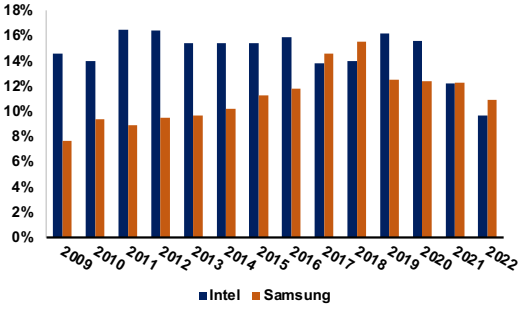


Source: Author analysis and estimates

The company is commonly known for its Intel-Core processors, which have been and are present in the majority of computers worldwide since its invention. The company focuses on three key areas: the production of PC components, data cloud and communication services and semiconductors manufacturing, which has clearly benefited the two other segments. In the past recent years, the company has been struggling with the innovation of the production of the most efficient chips, which has not prevented the company from increasing its revenue consecutively since 2013, from 52 billion dollars to 79 billion dollars in 2021. Semiconductor market leadership has essentially been shared by Intel and Samsung over the past decade, with both reaching record revenues in 2021. The upcoming years will tend to be very harsh for the company's earnings, which might be suppressed since Intel plans to invest a tremendous amount of capital in new foundry facilities and Research and Development (R&D) to catch up with the competition. Despite a large amount of capital allocated to new investments, the company will receive financial support from the US government and the European Union. Through the roadmap presented by the company for the next years, is noticeable that the company is sliding its business and slowly moving away from the PC-centric side to the data centre and manufacturing business. Nowadays, with the

increasing importance of chips and the increased demand for different specific requirements, some companies started to design their own chips to reduce costs and increase specifications for each end. For example, currently, Google designs two kinds of chips, one for the Google Pixel and the other for the YouTube platform. Other companies like Tesla, Apple, and even John Deere also started designing their own chips. Intel plans to increase its manufacturing capacities to meet the increased demand for efficient and powerful semiconductors. The company is also present and developing new technologies in the autonomous driving segment and in the Internet of Things (IoT) business. Regarding the involvement risk, Intel is exposed to the high risk of the technology sector as being one of the leading companies in the semiconductor business.

Figure 3 – Intel vs Samsung semiconductor market share from 2009-2022

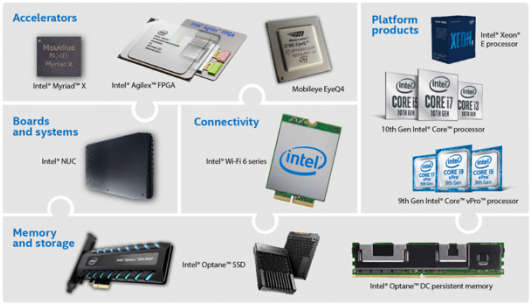


Source: Statista

2. Business Description

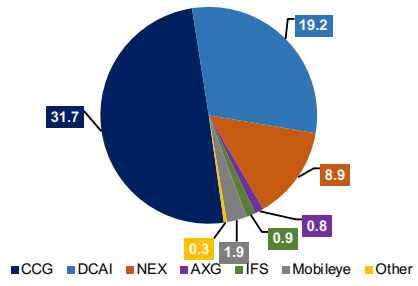
Intel Corporation was founded more than 50 years ago, in 1968, the name stands for "Integrated Electronics", and was founded by Gordon Moore (author of Moore's Law), Robert Noyce and his associate Andrew Grove, through their willingness to bring the digital world onto a chip. In 1971, Intel became a public company, on the NASDAQ Global Select Market under the ticker INTC, via an Initial Public Offering (IPO) raising $6.8 million, $23.50 per share. Also in that year, Intel launched the first commercially available microprocessor, Intel 4004, the world's first Central Processing Unit (CPU), which allowed small machines to perform calculations that previously only very large machines could do. And in 1974, Intel processors were in the world's first Personal Computer (PC) and years later in 1981, the revolutionary x86 architecture processors were in the first IBM personal computer. Originally, Intel began by developing memory chips, SRAM and DRAM, which quickly led to Intel becoming a market leader throughout the 1970s. By the early 1980s with the growing success of Personal Computers (PCs), Intel shifted its businesses, by redirecting its sources from the DRAM business to the microprocessor business. Therefore, products such as 386, 486, Pentium, and Intel Core Processors became the centrepiece of Intel businesses and later in 1990, Intel became the primary supplier of microprocessors for PCs fuelling the development and evolution of the PC market. Nowadays Intel has a strong market position with growing free cash flows, dividends, and consistent share buybacks. Intel is the world's second-largest manufacturer of microprocessors and chipsets, overtaken by Samsung Electronics in Q3 2021. Intel and Samsung are one of the few companies in the market that are in the foundry business and are also chipmakers. Intel Corporation distinguishes itself by producing its components in-house, this gives Intel full control of its component's design and product quality. Besides that, the company is able to retain its know-how and reduce its dependence on suppliers. Even in China, Intel assembles some of its chipsets but at Intel-owned facilities. This industry is one of the most important and fastest-growing spaces in the modern economy. The scepticism around the company stems from strong competition and lack of innovation, causing Intel to lose market share to its competitors. Nevertheless, the new CEO Pat Gelsinger, who took the helm in February 2021, has a bold plan to catch up with the competition, help with the global chip shortage, and bring Intel back to dominance within the next five years. Intel announced in 2013 that they were seeking to reduce reliance on the PC-centric business, which is a mature market with a standardized production process, to a more innovative and emerging market, the data-centric businesses, such as autonomous driving and Artificial Intelligence (AI). In 2022 the company decided to reorganize its business segments to have a clear perspective of the growth in both large traditional and emerging markets.

Figure 4 – Intel products and components



Source: Company Data

Figure 5 – Intel Revenues by Segment 2022 ($billions)



Source: Company Annual Report

Thereby the business is divided into six different segments. The Client Computing Group (CCG) is the leading revenue driver accounting for 50.27% of the company's total revenues in 2022 (vs 52.72% in 2019) followed by Datacenter and AI Group (DCAI) with 30.45% (vs 30.15% in 2019), Network and Edge Group (NEX) with 14.11% (vs 9.49% in 2019), Mobileye with 3.01% (vs 1.22% in 2019), Intel Foundry Services (IFS) with 1.42% (vs 0.64% in 2019), Accelerated Computing Systems and Graphics Group (AXG) accounted for 1.33% (vs 0.84% in 2019), and other segments with 0.47% (vs 4.94% in 2019).

Table 2 – Intel Business segments

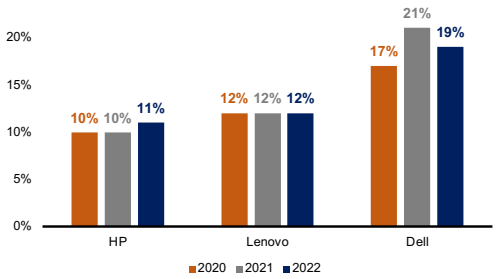
CCG	DCAI	NEX	Mobileye	AXG	IFS
Intel® 4G, 5G, and 6 Wi-Fi Solutions	Data Center and Server Management Systems	Intel® Smart Edge	EyeQ® SoC	Intel® Developer Cloud	Intel® 3
Intel® Ethernet Adapters	Intel® Developer Cloud	5G ASIC	Mobileye SuperVision®		Intel® 20A
Intel® Developer Cloud		Intel® Edge Software Hub	Cloud-enhanced ADAS		Intel® 18A
		Intel® Smart Edge	Moovit		Intel® EMIB
		Intel® Developer Cloud			Intel® Foveros
					Intel® FCxGA

Source: Company Annual Report

Client Computing Group (CCG)

The name of this segment back in time was PC-centric and as the name suggests, this segment is related to PC components. It includes end-user products such as the Central Processing Unit (CPU), which is the brain of the computer and runs the computer and all its programs, and the Graphic Processing Unit (GPU), which allows PCs to run their graphics and display their images with better resolution. The CCG incorporate processors designed for multiple PC formats, such as desktops, laptops, 2-in-1 and mobile computing. This segment also focuses on higher-growth segments of thin and light, commercial, gaming, and emerging areas such as connectivity. Intel is mainly focused on CPUs and application processors. On the CPU side, the CCG contains all the Intel Core chips, such as Intel Core I3, I5, I7, etc. and more recently the launch of the 12th Gen Intel Core processor, which is one of the final products in the Alder Lake generation. The company is exploiting the momentum around the Alder Lake line-up and is powering more than 525 designs from Acer, Asus, Dell, HP, Lenovo, and others. According to the

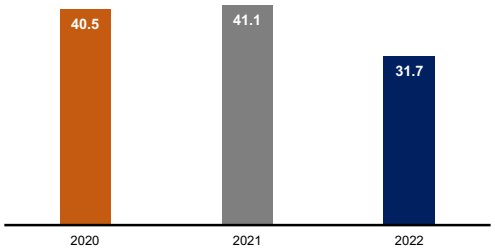
Figure 6 – Intel's three largest customers in the last three years (%)



Source: Company Annual Report

company, it is scheduled the launch of the new generation of CPUs Raptor Lake and Meteor Lake, with an increased performance of 20% based on the actual Intel 4. In the second half of 2022 and in 2023 is expected the launch of the so-promised Intel 18A and Intel 3, followed by Intel 20A process nodes in 2024. On the GPU side, Intel is the market leader in integrated GPUs and contains a broad portfolio of offers, which are built on its processors. However, its new discrete GPU business will be included in the AXG segment. Despite this segment has been losing weight in the company's total revenues, it has been steadily growing revenue over the last years, and it is a major source of Intel's manufacturing scale, intellectual property, and Cash Flow. In 2020 the revenues derived from this segment were $40.5 billion and in 2022 were $31.7 billion.

Figure 7 – CCG Revenues in the past three years ($billion)

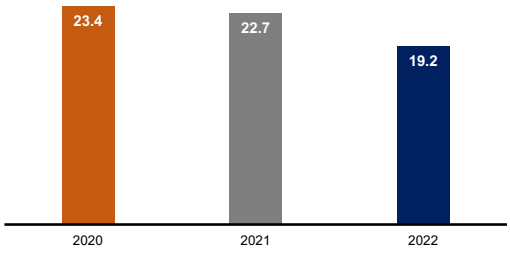


Source: Company data

Datacenter and AI Group (DCAI)

Through this segment, the company offers a broad portfolio of domain-specific accelerators, Field-Programmable Gate Array (FPGA) products and memory, that seek to develop data center products and hyperscale solutions for diverse computing needs, while overseeing the company's artificial intelligence (AI) strategy. This segment focuses on fulfilling the demand for cloud computing by developing workload-optimized platforms for storage, computing and network functions. This segment is worth highlighting Intel's partnership with Amazon Web Services (AWS) and supply agreement with Meta. The partnership with AWS includes the co-development of multigenerational data center solutions optimized for AWS infrastructure. This partnership relies on the Intel Xeon processors, which are capable to use comprehensive High-Performance Computing (HPC), helping AWS achieve outstanding results for complex problems such as demanding workloads, Machine Learning and AI processes. In 2022, with the acquisition of Granulate, a software company that improves application performance and cuts costs by optimizing kernel-level resource allocation, Intel began to expand the capabilities of its platforms with real-time AI-driven continuous optimizations for cloud computing and the introduction of Amber, the security attestation service. The revenues from this segment in the last three years were, $23.4 billion in 2020, $22.7 billion in 2021 and $19.2 billion in 2022.

Figure 8 – DCAI Revenues in the past three years ($billion)

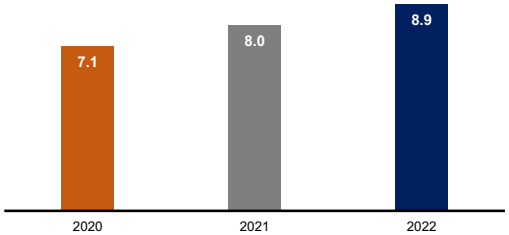


Source: Company data

Network and Edge Group (NEX)

This business segment is mainly composed of three product segments, processors for network deployments, Ethernet adapters and Silicon Photonics. These products allow customers to focus on digital transformation and product leadership throughout the network to the intelligence edge. For example, Ferrovial, a multinational Spanish, uses Intel's edge computing, AI, and connectivity technologies to identify wrong-way drivers, warn of oncoming

Figure 9 – NEX Revenues in the past three years ($billion)



Source: Company data

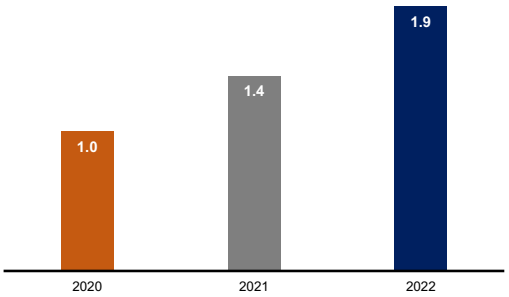
hazards, and so on. This segment clearly shows the benefit of networks that are evolving towards software and AI. Overall, this segment provides high-performance connectivity and computes solutions designed for communications networks, cloud networking, healthcare, industrial and retail. The resulting revenues from this segment were $7.1 billion in 2020 and $8.9 billion in 2022.

Mobileye

Mobileye plays a massive role in the evolution of autonomous driving and self-driving solutions. Mobileye is based in Israel, and it was acquired by Intel in 2017 for $15 billion. Intel plans to take Mobileye public through an IPO, at the end of 2022 or early 2023, according to the market conditions and Intel expects to retain the majority ownership. This segment develops advanced driver-assistance systems (ADAS) for higher levels of autonomy. Their products include computer vision, machine learning-based sensing, data analysis, mapping and localization, driving policy and active sensors. According to the company, Mobileye is developing a high-definition map and is collecting 43 million miles per day on average from 1.5 million vehicles. Their technology is already present in BMW, Audi, Volkswagen, Nissan, General Motors, and others.

The company expects the future of autonomous driving to unfold in two phases, firstly through services such as Robotaxi and then through Autonomous Driving (AV) passenger cars. Either way, the company is in a unique position to dominate a large part of the market share. The segment revenues have been growing year-over-year (YoY), from $879 million in 2019 to $1.9 billion in 2022.

Figure 10 – Mobileye Revenues in the past three years ($billion)

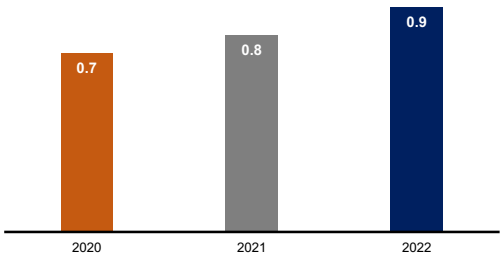


Source: Company data

Intel Foundry Services (IFS)

As Intel is one of the few Integrated Device Manufacturers (IDM), which is a semiconductor company that both designs and builds chips, this segment is extremely vital if Intel wants to regain the crown against Samsung. With IFS the company expects to expand its in-house production of semiconductors while leveraging its internal and external capacity, continuing to build the majority of its products in Intel fabs. Additionally, the company expects to provide its foundry services to third parties. In March 2022, Intel announced the acquisition of Tower Semiconductor for $5.4 billion in cash, the company is specialized in foundry services. This acquisition is expected to accelerate the foundry business and help Intel to become a major provider of foundry capacity globally. Tower Semiconductor accounted for a market share of 1.4% in the foundry market in 2021. Although it is a small portion, it's an important step for Intel, since it complements Intel's strategy to expand in the foundry market and contributes additional revenues for the segment. The company must put a lot of invested capital into the construction of foundries. The chip

Figure 11 – IFS Revenues in the past three years ($billion)



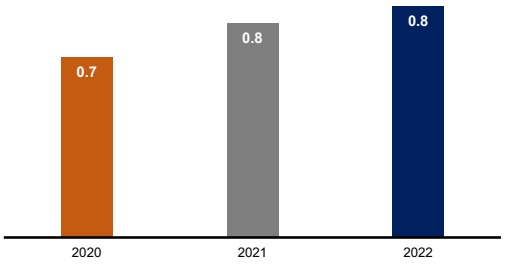
Source: Company data

shortage has made manufacturing chips a more attractive business and Intel plans to expand its ability to produce. In doing so, Intel announced the investment of $20 billion in the construction of two new fabs in Arizona, two new leading-edge fabs in Ohio, which will cost around $20 billion, and upgrade their advanced packaging manufacturing in New Mexico and Malaysia, that will cost $3.5 billion and $7 billion respectively. Besides that, Intel also plans a holistic investment around Europe, in Germany, France, Spain, Poland, Italy and Ireland in order to drive innovation and create a world-class foundry business with a unique geographic position. Intel will spend around $80 billion until 2031 in Europe. Until the fabs are fully operational and production is at 100%, a large amount of expenditure in this segment and a level of revenue that does not match the investment is expected. It is important to refer that in 2022 Intel already began shipping packaging units for their first IFS customer, Amazon Web Services. Thereby through these aggressive investments, Intel expects to take advantage of the geographic position of its fabs to build a world-class foundry business, meet the growing global demand for semiconductors, open their intellectual properties (IP) and provide their x86 architectures to external foundry customers. The segment's revenues rose from $461 million in 2019 to $895 million in 2022.

Accelerated Computing Systems and Graphics Group (AXG)

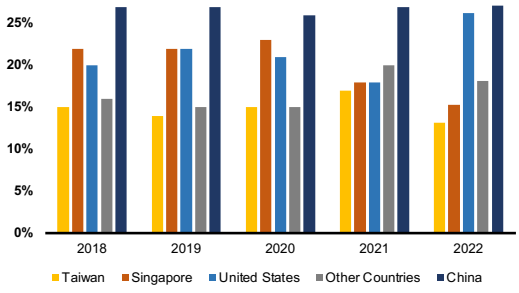
This segment englobes the new discrete GPU, Intel Arc, and provides High-Performance Computing (HPC) and GPUs dedicated to a series of different workloads, from gaming and content creation to HPC and AI solutions across client, enterprise, and data center. Although Intel is already the market leader in providing integrated GPUs, the company decided to enter a new market in 2022 by launching a brand-new discrete GPU, the Intel Arc A series. While the company does not have any comparative performance advantage, for a slight difference in the average score, over its competitors, entering the discrete GPU market presents a good opportunity for growth with the launch of new and innovative products. Revenue from this segment in 2019 and in 2022 was $837 million.

Figure 12 – AXG Revenues in the past three years ($billion)



Source: Company data

Figure 13 – Intel Revenues (%) by Geographic Region



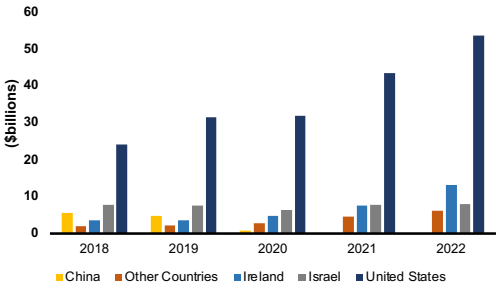
Source: Refinitiv Eikon

Geographic Reach

Since 2015, Intel's business has been divided between China, Singapore, the United States, Taiwan, and others. It is important to refer that the location of the revenues is based on Intel customers, and not on the location where the final product is sold. In 2022, China accounted for 27.16% of total revenues (vs 27.83% in 2019), followed by Singapore with 15.32% (vs 21.75% in 2019), the United States with 26.21% (vs 21.70%), Taiwan with 13.15% (vs 13.08%), and all others with 18.16% (vs 14.75% in 2019). In 2022, Intel's three main

customers, Dell Inc., Lenovo Group Limited and HP Inc. accounted for 42% of its net revenue. Dell's share of net revenues in 2022 was 19% (vs 17% in 2019), Lenovo's was 12% (vs 13% in 2019) and HP's was 11% (vs 11% in 2019). Regarding the Long-Lived Assets, Intel has 15 Wafer Fabs (facilities that produce integrated circuits) in production worldwide at 10 different locations. These facilities are composed by cleans rooms, that are 10 000 times cleaner than a heart surgery room and are filled with yellow light to prevent exposing the chips to shorter wavelengths of light than the lithography machines that are used to design the chips. The company has seven fab production sites, three are located in the US, two are in Israel and the other two are located in Ireland and China. The company also has one testing facility and one assembly development facility in the US. The remaining assembly facilities and test sites are located, two in China and two in Malaysia, and then one in Costa Rica and one in Vietnam. In 2022 the total value of the total assets of the company was $182 billion, higher than its market capitalization, with the current assets evaluated at $50 billion.

Figure 14 – Long-Lived Assets by Geography



Source: Refinitiv Eikon

Figure 15 – Geographic Distribution

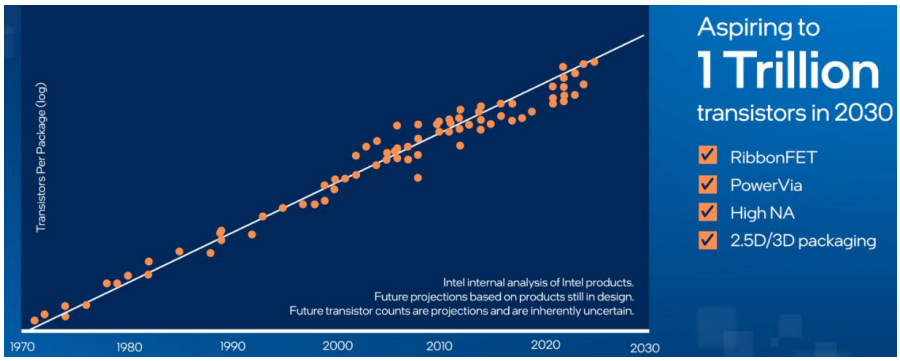
Source: Company Annual Report

Moore's Law

It is inevitable to not mention Moore's Law since it was predicted by Gordon Moore, one of Intel's co-founders. The phenomenon of making new processors faster than the previous models, making the new ones with more transistors in their core and doubling the number of transistors every two years whereas its cost is halved, is known as Moore's Law. Intel failed to keep up with the development of faster chips in the period defined by Moore's Law, and the development of the 10-nanometer which should take two years, took Intel

more than five years to develop. The delay of the 10-nanometer launch and the 7-nanometer launch, lead to difficulty in getting back to Moore's Law and keeping up with the industry. In 2022 while Intel launches the 7-nanometer production, TSMC and Samsung are committed to starting production of their 3-nanometer nodes.

Figure 16 – Moore's Law number of transistors per device: past, present, future



Source: Company data

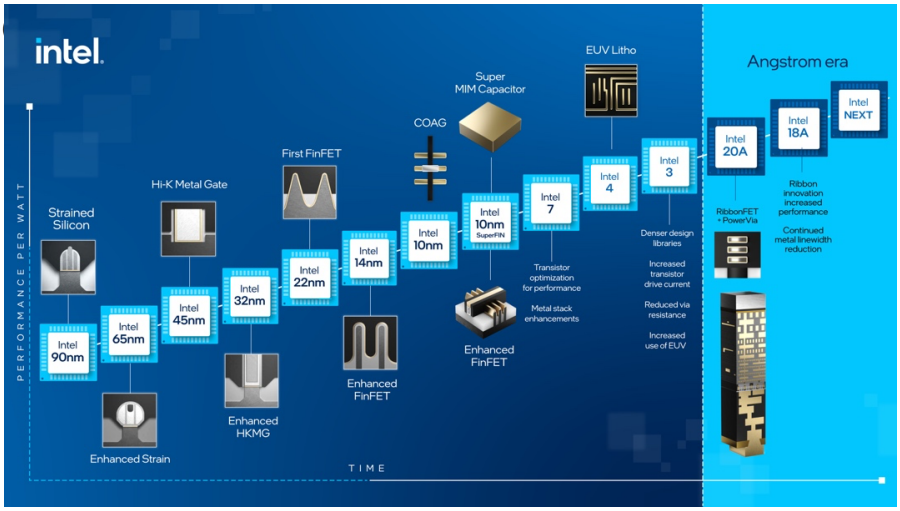
Company strategy

The company must have a strong financial position to thrive in such a competitive, highly uncertain and fast-changing environment. Intel is a technological company, and as it is, innovation plays a crucial role in the future of the company. Over the past 8 years, the amount invested in research and development has increased from $11 billion in 2014 to $18 billion in 2022, representing on average 21% of net revenues. Like research and development, the capital invested in properties, plants, buildings, technology, and equipment is also one of the pillars of Intel's business. In 2022, Intel invested more than $25 billion (vs $14 billion in 2019, 20% of net revenue), representing 40% of net revenues. The delay in the development of some products and the launch of chips with better performance by the competition, led to a decrease in the gross margin by 10% in 8 years. The strategies of the company to regain its absolute dominance are mainly based on product leadership and manufacturing at scale. Intel expects to boost its market share with the launch of the new 12th generation of Gen client processors Alder Lake, the new discrete GPU Intel Arc, and its latest generation of Intel Xeon data center CPU (Sapphire Rapids). Aligned with that, the company has a bold and ambitious plan to attract, develop, and retain top talent from around the world to expand its IDM ability to meet internal demand and expand the use of third-party foundry services. The company's strategy for the next few years is to invest aggressively in the production of semiconductors to regain market share from Samsung. Additionally, the entrance into the discrete GPU market has a lot of potential, since it is a growing market with few producers, and may place the company as a strong competitor for the leadership of the market. With the redistribution of its segments, the company also seeks to balance the profits

from a more mature and saturated market, which is the PC-centric market, and compare them with those of an emerging market, which the company is betting heavily on, which is the data-centric. The company is also investing in R&D to improve the performance of its products and make them more attractive.

In addition, Intel is focusing on opportunities to improve its profit margins and acquisitions that could enhance the company's position in the market and give them a competitive advantage.

Figure 17 – Transistors innovations over time



Source: Company data

3. Environmental Social and Governance (ESG)

Environmental & Social

Operating in the semiconductor industry, Intel has been continuously raising the bar for more sustainable production. The company pledges to become Net Zero Greenhouse Gas Emissions in its global operations by 2040. In Intel's Corporate, Social and Responsibility (CSR) plan, the company highlights the main goals that plan to achieve by 2030 through the program RISE, which stands for Responsible, Inclusive, Sustainable and Enabling. Intel has consistently achieved better ESG scores by Refinitiv Eikon compared to its peers, in 2021 the company scored 86.6, ranking second among the selected peers, only Cisco Systems scored higher. The ESG score is broken down into three different categories, Environment, Social and Governance, in which Intel scored 90.09, 83.66, and 85.09 respectively. The trend is expected to continue due to the company's continuous efforts and policies. Over the years and with the impact of global warming, Intel is looking to reduce its environmental footprint across the company, including the supply chain, as the program matures. The two primary components of the company's operations are energy and water. The company seeks to conserve energy consumption and reduce or reuse the water used in its operations. In fact, in the United States, Europe, Israel and Malaysia Intel relies 100% on renewable energy, and achieved a level of 80% renewable electricity globally, over the last five years Intel purchased 30 billion kWh of renewable electricity. Regarding the company's water consumption, their goal is to return to the communities every drop of fresh water that the company brings in, through on-site or wastewater treatment. As a matter of fact, in 2021, across three different countries, the US, Costa Rica and India, the company reached net-positive water, meaning that the company could return more water to the communities they draw from to make its products. Besides that, in 2021 Intel conserved 9.3 billion gallons of water and restored 2.3 billion through watershed restoration projects. Additionally, the company achieved 99% (by volume) of global freshwater treated and returned to communities. By 2030 the company aims to extend these statistics to its global facilities. Furthermore, by 2030 the company also wants to reach zero waste in landfill, upcycled, recovered, or reused in some facilities and by 2040 the company plans to reach net-zero carbon emissions. Regarding the social impact, Intel also has ambitious plans concerning social responsibility, and in 2021 20% of employees volunteered, accounting for 848,000 hours with an estimated $24 million value of volunteer hours. In 2022, the company expects to increase the number of volunteer hours to 1 million. Since 1995, the employees have donated over 19.6 million hours of service to improve education, environmental projects, and enhance the communities. Beyond that, in the year 2021, throughout 16 campaigns

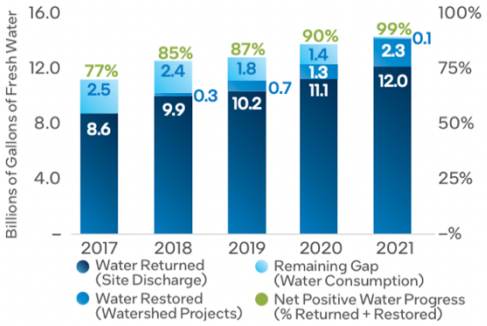
Table 3 – Intel & Peers ESG Score

	ESG score by Refinitiv
CSCO	87.69
INTC	**86.16**
TXN	82.56
NVDA	79.29
TSM	77.95
AVGO	75.56
SMSN	75.47
UM	72.74

Source: Refinitiv Eikon

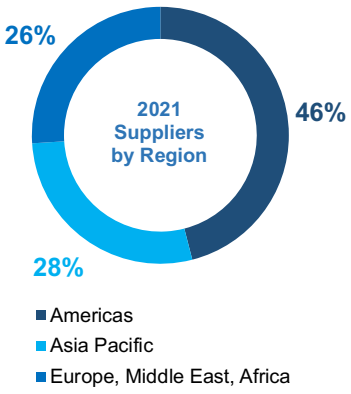
AMD	68.07

Figure 18 – Water consumption cycle



Source: Company Data

Figure 19 – Intel suppliers geographically distribution (2021)



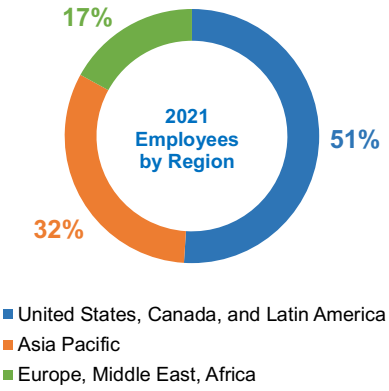
Source: Company Data

the company raised over $ 2 million in donations to support COVID-19, earthquakes, floods and more across 13 countries. Between 1988 and 2021, Intel Foundation was able to fund more than $ 760 million through funding programs and STEM initiatives. When compared to the US Workforce in the semiconductor industry, Intel has a higher-than-average female-gender ratio in its global workforce of 28% versus 25.8% in 2021. The percentage of women on the board of directors climb from 17% in 2017 to 30% in 2021. While these are good results achieved by the company when compared to the industry, Intel does not want to stop there and has plans to increase female presence and pay equity.

Figure 21 – Corporate Social Responsibility Matrix

Source: Company Data

Figure 20 – Geographically distribution of Intel's employees



Source: Company Data

Governance

The company's corporate structure follows the Nasdaq Stock Market LLC rules and the Securities and Exchange Commission (SEC) regulations. Therefore, the Corporate Governance Policies require the Intel Corporation Board of Directors (BoD) to have a substantial majority of independent directors. Currently, the BoD has four standing committees: Audit & Finance; Compensation; Corporate Governance and Nominating; and M&A. The Board is responsible for providing oversight and counselling to the management of the company in order to act in a manner they reasonably believe is in the best interests of the company and for the benefit of the company's stockholders. Another responsibility of the BoD, with the support of Corporate Governance and Nominating, is the election of its own members based on their background, skills and experience, never forgetting to represent the balanced and best interests of the stockholders as a whole. Furthermore, the BoD believes, based on its experience, that the positions of Chair of the Board of Directors and Chief Executive Officer (CEO) should be held by distinct persons. Additionally, the Board has some policies such as a retirement policy for directors where nonemployee directors may not stand for reelection after age

75 and actively seek out women and minority candidates with diverse backgrounds.

Table 4 – Intel's Board of Directors

Name	Audit & Finance	Compensation	Corporate Governance & Nominating	M&A
Patrick Gelsinger, CEO				
James (Jim) J. Goetz			○	○
Andrea Goldsmith				
Alyssa Henry		○		○
Omar Ishrak*		○	○	
Risa Lavizzo-Mourey	○	○	●	
Tsu-Jae King Liu	○			
Gregory D. Smith	●			
Lip-Bu Tan				○
Dion Weisler		●		○
Frank D. Yeary	○		○	●

Source: Company Data

The BoD is composed of 11 directors, 9 of whom are independent directors, which is in line with company policies. The company's Corporate Governance is based on the Anglo-Saxon model, while alongside the BoD there is a Statutory Auditor, Ernst and Young LLC, which has been Intel's auditor since the company's inception in 1968. The Audit & Finance Committee, as the name suggests, represents and supports the BoD in the oversight of financial requirements, financial risk assessment, capital structure and capital allocation strategies, dividends and stock repurchase, and tax strategies and compliance. The Compensation Committee is responsible by manage and reviewing the compensation of the executive officers, overseeing the company's strategies and initiatives of talent recruitment, development and retention, diversity and inclusion and management development and succession planning for the CEO and senior leaders. The committee responsible for the ESG matters and the selection of Board members is the Corporate Governance & Nominating Committee. Besides that, they also review the Corporate Governance guidelines, and poison pill policy and makes recommendations to the BoD regarding its size and composition. The M&A Committee assists the BoD in evaluating and overseeing M&A transactions and venture investments. All members of the BoD have extensive knowledge and experience from several relevant fields, and in 2021, 36% of the board are women, a gender ratio that has room for improvement, although it is higher than its peer ratio. On 13th January 2021, Intel announced Pat Gelsinger as its new CEO, who started later on 15th February 2021. Gelsinger is an engineer who has worked for Intel for over 30 years. He began his career at Intel in

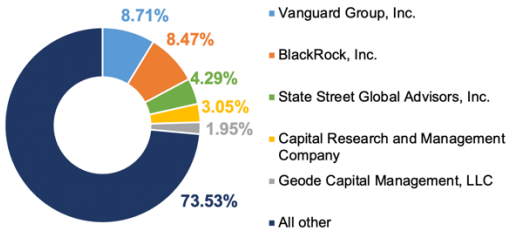
1979, when he was 18 years old. Pat worked on the 386 processor and was the architect of the 486, which later became the Pentium processor. Gelsinger was mentored by former Intel CEO Andrew Grove, and at the age of 32 became the youngest Vice President in Intel's history. Later, in 2001, he became the company's first Chief Technology Officer (CTO). During his time at the company, he managed to lead the creation of key industry technologies such as Wi-Fi and USB. He also led the move to 14-nanometer chips and played a key role in the Intel Core and Intel Xeon processor families. However, he left the company in 2009 and became the CEO of VMware in 2012 at Dell EMC and Dell Technologies Inc. This experience gave him knowledge in software and cloud computing since VMware became the first commercial successfully company to virtualize the x86 architecture. Pat's total compensation of $178.59 million in 2021 is above average for companies of similar market capitalization in the US market.

Shareholder Base

The company has 4.1 billion shares outstanding. Intel ownership is diversified by a base of Institutional shareholders (63.3%), General Public (36.6%), Individual Insiders (0.06%) and State or Government (0.04%). The top 25 shareholders hold 39.95% of the company's shares, indicating that the company's shares are widely distributed, ensuring diversity and reducing the possibility of a dominant shareholder. Currently, the majority shareholders of the company are The Vanguard Group, Inc. with an 8.71% stake and Blackrock, Inc. with 8.47% ownership, in third place comes State Street Global Advisors, Inc. with a stake of 4.29%. It is noteworthy that the firm's largest shareholders have strong ESG mandates. Moreover, these investors aim to mitigate the risk of their investments and are looking for a short-term return. Consequently, there may be times when the personal interests of Institutional Investors are not aligned with the company's long-term interests and may seek to disrupt company policies. Accordingly, to the information currently available, over the past 12 months, inside traders have bought over 139 378 shares with an estimated value of $6.44 million, with no sales recorded during the same period. In addition, in the last twelve months, the top 25 shareholders have increased their exposure to the company by an average of 4.37%. These two factors show the shareholders' strong belief in the company's future.

On balance, Intel delivered a solid and better ESG performance than its peers and the company is foreseen to maintain its stance and continue to captivate more investors with a strong ESG position, reducing the ESG risks around the company's business.

Figure 22 – Intel's Top Institutional Holdings



Source: Refinitiv Eikon

4. Industry Overview and Competitive Positioning

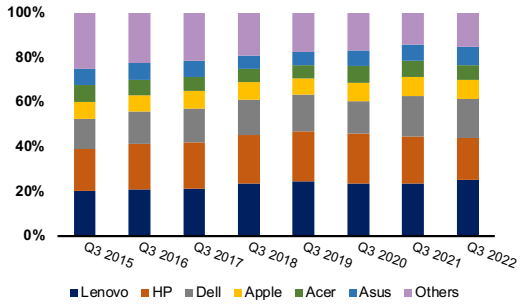
The semiconductor industry is composed of different types of companies, which altogether have the capacity to transform a semiconductor into chips and then use them in all different kinds of electronic devices, such as a smartphone, a fridge or the latest F-35 fighter jets. The microchip industry is breakdown into Equipment Manufacturers, such as ASML Holding and Lam Research, which provide the necessary equipment for semiconductor production. Then Foundries like Taiwan Semiconductor Manufacturing Company (TSMC) manufacture the semiconductor in so-called "pure-play" form, they create the semiconductor but the equipment itself has no finality. After that, companies like Advanced Micro Devices (AMD) Nvidia, Qualcomm and Broadcom known as Fabless, bought the semiconductor in the "pure-play" form and design the chips on behalf of customers, creating microprocessors, CPUs and GPUs for example to then sell them to customers like Dell, HP, Lenovo and etc. On the other hand, there are companies that prefer to buy the chips from manufacturers and design their own chips to their own finalities, such as Apple and Tesla. Intel Corporation and Samsung Electronics are known as Integrated Device Manufacturers (IDMs), which means that they have their own fabs, manufacture and design their own chips. Since almost the beginning, Intel has been a market leader in both the semiconductor industry and microprocessors industry, but in the last decade the company failed to innovate, and as a result lost market shares to its biggest rivals, both in the foundry businesses, to Samsung and TSMC, and in the chip design, AMD and Nvidia. In Q3 2021, as noted before, Intel lost its crown to Samsung as the largest semiconductor producer, having now 12.2% of the worldwide production against Samsung's 12.3%. Intel IDM 2.0 roadmap presented by the CEO, Pat Gelsinger, displays aggressive plans to increase capacity and catch up with peers, and by 2025 the company is expected to surpass the chip-making capabilities of both TSMC and Samsung, which is a very ambitious and far-fetched plan. This plan has also illustrated the investment of over 80 billion euros in R&D and manufacturing activities in Europe over the next ten years. The strategy consists of the construction of a new semiconductor manufacturing facility in Germany, an R&D hub in France and additional facilities across Italy, Poland and Ireland. Besides that, the company already spend 40 billion dollars in Ohio and Arizona, building two new semiconductor fabs in each location. With these investments, Intel is looking out for an opportunity to build strategic locations for its new fabs concerning the current geopolitical tensions between Russia and Ukraine and the possible conflict between China and Taiwan. There are different categories of chips, and the different sizes of chips are found in different types of electronics. The 10 to 14nm chips can be found in CPUs and GPUs, less

Figure 23 – Largest publicly traded semiconductor companies by revenue in Q3 22

Rank	Name	Symbol	Country
1	Samsung	005930.KS	South Korea
2	**Intel**	**INTC**	**United States**
3	TSMC	TSM	Taiwan
4	QUALCOMM	QCOM	United States
5	SK Hynix	000660.KS	South Korea
6	Broadcom	AVGO	United States
7	Micron Technology	MU	United States
8	NVIDIA	NVDA	United States
9	Applied Materials	AMAT	United States
10	AMD	AMD	United States
11	ASE Group	ASX	Taiwan
12	ASML	ASML	Netherlands
13	Texas Instruments	TXN	United States
14	MediaTek	2454.TW	Taiwan
15	Lam Research	LRCX	United States

Source: Statista

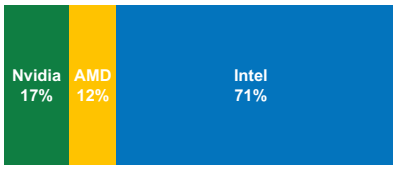
Figure 24 – PC Manufacturers Worldwide from 2015 to 2022



Source: Statista

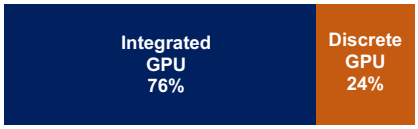
advanced chips like 20 to 40nm chips are used in the automotive industry components, and bigger chips can be found in household devices, like coffee makers. At the moment, the most advanced chips, the 5nm chips are used for data handling and Artificial Intelligence (AI) processing, which is used in leading-edge technologies, such as the latest iPhone and MacBook, NASA rovers and F-35 fighter jets. The equipment required to produce this kind of chips is an extreme ultraviolet lithography machine (EUV machine), that is provided by only one company, ASML, and its costs upwards of $180 million. Intel decided to not buy these machines until a couple of years ago, delaying the delivery of the 10nm for years. TSMC began the commercial production of 10nm chips in 2016 while Intel started the production of the same chip in 2018. In 2022, TSMC and Samsung are producing the 5nm chips while Intel is expected to launch their first processors based on the 7nm in the second half of the year. In the meantime, competitors such as AMD and Apple have been able to develop their processors based on TSMC 5nm chips and as a result, create more powerful and efficient chips. Thus, Intel has been losing market share both in the semiconductor and PC markets. The last couple of years and the next five to six years will be very harsh for Intel's earnings, but the company foresees a bright future after all the investment in the foundry industry and R&D. While Intel has faced a slowdown in terms of financial performance during 2022, due to the lack of competitiveness rather than general industry weakness. The company had a significantly weaker financial performance than its main rival, AMD, as a result of a decrease in the data center market share and a weaker PC market. Since AMD is a fabless company, it means that it outsources the production of the chips, and they have been relying on the production of TSMC chips. As mentioned before, TSMC is a few steps ahead of Intel technology, due to the struggle that Intel faced in the release of the 10nm, they still try to rectify that delay, which allowed TSMC and Samsung to enjoy technological leadership against Intel. As a result, since AMD chips are supplied by TSMC, AMD has been able to develop a portfolio with higher product performance than Intel, across all of the notebook, desktop and server markets. The main revenue drivers come from the different CPUs and GPUs offered by the company. The CPUs can be distributed in three categories: desktop, notebook, and server. While the GPUs can be decomposed into discrete and integrated. Despite that, in 2022 Intel officially launched its new discrete GPU, Intel Arc A Series, and entered a market dominated by Nvidia and AMD. In the GPU segment, it can be decomposed into two groups, discrete and integrated. Intel has 71% of the GPU market, and it's the leader in the integrated segment, which accounts for 76% of the total market. On the other hand, Nvidia's market share is 17% and is the leader in the discrete GPU, this graphic card represents almost 90% of Nvidia's profit. In Q4 2022, the market share for the discrete GPU was 82%

Figure 25 – GPU Market Share (Integrated & Discrete) Q4 2022



Source: Statista

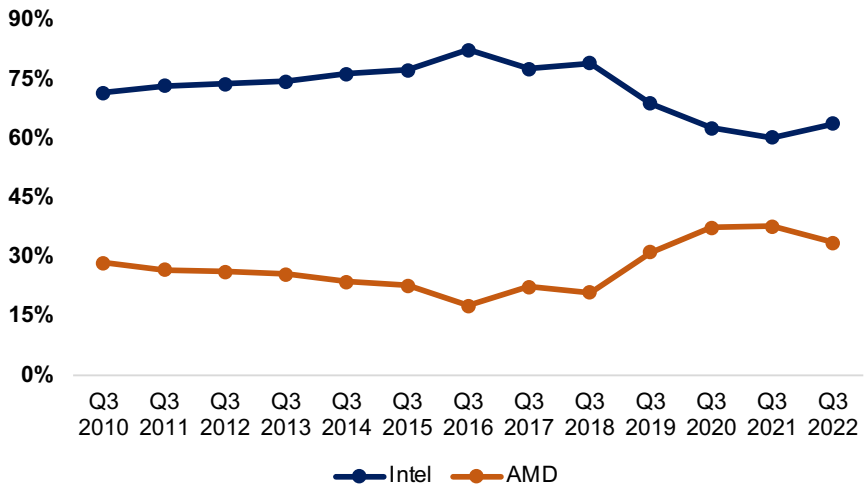
Figure 26 – GPU Market Share (Integrated vs Discrete) Q3 2021



Source: PassMark

for Nvidia 9% for AMD and the remaining 9% for Intel. In terms of dimension among these three major players, Intel is undoubtedly the biggest fish. Until 2022, Intel only produced integrated graphic cards and had the biggest pie of market share. In 2022 the company launched its first discrete graphic card, and despite its narrow score difference for Intel resulting in lower performance, in terms of benchmark, when compared with the ones distributed by AMD and Nvidia, Intel expects to be a strong container as the years go by and increase its presence in this segment. In the first year that Intel joined the discrete GPU market, the company already matched AMD in terms of market share. Regarding the CPUs businesses, AMD's average benchmark scores across, desktops, laptops and servers are higher than Intel's. This gives AMD a superior product performance advantage over Intel. Inside this market, the narrowest gap can be found in the desktop market, with Intel accounting for 54.3% in Q4 2021 and AMD picking up 45.7 %.

Figure 27 – AMD vs Intel CPUs Market Share across all platforms (Desktop, Laptop and Server)

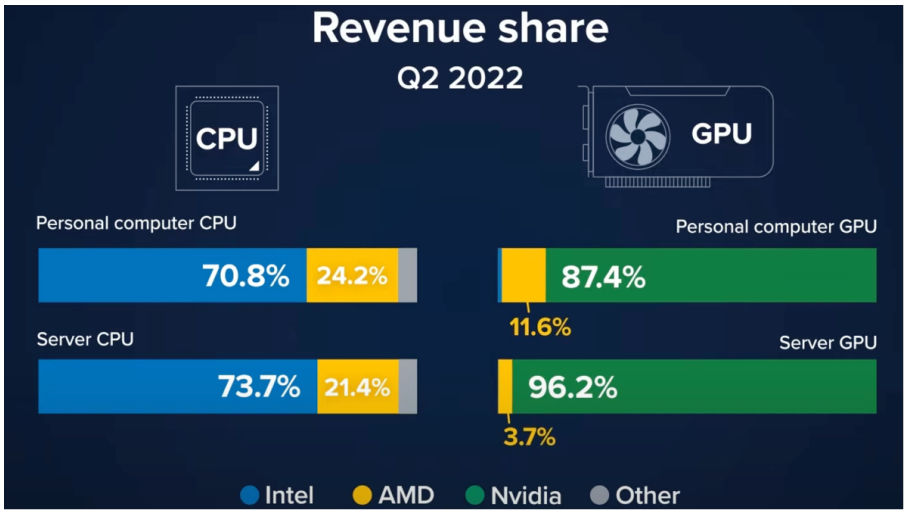


Source: PassMark

From 2007 until 2019 Intel had more than 60% of the market share, and in the last couple of years, with the high technological advancement of AMD, the rival was able to reduce this gap. On the other hand, in the server businesses, since 2011 that Intel has had more than 90% of the market share. In 2021 the market share was spilt between 94.1% for Intel and 5.9% for AMD. In the Laptop market, between 2013 and 2020 the company was able to maintain a market share above 80% and in 2021 that value decreased to 75.6% and AMD had the remaining market share. Overall, across all segments in the CPU market, Intel's market share has been decreasing in the past few years, after a decade of total dominance over its rival AMD. In 2021, the market share of all CPUs across all segments was divided between 62.9% for Intel and 36.9%

for AMD, while in 2018 these figures were slightly different, with Intel having 77.1% of the market share and AMD having 22.9%. This is the result of Intel's delays in developing its own chips, particularly 10nm chips, and AMD's ability to become far more competitive than Intel through chips supplied by TSMC.

Figure 28 – CPU & Discrete GPU Market Share as of Q2 2022



Source: CNBC

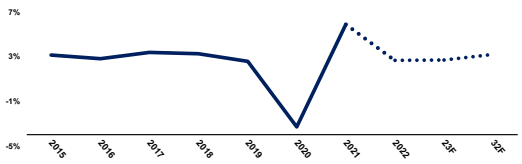
With the acquisition of Tower Semiconductor for $5.4 billion in cash as part of the IDM 2.0 strategy, the company is more prepared to process nodes up to 65nm. While Tower Semiconductor only accounts for 1.4% of the foundry market, this acquisition can boost Intel's specialization, increase its market share, and also its revenues. According to McKinsey, the semiconductor industry will grow steadily in the next decade, reaching $1 trillion by 2030, with an annual growth rate of 6-8%. Thus, if Intel is able to maintain its 14-15% market share as it has for the past twenty years, its expected revenue will be around $140 billion, which is an amount substantially higher than the $130 billion forecast for 2030 and $136 billion for 2031 in this report. Besides that, McKinsey also foresees that the automobile industry demand for semiconductors will increase to 15% by 2030, while in 2021 accounted for roughly 8%. The costs presented by the Society of Automotive Engineers (SAE) for the level 1 autonomous driving cars in 2021 were $500. This value is expected to increase to $4,000 as autonomous vehicles become more standard by 2030. In the segment of autonomous driving, Intel acquired an Israeli company in 2020, Moovit, with the intuition of enhancing its Advance driver-assistance system (ADAS) and expanding its mapping technology. Intel has had a strong presence in this segment since the acquisition of Mobileye, which is also an Israeli company, in 2017 by $15.3 billion, the largest acquisition ever of an Israeli tech company. From then on, has established several partnerships with the Volkswagen Group in 2018, with the commercialization of Mobility-as-a-Service (MaaS), and also in that year, the

subsidiary announced partnerships with the BMW Group and Nissan. Mobileye has made significant progress in this segment, conquering partnerships with Ford, NIO, Transdev, and more recently Toyota. Mobileye's technology was also incorporated in the first Tesla Model S, until 2016 when the partnership ended due to a deadly crash of self-driving. JPMorgan estimates indicate strong growth potential in this segment for the next couple of years and predict an estimation of nearly 15 billion autonomous and semiautonomous vehicles by 2025, while in 2021 there were 2 billion.

Macroeconomic Outlook

As a consequence of Covid-19 and geopolitical tensions, the Global economy is facing a harsh time with expectations of a slowdown in the world GDP. The World Bank predicts a slowdown from 5.9% in 2021 to 3.2% in 2022 and 2.3% in 2023. In addition to that, global inflation is forecasted to rise from 4.7% in 2021 to 8.8% in 2022 and decline to 6.5% in 2023 and to 4.1% by 2024. With inflation higher than seen in decades, with Russia's invasion of Ukraine and the persisting of Covid-19 in some countries such as China, which is causing pandemic-related problems on the supply side. The future of Global economic health is very uncertain, depending on how the course of all the challenges mentioned before evolves. Besides that, the world GDP growth by 2027 is forecasted to be 3.2%.

Figure 29 – World Real GDP Growth

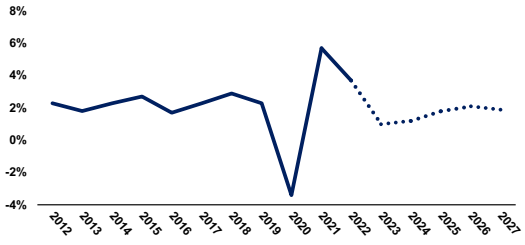


Source: IMF

USA Outlook

Back in 2020, the US had a negative annual GDP growth of 3.4%, which was offset by the 5.7% GDP annual growth in 2021. For the future, the US is expected to follow the trend of the world GDP, and for 2022 the US GDP annual growth reached 3.7%, and then is forecasted to reach 1.0% in 2023 and 1.9% in 2027. Concerning the levels of inflation, in 2022 the inflation rate jumped from 4.7% in 2021, to 8.1%. For the upcoming years, the levels of inflation are expected to decrease drastically reaching 3.5% in 2023 and returning to 2% in 2025. The unemployment rate reached a historical minimum low of the past decades, of 3.7% in 2019 and 2022. Due to the current economic outlook, this rate is expected to increase up to 5.4% in 2025 and by 2027 is forecasted to go back to 4.7%. As the Trade War has ramped up in the past decade, the geopolitical tensions between the US and China have dragged the technology businesses into the conflict. Over the past 10 years, TSMC and Samsung have increased their presence in the manufacturing of the world's most advanced chips, leaving the largest manufacturer of semiconductors in the US, Intel, behind. Taiwan and South Korea collectively hold about 80% of the global foundry market. The US claims that China has ambitions to boost its domestic chip industry and that the country is using these chips for advanced military capabilities. As a result, the

Figure 30 – US Real GDP Growth



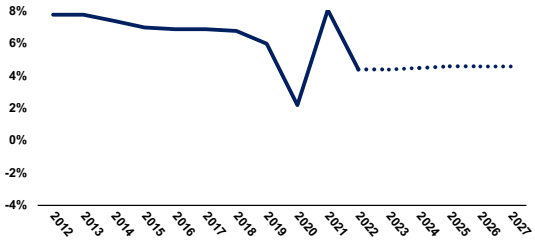
Source: IMF

US decided to impose some restrictions on the exportation of these machines to Chinese companies, and chips related to AI and supercomputing will require a license to be exported to China.

China Outlook

The trade war with the US has had a tremendous impact on the country's exports and consequently its annual GDP growth. With the Covid-19 strict zero policies and the housing market crisis, China's economic growth is currently behind the rest of the Asia-Pacific region, for the first time in more than 30 years, according to the World Bank forecasts. In 2022 the annual GDP growth declined to 3.2% after the country's higher annual GDP of 8.1% in 2021, and for the next foreseeable future is expected to remain at 4.6% until 2027.

Figure 31 – China Real GDP Growth

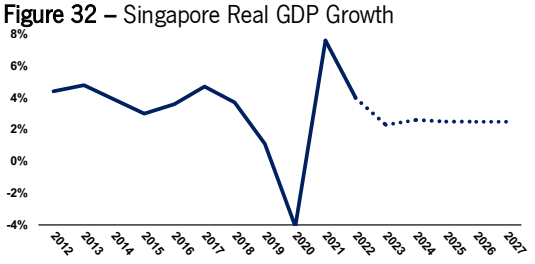


Source: IMF

Singapore Outlook

Based on revenues, Singapore comes in second behind China and above the US and Taiwan. Like the majority of countries, Singapore is suffering from supply-chain disruptions, higher commodity prices, rising interest rates and weaker demand. The country is very vulnerable to its largest partner, China. In recent years, Singapore recovered from negative annual GDP growth of 4.1% in 2020 to positive growth of 7.6% in 2021 and 4.0% in 2022. According to Bloomberg, there is a 10% chance that Singapore will enter in a recession in 2023 powered by supply chain bottlenecks and Russia's war in Ukraine. The provisions of IMF for 2023 is an annual GDP growth of 2.3% followed by a recovery in 2024 to 2.6% and a slight decrease each year up to 2.5% in 2027.

Figure 32 – Singapore Real GDP Growth

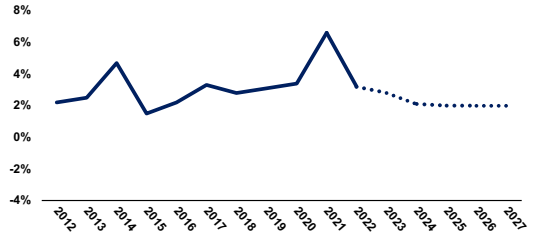


Source: IMF

Taiwan Outlook

Taiwan's economy is still heavily reliant on the performance of the volatile Chinese economy. The slowing in the global demand for electronics, high inflation and geopolitical tension with China led to a decrease in the GDP from 6.3% in 2021 to a recovery of 3.2% in 2022. As for the future, the provisions made by the IMF is that by 2027 the annual GDP growth will be 2%. The trade war between the US and China has not benefited Taiwan since they are the two largest export markets. The possibility of a recession in the US and the ongoing outbreaks and lockdowns in China due to Covid-19 have weakened exportations. The threat of military conflict and trade sanctions had led companies to adjust their inventories and delay or reduce their capital expenditure plans.

Figure 33 – Taiwan Real GDP Growth



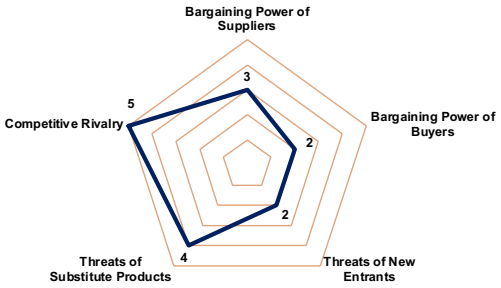
Source: IMF

Industry Position

Porter's Five Forces

These forces help to understand the competitive position of the company and identify the main sources of competition in the industry.

Figure 34 – Porter's five forces analysis



Source: Author, Company Data

Bargaining Power of Suppliers – Medium

Despite the fact that Intel produces its own chips and designs them, the company works with a complex supply chain composed of thousands of suppliers. There are suppliers that provide more generic services or products such as delivery logistics and packaging services, lab and office equipment and so on. Over time, the company might face supplier quality issues of suppliers extending lead times and the company has to change or alternate some suppliers. On the other hand, for certain types of equipment, services and material, Intel relies on a limited number of suppliers or a single geographical location. In order to start the manufacturing of Intel 4, the company relies on a single company, ASML, which is the only company in the world that manufactures EUV photolithography tools that is essential to produce the most advanced and sophisticated chips. Back in 2012, Intel jointly with Samsung and TSMC invested substantial amounts in ASML. The company was struggling with developing the EUV technology and needed financial aid to complete the project. Intel invested and owned 15% of ASML, TSMC 5% and Samsung 3%. The development and availability of that equipment, on which Intel, Samsung and TSMC depend significantly, has the effect of delaying the development or enhancement of chip manufacturing. Due to the cheaper labour costs in Asia, Intel also has a limited number of third-party foundries that provide leading-edge manufacturing processes. In the past years, the industry of semiconductors has experienced a shortage of substrates and other components essential to the manufacturing capacity and this trend tends to continue in the upcoming years. This has led to an increase in costs, reducing production and delaying product shipments. The company is well aware of its dependence and difficulties and in order to combat them, Intel announced that it entered into arrangements with its key suppliers, that involve long-term purchase commitments and prepayments.

Figure 35 – Intel's investment in ASML back in 2012

Source: CNBC

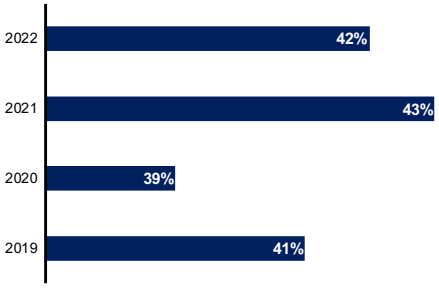
Figure 36 –ASML's Revenues in 2021 distribution

Source: CNBC

Bargaining Power of Buyers – Low-Medium

The way that the market has evolved in the past years, the power of buyers in this industry has been declining. This is a result of Covid-19 and supply chain constraints unable to keep up with the exponentially rising demand for semiconductors over the past few years. Despite the growing independence from its customers, Intel has a significant amount of revenue from a limited

Figure 37 – Revenue accounted from Intel's three largest customers (Dell, HP and Lenovo)



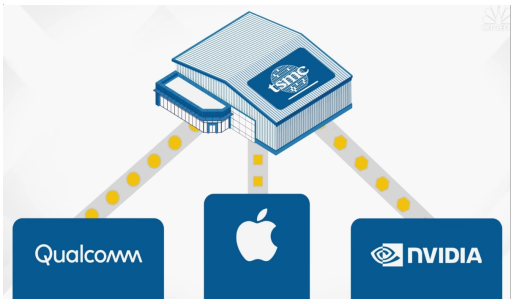
Source: Company Data

number of customers, in 2022 its three biggest customers accounted for 42% of revenue (43% in 2021 and 39% in 2020). Although switching costs may not be very expensive, the company enjoys strong brand recognition among end users and there is now significant rivalry for the best chips on the market.

Threats of New Entrants – Low-Medium

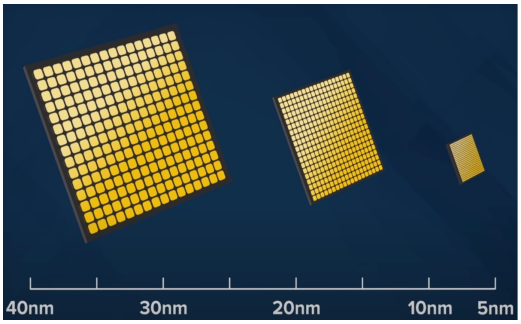
Regarding the foundry market, it is very unlikely the entrance of new competitors, since there are a lot of fixed costs associated with the production of a factory or developing a product. The fabs and the equipment necessary to produce the semiconductors are very expensive and require a lot of know-how and expertise. On the other hand, the design of the chips has attracted a lot of companies such as Apple and Amazon, which decided to outsource the manufacturing of the chips to companies like TSMC for Apple and Intel for Amazon, and these companies started to design their own chips. Besides that, in the past years, the company ARM has launched a new and efficient way of designing chips, outside of the conventional, and it has gained a lot of fans. The processors designed and produced by Apple, the M1 processors and so on and so forth, are all based on ARM-based technology. Given the balance between the two business sectors, in the foundry industry, the threat is relatively low while in the design industry it tends to increase in the upcoming years.

Figure 38 – Some companies prefer to outsource the manufacturing of the chips



Source: CNBC

Figure 39 – Different Semiconductor sizes

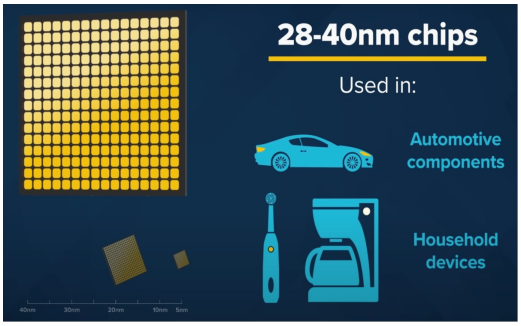


Source: CNBC

Threats of Substitute Products or Services – Medium-High

Intel is incorporated in a highly competitive and cyclical industry, so the comparative advantage does not hold for long. Samsung and Intel are one of the companies that spend more capital on R&D worldwide. Samsung invested $19 billion in R&D in 2022, compared to Intel's $18 billion. It takes a lot of innovation and cutting-edge technology each year to be able to sustain a consistent market share in these sectors. As an illustration, Intel is having trouble maintaining its market dominance mostly because of the delay in the development and release of its 10 nm chip. As a result, its rivals who are manufacturing (foundries) and designing (fabless) the 7 and 5nm semiconductors are able to manufacture the most sophisticated chips on the market and, as a consequence, create the most effective processors. Overall, only companies that are disposed to spend a lot of resources in trying to be on the crest of the wave might thrive in this market.

Figure 40 – 28-40 nm range chips functionality



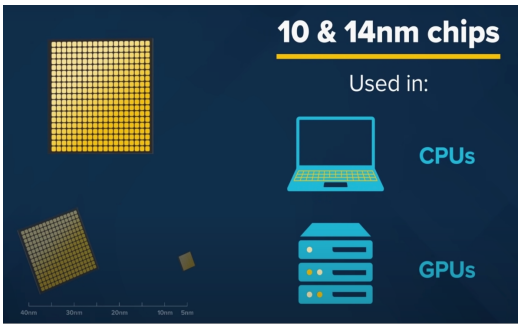
Source: CNBC

Rivalry among the Existing Competitors - High

Intel faces intense competition across its entire product portfolio from companies that are involved in the design of chips, such as AMD, Nvidia, Qualcomm, and more recently and increasing competition from Apple's

products and ecosystem. The ARM-based products and ecosystem are also increasing their competitiveness in the last couple of years. Once again, most of Intel's competitors rely on third-parties foundries, such as Samsung and TSMC. Although most of the market is already covered by developed economies, China recently launched a program to promote its domestic semiconductor industry and supply chain. This may increase severely the introduction of new products and technologies with a lower price. Additionally, a few partnerships such as the acquisition of ARM Holdings by Nvidia and the acquisition of Xilinx by AMD resulted in a higher competition and fewer customers, partners, and suppliers.

Figure 41 – 10-14 nm range chips functionality

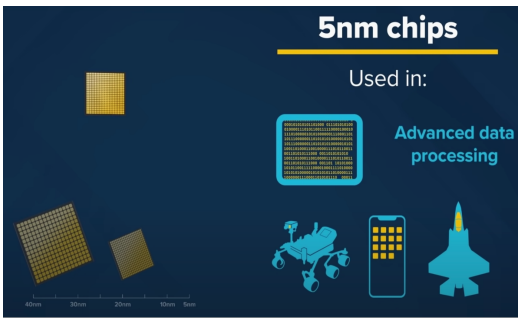


Source: CNBC

SWOT

Understanding Intel's strategy and the industry's position in accordance with its competitors requires evaluating the company's strengths, weaknesses, opportunities, and threats.

Figure 42 – 5 nm range chips functionality



Source: CNBC

Strengths

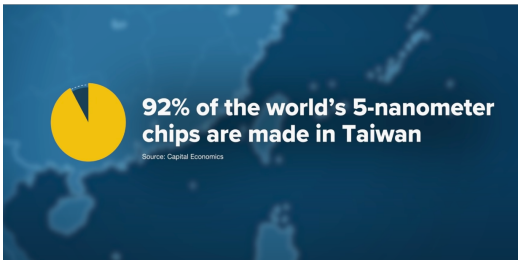
Diversified Portfolio: The company's businesses are spread across different markets, from processors, CPU and GPU to autonomous driving technologies. This decreases the risk of the company being highly dependent on a particular sector.

Brand Value: Intel is one of the oldest players in the PC market. It is well-known for its quality, efficiency and reliability, leading to being ranked by Brand Finance as the 69th most valuable brand in the world in 2022.

Disposition to spend large amounts of capital on R&D: Due to its financial strength, the company has the capacity to spend more than twice or three times as much as its peers in R&D. As a result, the company has the ability to launch innovative products and processes ahead of its competitors.

Benefits from a unique geographical position: Approximately, 92% of 5nm chips are currently produced in Taiwan as of 2022. The entire global supply chain is thus vulnerable to local natural calamities such as Earthquakes and droughts. Additionally, as previously mentioned, geopolitical friction between Taiwan and China has been rising. Intel will benefit from a distinguished geographic position and thus lessen its dependence on Asia thanks to the ambitious investment plans made by the company to expand its operations to Europe and enhance its position in the US.

Figure 43 – Percentage of 5nm chips manufactured in Taiwan as of 2022



Source: CNBC

Weaknesses

Decrease in profit margin: Since 2013, Intel's market share has been steadily declining. The outcome resulted in the company incurring massive losses.

Foundry market: Due to the sequential delay of the 14nm chip and 10nm, TSMC and Samsung, which are producing the 5nm and have already announced the production of the 3nm, are way ahead of Intel, which is producing its first 7nm chips. Thanks to this, Intel lost some clients and partnerships, including Apple, which announced in 2020 that it would switch to TSMC chips and start designing the chips themselves.

Going through a high investment phase: The roadmap presented by the company displays an aggressive investment plan for the next five years. This leaves the company in a vulnerable situation since its free cash flows might be negative for the upcoming years, and consequentially its dividend might not be well covered during this period.

Failed to enter the mobile industry: After unsuccessful attempts to enter the mobile devices industry, the company failed to have a significant impact in this industry. Back in 2011, Intel turned down an early partnership with Apple to provide them with chips for its iPhones, and since then the company missed an opportunity to be part of that business.

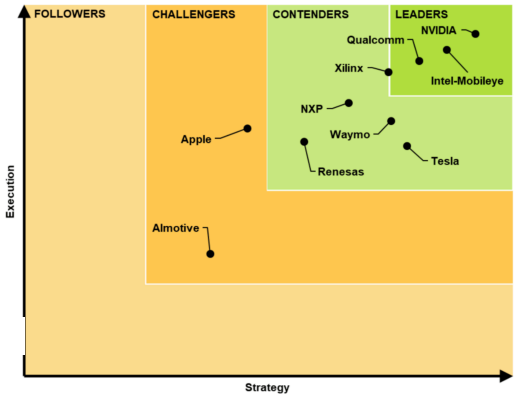
Seasonal Trend: Due to consumer demand and consumption, Intel's net revenue has often been higher in the year's second half.

Opportunities

Enter in GPU discrete market: Despite its presence on the integrated GPU, the company now has an opportunity to explore the discrete market and manufacture innovative products to obtain some market share.

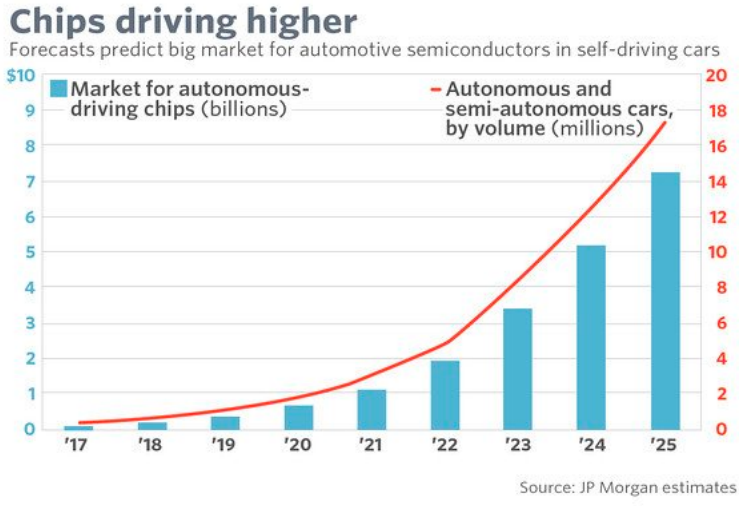
Autonomous driving: With the rise of the trend of autonomous vehicles, there is an urge and an exponential increase in demand for semiconductors in these vehicles. According to JP Morgan estimates, the market for autonomous-driving chips will increase from $1.64 billion in 2021 to $7 billion by 2025.

Figure 44 – Key players of chips and technology for autonomous driving



Source: Navigant Research

Figure 45 – Estimates for the autonomous driving chip market



Source: JP Morgan

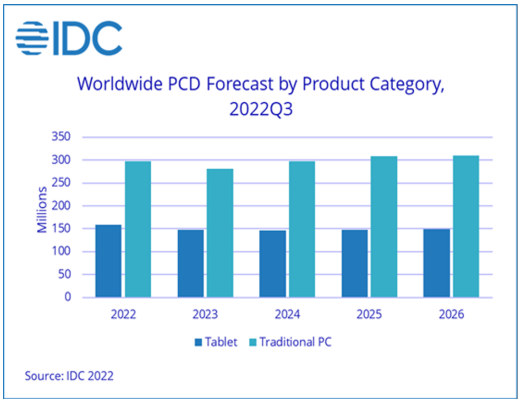
Threats

Dependence on certain suppliers: The overdependence on suppliers such as ASML gives them more control and higher bargaining power that may lead to an increase in the price of materials. Additionally, geopolitical tensions, mainly in Asia, and commodity prices directly impact the cost of production, representing an operational threat.

Demand for PC slump after the pandemic boost: Accordingly, to Statista, global PC, including Personal Computers, notebooks and ultramobile premiums, shipments will decrease by 9% in 2022 after two consecutive years with demand increasing by more than 10%. Besides that, nowadays, more than ever, consumers are relying more on smartphones and tablets, which is a very negative aspect of Intel's business since they do not have any presence in those markets.

Competition: Intel faces fierce competition in every business, and the possibility of the emergence of Chinese products will worsen the situation. Due to the high level of competition among a small number of companies, partnerships between them could negatively affect Intel's market share.

Figure 46 – PC market demand forecast



Source: IDC

Table 5 – SWOT Analysis

STRENGTHS	WEAKNESSES
- Diversified portfolio; - Brand value; - Benefits from a unique geographical position;	- Decrease in profit margin; - Foundry market; - High-Investment Phase; - Failed to enter the mobile industry;
OPPORTUNITIES	**THREATS**
- Enter in GPU discrete market; - Autonomous driving;	- Dependence on certain suppliers; - Demand for PC slump after the pandemic boost; - Competition;

Source: Author

PEST analysis

This analysis helps to understand the influence of external factors and the macro-environment of the business. The semiconductor market and chip design are one of the most dynamic industries in the world and being so, they are highly connected to a wide variety of external factors.

Political / Economic

As most of the companies operating in the semiconductor industry, they are exposed globally to diplomatic events, trade wars and geopolitical tensions, especially when it concerns China and US, and China and Taiwan. As semiconductors get more and more technologically advanced, it has been raising awareness among governments concerning national security instruments. In early October 2022, the US government implemented new

export controls for China due to the urge of the threat of the country building or acquiring these types of chips for military purposes. The trade relationships between the US and China have directly affected Intel's profitability and supply chain. China is the leading market for Intel's revenues, the company faces a lot of pressure, and as the trade war intensifies the price of tariffs tends to go higher as the price of the commodities also increases. The economic aspects affecting the company's business are the GDP of some Asian countries, the level of employment and the state of the economy overall since the company is inserted in a cyclical industry. As a consequence of business being held globally, the company also faces the risk of exchange rates and stability of the host countries and as it has been shown recently, the company is also vulnerable to inflation rates and interest rates.

Social

With the evolution of technology, there has been an increasing worry about the privacy and ethics of data information. Since the company holds employ's information and personal data, there is a constant worry about data protection from possible leaks and cyberattacks. On the social side, the company has several goals to meet regarding its water use and plans to achieve net-zero greenhouse gas emissions by 2040. Besides that, Intel also has plans for the inclusion of its workers and communities.

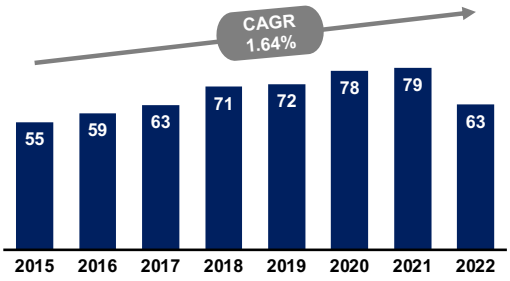
Technological

In 2013 Intel decided to shift its business model from being a PC centric to a data-centric business. Technology has driven most of the changes around the world in the past decades, so it is important for the company to maintain on the edge of technology and take advantage of this technological evolution. When the company decided to change its business from a mature market to a growing opportunity, its revenues have been increasing at a fast pace around the world as the company added a large range of new services and products. Investments in R&D play a major role in this industry, and it is extremely important for Intel to improve the performance of existing products and bring new and innovative products into the market. As the technology evolves, the company must keep open-minded and open to implementing new technologies as fast as possible, otherwise, the company might face harsh challenges again, like the delaying of implementing the EUV machines produced by ASML that increases the performance and efficiency of the semiconductors. Intel has to remain focused on its portfolio and improve its business along with new technologies.

5. Financial Analysis

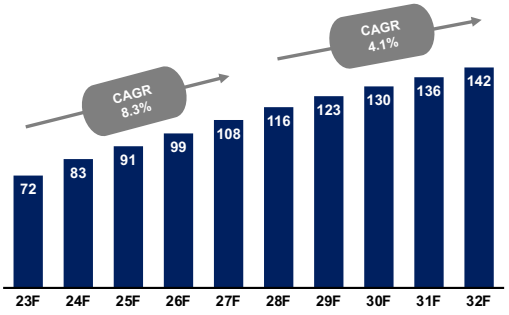
Intel revenues have followed a steady growth in the past 8 years, with a CAGR of 1.63%. As a result of heavy competition, delays in developing the most sophisticated semiconductors and the sales of PCs declining by 28.1% in the past year, the revenues for 2022 fell by 20%, decreasing to $63 billion. Besides that, the gross margin has decreased from 63.7% in 2014 to 55.4% in 2021, and to 43% in 2022. In the past decade, Intel has benefited greatly from the economies of scale and the complexity of producing this type of equipment. Until 2025YE Intel will face several challenges like the continuous shortage of supply, increased level of competitiveness and consequently loss of market share. Additionally, Intel is expected to invest more capital than twice as much as its peers in the next 3 years. In 2013, Intel announced a strategy to switch its focus from the PC business to the Data Center business, as it tries to maintain its leadership in the PC business. In the last couple of years, the revenues of the Data Center Group have had a CAGR of 5.23% between 2017 and 2021, while the CCG had a CAGR of 2.56% in the same period. The growth of the data center business reflects the increasing amount of investment made by governments and companies into IT infrastructures along with the adoption of cloud environments. Additionally, the ascending presence in the world of AI, IoT, machine learning, big data, and the penetration of 5G prompt the growth of the data center market. Considering the projections made by the company and the actual state of the world economy, with the PC shipments decreasing by 13% in 2022YE and higher unit costs, the revenues are expected to go back to the levels of 5 years ago. The company has designed a roadmap that requires a high investment in capital expenditures to build new facilities and factories. These facilities are expected to be completely operational by 2024/2025, which means that the company will not benefit from the capital expended until then. In the forecasted period, considering the growth of the different business sectors of the company, the revenues are projected to grow at a slow pace, and will only reach $77 billion again in 2024YE. After that, from 2025YE to 2032YE the expected growth stands between 5% to 10%, yielding a CAGR of 6.98% in the next ten years, slightly below the 7.4% CAGR estimated by Bloomberg for the Semiconductor Industry from 2022 to 2029. The global semiconductor market in 2021 had a market size of $528 billion and Intel had around 12% of the market share. According to McKinsey, this industry is poised for a decade of growth and is expected to reach around $1 trillion industry by 2030. If Intel manages to maintain the market share of around 15% the revenues might be higher than forecasted. The forecasted revenues for the year 2030YE are around $130 billion, which represents **12%** of market share semiconductor revenue worldwide. Looking at the past years, the 13-historical average of Intel's market share

Figure 47 - Past Revenues ($billions)



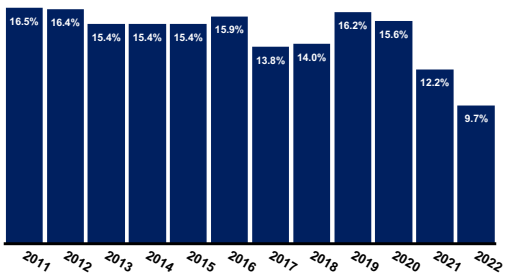
Source: Refinitiv Eikon

Figure 48 - Forecasted Revenues ($billions)



Source: Author analysis and estimates

Figure 49 – Intel's market share semiconductor revenue worldwide



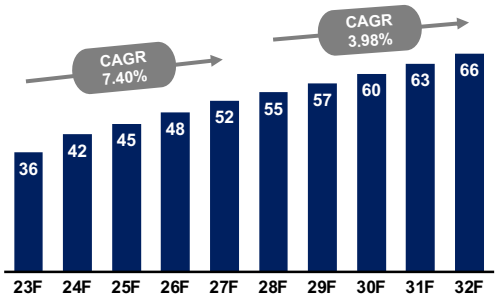
Source: Statista

semiconductor revenue worldwide is on average **15.03%,** reaching its highest values of 16.5%, 16.4% and 16.2% in 2011, 2012 and 2019 respectively and the lowest value of 9.7% in 2022. In the same report issued by McKinsey, the overall growth in the semiconductor market is driven by computing and data storage, wireless communication, automotive electronics and so on. The company has a strong and distinguished presence in all of these business segments.

Client Computing Group (CCG)

The fall of 28.1% in PC shipments in 2022 led to a decrease in revenues of the Client Computing Group (CCG) by 23%. In addition, the transition of Apple to producing its own components, since 2020, has negatively impacted the revenues of CCG. Despite high competition from AMD, it is also expected an increase in market share of the ARM-based CPU, used by Apple, which is forecasted to achieve a 20% market share in the next decade. The weight of the CCG on the revenues has been decreasing since Intel announced their plan to focus more on the data center side of the business. In the past 3 years, the weight of the segment in the total revenues decreased by 1.5%. Consequently, in 2025YE this business unit represents 49% of the revenues and 47% in 2032YE. The CCG had a three-year CAGR of 2.68% between 2019 and 2021. In 2023Y, following this pattern is forecasted that with the predicted demand for PC rising again in the next years this segment's revenue is expected to recover by 15% and after that is forecasted to reach $41 billion in 2024YE, then grow at a seven and half per cent per year until 2027YE after that is expected to grow at a constant rate of 5%. The CAGR in the forecasted period 2023YE to 2032YE is 6.19%, ramping from $31.7 billion to $66.5 billion.

Figure 50 - CCG Revenue ($billions)

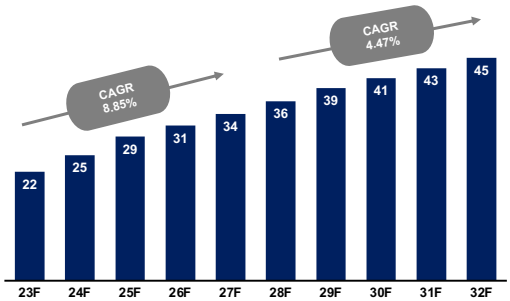


Source: Author analysis and estimates

Data Center and AI Group (DCAI)

Since the beginning of 2022, the DCAI segment includes FPGAs and ASICs, which play a critical role in the future of Intel revenues. In terms of performance, AMD is once again ahead of Intel, with their latest EPYC Milan, which according to Microsoft offers 31% more connectivity than the current solutions. However, Intel Xeon has an advantage relatively of storage capacity, with 6TB. One of Intel's most attractive points in this segment is the broad portfolio of solutions, which caters to wider demands and the ability to cross-selling products. Nevertheless, there is a lot of pressure in this business with the acquisition of Mellanox and Xilinx by Nvidia and AMD, respectively, giving them a boost in networking products for their GPU line-up. From 2021 to 2028, the server business is forecasted to grow at a CAGR of 7.8%. It is unlikely that Intel maintains their **96.9%** market share, but it certainly will continue to be a reference in this market and will take advantage of high-

Figure 51 - DCAI Revenue ($billions)



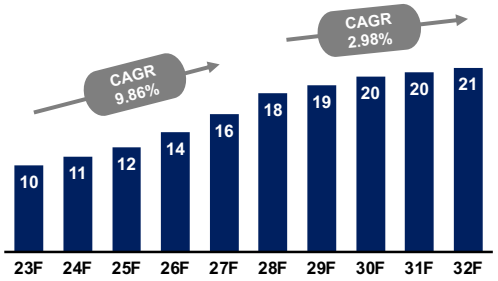
Source: Author analysis and estimates

growth revenue until the market reaches a mature state. According to the company, the next couple of years will serve to rebuild the server product portfolio leading to a growth slower than the overall data center market. Following this pattern is forecasted that the predicted demand for PC rising again in the next years. With that being said, after a decline of 15.4% in 2022, it is expected a growth of 15% in 2023YE and in the two consecutive years. In the forecasted period is expected a high growth until 2025YE, increasing from $22,08 billion to $31.39 billion in 2026YE, and then a steady growth from 7.5% in 2027YE, and then decrease to 5% in the subsequent years. The CAGR in revenues in the forecasted period is 7.41%, reaching $45.14 billion in revenues in 2032YE.

Network and Edge Group (NEX)

This business segment is composed of a portfolio of hardware and software that allows clients access to digital transformation from edge to cloud. The segment revenues include processors from the Internet of Things (IoT), which is the largest revenue contributor in the segment, ethernet adapters and silicon photonics-based. Given the most recent developments of Intel Xeon processors, there are a lot of expectations in the market of embedded processors for the next decade. In 2021 the market size was valued at $21.8 billion and the projected revenue for 2030 is $44 billion with a forecasted CAGR of 8.2% between 2022 and 2030 based on Straits Research. According to Omdia, Intel has the second largest market share in the Ethernet adapter market trailing behind Nvidia, due to their acquisition of Mellanox. Relative to Silicon Photonics, Intel has a market share of 53% according to Yole Development. The global Ethernet adapter market is projected to reach $16.30 billion by 2027 in revenues and register a CAGR of 33.50% from 2020 to 2027. Despite silicon photonics playing a minor role in this segment, this market is expected to grow at a CAGR of 26.8% between 2021 and 2027 and reach $4.6 billion in revenues by 2027. Based on the total revenue forecast across the three markets, is expected that this segment reaches $10 billion in 2024YE and $20 billion in 2030YE, and the expected CAGR in the forecasted period is 7.86%.

Figure 52 - NEX Revenue ($billions)

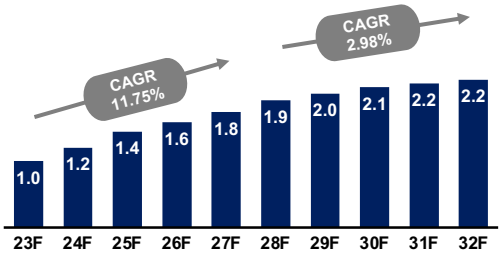


Source: Author analysis and estimates

Accelerated Computing Systems and Graphics Group (AXG)

Under this segment, Intel had already established its absolute leadership in the integrated GPU market and is looking forward to joining the discrete GPU market composed of Nvidia and AMD with a market share of 82% and 9%, in 2022, respectively, and the remaining 9% is held by Intel. Although Intel is a new player in this market, its products had achieved very good performances with a slight lag of 8.4% for AMD and 6.5% for Nvidia in terms of performance

Figure 53 - AXG Revenue ($billions)



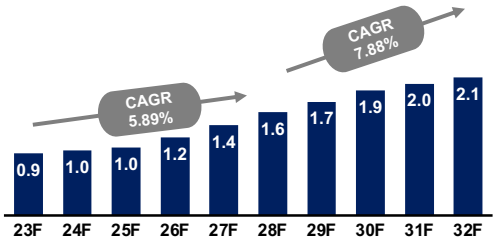
Source: Author analysis and estimates

benchmarks. The possibility of Intel becoming a strong contender against AMD and Nvidia leads to a lot of expectations in sales from this segment. The forecasted revenues are expected to reach $1.2 billion in 2024YE and $2 billion in 2029YE, with a CAGR of 8.30%.

Intel Foundry Services (IFS)

The acquisition of Tower Semiconductor was a very important step for Intel since it accounted for a small portion of the foundry market with a market share of 1.4%. Besides that, with all the aggressive investments made by Intel, $3.5 billion in New Mexico, $20 billion in Arizona, and €80 billion in Europe, throughout the next decade, is foreseeable high growth in revenues and also in market share in the forecasted period. Despite the decrease in the total revenues, this segment registered a growth of 14% in 2022, after a growth of 10% in 2021 and 55% in 2020. In 2023YE the revenues are expected to increase by 5%, from $895 million in 2022 to $940 million in 2023YE. Despite this peak in revenue growth, this segment will face conservative growth until 2025YE. After that is expected that most of the fabs that are under construction will be operational and taking advantage of the economies of scale. The estimated CAGR between 2023YE and 2032YE is 8.38% and the revenues are forecasted to grow from $895 million in 2022 to $2 billion in 2032YE.

Figure 54 - IFS Revenue ($billions)

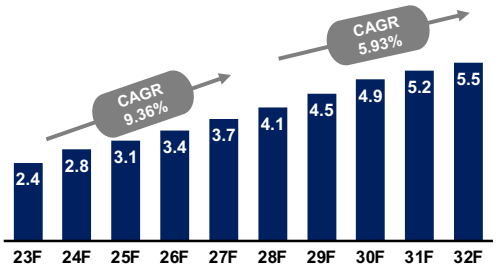


Source: Author analysis and estimates

Mobileye

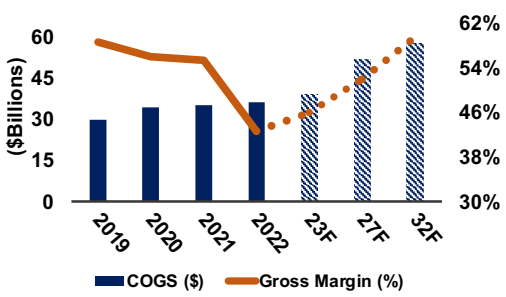
As vehicle production volume declined in 2020 by 17%, the revenues in this segment were directly affected but they still managed to achieve a revenue record of $1 billion in that year. Given the estimations by JPMorgan, it is expected a combined volume growth of autonomous and semiautonomous vehicles at $14 million units by 2025, from $2 million in 2021, and a market of almost $9 billion for autonomous driving chips, from $1.5 billion in 2021. As the IFS segment, this business segment registered a growth of 37% in 2022, after a growth of 43% in 2021 and 10% in 2020. So, it is expected that Intel continues to grab a large portion of the market share due to its partnerships with Toyota, Geely and Ford.
The revenues are forecasted to reach $3 billion in 2025YE and $9 billion by 2031YE with a CAGR of 10.57% in the forecasted period.

Figure 55 - Mobileye Revenue ($millions)



Source: Author analysis and estimates

Figure 56 - Cost of Revenue ($billions)



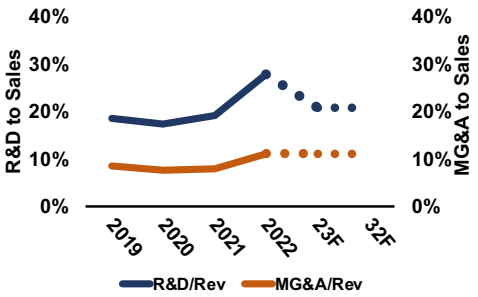
Source: Author analysis and estimates

Cost of Goods Sold

The cost of goods sold has an extensive impact on profits generated by the company and represented 57% of revenues in 2022. In the past three years the cost of revenue accounted for more than 40% of revenues and since Intel is going through a period of large capital spending, is forecasted that the cost

of revenue remains high in the following years. With that in mind, the COGS for 2023YE is expected to account for 54% of the revenues and then is forecasted to decrease 1.5% year over year, reaching 40.5% weight of the revenues by 2032YE, near to the historical average of the past 8 years, which is 39.82%. The cost of revenue accounts for the whole process of production which is development costs, fabless manufacturing, and shipping costs, which are expected to be reduced primarily from the fabs automation.

Figure 57 - Operating Costs

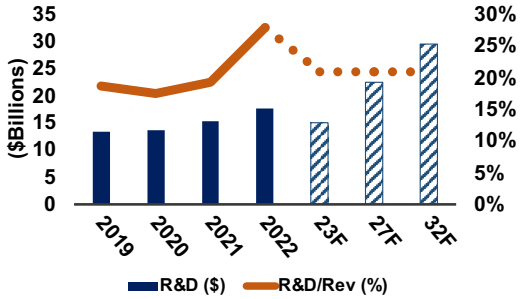


Source: Refinitiv Eikon, Author estimates

Operating Costs

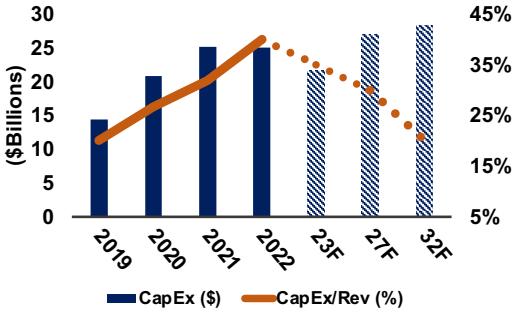
The Marketing, General and Administrative (MG&A) and R&D expenses in 2022 were $24.5 billion, with the R&D representing 27.8% of revenues. The increase of $2.3 billion in R&D and $668 million in MG&A from 2021 to 2022 is justified by investments in CCG, DCAI and Mobileye and incentive-based cash compensation. These costs are assumed to be directly influenced by revenues, so the period forecasted is expected to grow as a percentage of the past 9 years' historical average. The average weight of R&D in revenues in the past 8 years is 20.76% and for the MG&A is 11.08%. The operational expenses are foreseen to have a CAGR of 6.98% in the next 10 years, reaching $29.5 billion in R&D and $15.7 billion in MG&A in 2032YE. The increase of the operating costs by 96.3% from 2021 to 2031YE is sustained by the intense market competitiveness and the high necessity for faster and better-performance equipment.

Figure 58 - R&D expenses and the impact on revenues



Source: Refinitiv Eikon, Author estimates

Figure 59 - CapEx expenses ($billions)

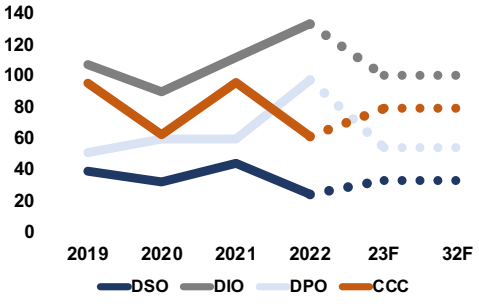


Source: Refinitiv Eikon, Author estimates

Rising CapEx in order to regain the market leadership

Over the last months, Intel planned and invested more capital than usual due to the aggressive expansion plans to the foundry market. As the semiconductor industry faces a supply shortage, Intel is looking for more independence from supply constraints. Intel has planned to build new fabs in Ohio and Arizona along with investments in New Mexico and Malaysia facilities. Additionally, Intel already started the expansion into Europe with an €80 billion investment plan in the next decade, until 2031. In 2022, the CapEx reached a total of $25 billion, which represents 40% of the company's revenues. In 2023YE is estimated that Intel reaches a CapEx of $21.7 billion, 35% of the projected revenue, from $20.3 billion in 2020. Looking at the past 9 years, on average, the CapEx amounted to around 21.6% of the revenues. Therefore, the CapEx is projected to stay around the middle to low digits of 30% until 2028YE as estimated by the company, and from 2029YE to 2032YE is forecasted to go from 25% of revenues to 20%. The estimated CapEx will represent a high percentage of sales, 35% in 2023YE and 2024YE and 2025YE, after that a small decrease to 30% in the next 3 years. Notwithstanding, the value of the CapEx will follow an upward trend throughout the forecasted period, reaching

Figure 60 - Liquidity Ratios (days)



Source: Author analysis and estimates

$24.8 billion in 2024YE (35% of net revenue) and $28.4 billion in 2032YE (20% of net revenue).

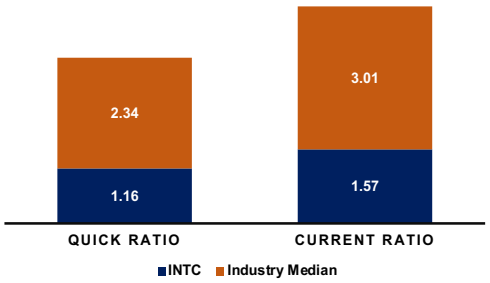
Net Working Capital

The NWC of Intel in the past periods has oscillated between negative and positive values. In 2022 the NWC was $7.76 billion and in the previous year, in 2021, was $14.49 billion. In the forecasted period the NWC is expected to decrease from $3.6 billion to $622 million in 2032YE. Regarding the current assets, Accounts Receivables, and Inventories, were estimated based on the eight-year historical average of Days Sale Outstanding (DSO) and Days Inventory Outstanding (DIO). The account receivables for the next ten years were estimated through the ratio of the estimated DSO per year and the revenues. The current liabilities include the Accounts Payable, which were estimated once again using the nine-year historical average of the Days Payable Outstanding (DPO). The forecast of the accounts payable and inventories were made through the ratio of the estimated DPO and DIO per year and the cost of revenue, respectively. The Accrued Liabilities were estimated based on the percentage of MG&A over the last nine years.

Financial Health

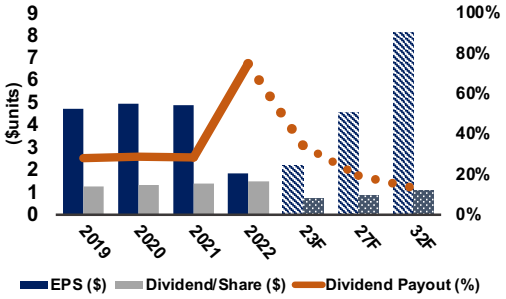
Regarding the liquidity values, Intel's quick ratio and current ratio had been consistently greater than 1, meaning that the current assets have been higher than the current liabilities required. Nevertheless, these values achieved by intel have been substantially lower relative to the industry median. The quick ratio and current ratio of 2022 were, 1.16 and 1.57, respectively, while the industry median was 2.34 and 3.01. Despite the company having the ability to meet its short-term obligations, as the quick ratio and current ratio demonstrate, the ratio of the company is still below the industry mean. It, therefore, means that peers have a greater ability to pay off their current debts with less struggle. In the forecasted period is expected an increase in the liquidity ratios, drawing near the peer's average. Regarding the Times Earned Interest (TIE), Intel has shown a stable position in the past, with outstanding values when compared to its peers, suggesting that the company has been able to meet its debt obligations better than the overall industry. In 2021, the TIE for Intel was 37.2 and the industry median was 20.7m but in 2022 the scenario was way different with Intel reaching a TIE of 4.7 while the peer's median was 23.0. For the next years, an extension of the past trend is expected. In the past eight years, the cash conversion cycle (CCC) had increased by almost 27 days, from 50.6 in 2014 to 83.2 in 2022. Compared with the industry median in 2022, Intel managed to get a lower CCC by 41.8 days, indicating higher liquidity and efficiency in the company operations and

Figure 61 - Liquidity ratios (%)



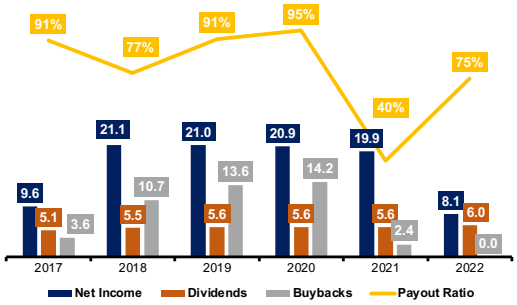
Source: Author analysis and estimates

Figure 62 - Intel Dividend Per Share & Dividend Payout Ratio



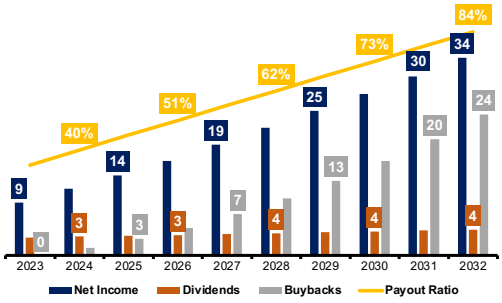
Source: Author analysis and estimates

Figure 63 – Historical Payout and payout ratio



Source: Company report

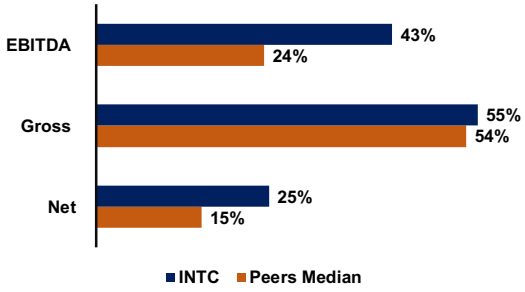
Figure 64 – Forecasted Payout and payout ratio



Source: Author analysis and estimates

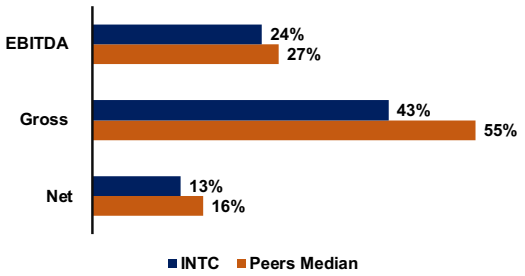
management when compared to the industry. Although it is a good value, the upward trend is not good for the company. In the forecasted period the CCC is predicted to vary around 79 days. The days payable outstanding (DPO) have been constant through the years, with an average of 33 days in the past nine years. This led to 58.6 days in 2021 and 77.2 in 2022, higher than the industry median of 57.2 days. The largest variations occurred on the days sales outstanding (DSO) and in the days inventory outstanding (DIO). The DSO had a positive variation of 44.8% in eight years, and in 2021 reached a value of 37.8 days and 39.6 in 2022, 19.6 days lower than the industry median. The DIO followed the same pattern with an increase of 30.8% in the same period, achieving 99.3 days in 2021 and 120.7 in 2022, below the industry median by 7 days. Concerning the percentage of long-term debt to capitalization, in the past seven years, the values have increased from 17.3% in 2014 to 28.9% in 2020, 25.1% in 2021 and 25.9% in 2022. The financial leverage of Intel has consistently been above the industry median, which is 15.8%. This shows that the proportion of long-term debt used to finance its assets, relative to the amount of equity used, has increased over the years and it is greater than the industry median, resulting in more leverage and higher variation in debt to equity, which increased from 24% in 2014 to 40% in 2021 and 39% in 2022. In the short-term, the current assets exceed the current liabilities by $20 billion and the same occurs in the long-term horizon with the long-term assets surpassing the long-term liabilities by $85 billion. The company's dividend payout ratio has oscillated between 26% in 2018 to 42% in 2016 and 75% in 2022. The company's dividends per share have been steadily increasing in the past 8 years, from $0.9 to $1.38 dollars per share in 2021 and $1.46 in 2022. Due to the high level of investment and the tremendous decrease in revenues in 2022, the dividend payout ratio was around 75%, as the Net Income available was around $8.1 billion and the amount paid in dividends was $6 billion. Over the years it is forecasted an increase of 3.65% of the amount paid in dividends, based on the historical average of the past nine years, and the dividend payout ratio is expected to decrease as the company will cut by half the dividends in 2022. In the forecasted period the dividend payout ratio is expected to stay around the 30% in the next two years and after that a steady decrease to 15% along the forecasted period, reaching 13.1% in 2032YE with $4.4 billion being paid in dividends and $24 billion in buybacks pending on the market conditions and the price of the stock. As mentioned above, the company has been investing a lot of capital and consequently is remarkable in its reinvestment rate. In 2021 the industry median reinvestment rate was 14.2% while Intel reinvested 16.1% of its capital. The highest value in the last 8 years was reached in 2018, with a rate of 21.0% while the lowest value was 8.4% in 2016.

Figure 65 - Intel Profitability Margins 2021



Source: Refinitiv Eikon

Figure 66 - Intel Profitability Margins 2022

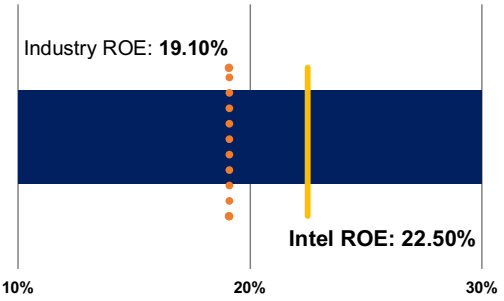


Source: Refinitiv Eikon, Author estimates

Financial Performance and Profitability

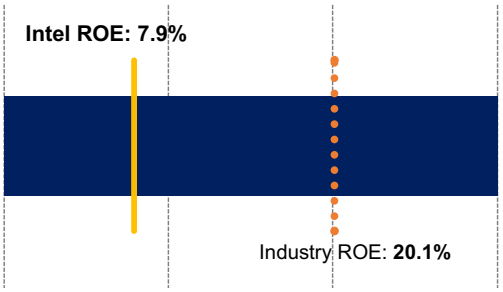
Intel is a mature company that is passing through a phase of a lot of investment, in order to catch up with its peers. In the previous decade, Intel led the Desktop PC and Server market with almost zero competition. Due to the recent profitable developments made by Nvidia and AMD, Intel has been losing its market share and consequentially its gross margin has been declining year over year. From 2014 to 2022 Intel's gross margin declined from 63.7% to 42.6%. Considering the difficulties faced by Intel due to the Covid-related supply shortages and the slow-down of the world economy, the next two to three years will be very rough in terms of revenues, shrinking its gross margins to 46% in 2023YE. Afterwards, the gross margin is forecasted to increase at 1.5% per year, reaching 59.5% in 2032YE, near to the historical average of the past 8 years, 60.18%. From 2013 to 2022 EBITDA Margin of Intel fluctuated from 38.2% in 2016 to 48.2% in 2020. In 2022 Intel's EBITDA Margin was 24.4%, in line with the industry median of 26.8%. Thereby, in the predicted period is expected a steady increase to 29% in 2023YE, and then a steady growth up to 43% in 2032YE. Moreover, both Intel's Operating Margin and Net Margin have been higher than the industry median in the past years except in 2022. In 2021 Intel had an Operating Margin of 24.6%, beating the industry median of 17.1% and, a Net Margin of 25.1% against a 15.3% of industry median. However, in 2022, the Operating Margin was 5.3% and the Net Margin was 12.7%, close to the industry median of 15.9%. Despite Intel presenting great profitability ratios until 2022, it has shown below-average capability when it comes to the efficiency of using assets and turning them into revenue. Using the DuPont formula, in 2021 the Asset Turnover of Intel was 0.49 and 0.36 in 2022, way below the industry median which was 0.71 in 2021 and 0.64 in 2022. On the other hand, the Return on Equity (ROE), which corresponds to the ability of the company of using the shareholders' equity, Intel had inconsistent results. In 2016 the ROE of Intel was 16% and in 2018 was 28.7%, with a difference in revenues of $11.46 billion. In 2021, the ROE was 22.5%, above the industry median of 19.1% and the S&P500 average of 21.88% but in 2022 the company ROE was 8.1% below the industry median of 20.1%. Over the forecasted period the ratio is expected to decline to 7% in 2023YE and thereafter a slow increase of 8.6% over the forecasted period, reaching 15.7% in 2032YE. Regarding the Return on Invested Capital (ROIC), the company has been able to generate higher returns on investments than it costs the company to raise the capital needed to make those investments. In 2022 the ROIC decreased from 14.8% in 2021 to 5.5%. Between 2014 and 2022 the average ROIC was 14.4%. In the forecasted period, Intel is expected to create value in its investments as well, except in the first three years. All in all, financially the company is well-positioned, and it is forecasted a slight increase in the CapEx as the company expands its

Figure 67 – 2021 Intel vs Industry ROE



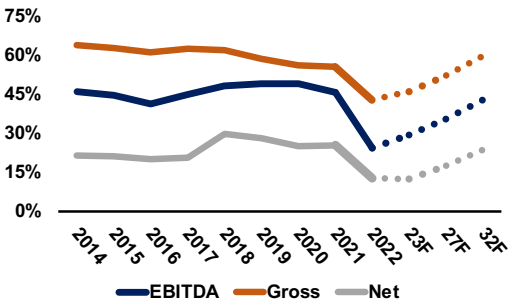
Source: Refinitiv Eikon, Author estimates

Figure 68 – 2022 Intel vs Industry ROE



Source: Author analysis and estimates

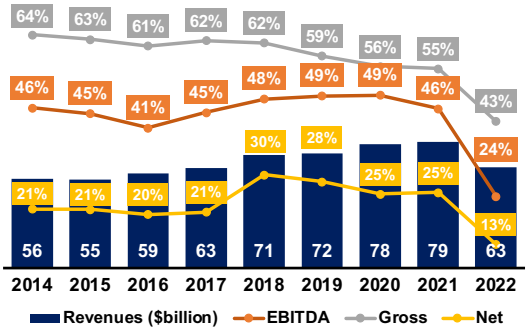
Figure 69 - Past and Future Profitability Margins



Source: Author analysis and estimates

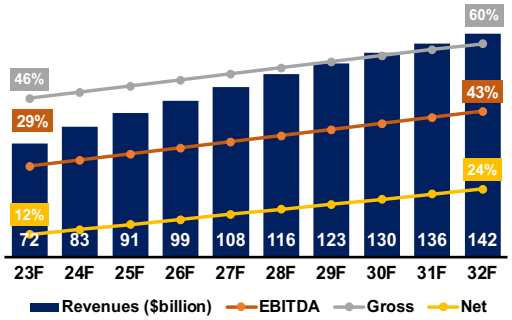
foundry services in the next three to four years. Currently, as of March 2023, the company is valued at $121 billion, with 4.1 billion shares outstanding. As previously mentioned, the earnings per share have been consistently growing over the last eight years, from $2.31 in 2014 to $4.86, providing a CAGR of 9.74%, however, in 2022 the EPS were $1.96. Looking at the revenue per share, it grew at a 7.23% eight-year compound annual growth rate. The net income per share followed the same trend, with an eight-year CAGR of 7.08%. It is important to note that these ratios will continue to suffer in the short-term a slight decrease, as the company will be heavily investing in the upcoming years. However, the gross margin and net margin presented by Intel show that the company has the necessary financial strength to be able to go through this phase of aggressive investments. The company has solid shareholder equity, and its level of debt is in line with its capital structure. Besides that, Intel has been able to buy back around 1-5% of its shares. In 2017 the company spent $3.5 billion in buybacks and $5.1 billion in dividends, and in 2018, 2019 and 2020 the company spent $10.7 billion, $13.6 billion, and $14.2 billion in buybacks, respectively. On top of this, Intel paid a consistent dividend of $5.5 billion in 2018 and $5.6 billion each year between 2018 and 2021 and $6.0 billion in 2022. Historically the company have been able to sustain and also increase its payout ratio but from 2022 and 2023 onwards, will be very difficult for the company to maintain their numbers. In 1997, Intel had 7.18 billion shares outstanding and in 2022 that number dropped more than 42%, to 4.1 billion. This means that the relative value of each share has been increasing. Another positive aspect regarding the financial positioning of the company is that its free cash flow has been growing faster than its dividend, which means that the company has been able to increase its dividends in a healthy structure until 2022.

Figure 70 – Historical Profitability Margins, Revenues in $billions



Source: Refinitiv Eikon

Figure 71 - Forecasted Profitability Margins, Revenues in $billions



Source: Author analysis and estimates

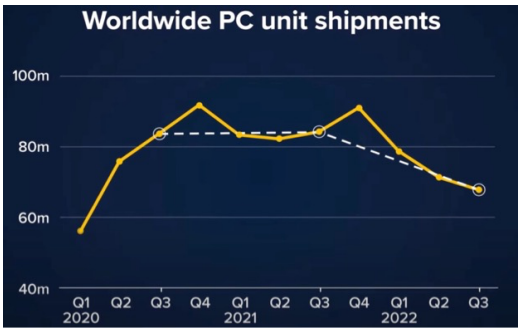
Figure 72 - Cash to Stockholders ($billions)

Source: Company Report

6. Investment Summary

Intel is a company that provides platform products, such as processing units, chipsets, and non-platform products, including connectivity products, graphics and storage products. Intel is a market leader in the Desktop, Laptop and Server segments as so the company has been directly affected by the decrease in demand for PC units in 2022. In the foundry market, Intel lost its leadership to Samsung in Q3 of 2021. Despite that, the company has ambitious plans for the upcoming years, to regain and maintain its leadership across all business segments. The price target of **$33.98**, represents an upside potential of 16%, issuing a **Buy** recommendation for Intel, on the closing price of $29.29 on March 28th, 2023. The target price was obtained through the Discounted Cash Flow Method (DCF), supported by the Dividend Discount Model (DDM) and Relative Valuation.

Figure 73 – Past Quarters PC demand



Source: CNBC

Valuation Methods

For the DCF valuation, the Enterprise Value (EV) of $160 billion was computed through the Free Cash Flow to the Firm (FCFF) approach. In order to complement the company's value, other models were also performed, such as a Multi-Stage Dividend Discount Model (DDM), once the company has a stable stream of dividends and stock repurchases in the last years, it was possible to perform this method, leading to a target price of **$31.88** with an upside potential of 8.8%. The relative valuation was carried out through multiples, using a selected range of peers from the semiconductor industry, supporting the recommendation with an average price target of **$41.22** with a potential upside of 41%.

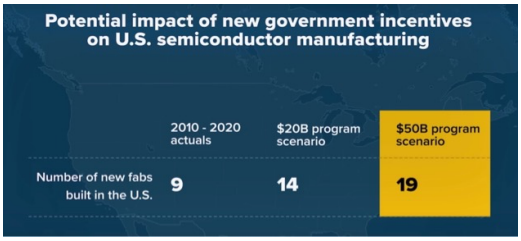
Figure 74 – Football Field price projection

Source: Author analysis and estimates

<u>Key Drivers</u>

The present undervaluation of Intel, across the three different methods, is believed to be due to the existing uncertainty around market leadership in the different business segments and is also a result of the high investment phase that the company is going through. The company's revenues have been growing year over year, reaching a CAGR of 4.43% in the last 8 years. In order to remain a competitive company, Intel has been forced to lower its margins in the most recent years, which will lead to a decline in the gross profit margin from 63.7% in 2014 to 42.6% in 2022 and 46.0% forecasted for 2023YE. In 2023, is expected a recovery in sales due to the expectation of an increase in chips demand, PC demand and more investments in cloud computing technologies, with partnerships with Microsoft and AWS which are one of the most cloud computing systems used in the world right now, autonomous driving and AI technologies. So, the company has a lot of options for

Figure 75 – Different possible scenarios of the CHIPS Act



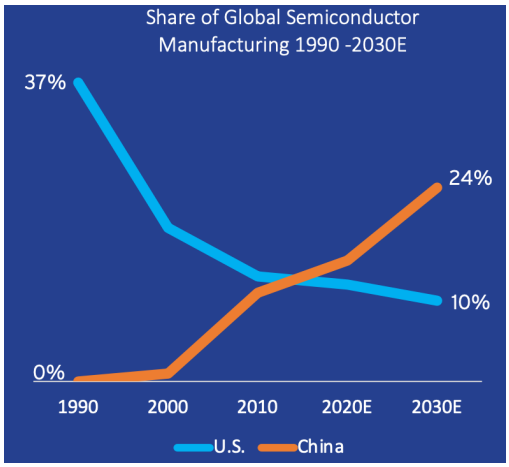
Source: CNBC

exponential growth exploring partnerships alongside the largest companies in the world, such as Amazon, Microsoft, Google and so on. After a decrease of more than 20% in revenues in 2022 is forecasted a recovery of 14.6% in 2023. The Earnings per Share (EPS) in 2022, decreased by $2.89, a decrease of 59% compared with the previous year. Although some business segments like NEX and Mobileye are getting revenue records, the two main segments CCG and DCAI have been extremely bearish in 2022. These events are justified by a decrease in demand for PCs and competitive pressure.

The CHIPS Act passed by the US Congress, and the strong momentum in Europe can reshape Intel's businesses, giving them a unique geographical advantage, and making their supply chain much more resilient and balanced. It is estimated that the company could receive up to $15 billion in assistance for the US manufacturing plants, this could leverage the company's Free Cash Flow if it goes on.

The climate of instability both economic and political, with inflation reaching double-digit figures, the Russian invasion of Ukraine, and the tension between China and Taiwan led to much uncertainty in the semiconductor market, causing a slowdown in the revenues of the companies. This led to more conscious investments made by Intel, leading to a decrease in the estimated yearly Capital Expenditures of $27 billion, at the beginning of 2022, to $21 billion. After the release of the new discrete GPU by Intel, the company will be able to access and compete in a market traditionally controlled by Nvidia and AMD. While Intel does not have a performance advantage over its rivals in this market, the company is quite close when compared to the base benchmark's performance. In 2022 the unexpected happened with Intel having the worst product in terms of benchmark performance, by a slight difference, and conquering 9% of the market share, equalizing AMD. In just one year the company managed to have an instant impact in a market valued at $40 billion in the US. This shows that Intel is able to innovate, compete and take advantage of its strong brand name that has been built. Besides that, Intel's expansion plans in the foundry market and its unique geographic position gives Intel much more independence and leeway from supply shortage and reduces its vulnerability to natural disasters and geopolitical tensions, which is very important since China and Taiwan account for more than 42% of Intel revenues. The expected growth in the foundry market, the emergence of the FPGAs and the Internet of Things (IoT), and the entry into the discrete GPU market will pave the road to a stronger competitive position, better financial position and ultimately regain the market leadership in the Semiconductor Industry against Samsung in the long-term. The reason why it is believed that Intel is undervalued is firstly due to the delay of the production of the 10-nanometer, which should be launched in 2015 according to Moore's Law, and while Intel started the production of the 7-nanometer chip early in 2022, TSMC

Figure 76 – Percentage of semiconductors manufactured in the US and China in the past years and an estimate for the upcoming years



Source: Statista

Figure 77 – Geographical distribution of Intel's factories planned until 2024

Source: CNBC

and Samsung are already producing the 5-nanometer chip which is the most advanced node on the market. The lack of innovation and strong competitiveness has cost Intel in the last decade a big pie of the market share, not only in the foundry market but also in the performance of the design of microprocessors. Nonetheless, Intel will be expanding its production in the US and Europe, with two huge fabs in Arizona, costing them $20 billion, a major fab expansion in Ireland and new projects in Europe which will cost Intel around $80 billion in the next ten years. Intel has announced for 2025, the 18a, which is a chip so efficient that will be needed an even smaller unit of measurement than the nanometer to measure it, the angstrom. So, it will require a lot of work and innovation from Intel to take the next steps and if the company meets the scheduled timetable, it will for sure regain its dominance and will be the world's largest integrated design and manufacturer for the long term, putting them back on track. The biggest doubt right now is if the investments that the company is putting through will eventually pay out or if it will be oblivion and the company keeps investing and getting no returns. On the other hand, if the company receives assistance from the US government, if the supply chain issues lessen, and if all the factories work out and turn out well to be a good investment then the company is deeply undervalued. Intel is facing a lot of pessimism from the market since they have been losing market share plus the new phase of aggressive investments that will suppress the earnings of the company for the next four years, at least. Looking at the company's overall financials, the company is currently valued at $121 billion with 4.1 billion shares outstanding, giving a share price of $29.29. The revenue per share has been growing at a 9% ten-year CAGR. The compound annual growth rate in 2019 and 2021 was 11.58%. Besides that, the company has solid shareholder equity and looking at its debt, the current ratio and the quick ratio show that the company has the ability to pay off its debt with no struggle. Intel has repurchased about 1-5% of their shares annually during the past ten years. From 1997 to 2022, the shares outstanding went from 7.18 billion to 4.1 billion, a 43% reduction in share count. Additionally, the company pays a consistently growing dividend. In the past ten years, the compound annual growth rate of its dividend is 5.18%. Also, it is important to note that the company will be investing heavily over the next 5 years, which will suppress some of its earnings in the short term. Intel's Price-to-Earnings of 14.95x is relatively low when compared to its peers, especially when looking at its most direct competitors, AMD and Nvidia, with P/E of 119.38x and 156.27x, respectively. AMD has an inconsistent track record of profitability and has been increasing its share count consistently with no dividend since the company is unable to sustain one. On the other hand, Nvidia is a company with excellent results and expected high growth, but it is already priced for perfection.

Figure 78 – The interest shown by European countries and different locations where Intel is present through factories or R&D centres

Source: CNBC

7. Valuation

The price target of **$33.98** with an upside potential of 16% on the adjusted close price of $29.29 on 28th March 2023, was reached through the Discount Cash Flow (DCF) method, which measures the intrinsic value of the company based on the sum of the present value of its future cash flows. Based on this, the perspective is that the company is undervalued, and the recommendation stands in **BUY**. To confirm the robustness of the DCF and to include the investment risks was also performed a sensitivity analysis and a scenario analysis in the next section. The DCF analysis is complemented by the Dividend Discount Model (DDM) and a market valuation, using Price Multiples and Enterprise Multiples, with the purpose of reiterating the DCF.

Table 6 – FCFF Approach

Price Target	
Enterprise Value ($Millions)	$159,623
(-) Total Debt	$47,279
(+) Cash & Cash Equivalents	$28,338
Equity Value	$140,682
#Shares Outstanding (Million)	4,140
Price Target	**$33.98**
Price 28 Mar, 23	$29.29
Upside Potential	**16%**

Source: Refinitiv Eikon and Author estimates

Free Cash Flow (FCF)

The DCF valuation applies the Free Cash Flow to the Firm (FCFF) approach to arrive at the intrinsic value of the company. The length of the period forecasted is 10 years due to the fact that Intel is going through a phase of a high level of investment that will persist, at least, for the next three to four years. Initially, it was projected the FCF for the next 10 years by estimating the revenues, EBIT margins, Depreciation and Amortization, investments in fixed capital (CapEx) and, the change in net working capital (changes in NWC). After that, was reached a terminal value through the perpetuity growth model. And then the projected FCF and the terminal value were discounted back to the present value in order to get the enterprise value.

Weighted Average Cost of Capital (WACC)

The estimated WACC for Intel Corporation was **10.71%** with an after-tax cost of debt of **4.19%** and a cost of equity of **13.25%**.

Table 7 – WACC Inputs

Input	Rate	Source
Risk-free rate	**3.57%**	10-year Government Bond US
Beta	**1.50**	Average of Bottom-Up approach and Regression Analysis
Equity Risk Premium	**6.45%**	Weighted Average based on Revenue per region (Damodaran)
Cost of Equity	**13.25%**	CAPM
Cost of Debt	**4.99%**	Risk-free rate & Default Spread & Country Default Spread (Damodaran)
Tax Rate	**15.99%**	Average 9-Year Historical Tax Rate
Debt/Equity	**38.99%**	Total Debt 2022 divided by Market Capitalization on 28th March 2022
WACC	**10.71%**	

Source: Refinitiv Eikon, Prof. Damodaran and Author estimates

Cost of debt

The cost of debt was reached through the combination of the Risk-free rate, the Default Spread and the Country Default Spread. The Risk-free rate of **3.57%** was achieved through the United States 10-year government bond. The Default Spread took into account Moody's rating of Intel, which is A2, giving it a rate of 1.42% following Professor Damodaran's 2023 January update. According to Professor Damodaran's database, the country default spread for the United States is 0%. Considering the previous values, the reached pre-tax cost of debt is **4.99%**.

Cost of equity

The cost of equity was computed through the Capital Asset Pricing Model (CAPM) formula, reflecting the weighted average Equity Risk Premium (ERP) of different countries due to the global exposure of the company. The weighted ERP achieved is **6.45%**, considering a select range of countries based on revenues. The values for each country were obtained through the Equity Risk Premium from Damodaran's database updated in January 2023. With a Risk-free rate of 3.59%, an ERP of 6.45% and a Beta of 1.50 the expected return on equity is 13.25%.

Table 8 – Cost of Debt

Cost of Debt	
Risk-free rate	**3.59%**
Default Spread (Moody's rating A1)	**1.42%**
Country Default Spread - US (Damodaran)	**0.00%**
Pre-tax Cost of Debt	**4.99%**

Source: Author analysis and estimates

Table 9 - Equity Risk Premium (ERP)

Country	Weight	ERP	Weighted ERP
China	27.16%	7.16%	**1.96%**
Singapore	15.32%	5.94%	**0.91%**
United States	26.21%	5.94%	**1.56%**
Taiwan	13.15%	6.97%	**0.91%**
Rest of the world	18.16%	6.18%	**1.11%**
Weighted Average ERP			**6.45%**

Source: Author analysis and estimates

Tax Rate

For the tax rate, it was used the historical average of the effective tax rate in the past nine years, giving a value of 15.99%.

Table 10 - Required Return on Equity

CAPM	
Equity Risk Premium	**6.45%**
Beta	**1.50**
Risk-free rate	**3.57%**
Return on Equity	**13.25%**

Source: Author analysis and estimates

Beta

The Adjusted Beta of 1.50 results from the combination of two methods, the Bottom-up approach and regression analysis. The Unlevered Beta used in the Bottom-up approach was extracted from Damodaran's database updated in January 2023, with a Beta for the semiconductor industry of 1.48. Then, with a total debt of $47,279 billion, covering the long-term debt, current debt and capital lease obligation, and a market capitalization of $121 billion, results in a debt-equity ratio of 38.99% and a Levered Beta of 1.96. The regression analysis is based on NASDAQ and Intel's 5-year daily closing price variation, from 28th March 2018 to 28th March 2023, giving a Beta of 1.04. With the Adjusted Beta of 1.50, a Risk-free Rate of 3.57% and a Market Risk Premium of 6.45%, the expected return on equity using the CAPM formula is 13.25%.

Table 11 - Enterprise Value

Enterprise value	
Terminal Growth Rate	2.89%
Discount Rate	13.25%
Terminal Value ($Millions)	$335,036
PV of Terminal Value	$121,105
NPV FCFF 22-31	$38,517
Enterprise value	**$159,623**

Source: Author analysis and estimates

WACC

Considering the after-tax cost of debt of 4.19%, the cost of equity of 13.25% and the respective weights of 28.05% for debt and 71.95% for equity and

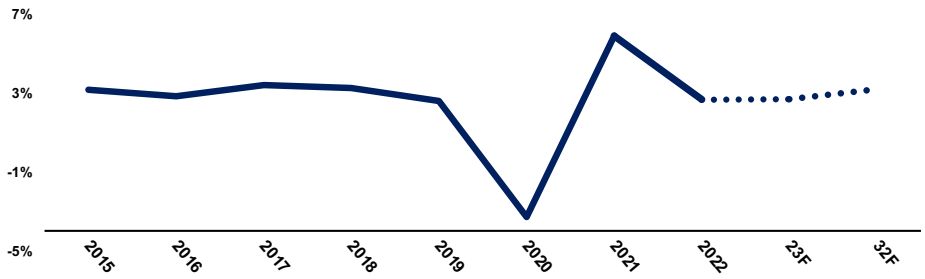
considering the tax rate previously mentioned, the obtained WACC rate is 13.25%.

Terminal Value

The terminal value was computed through the Perpetuity Growth Model Approach, and it is the expected value that the company will continue to generate and operating cash flows in the future. Considering the forecasted GDP by IMF from 2023 to 2027, which are the most forward-looking projections available, of each country where Intel operates, with a weighted percentage of sales, it reached a perpetual growth of 2.89%. This value is considerably high due to the level of sales in emerging economies such as China and Taiwan. The predicted average of the World GDP in the same period is 3.16%. The unlevered cash flows are expected to increase at a 2.89% growth rate, which is very conservative given the 8.45% CAGR of revenues.

$$TV_{2032} = [FCFF_{2032} \times (1 + g)/(WACC - g)$$

Figure 79 - World GDP Growth (annual %)



Source: IMF Data and estimates

Dividend Discount Model (DDM)

Intel is committed in return cash to its stockholders, through a share repurchase program and dividends. The dividend for 2022 was $1.46. In the last nine years, the dividends grew at a 5.53% CAGR. The Payout Ratio will be divided between dividends and buybacks. The dividends estimated in the forecasted period were based on a nine-year historical average of 4.08%. Regarding the buybacks, the average of the past six years is $7.42 billion, while the average of the forecasted period is slightly below, $9.8 billion. Considering that Intel will return a stable payout ratio of 90% after 2032YE, through dividends or stock buybacks, was performed a Multi-Stage DDM. Stem from the forecasted after-tax profits for the next ten years, steady growth in the payout ratio from the 34% predicted in 2023YE to 84% in 2032YE and 90% in perpetuity, the same 2.89% perpetual growth and cost of capital of 13.25% assumed in the DCF, a value of **$31.88** per share was achieved, with an

Table 12 - Dividend Discount Model (DDM)

Dividend Discount Model (DDM)	
Terminal Growth Rate	**2.89%**
Discount Rate	**13.25%**
Equity Value ($Millions)	**$140,682**
#Shares Outstanding (Million)	**4140**
Price Target	**$31.88**
Price 28 March, 23	**$29.29**
Upside Potential	**9%**

Source: Author analysis and estimates

upside potential of 9% as of 28th March 2023, with a closing price of $29.29. The implied target price supports the DCF Valuation and recommendation, which is to **BUY**.

Relative Valuation

In order to complement the valuation of Intel Corporation, it was conducted multiples valuation, where it is possible to compare Intel with similar companies in terms of risk exposure and business structure in the Semiconductor industry. The group of peers was selected from Refinitiv Eikon and then adjusted with companies with similar business and market capitalization. Two different approaches were performed for the relative valuation, Price Multiples and Enterprise Value Multiples. The multiples implemented in this valuation were P/E, EV-to-Sales ratio and EV-to-EBITDA ratio. With the aim of obtaining the most accurate values using this valuation, the data considered for Intel and its peers were collected based on results for the trailing twelve months, up to 28th March 2023.

Price-to-Earnings ratio

Through the median P/E of its peers, the fair price per share is **$33.15**, representing a potential upside of 13.2% as of 28th March 2023. The peer's P/E has a very wide range, which is why it was decided to use the **median** instead of the average of all the values. The P/E of the most direct competitors of Intel, such as Nvidia and AMD are considerably higher. The US Semiconductor industry average has a P/E of 17.70x reaching a price target of $34.67, which is in accordance with the DCF valuation.

EV-to-Sales ratio

For EV/Sales, it reached a price target of **$50.86**, which is substantially higher than the other multiples performed. The use of this multiple is best suited for Intel than the related Price-to-Sales because it considers the company's debt load and cash.

EV-to-EBITDA ratio

The EV-to-EBITDA ratio reached a price target of **$39.64**. This ratio has a significant drawback since it does not account for the capital expenditures, which in the case of Intel and in this industry is very relevant, however, it is possible to compare the company's value, including debt and liabilities, to its actual earnings.

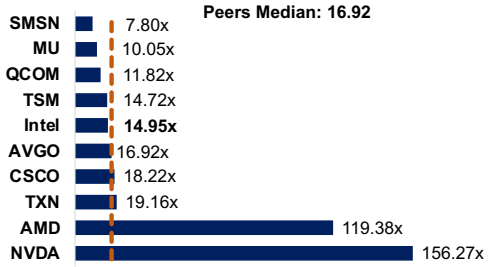
After assessing all the multiples, based on the average it was obtained an implied target price of **$41.22** with an upside potential of **41%**. The

Table 13 - Multiples Valuation

Multiples	Price Target
P/E	$33.15
EV/Sales	$50.86
EV/EBITDA	$39.74

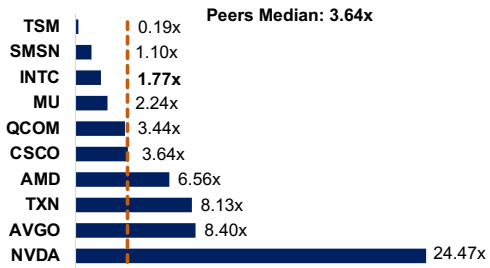
Source: Author analysis and estimates

Figure 80 - Peers Trailing P/E



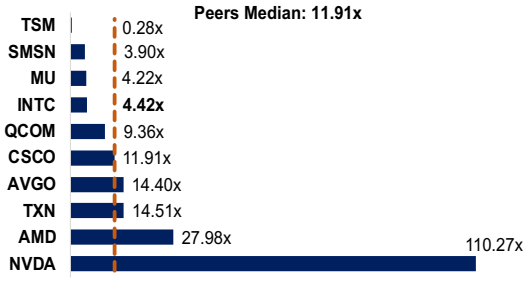
Source: Refinitiv Eikon, Author estimates

Figure 81 - Peers EV-to-Sales



Source: Refinitiv Eikon, Author estimates

Figure 82 - Peers EV-to-EBITDA



Source: Refinitiv Eikon, Author estimates

recommendation is to **BUY**, supporting the DCF Valuation and recommendation.

Table 14 - Peers' Multiples

Peers	P/E	EV/Sales	EV/EBITDA
NVIDIA Corp	156.27x	24.47x	110.27x
Advanced Micro Devices Inc	119.38x	6.56x	27.98x
Texas Instruments Inc	19.16x	8.13x	14.51x
Cisco Systems Inc	18.22x	3.64x	11.91x
Broadcom Inc.	16.92x	8.40x	14.40x
Taiwan Semiconductor Manufacturing Co Ltd	14.72x	0.19x	0.28x
Qualcomm Inc	11.82x	3.44x	9.36
Micron Technology Inc	10.05x	2.24x	4.22x
Samsung Electronics Co Ltd	7.80x	1-10x	3.90x
Intel Multiple	**14.95x**	**1.77x**	**4.42x**
Peers Median	**16.92x**	**3.64x**	**11.91x**

Source: Refinitiv Eikon, Author estimates

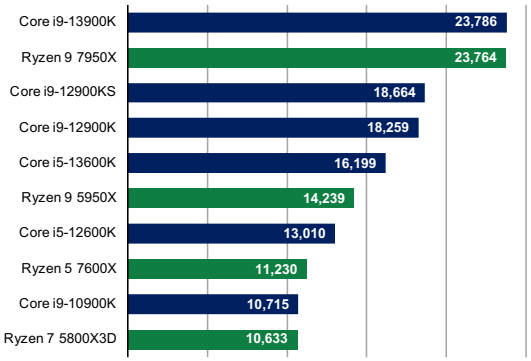
8. Investment Risks

The investment risks analysis took into account an overall overview of the main factors that can impact the operations of the company. The main components that have had the most influence on the company's operation in the last years were the delay of the production of the 10nm chip and then consequently the 7nm chip, and the protectionism around this industry imposed by the government. As a consequence of the lack of innovation in the past, the current operational standings of the company are in a dreadful situation, which is reflected in the stock price. The company is already priced for the struggle that the company will face in the next couple of years, hopefully, 2022 and 2023. In 2022, for the first time, NATO recognized China as an existential threat to the world order. The political and geopolitical factors can seriously impact Intel, both with its factories outside the US and the rules and restrictions applied by the government on whom the company can and cannot sell its products. On the other hand, the company will receive from the US government, through the CHIPS Act, $15 billion. Additionally, Intel will receive $7.3 billion as a subsidy from the German government, and the European Union will also provide €43 billion in its Chips Act, and Intel will benefit about $6.8 billion. With the current geopolitical tensions, the governments will actively incentivize the production of semiconductors on their own territories in order to reduce dependence on Asian countries. The main reason why the company is receiving a lot of aid from the US government and the European Commission is that the Western nations view the production of semiconductors as a question of national security and high-dependency products. Besides that, China continues to promote the one-China policy, according to which Taiwan is a part of China but is governed by a distinct political system and China has a significant economic impact on South Korea. In order to keep TSMC as the main worldwide supplier, the Taiwanese government is supporting the company through advantageous laws, aggressive tax cuts and research funding. The South Korean government is committed to developing a semiconductor ecosystem in the country through the $260 billion fund by 2029, with Samsung playing a major role. Regarding the delay in the launch of the latest chips, the company has a roadmap and if the company abides by its plan, it is feasible that the company reaches TSMC and Samsung technologies by 2025, with the launch of 20A in 2024 and 18A in 2025, in other words, the 2nm node semiconductor. On the design side of the business, when compared to the most recent Intel core processor, Raptor Lake, which uses 10nm fabrication, with AMD Ryzen 7000 series, which uses TSMC's 5nm fabrication. Contrary to what some investors might actually think, both products have similar results in terms of performance.

Figure 83 – Intel's subsidies in the next couple of years ($billion)

Source: CNBC

Figure 84 – Overall Score Multi-Core Processors Intel (Core) vs AMD (Ryzen)



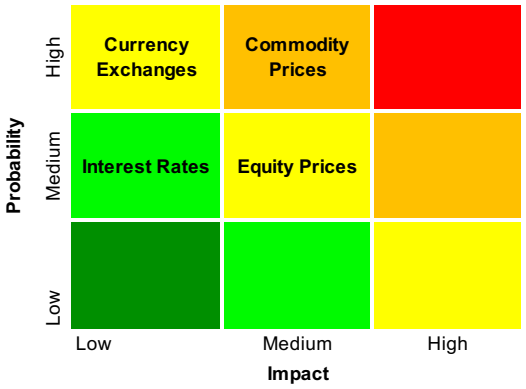
Source: PassMark

All things considered, the risk involved with this investment is **High**, due to the level of investment the company will make in the coming years, political and geopolitical instability in key locations for Intel's prosperity and factors such as innovation and development, for which they have weighed heavily in the past for the worst reasons and have been taken into account in the valuation process of the company.

Market Risks

Interest Rates risk is directly related to the company's outstanding debt and fixed-rate investment portfolio. As stated in the company's report, a hypothetical increase in the interest rates by 1%, taking into account all the hedge investments, would result in a loss of $120 million in its investment portfolio as of December 2022. On the other hand, a decrease of 1% in the interest rates would increase the fair value of the company's investment portfolio by $75 million as of December 2021. To minimize this risk and provide financial flexibility to its investments, the company is involved in strategies which include interest contracts that track the US dollar three-month LIBOR-based returns and swaps instruments that are generally offset by respective losses or gains on the correspondent hedging instruments. If the same were to happen, considering that the floating-rate and fixed-rate debt is converted to floating-rate debt, a hypothetical increase (decrease) of 1% in the interest rates would result in an increase (decrease) in the annual interest expense of less than $100 million from outstanding debt as of December 2022.

Figure 85 – Market Risks Matrix



Source: Author analysis and estimates

Equity Prices risk takes into account the marketable equity securities and equity derivative instruments. As of December 2022, the company's marketable securities were valuable at $1.3 billion, and the majority of its securities were traded on the Chinses Shanghai Stock Exchange. Regarding the company's non-marketable equity securities, these were valued at $4.6 billion as of December 2022, including the investment in Beijing Unisoc Technology Ltd. Of $1.1 billion ($1.1 billion as of December 2021).

Currency Exchange risk is present in a significant portion of the company's operating expenses and capital purchased, especially in the Euro, the Israel shekel, the Malaysian ringgit, the Japanese yen and the Chinese yuan. The company states that the gains or losses in the non-US-dollar-denominated investments in debt and equity instruments are usually offset by corresponding losses or gains on the related hedging instruments. All of the company's revenue is transacted in US dollars, and a weakened dollar may imply an increase in some expenses, such as utilities, raw materials, tax, and marketing expenses that are paid in the respective country. Intel relies on forward contracts, interest rate swaps and options contracts to have a more solid

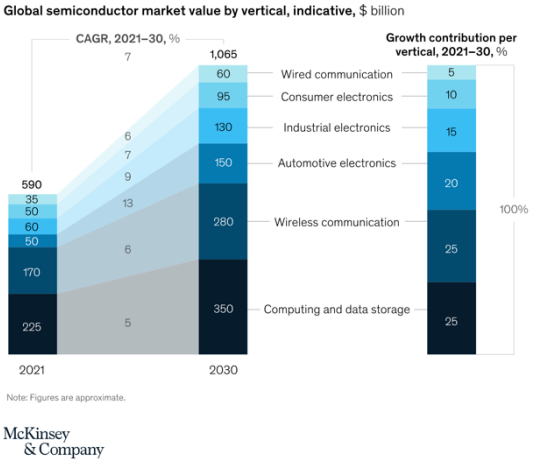
financial position that may result from setting up hedging strategies for currency exchange rates.

Commodity Price risk probably represents the lower risk among the others since Intel claims that is not affected directed by the commodity price risk to a material degree. According to the company's annual report, Intel set up a plan to mitigate the risk of a potential supplier concentration by creating a wide portfolio of commodity suppliers reducing the bargaining power. The company also uses commodity swaps and other kinds of commodity derivative contracts to protect itself against fluctuations.

Operational Risks

In the past decade, one of the risks that have affected the company significantly was the risks associated with developing and implementing new technologies. Intel has suffered a lot with the delay of the implementation of the 10nm and in 2020 the delay of the implementation of the 7nm chips. These delays allowed the competition, using third-party foundries such as TSMC to produce products with higher performance and efficiency. To circumvent this situation, the company has increased R&D spending, but it is still vulnerable to it happening again. Each time the company moves to next-generation process technology implies a lot of changes and risks inherent to this process due to its manufacturing complexity. Besides that, the company is also exposed to supply chain issues, such as quality issues, long lead times or unavailability. This threat was minimized by the company's decision to enter into arrangements with key suppliers that involve long-term purchase commitments and large prepayments. There is always the chance that new players may enter an already fiercely competitive market, or that new technologies will replace those already in use. As a result, Intel may have to raise R&D expenses in the future and might risk losing market share, this was taken into account in the course of this valuation. As previously stated in the financial analysis, is estimated by McKinsey that the semiconductor industry reaches a trillion-dollar industry by 2030. Intel's market share has steadily maintained around 14.7% in the last 14 years, reaching 16.2% in 2019 and 9.7% in 2022. In the forecasted estimates, the expected revenues for the year 2030 are around $130 billion, which represents a 12.2% market share. The company is involved in all the key business segments that will drive the market's growth in the next decade.

Figure 86 – The overall growth in the global semiconductor market is driven by the automotive, data storage and wireless industries

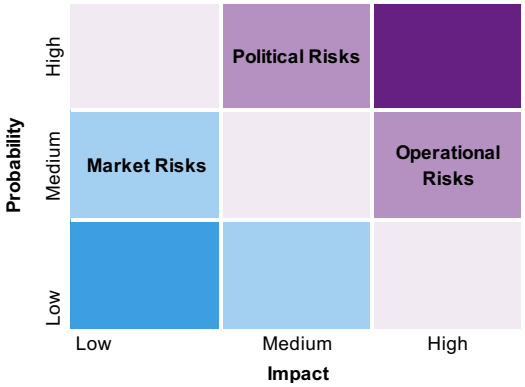


Source: McKinsey&Company

Political Risks

Intel businesses are spread across the globe and some operations may be more susceptible to this type of risk than others. In the past year, 2022, 73% of the company's revenue was accounted for outside the US. Since 2013, the sales for China alone ramped up more than 10 billion dollars, with an increase of 18.76% of total revenues in 2013 to 27.16% in 2022. These data show that any adjustments in the commercial relationships between the US and China can severely impact the company. In this way, trade policies and disputes may result in increased manufacturing costs, reduce demand, turn the products less competitive and limit the ability to sell the products to certain customers, as was the case with Nvidia was forbidden from exporting certain chips to China in 2022 by the American Government. With the evolution of the Trade War between the US and China, these overall resulted in increased tariffs and export restrictions that lead to a decline in financial performance. Besides that, the company is also dependent on laws and regulations worldwide that can decelerate or not certain technologies. Adapting to technologies such as 5G and autonomous driving involves a lot of regulations and compliance, which can be expensive and harm the course of business operations. Some laws established by the European Commission and other entities may limit the adoption of innovative technologies due to data protection and privacy legislation. The friction created by these entities has reduced the demand for products and services, especially in the cloud, Internet of Things and AI applications.

Figure 87 – Overall Risk Matrix



Source: Author analysis and estimates

Risks to Price Target

Due to the high impact and importance of the WACC and the growth rate in the company's valuation, a sensitivity analysis was performed, assuming a 1 p.p. deviation for each parameter. The fluctuations in the growth rate are predicted to come from the stronger or poorer performance of the selected economies (China, the US, Taiwan and Singapore) in the forecasted period based on the 10-year historical average. The changes in the WACC may result from better or worse financing programs that could affect the cost of debt if the company decides to increase or decrease its debt levels and consequentially provokes a change in its spread and debt rate. The cost of equity is also dependent on several factors, and it can be altered with the issue of more shares, creating dilution if the price of the stock does not follow these actions, its debt-to-equity ratio also changes among other factors, may induce a different cost of equity and therefore a different WACC. In this regard, a price range that may vary from $20.83 to $63.90 was obtained, demonstrating the price's sensitivity to changes in these inputs.

Table 15 – Effects on change in WACC and Growth rate

Price Target $33.98		Terminal Growth Rate, %								
		1.89%	2.14%	2.39%	2.64%	2.89%	3.14%	3.39%	3.64%	3.89%
WACC, %	8.71%	$46.25	$47.87	$49.62	$51.51	$53.56	$55.80	$58.25	$60.94	$63.90
	9.21%	$41.42	$42.76	$44.21	$45.76	$47.44	$49.25	$51.22	$53.37	$55.72
	9.71%	$37.24	$38.37	$39.58	$40.87	$42.25	$43.74	$45.35	$47.09	$48.98
	10.21%	$33.61	$34.56	$35.58	$36.66	$37.82	$39.06	$40.38	$41.82	$43.36
	10.71%	$30.41	$31.23	$32.09	$33.01	**$33.98**	$35.02	$36.13	$37.32	$38.60
	11.21%	$27.59	$28.29	$29.03	$29.81	$30.64	$31.52	$32.45	$33.45	$34.52
	11.71%	$25.08	$25.68	$26.32	$26.99	$27.70	$28.45	$29.25	$30.09	$30.99
	12.21%	$22.84	$23.36	$23.91	$24.49	$25.11	$25.75	$26.43	$27.15	$27.92
	12.71%	$20.83	$21.28	$21.76	$22.27	$22.80	$23.36	$23.94	$24.56	$25.22

Source: Author analysis and estimates

There are several risks listed above that may affect the revenues of the company. According to Intel's roadmap, if it is met, the company has a bold plan to catch up with its peer's technology and offset the delay incidents that occurred in the past decade. On the other hand, if the company, for some reason, delays once again its pledged products, the company may lose the confidence of its stockholders and potentially its revenues may be adversely affected. A sensitivity analysis with different revenue growth rates was performed to quantify the impact of the revenues on the company's value. Assuming that the company's revenues remain stable at the level of 2022 until 2032, it is expected to have a fair value of $14.02. Expecting a worse scenario, a decrease of 2.50% Year over Year in the forecasted period leading to a stock price of $10.50, reaching $49 billion in revenues in 2032. On the other hand, an increase of 10% every year for the next 10 years, reaching $164 billion in 2032, results in a stock price of $37.50.

Table 16 – Effect of change in revenue

$33.98	Revenue Growth Rate						
	(2.50%)	(2.00%)	(1.00%)	0.00%	5.00%	8.90%	10.00%
DCF Value	$10.50	$11.15	$12.53	$14.02	$23.55	**$33.98**	$37.50
2032 Revenue ($million)	$48,951	$51,520	$57,025	$63,054	$102,708	**$147,962**	$163,546

Source: Author analysis and estimates

Appendix

Appendix 1: Historical Income Statement

Income Statement ($million)	2015	2016	2017	2018	2019	2020	2021	2022
Revenue	**55,355**	**59,387**	**62,761**	**70,848**	**71,965**	**77,867**	**79,024**	**63,054**
Cost of Revenue	20,676	23,154	23,663	27,111	29,825	34,255	35,209	36,188
Gross Profit	**34,679**	**36,233**	**39,098**	**43,737**	**42,140**	**43,612**	**43,815**	**26,866**
Research & Development	12,128	12,685	13,035	13,543	13,362	13,556	15,190	17,528
Sales, General & Administrative	7,930	8,377	7,452	6,750	6,150	5,975	6,334	7,002
Total Operating Expenses	**20,058**	**21,062**	**20,487**	**20,293**	**19,512**	**19,531**	**21,524**	**24,530**
EBIT	**14,621**	**15,171**	**18,611**	**23,444**	**22,628**	**24,081**	**22,291**	**2,336**
Interest Expense	337	733	646	468	489	629	597	496
Interest Income	124	222	441	438	483	272	144	589
Other Income (Expense)	108	(192)	(144)	156	490	(147)	(29)	5,432
Net Income (Expenses)	**(105)**	**(703)**	**(349)**	**126**	**484**	**(504)**	**(482)**	**5,525**
EBT	**14,516**	**14,468**	**18,262**	**23,570**	**23,112**	**23,577**	**21,809**	**7,861**
Income Tax Expense	(2,792)	(2,620)	(5,351)	(2,564)	(3,010)	(4,179)	(1,835)	249
Net Income	**11,724**	**11,848**	**12,911**	**21,006**	**20,102**	**19,398**	**19,974**	**8,110**

Source: Refinitiv Eikon

Appendix 2: Historical Income Statement (%)

Income Statement (% of Revenue)	2015	2016	2017	2018	2019	2020	2021	2022
Revenue	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Cost of Revenue	37.35%	38.99%	37.70%	38.27%	41.44%	43.99%	44.55%	57.39%
Gross Profit	**62.65%**	**61.01%**	**62.30%**	**61.73%**	**58.56%**	**56.01%**	**55.45%**	**42.60%**
Research and Development	21.91%	21.36%	20.77%	19.12%	18.57%	17.41%	19.22%	27.80%
Sales, General and Administrative	14.33%	14.11%	11.87%	9.53%	8.55%	7.67%	8.02%	11.10%
Total Operating Expenses	**36.24%**	**35.47%**	**32.64%**	**28.64%**	**27.11%**	**25.08%**	**27.24%**	**38.90%**
EBIT	**26.41%**	**25.55%**	**29.65%**	**33.09%**	**31.44%**	**30.93%**	**28.21%**	**3.70%**
Interest Expense	0.61%	1.23%	1.03%	0.66%	0.68%	0.81%	0.76%	0.79%
Interest Income	0.22%	0.37%	0.70%	0.62%	0.67%	0.35%	0.18%	0.93%
Other Income (Expense)	0.20%	(0.32%)	(0.23%)	0.22%	0.68%	(0.19%)	(0.04%)	8.61%
Net Income (Expenses)	**-0.19%**	**-1.18%**	**-0.56%**	**0.18%**	**0.67%**	**-0.65%**	**-0.61%**	**8.76%**
EBT	**26.22%**	**24.36%**	**29.10%**	**33.27%**	**32.12%**	**30.28%**	**27.60%**	**12.47%**
Income Tax Expense	5.04%	4.41%	8.53%	3.62%	4.18%	5.37%	2.32%	0.39%
Net Income	**21.18%**	**19.95%**	**20.57%**	**29.65%**	**27.93%**	**24.91%**	**25.28%**	**12.86%**

Source: Refinitiv Eikon

Appendix 3: Forecasted Income Statement

Income Statement ($million)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	Assumptions
Revenue	**72,266**	**82,689**	**91,288**	**99,242**	**107,949**	**116,186**	**123,204**	**129,695**	**135,649**	**141,887**	Refinitiv Eikon; Company Reports; Estimates of each market;
Cost of Revenue	(39,024)	(43,412)	(46,557)	(49,125)	(51,816)	(54,026)	(55,442)	(56,417)	(56,972)	(57,464)	Computed through the Gross Margin (Gross Profit/Revenues); Based on revenues estimates and historical performance;
Gross Profit	**46.0%**	**47.5%**	**49.0%**	**50.5%**	**52.0%**	**53.5%**	**55.0%**	**56.5%**	**58.0%**	**59.5%**	
Research and Development	(14,999)	(17,163)	(18,947)	(20,598)	(22,406)	(24,115)	(25,572)	(26,919)	(28,155)	(29,449)	Based on the 9 year historical average R&D Margin (R&D/Revenues)=20.76%;
Sales, General and Administrative	(8,008)	(9,163)	(10,116)	(10,998)	(11,962)	(12,875)	(13,653)	(14,372)	(15,032)	(15,723)	Based on the 9 year historical average SG&A Margin (SG&A/Revenues)=11.08%;
Total Operating Expenses	**(23,008)**	**(26,326)**	**(29,064)**	**(31,596)**	**(34,368)**	**(36,990)**	**(39,225)**	**(41,291)**	**(43,187)**	**(45,173)**	
EBT	**10,235**	**12,951**	**15,668**	**18,521**	**21,766**	**25,169**	**28,537**	**31,986**	**35,489**	**39,250**	
Income Tax Expense	(1,257)	(1,637)	(2,072)	(2,506)	(2,962)	(3,481)	(4,026)	(4,564)	(5,116)	(5,676)	Based on the 9 year historical tax rate (15.99%);
Net Income	**8,978**	**11,314**	**13,596**	**16,015**	**18,803**	**21,688**	**24,512**	**27,422**	**30,373**	**33,573**	

Source: Refinitiv Eikon and Author estimates

Appendix 4: Forecasted Income Statement (%)

Income Statement (% of Revenue)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Revenue	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Cost of Revenue	54.00%	52.50%	51.00%	49.50%	48.00%	46.50%	45.00%	43.50%	42.00%	40.50%
Gross Profit	**46.00%**	**47.50%**	**49.00%**	**50.50%**	**52.00%**	**53.50%**	**55.00%**	**56.50%**	**58.00%**	**59.50%**
Research and Development	20.76%	20.76%	20.76%	20.76%	20.76%	20.76%	20.76%	20.76%	20.76%	20.76%
Sales, General and Administrative	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%	11.08%
Total Operating Expenses	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**	**31.84%**
EBT	**14.16%**	**15.66%**	**17.16%**	**18.66%**	**20.16%**	**21.66%**	**23.16%**	**24.66%**	**26.16%**	**27.66%**
Income Tax Expense	(1.74%)	(1.98%)	(2.27%)	(2.53%)	(2.74%)	(3.00%)	(3.27%)	(3.52%)	(3.77%)	(4.00%)
Net Income	**12.42%**	**13.68%**	**14.89%**	**16.14%**	**17.42%**	**18.67%**	**19.90%**	**21.14%**	**22.39%**	**23.66%**

Source: Refinitiv Eikon and Author estimates

Appendix 5: Historical Adjusted EBITDA

Non-GAAP Reconciliation ($million)	2014	2015	2016	2017	2018	2019	2020	2021	2022
EBIT	**15,937**	**14,622**	**15,172**	**18,612**	**23,445**	**22,629**	**24,082**	**22,292**	**2,336**
Plus: Stock-Based Compensation	1,148	1,305	1,444	1,358	1,546	1,705	1,854	2,036	3,128
SBC % of Revenue	*2.05%*	*2.36%*	*2.43%*	*2.16%*	*2.18%*	*2.37%*	*2.38%*	*2.58%*	*4.96%*
Adjusted EBIT	17,085	15,927	16,616	19,970	24,991	24,334	25,936	24,328	5,464
change in EBIT		*(6.78%)*	*4.33%*	*20.19%*	*25.14%*	*(2.63%)*	*6.58%*	*(6.20%)*	*(77.54%)*
Non-GAAP Operating Margin, %	*30.58%*	*28.77%*	*27.98%*	*31.82%*	*35.27%*	*33.81%*	*33.31%*	*30.79%*	*8.67%*
Plus: D&A	8,549	8,711	7,790	8,129	9,085	10,826	12,239	11,792	13,035
Adjusted EBITDA	**25,634**	**24,638**	**24,406**	**28,099**	**34,076**	**35,160**	**38,175**	**36,120**	**18,499**
Non-GAAP EBITDA Margin, %	*45.88%*	*44.51%*	*41.10%*	*44.77%*	*48.10%*	*48.86%*	*49.03%*	*45.71%*	*29.34%*

Source: Refinitiv Eikon

Appendix 6: Forecasted Adjusted EBITDA

Non-GAAP Reconciliation ($million)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
EBIT	**10,235**	**12,951**	**15,668**	**18,521**	**21,766**	**25,169**	**28,537**	**31,986**	**35,489**	**39,250**
Plus: Stock-Based Compensation	1,825	2,088	2,306	2,506	2,726	2,934	3,112	3,276	3,426	3,583
SBC % of Revenue	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*	*2.53%*
Adjusted EBIT	12,060	15,040	17,973	21,028	24,492	28,103	31,649	35,262	38,915	42,833
change in EBIT	*120.72%*	*24.71%*	*19.50%*	*17.00%*	*16.47%*	*14.75%*	*12.62%*	*11.41%*	*10.36%*	*10.07%*
Non-GAAP Operating Margin, %	*16.69%*	*18.19%*	*19.69%*	*21.19%*	*22.69%*	*24.19%*	*25.69%*	*27.19%*	*28.69%*	*30.19%*
Plus: D&A	10,943	12,522	13,824	15,028	16,347	17,594	18,657	19,640	20,541	21,486
Adjusted EBITDA	**23,003**	**27,561**	**31,797**	**36,056**	**40,839**	**45,698**	**50,306**	**54,902**	**59,457**	**64,319**
Non-GAAP EBITDA Margin, %	*31.83%*	*33.33%*	*34.83%*	*36.33%*	*37.83%*	*39.33%*	*40.83%*	*42.33%*	*43.83%*	*45.33%*

Source: Refinitiv Eikon and Author estimates

Appendix 7: Historical Balance Sheet

Balance Sheet ($million)	2017	2018	2019	2020	2021	2022
Cash and Cash Equivalents	14,002	11,650	13,123	23,895	28,413	28,338
Accounts Receivable, net	5,607	6,722	7,659	6,782	9,457	4,133
Inventories	6,983	7,253	8,744	8,427	10,776	13,224
Others	2,908	3,162	1,713	8,145	9,072	4,712
Total Current Assets	**29,500**	**28,787**	**31,239**	**47,249**	**57,718**	**50,407**
PP&E, net	41,109	48,976	55,386	56,584	63,245	80,860
Intangible Assets and Goodwill	37,134	36,349	37,103	35,997	34,233	33,609
Other Long-Term Assets	15,506	13,851	12,796	13,261	13,210	17,227
Total Assets	**123,249**	**127,963**	**136,524**	**153,091**	**168,406**	**182,103**
Accounts Payable	2,928	3,824	4,128	5,581	5,747	9,595
Accrued Liabilities	14,493	12,802	18,182	19,173	21,715	22,560
Total Current Liabilities	**17,421**	**16,626**	**22,310**	**24,754**	**27,462**	**32,155**
Long-Term Debt & operating leases	25,037	25,098	25,308	33,897	33,510	37,684
Other Long-Term Liabilities	11,772	11,676	11,402	13,402	12,043	8,978
Total Liabilities	**54,230**	**53,400**	**59,020**	**72,053**	**73,015**	**78,817**
Common Stock and APIC	26,074	25,365	25,261	25,556	28,006	31,580
Other Comprehensive Income (OCI)	862	(974)	(1,280)	(751)	(880)	(562)
Retained Earnings	42,083	50,172	53,523	56,233	68,265	72,268
Total Liabilities and Equity	**123,249**	**127,963**	**136,524**	**153,091**	**168,406**	**182,103**

Source: Refinitiv Eikon

Appendix 8: Historical Balance Sheet (% of revenue)

Balance Sheet ($million)	2017	2018	2019	2020	2021	2022
Cash and Cash Equivalents	22.31%	16.44%	18.24%	30.69%	35.95%	44.94%
Accounts Receivable, net	8.93%	9.49%	10.64%	8.71%	11.97%	6.55%
Inventories	11.13%	10.24%	12.15%	10.82%	13.64%	20.97%
Others	4.63%	4.46%	2.38%	10.46%	11.48%	7.47%
Total Current Assets	**47.00%**	**40.63%**	**43.41%**	**60.68%**	**73.04%**	**79.94%**
PP&E, net	65.50%	69.13%	76.96%	72.67%	80.03%	128.24%
Intangible Assets and Goodwill	59.17%	51.31%	51.56%	46.23%	43.32%	53.30%
Other Long-Term Assets	24.71%	19.55%	17.78%	17.03%	16.72%	27.32%
Total Assets	**196.38%**	**180.62%**	**189.71%**	**196.61%**	**213.11%**	**288.80%**
Accounts Payable	4.67%	5.40%	5.74%	7.17%	7.27%	15.22%
Accrued Liabilities	23.09%	18.07%	25.27%	24.62%	27.48%	35.78%
Total Current Liabilities	**27.76%**	**23.47%**	**31.00%**	**31.79%**	**34.75%**	**51.00%**
Long-Term Debt & operating leases	39.89%	35.43%	35.17%	43.53%	42.40%	59.76%
Other Long-Term Liabilities	18.76%	16.48%	15.84%	17.21%	15.24%	14.24%
Total Liabilities	**86.41%**	**75.37%**	**82.01%**	**92.53%**	**92.40%**	**125.00%**
Common Stock and APIC	41.54%	35.80%	35.10%	32.82%	35.44%	50.08%
Other Comprehensive Income (OCI)	1.37%	(1.37%)	(1.78%)	(0.96%)	(1.11%)	(0.89%)
Retained Earnings	67.05%	70.82%	74.37%	72.22%	86.39%	114.61%
Total Liabilities and Equity	**196.38%**	**180.62%**	**189.71%**	**196.61%**	**213.11%**	**288.80%**

Source: Refinitiv Eikon

Appendix 9: Forecasted Balance Sheet

Balance Sheet ($million)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	Assumptions
Cash and Cash Equivalents	20,307	23,236	25,652	27,887	30,334	32,648	34,620	36,444	38,117	39,870	Historical average past 6 years: 28.10%
Accounts Receivable, net	6,485	7,420	8,192	8,906	9,687	10,426	11,056	11,639	12,173	12,733	Based on DSO as % Revenues
Inventories	10,727	11,933	12,798	13,504	14,243	14,851	15,240	15,508	15,661	15,796	Based on DIO as % Revenues
Others	5,119	5,857	6,466	7,030	7,646	8,230	8,727	9,187	9,608	10,050	Prepaid Expenses as % Revenues
Total Current Assets	**42,638**	**46,620**	**50,974**	**55,735**	**60,940**	**66,632**	**72,855**	**79,660**	**87,100**	**95,235**	
Total Assets	**166,451**	**188,291**	**207,378**	**225,767**	**245,890**	**265,693**	**283,941**	**301,866**	**319,507**	**338,329**	Historical growth average (6.4%);
Accounts Payable	5,796	6,448	6,915	7,297	7,696	8,025	8,235	8,380	8,462	8,535	Based on DPO as % Revenues;
Accrued Liabilities	19,425	22,226	24,538	26,676	29,016	31,230	33,117	34,861	36,462	38,139	Based on Accrued Liabilities of SG&A as % Revenues;
Total Current Liabilities	**25,221**	**28,674**	**31,453**	**33,973**	**36,713**	**39,255**	**41,352**	**43,241**	**44,924**	**46,674**	
Long-Term Debt & operating leases	37,822	42,075	45,123	47,612	50,220	52,362	53,734	54,680	55,218	55,694	Historical average vs cogs: 96.92%;
Other Long-Term Liabilities	14,907	16,583	17,785	18,766	19,794	20,638	21,179	21,551	21,763	21,951	Historical average vs cogs: 38.20%;
Total Liabilities	**40,128**	**45,258**	**49,238**	**100,350**	**106,726**	**112,256**	**116,265**	**119,472**	**121,905**	**124,319**	
Common Stock and APIC	35,500	40,227	45,908	52,407	52,727	57,786	62,928	68,310	73,951	80,059	Historical average 6years vs cogs: 88.3%;
Other Comprehensive Income (OCI)	(598)	(598)	(598)	(598)	(598)	(598)	(598)	(598)	(598)	(598)	Average past 6 years;
Retained Earnings	53,599	61,329	67,708	73,607	87,034	96,249	105,346	114,681	124,248	134,549	Historical average 6 years vs revenues: 74.2%
Total Liabilities and Equity	**166,451**	**188,291**	**207,379**	**225,767**	**245,889**	**265,693**	**283,941**	**301,866**	**319,507**	**338,330**	

Source: Refinitiv Eikon and Author estimates

Appendix 10: Forecasted Balance Sheet (% of revenue)

Balance Sheet ($million)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Cash and Cash Equivalents	28.10%	28.10%	28.10%	28.10%	28.10%	28.10%	28.10%	28.10%	28.10%	28.10%
Accounts Receivable, net	8.97%	8.97%	8.97%	8.97%	8.97%	8.97%	8.97%	8.97%	8.97%	8.97%
Inventories	14.84%	14.43%	14.02%	13.61%	13.19%	12.78%	12.37%	11.96%	11.55%	11.13%
Others	7.08%	7.08%	7.08%	7.08%	7.08%	7.08%	7.08%	7.08%	7.08%	7.08%
Total Current Assets	**59.00%**	**56.38%**	**55.84%**	**56.16%**	**56.45%**	**57.35%**	**59.13%**	**61.42%**	**64.21%**	**67.12%**
Total Assets	**230.33%**	**227.71%**	**227.17%**	**227.49%**	**227.78%**	**228.68%**	**230.46%**	**232.75%**	**235.54%**	**238.45%**
Accounts Payable	8.02%	7.80%	7.58%	7.35%	7.13%	6.91%	6.68%	6.46%	6.24%	6.02%
Accrued Liabilities	26.88%	26.88%	26.88%	26.88%	26.88%	26.88%	26.88%	26.88%	26.88%	26.88%
Total Current Liabilities	**34.90%**	**34.68%**	**34.45%**	**34.23%**	**34.01%**	**33.79%**	**33.56%**	**33.34%**	**33.12%**	**32.90%**
Long-Term Debt & operating leases	52.34%	50.88%	49.43%	47.98%	46.52%	45.07%	43.61%	42.16%	40.71%	39.25%
Other Long-Term Liabilities	20.63%	20.06%	19.48%	18.91%	18.34%	17.76%	17.19%	16.62%	16.04%	15.47%
Total Liabilities	**107.87%**	**105.62%**	**103.37%**	**101.12%**	**98.87%**	**96.62%**	**94.37%**	**92.12%**	**89.87%**	**87.62%**
Common Stock and APIC	49.12%	48.65%	50.29%	52.81%	48.84%	49.74%	51.08%	52.67%	54.52%	56.42%
Other Comprehensive Income (OCI)	(0.83%)	(0.72%)	(0.65%)	(0.60%)	(0.55%)	(0.51%)	(0.48%)	(0.46%)	(0.44%)	(0.42%)
Retained Earnings	74.17%	74.17%	74.17%	74.17%	80.62%	82.84%	85.51%	88.42%	91.60%	94.83%
Total Liabilities and Equity	**230.33%**	**227.71%**	**227.17%**	**227.49%**	**227.78%**	**228.68%**	**230.46%**	**232.75%**	**235.54%**	**238.45%**

Source: Refinitiv Eikon and Author estimates

Appendix 11: Historical Financial Ratios

Financial Ratios	2014	2015	2016	2017	2018	2019	2020	2021	2022
Profitability Ratios									
Gross Margin	63.70%	62.60%	61.00%	62.30%	61.70%	58.60%	56.00%	55.40%	42.60%
1Y Growth	*3.9%*	*(1.1%)*	*(1.6%)*	*1.3%*	*(0.6%)*	*(3.1%)*	*(2.6%)*	*(0.6%)*	*(12.80%)*
EBITDA Margin	43.30%	41.70%	38.20%	42.30%	45.60%	48.00%	48.20%	43.00%	24.40%
1Y Growth	*4.3%*	*(1.6%)*	*(3.5%)*	*4.1%*	*3.3%*	*2.4%*	*0.2%*	*(5.2%)*	*(18.60%)*
Effective Tax Rate	25.90%	19.60%	20.30%	26.30%	11.00%	12.50%	16.70%	8.50%	(3.20%)
1Y Growth	*2.2%*	*(6.3%)*	*0.7%*	*6.0%*	*(15.3%)*	*1.5%*	*4.2%*	*(8.2%)*	*(11.70%)*
Net Margin	20.90%	20.60%	17.40%	23.90%	29.30%	29.20%	26.80%	25.10%	12.70%
1Y Growth	*2.6%*	*(0.3%)*	*(3.2%)*	*6.5%*	*5.4%*	*(0.1%)*	*(2.4%)*	*(1.7%)*	*(12.40%)*
Dividend Payout Ratio	37.10%	38.86%	41.57%	39.28%	26.38%	27.75%	28.70%	28.26%	74.53%
Liquidity Ratios									
Cash Ratio	-	-	-	0.80	0.70	0.59	0.97	1.03	0.88
Current Ratio	-	-	-	2.50	2.43	1.99	2.87	3.14	1.57
Efficiency Ratios									
Days Sales Outstanding (DSO)	28.92	31.56	28.83	32.61	34.63	38.85	31.79	43.68	23.92
Days Inventory Outstanding (DIO)	76.98	91.21	87.54	107.71	97.65	107.01	89.79	111.71	133.38
Prepaid Expenses % of Revenue	*4.40%*	*4.71%*	*13.75%*	*4.63%*	*4.46%*	*2.38%*	*10.46%*	*11.48%*	*7.47%*
Days Payable Outstanding (DPO)	49.50	36.42	39.02	45.16	51.48	50.52	59.47	59.58	96.78
Accrued Liabilities % of SG&A	*156.77%*	*170.88%*	*189.70%*	*194.48%*	*189.66%*	*295.64%*	*320.89%*	*342.83%*	*322.19%*
Cash Conversion Cycle (CCC)	56.39	86.36	77.35	95.16	80.80	95.34	62.12	95.81	60.53
Net Working Capital (NWC)	(4,346)	(3,052)	43.00	(1,923)	511	(4,194)	(1,400)	1843.00	7762.00
(Increase) / Decrease in NWC	-	(1,294)	(3,095)	1,966	(2,434)	4,705	(2,794)	(3,243)	6,724

Source: Refinitiv Eikon and Author estimates

Appendix 12: Forecasted Financial Ratios

Financial Ratios	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Profitability Ratios										
Gross Margin	46.00%	47.50%	49.00%	50.50%	52.00%	53.50%	55.00%	56.50%	58.00%	59.50%
1Y Growth	*3.39%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*
EBITDA Margin	31.83%	33.33%	34.83%	36.33%	37.83%	39.33%	40.83%	42.33%	43.83%	45.33%
1Y Growth	*2.49%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*	*1.50%*
Effective Tax Rate	-	-	-	-	-	-	-	-	-	-
1Y Growth	-	-	-	-	-	-	-	-	-	-
Net Margin	12.42%	13.68%	14.89%	16.14%	17.42%	18.67%	19.90%	21.14%	22.39%	23.66%
1Y Growth	*(0.44%)*	*1.26%*	*1.21%*	*1.24%*	*1.28%*	*1.25%*	*1.23%*	*1.25%*	*1.25%*	*1.27%*
Dividend Payout Ratio	34.13%	28.18%	24.41%	21.57%	19.12%	17.25%	15.88%	14.78%	13.89%	13.07%
Liquidity Ratios										
Cash Ratio	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85	0.85
Current Ratio	1.69	1.63	1.62	1.64	1.66	1.70	1.76	1.84	1.94	2.04
Efficiency Ratios										
Days Sales Outstanding (DSO)	32.75	32.75	32.75	32.75	32.75	32.75	32.75	32.75	32.75	32.75
Days Inventory Outstanding (DIO)	100.33	100.33	100.33	100.33	100.33	100.33	100.33	100.33	100.33	100.33
Prepaid Expenses % of Revenue	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*	*7.08%*
Days Payable Outstanding (DPO)	54.21	54.21	54.21	54.21	54.21	54.21	54.21	54.21	54.21	54.21
Accrued Liabilities % of SG&A	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*	*242.56%*
Cash Conversion Cycle (CCC)	78.87	78.87	78.87	78.87	78.87	78.87	78.87	78.87	78.87	78.87
Net Working Capital (NWC)	11,416	12,905	14074.55	15,113	16,234	17,253	18,061	18766.91	19371.37	19993.28
(Increase) / Decrease in NWC	-3653.70	(1,490)	(1,169)	(1,038)	(1,121)	(1,019)	(809)	(706)	(604)	(622)

Source: Refinitiv Eikon and Author estimates

Appendix 13: Discounted Cash Flow Valuation

DCF ($millions)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Revenue	**72,266**	**82,689**	**91,288**	**99,242**	**107,949**	**116,186**	**123,204**	**129,695**	**135,649**	**141,887**
YoY Growth (%)	*14.61%*	*14.42%*	*10.40%*	*8.71%*	*8.77%*	*7.63%*	*6.04%*	*5.27%*	*4.59%*	*4.60%*
COGS	(39,024)	(43,412)	(46,557)	(49,125)	(51,816)	(54,026)	(55,442)	(56,417)	(56,972)	(57,464)
Gross Margin	*46.00%*	*47.50%*	*49.00%*	*50.50%*	*52.00%*	*53.50%*	*55.00%*	*56.50%*	*58.00%*	*59.50%*
Gross Profit	**33,242**	**39,277**	**44,731**	**50,117**	**56,134**	**62,159**	**67,762**	**73,277**	**78,676**	**84,423**
R&D	(14,999)	(17,163)	(18,947)	(20,598)	(22,406)	(24,115)	(25,572)	(26,919)	(28,155)	(29,449)
SG&A	(8,008)	(9,163)	(10,116)	(10,998)	(11,962)	(12,875)	(13,653)	(14,372)	(15,032)	(15,723)
EBIT	**10,235**	**12,951**	**15,668**	**18,521**	**21,766**	**25,169**	**28,537**	**31,986**	**35,489**	**39,250**
Income Tax	(1,257)	(1,637)	(2,072)	(2,506)	(2,962)	(3,481)	(4,026)	(4,564)	(5,116)	(5,676)
Net Income	**8,978**	**11,314**	**13,596**	**16,015**	**18,803**	**21,688**	**24,512**	**27,422**	**30,373**	**33,573**

Source: Author estimates

DCF ($millions)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E
Net Income	**10,943**	**12,522**	**13,824**	**15,028**	**16,347**	**17,594**	**18,657**	**19,640**	**20,541**	**21,486**
D&A	10,943	12,522	13,824	15,028	16,347	17,594	18,657	19,640	20,541	21,486
NWC	(3,654)	(1,490)	(1,169)	(1,038)	(1,121)	(1,019)	(809)	(706)	(604)	(622)
CapEx	21,680	24,807	27,386	24,811	26,987	29,046	24,641	25,939	27,130	28,377
FCFF	**(5,792)**	**(2,895)**	**(1,570)**	**4,738**	**6,522**	**8,672**	**17,180**	**19,865**	**22,620**	**25,459**
PV of FCFF	(5,232)	(2,362)	(1,157)	3,154	3,921	4,710	8,427	8,801	9,052	9,202

Source: Author estimates

Appendix 14: WACC calculation

WACC			
Cost of Equity		**Cost of Debt**	
Risk Free Rate	3,57%	Cost of Debt	4.99%
Beta	1.5	Tax Rate	15.99%
Risk Premium	6.45%		
Cost of Equity	**13.25%**	After-tax cost of debt	**4.19%**
Weight of Equity			71.95%
Weight of Debt			28.05%
WACC			**10.71%**
Growth Rate			**2.89%**

Source: Author estimates

Appendix 15: Beta regression

Date	NASDAQ prices	NASDAQ variation	INTC prices	INTC variation
28/03/2018	6949.23		42.95	
29/03/2018	7063.45	1.64%	45.10	5.00%
02/04/2018	6870.12	-2.74%	42.36	-6.07%
03/04/2018	6941.28	1.04%	43.08	1.70%
04/04/2018	7042.11	1.45%	43.29	0.48%
05/04/2018	7076.55	0.49%	43.63	0.78%
06/04/2018	6915.11	-2.28%	42.25	-3.16%
09/04/2018	6950.34	0.51%	42.91	1.56%
10/04/2018	7094.30	2.07%	44.40	3.47%
11/04/2018	7069.03	-0.36%	44.25	-0.33%
12/04/2018	7140.25	1.01%	45.65	3.17%
13/04/2018	7106.65	-0.47%	44.91	-1.63%
16/04/2018	7156.28	0.70%	45.38	1.04%
17/04/2018	7281.10	1.74%	46.36	2.18%
18/04/2018	7295.24	0.19%	46.42	0.13%
10/03/2023	11138.89	-1.76%	27.22	2.95%
13/03/2023	11188.84	0.45%	26.95	-0.99%
14/03/2023	11428.15	2.14%	28.01	3.93%
15/03/2023	11434.05	0.05%	28.41	1.43%
16/03/2023	11717.28	2.48%	30.18	6.23%
17/03/2023	11630.51	-0.74%	29.81	-1.23%
20/03/2023	11675.54	0.39%	29.16	-2.18%
21/03/2023	11860.11	1.58%	28.46	-2.40%
22/03/2023	11669.96	-1.60%	28.13	-1.16%
23/03/2023	11787.40	1.01%	29.03	3.20%
24/03/2023	11823.96	0.31%	29.36	1.14%
27/03/2023	11768.84	-0.47%	29.18	-0.61%
28/03/2023	11716.08	-0.45%	29.29	0.38%

The table presents **part** of the data collected from the Refinitiv Eikon, from 28/03/2018 to 28/03/2023.

Source: Refinitiv Eikon

Appendix 16: Bottom-up Beta approach

Bottom-Up Beta	
Total Debt	47,279
Market Cap	121,261
Debt/Equity	38.99%
Unlevered Beta (Semiconductor Industry - Prof Damodaran	1.48
Tax Rate	15.99%
Levered Beta	1.96

Source: Damodaran Database, Refinitiv Eikon

Appendix 17: Beta

Bottom-Up Beta	
Bottom-Up Beta	1.96
Regression Beta	1.04
Beta	**1.50**

Source: Author estimates

Appendix 18: Equity Risk Premium

Weighted Equity Risk Premium			
	ERP	**Weight**	**Weighted ERP**
Taiwan	6.97%	13.15%	0.92%
China	7.16%	27.16%	1.94%
United States	5.94%	26.21%	1.56%
Singapore	5.94%	15.32%	0.91%
World	6.18%	18.16%	1.12%
Total		100.00%	**6.45%**

Source: Damodaran Database, Refinitiv Eikon

Appendix 19: Tax Rate

Tax Rate								
Historical Tax Rate			Assumption: Provision for Income Taxes / Net Income before Taxes					
2014	2015	2016	2017	2018	2019	2020	2021	2022
25.93%	19.65%	20.25%	26.29%	11.00%	12.51%	16.66%	8.46%	3.21%
Average: 15.99%								

Source: Refinitiv Eikon

Appendix 20: Dividend Discount Model Valuation (Historical Data)

DDM ($million)	2017	2018	2019	2020	2021	2022
Net Income	12,912	21,007	20,103	19,399	19,975	8,110
Payout Ratio	*67%*	*77%*	*95%*	*102%*	*40%*	*75%*
Total Payout	**8,672**	**16,241**	**19,178**	**19,768**	**8,044**	**6,044**
- Dividends	5,072	5,541	5,578	5,568	5,644	6,044
YoY Growth	*2.98%*	*9.25%*	*0.67%*	*(0.18%)*	*1.36%*	*7.09%*
- Buybacks	3,600	10,700	13,600	14,200	2,400	0

Source: Refinitiv Eikon, Company Data

Appendix 21: Dividend Discount Model Valuation (Forecasted Data)

DDM ($million)	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	Assumptions
Net Income	8,978	11,314	13,596	16,015	18,803	21,688	24,512	27,422	30,373	33,573	DCF;
Payout Ratio	*34%*	*40%*	*45%*	*51%*	*56%*	*62%*	*68%*	*73%*	*79%*	*84%*	Sustainable growth to reach 90% in 11 years (Perpetuity);
Total Payout	**3,064**	**4,493**	**6,159**	**8,150**	**10,619**	**13,460**	**16,582**	**20,083**	**23,942**	**28,340**	Result of Payout Ratio;
- Dividends	(3,064)	(3,188)	(3,318)	(3,454)	(3,595)	(3,741)	(3,894)	(4,052)	(4,218)	(4,389)	22YE precise value; Based on the 8-year historical average growth (4.08%);
YoY Growth	*-49.32%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	*4.08%*	
- Buybacks	0	1,305	2,841	4,696	7,025	9,719	12,689	16,031	19,724	23,951	Around same average; Average past 6 years: 7.42; Average next 10 years: 9.8;
Payout PV	2,705	3,503	4,240	4,954	5,699	6,378	6,938	7,420	7,810	8,163	-

Source: Author Estimates

Appendix 22: Relative Valuation

Peers	P/E	EV/Sales	EV/EBITDA
NVIDIA Corp	156.27x	24.47x	110.27x
Advanced Micro Devices Inc	119.38x	6.56x	27.98x
Texas Instruments Inc	19.16x	8.13x	14.51x
Cisco Systems Inc	18.22x	3.64x	11.91x
Broadcom Inc.	16.92x	8.40x	14.40x
Taiwan Semiconductor Manufacturing Co Ltd	14.72x	0.19x	0.28x
Qualcomm Inc	11.82x	3.44x	9.36
Micron Technology Inc	10.05x	2.24x	4.22x
Samsung Electronics Co Ltd	7.80x	1-10x	3.90x
Intel Multiple	**14.95x**	**1.77x**	**4.42x**
Peers Median	**16.92x**	**3.64x**	**11.91x**

Source: Refinitiv Eikon

Appendix 23: Growth rate

Real GDP growth (Annual percent change)						
	2023	2024	2025	2026	2027	Average
China	4.4	4.5	4.6	4.6	4.6	4.54%
Singapore	2.3	2.6	2.5	2.5	2.5	2.48%
Taiwan	2.8	2.1	2	2	2	2.18%
United States	1	1.2	1.8	2.1	1.9	1.60%
World	2.7	3.2	3.4	3.3	3.2	3.16%

Source: IMF

Appendix 24: Weighted Growth rate

Real GDP growth (Annual percent change)			
	Average	Weight	Weighted growth rate
Taiwan	2.18%	13.15%	0.29
China	4.54%	27.16%	1.23
United States	1.60%	26.21%	0.42
Singapore	2.48%	15.32%	0.38
World	3.16%	18.16%	0.57
Total		100.00%	**2.89%**

Source: IMF, Company Data

References

Allied Market Research. (2019). *Data Center Chip Market by Chip Type (GPU, ASIC, FPGA, CPU, and Others), Data Center Size (Small & Medium Size and Large Size) and Industry Vertical (BFSI, Manufacturing, Government, IT & Telecom, Retail, Transportation, Energy & Utilities, and Others): Global Opportunity Analysis and Industry Forecast, 2018 - 2025*. https://www.alliedmarketresearch.com/data-center-chip-market

Aswath Damodaran. (2012). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 3rd Edition* (Wiley, Ed.).

Bloomberg. (2022). *Chipmakers See 'Breathtaking' Drop in Demand as Recession Looms*. https://www.bloomberg.com/news/articles/2022-10-07/chipmakers-see-breathtaking-drop-in-demand-as-recession-looms?leadSource=uverify%20wall

CNBC. (2022). *Intel's Mobileye targets $15.9 billion valuation in IPO*. https://www.cnbc.com/2022/10/18/intels-mobileye-targets-15point9-billion-valuation-in-ipo-.html?&qsearchterm=intel

Damodaran, A. (2022). Country Risk: Determinants, Measures and Implications - The 2022 Edition. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4161010

IMF. (2022). *World Economic Outlook Report* .

Intel Corporation. (2021). *Intel Corporation Annual Report 2021*. Https://Www.Intc.Com/Filings-Reports/Annual-Reports. https://www.intc.com/filings-reports/annual-reports

Intel Corporation. (2022). *Intel Announces Initial Investment of Over €33 Billion for R&D and Manufacturing in EU*. https://www.intel.com/content/www/us/en/newsroom/news/eu-news-2022-release.html#gs.qqb4v5

J.P. Morgan. (2018). *Driving into 2025: The Future of Electric Vehicles*. https://www.jpmorgan.com/insights/research/electric-vehicles

McKinsey & Company. (2022). *The semiconductor decade: A trillion-dollar industry*. https://www.mckinsey.com/industries/semiconductors/our-insights/the-semiconductor-decade-a-trillion-dollar-industry

Navigant Research. (2020). *Guidehouse Insights Leaderboard: Automated Driving Systems*. https://www.greencarcongress.com/2020/03/20200324-navigant.html

PassMark. (2022). *AMD vs Intel Market Share*. https://www.cpubenchmark.net/market_share.html

Statista. (2022). *Semiconductor companies market revenue worldwide from 2009 to 2022*. https://www.statista.com/statistics/270590/global-revenue-generated-by-semiconductor-vendors-since-2009/

Statista. (2022). *Personal computer (PC) vendor market share worldwide from 2006 to 2022*. https://www.statista.com/statistics/267018/global-market-share-held-by-pc-vendors/

Statista. (2022). *Intel - statistics & facts*. https://www.statista.com/topics/1877/intel/#statisticChapter

Straits Research. (2022). *Embedded Processor Market Size is projected to reach USD 44 Billion by 2030, growing at a CAGR of 8.2%: Straits Research*. https://www.globenewswire.com/en/news-release/2022/07/20/2483123/0/en/Embedded-Processor-Market-Size-is-projected-to-reach-USD-44-Billion-by-2030-growing-at-a-CAGR-of-8-2-Straits-Research.html