Cadence Design Systems (CDNS)

SELL: $ 170.50 (-40.45%)

Equity Research Division

2nd June 2024

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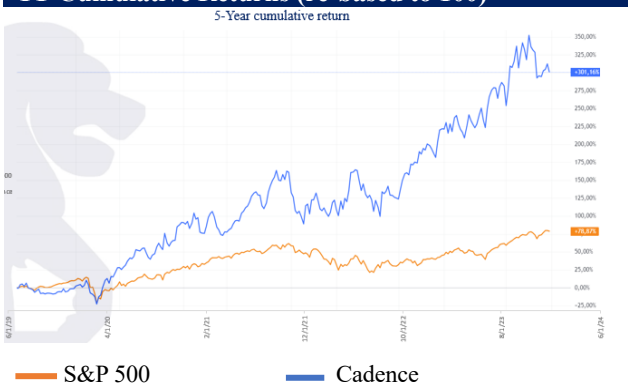
Basic Information	
Last Closing Price	$ 286.3
Target Price	$ 170.5
+/- Potential	-40.45%
Bloomberg Ticker	CDNS:US
GICS Sector	Information Technology
GICS Sub-Industry	Semiconductor Equipment

1Y Cumulative Returns (re-based to 100)



Market Cap	77,914
Basic Shares O/S	272,7
52-Wk High	327.36
52-Wk Low	217.77
Fiscal Year End	31 Dec. 2023

€(million)	FY20A	FY21A	FY22A	FY23A
Gross profit	2,683	2,988	3,562	4,090
EBITDA	800	920	1,206	1,408
EBIT	655	778	1,074	1,262
Net Income	591	696	849	1,041

Source: Bloomberg

Key Executives	
Anirudh Devgan	President, CEO
John M. Wall	Executive VP, CFO

Investment Thesis

Cadence Design System (CDNS) is one of the dominant players in its core market, sharing it primarily with Synopsys. The company is expected to face higher demand from its geographically diversified customer base, further sustained by the AI boom. Moreover, Cadence enjoys a strong competitive advantage bolstered by its extensive experience, dominant market position, and high barriers to entry in the Electronic Design Automation (EDA) industry.

Looking ahead, Cadence should be able to capitalize on favorable industry dynamics and emerging opportunities, further sustained by investments in R&D. Despite a promising future growth of the EDA and semiconductors markets, we think that Cadence is already pricing in the leadership in the EDA market, and the valuation is boosted by the extremely high expectations of the market.

Despite the potential tailwinds coming from the company's competitive advantage, we think that at the current valuation Cadence is overpricing its future growth, even exceeding the high multiples of the other companies in its reference market. Accordingly, we recommend a SELL rating for Cadence Design Systems.

Valuation

We are valuing Cadence using a 50/50 blend of intrinsic value (DCF) and relative valuation, arriving at a target price of $170.50/share, a 40% decrease from its last close price.

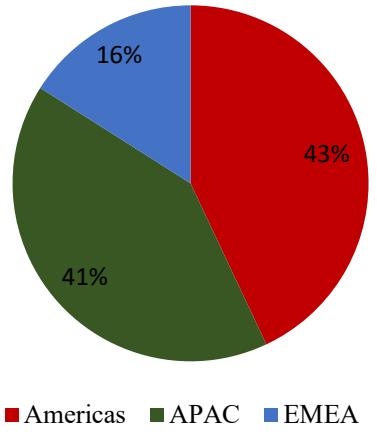
Key Risks:

Upside risks: Stronger than expected pricing power and contributes from technology secular trends.

Downside risks: Loss in market share and competition in proximity markets.

Exhibit 1.1: Diversified revenues worldwide

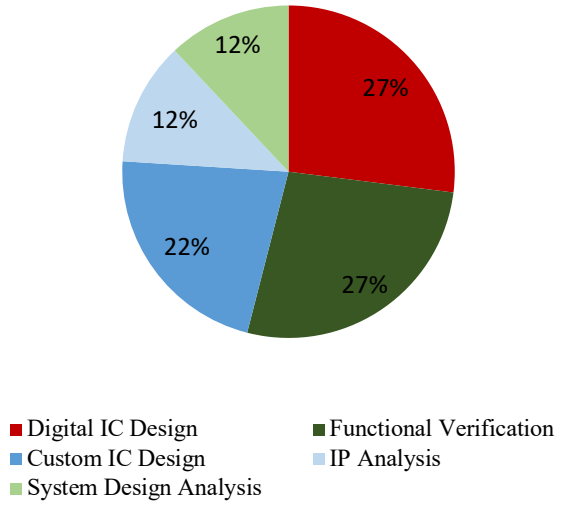
Revenue breakdown by Geography (FY2023)



Source: Company Filings

Exhibit 1.2: Extensive and diversified business lines

Revenue breakdown by Business Line (FY2023)



Source: Company Filings

Company Overview

Cadence Design Systems Inc (Cadence) is a provider of system design solutions that are used for designing of electronics systems, integrated circuits, and electronic devices. The company's product and solution portfolio include electronic design automation software, emulation and prototyping hardware, system interconnect and analysis, verification intellectual property and design intellectual property. Cadence is headquartered in San Jose, California.

Product Offering

Beyond traditional EDA, the company classifies its products and services into five categories:

- **Custom IC Design and Simulation**: provides tools for creating schematic and physical representations of circuits;
- **Digital IC Design and Signoff:** enable logical representation, implementation, and verification of digital circuits;
- **Functional Verification:** facilitate efficient verification of circuitry against functional specifications, reducing the risk of errors before manufacturing;
- **IP:** offers pre-verified, customizable functional blocks, catering to various IC integration needs such as DSPs, AI subsystems, standard protocol controllers, and analog IP;
- **System Design and Analysis:** support PCB and IC package development, electromagnetic analysis, and thermal simulations.

Revenue generation

Cadence generates revenue primarily through four channels: i) software and IP licensing; ii) sales or leasing of emulation and prototyping hardware; iii) maintenance services for software, hardware, and IP; iv) engineering services. Additionally, revenue streams include royalties from IP usage.

The timing of revenue is influenced by product mix and recognition method, whether over time or upon delivery completion. Typically, 85-90% of annual revenue is recurring, encompassing revenue from software arrangements, services, royalties, IP maintenance, and hardware leases.

Cadence's main revenue segment is represented by Digital IC Design and Signoff, representing ca. 27% of sales, followed by Functional Verification representing ca. 27% of sales as well. Custom IC Design and Simulation follows, making up 22% of the company's revenues. Lastly, IP and System Design and Analysis both generate 12% of sales.

Cadence's main market is represented by the Americas, making up 43% of the company's revenues; the APAC market follows, representing ca. 41% of sales, followed by EMEA, representing ca. 16% of sales.

Industry Outlook

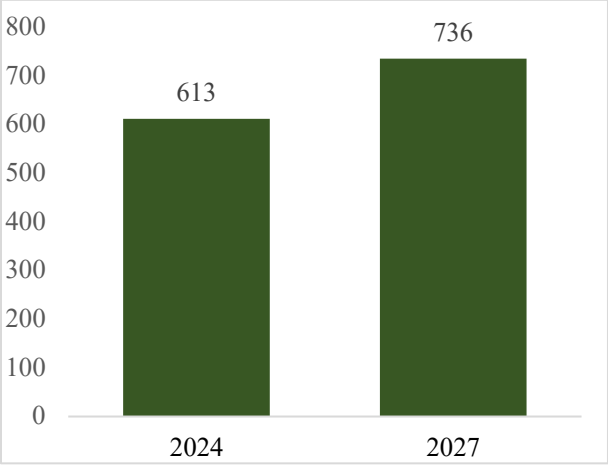
Semiconductor Industry

The semiconductor industry is currently valued at an estimated US$613 billion, with expectations of reaching US$736 billion by 2027, demonstrating a Compound Annual Growth Rate (CAGR) of 6.30% from 2024 to 2027. This growth trajectory is largely driven by the industry's adaptability and innovation, especially in key markets like China, projected to generate approximately US$198.90 billion in 2024. Macro trends underscore the semiconductor industry's strategic importance in the global supply chain and geopolitical dynamics.

Looking ahead, the sector is poised for sustained expansion, driven by innovations in artificial intelligence (AI), the Internet of Things (IoT), and the rollout of 5G networks. AI applications across industries will create new growth opportunities for semiconductor manufacturers by enhancing chip performance, speeding up manufacturing processes, and reducing production costs. Moreover, the increasing adoption of IoT devices and feature-rich consumer electronics fuels demand for advanced semiconductor components, driving industry growth.

Exhibit 2.1: Semiconductors industry revenue worldwide

Revenue worldwide from 2024 to 2027 ($ billion)



Source: Minerva IMS Industry Analysis

Advancements in technology, such as the anticipated production of 2nm chips from late 2024 to early 2025, are expected to further enhance semiconductor efficiency, providing a 25% increase in power efficiency and a 12% performance improvement compared to the latest 3nm chips.

Additionally, emerging trends in semiconductor technology include the rise of edge computing, quantum computing, and neuromorphic computing, which are expected to further drive demand for advanced semiconductor solutions. Edge computing, in particular, requires high-performance chips to process data closer to the source, enhancing efficiency and reducing latency in applications like autonomous vehicles and industrial automation.

Furthermore, sustainability and environmental concerns are gaining traction in the semiconductor industry, leading to increased focus on eco-friendly manufacturing processes, energy-efficient designs, and recycling initiatives. Companies are investing in research and development to create more sustainable semiconductor materials and processes, aligning with global efforts to mitigate climate change and reduce carbon emissions.

In terms of competitive landscape, the semiconductor industry is characterized by key players across different regions. In the USA, companies like Nvidia, Cadence, Intel, Broadcom, and AMD dominate the market. Europe sees ASML, NXP Semiconductors, and Infineon as major players. The Asia-Pacific region is led by Samsung, TSMC, and SK Hynix, while Japan boasts companies like Kyocera, Toshiba, and Fujitsu.

Porter's 5 Forces

Threat of New Entrants: Moderate. The threat of new entrants for Cadence Design Systems Inc. is moderate. The EDA industry, where Cadence operates, requires substantial investments in research and development and is highly capital-intensive. This high capital requirement creates significant barriers for new entrants attempting to compete with established players like Cadence.

Cadence has established a strong reputation for quality and reliability, and its economies of scale provide additional barriers to entry for new competitors. The company's extensive experience and dominance in analog design, holding over 80% of the market share for more than two decades, add to its competitive advantage and the stickiness of its overall EDA portfolio.

Bargaining Power of Buyers: Low. Cadence Design Systems Inc. experiences relatively low bargaining power from its customers. The company's key customers span various sectors, including semiconductor companies and system companies that rely heavily on Cadence's EDA tools to design and verify integrated circuits (ICs). These tools are critical for developing advanced applications in artificial intelligence, high-performance computing, 5G communications, and automotive technology. Its revenue is predominantly subscription-based, securing 85% of quarterly earnings, ensuring stability and reducing customer leverage. The company's remaining revenue streams, including hardware sales and services, further diversify income sources. Its comprehensive product portfolio, featuring AI-driven verification platforms like Verisium and hardware solutions such as Palladium Z2 and Protium X2, deeply integrate into customer workflows, resulting in high switching costs. This integration, alongside steady demand for its digital, verification, and systems offerings, supports complex semiconductor design development, strengthening Cadence's market position and diminishing customer bargaining power.

Threat of Substitutes: Low. The threat of substitutes for Cadence Design Systems is relatively low. EDA tools are crucial in semiconductor design, a field characterized by its complexity and high precision requirements. The process of establishing a design flow with specific EDA tools is intricate and time-intensive, creating high switching costs due to product familiarity and the need for specialized engineer training. Additionally, the mission-critical nature of EDA tools in modern IC design makes it difficult for substitutes to gain traction. As the demand for more advanced semiconductor technologies continues to grow, driven by trends in AI, 5G, and autonomous driving, the reliance on sophisticated EDA tools like those provided by Cadence becomes even more entrenched. Furthermore, the company's substantial investments in research and development ensure that it remains at the forefront of technological innovation, thereby reducing the threat of substitutes further.

Industry Rivalry: Moderate. The semiconductor industry is marked by significant competition, and Cadence Design Systems faces a considerable level of rivalry. As one of the main players in the EDA market, Cadence competes with companies such as Synopsys and Mentor (a Siemens company). This rivalry is particularly intense due to the high barriers to entry, established by decades of design expertise and market consolidation. Together, Cadence and Synopsys control about 60% of the EDA market, with an even larger share held collectively by the three leading firms.

Technological advancement is a critical factor driving this competition. To remain competitive, companies must invest heavily in research and development. Cadence holds a strong position in specific product segments, particularly in analog design, which adds to its market strength. Furthermore, the industry's cyclicality affects companies differently; the EDA market is somewhat insulated due to its structural growth drivers related to increasing complexity and prevalence of electronics. This results in less fluctuation compared to the broader semiconductor market, which can be more volatile.

Bargaining Power of Suppliers: Moderate. The bargaining power of suppliers for Cadence Design Systems is moderate. Cadence relies on a network of suppliers for various inputs essential for their EDA tools, including advanced software and technical components. Some suppliers hold significant bargaining power due to their unique technologies or specialized resources. This reliance can make it challenging for Cadence to find alternative sources for certain critical inputs. The bargaining power of suppliers varies depending on the nature of the input. For specialized inputs, such as certain advanced software tools or proprietary technology components, the bargaining power of suppliers is higher. This is because there may be a limited number of suppliers capable of providing these highly specialized inputs, giving the suppliers greater leverage in negotiations. However, Cadence's large scale, significant market share, and ability to foster long-term relationships with suppliers provide it with substantial purchasing power, allowing it to negotiate favorable terms and maintain some degree of stability within its supply chain.

Tailwinds	Headwinds
Semiconductor industry's high R&D investment and capital intensity deter new entrants	Evolving regulations in the semiconductor industry may increase compliance costs and operational complexities.
Key customers heavily rely on Cadence's EDA tools	Intense competition from other suppliers, especially in the high-end segment, requires continuous R&D investment
Complex semiconductor design and Cadence's innovation make substitutes unlikely	Managing diverse customer preferences and needs adds complexity and risk.
Strong position in key segments and technological adaptability mitigate competition.	Price volatility affects cost structures and profitability, posing financial challenges
Collaborations with key industry players provide access to new markets and bolster competitiveness	Suppliers' unique technologies or resources may impact Cadence's operations and supply chain

Swot Analysis

Strengths

Technological Leadership: Cadence offers top-notch EDA software and hardware tools. These unique tools are integrated in chips and circuits that are used in a range of projects in the semiconductor industry.

Investments in R&D: Cadence makes significant investments in R&D to make sure their products are cutting edge. Through partnerships with top IT firms and academic institutions, the company maintains its innovative edge and provides its clients with state-of-the-art solutions

Global presence: The company has a diversified geographic presence. It operates sales offices, design centers and R&D facilities across North America, Europe, Asia Pacific, the Middle East, and Africa. A diversified geographic presence offers the company more avenues for attaining significant revenue growth. It also reduces the company's exposure to geo-political and socio-economic risks associated with a particular market and facilitates a strong positive global image for the company.

Weaknesses

Sector Competition: There are several businesses fighting for market share in the fiercely competitive EDA sector, with Synopsys being the major competitor. The competitive environment exerts pricing pressure on the company, which affect its business performance.

Limited number of clients: Additionally, a sizable amount of Cadence's income is derived from a limited number of large clients. The company's finances may be seriously impacted if any one of these clients were to disappear.

Opportunities

M&A firepower: With its strong financial position, Cadence can buy out smaller businesses that enhance its current offerings. The business can increase its market share and diversify its product line by carefully purchasing businesses; recently, Cadence acquired Intrinsix, SerDes and Pulsic, in order to create synergies with its own products and services.

Strategic Partnerships: Cadence has developed partnerships with major technology companies in the areas EDA, silicon foundries, IP providers, and verification and PCB service providers, which help it increase revenue and market share.

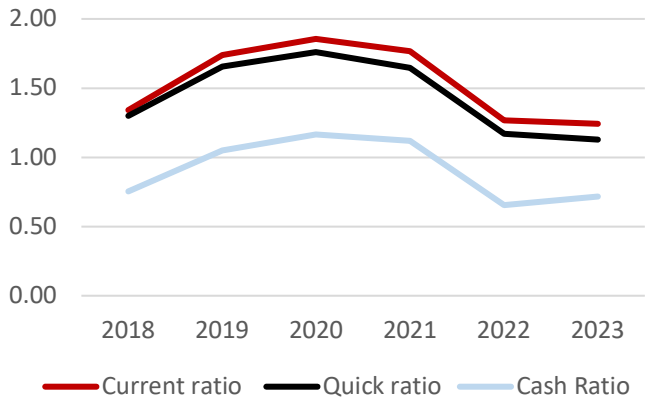
Threats

Technological changes: The technology market is subject to rapid changes, and to compete effectively, Cadence must continually introduce new products that achieve market acceptance. IT-enabled communication equipment industry is characterized by fast technological changes, evolving industry standards, changing market conditions and frequent new product and service introductions and enhancements. The introduction of products using new technologies, or adoption of new industry standards can make the existing products or products under development obsolete or unmarketable. In order to remain competitive and increase its sales, the company needs to adapt to the rapidly changing business environment.

Dependency on key customers: A sizable portion of Cadence's earnings relies on a small group of key clients. The company's financial stability could be severely affected if one or more of these major clients reduce their business or switch to competitors. This dependency creates vulnerability, as losing a key customer could lead to a substantial decline in revenue, negatively impacting Cadence's financial performance and market position. Furthermore, recent technologies developed by competitors or market disruptors could exacerbate this risk by enticing these key clients away from Cadence's offerings.

Exhibit 3.1: Cadence's liquidity progression in the past years

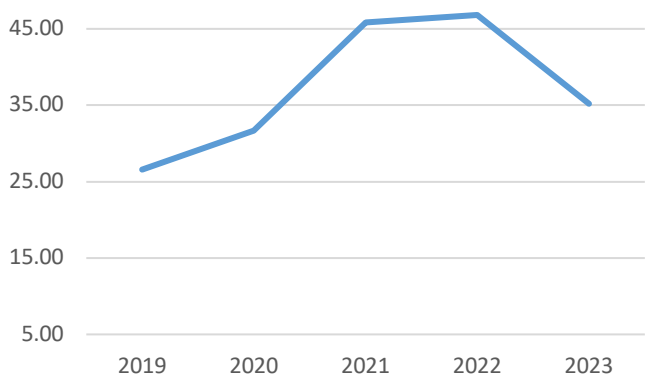
Current, Quick and Cash Ratio (2018-2023)



Source: Minerva Investment Management Society

Exhibit 3.2: Strong Interest Coverage Ratio in the past years

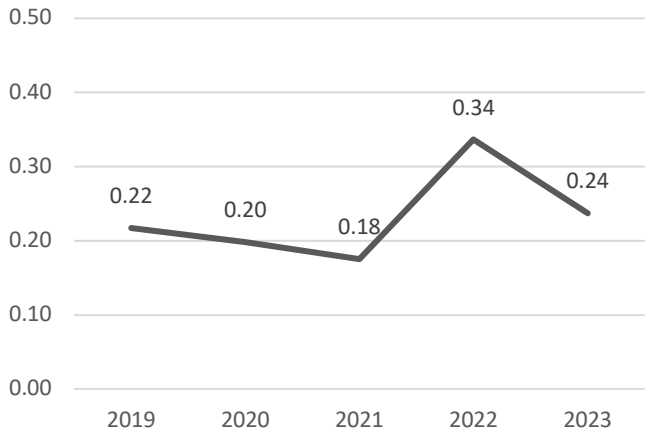
Interest coverage ratio (2019-2023)



Source: Minerva Investment Management Society

Exhibit 3.3: Healthy D/E Ratios in the past years

Debt/equity ratio (2019-2023)



Source: Minerva Investment Management Society

Financial Analysis

Liquidity

For the purpose of analyzing Cadence's liquidity, we took into consideration 3 main ratios: the current, the quick, and the cash ratio. The same trend is prevalent in all these indicators, observing a steep decline in FY22 due to the acquisition of OpenEye Scientific Software Inc, only using cash, and this explains the significant reduction in the cash ratio in that year. This is in line with the company's growth strategy, like the other acquisition that year of Future Facilities Ltd, which explains to us why the current and quick ratio also dropped (but remaining above one). The low difference between current and quick ratio suggests that inventory has not a significant influence on the computation of current assets, which is typical for software companies. In conclusion, the liquidity position is very favorable, and leaves us with a positive outlook for the future.

The current ratio has been above one, suffering a decrease from figures around 1.8 before FY22, to values in the neighborhood of 1.3 afterwards, indicating a strong ability to cover the short-term obligations with current assets.

On the same note, for the past two years, the company has managed to maintain a quick ratio close to 1 (1.17 to 1.13), signaling the capacity to pay most of the current liabilities without the need to sell its inventory or get additional financing.

The only point of concern at the liquidity chapter may seem the relatively low cash ratio registered for the past three years. The values that were consistently above 1 before 2021 ranged from 0.65 in FY22 to 0.72 in FY23 indicating that the company has lost its ability to cover its short-term obligations using only cash and cash-equivalents.

However, since most of these liabilities are contract liabilities, which don't have to be paid in cash, and additionally, Cadence has a reduced customer base with which it has strong and long-lasting relationships, these liabilities do not pose any point of concern.

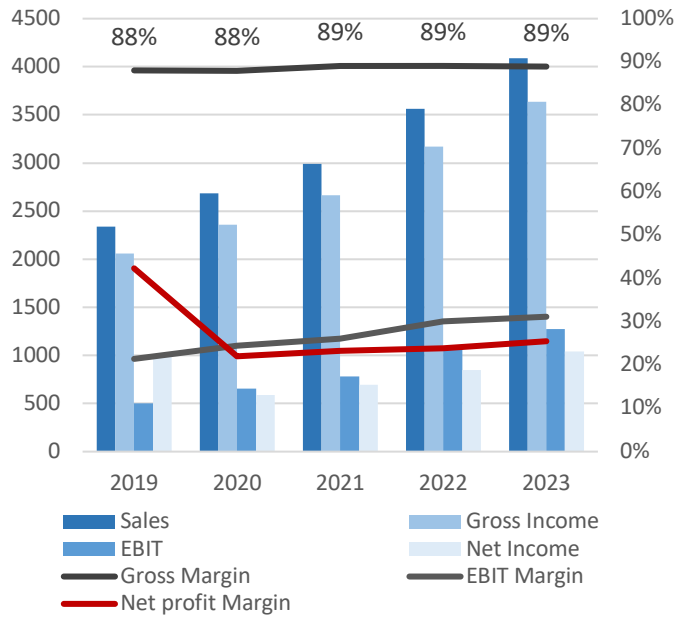
Solvency

In order to analyze Cadence's ability to sustain its debt obligations we have analyzed its Interest Coverage Ratio (ICR) and Debt to Equity Ratio (D/E) for the FY18 – FY23 period. The latter ratio, which considered the Long-Term Debt and its current portion, has been at very low levels for the past period, the values being always under 0.5 In 2022 the ratio has soared due to the various acquisitions, in line, like we already said, with the company's growth strategy, while in 2023 a sharp increase in equity led the ratio to fall. Thus, it is clear that Cadence doesn't rely on debt to fund its operations, having a relatively stable capital structure in the period analyzed.

Examining the Interest Coverage Ratio, we observe a similar trend as the one encountered in the D/E Ratio. The ratio has consistently recorded great values, increasing till the peak in FY22 of 47 because of a consistently increasing operating income and a stable interest expense, while in 2023 the decrease has been caused by the rise in the interest expense, even if the operating income is still growing. The main reason for such high values is that Cadence doesn't rely on debt to fund its operations,

Exhibit 3.4: Strong margins and growing sales

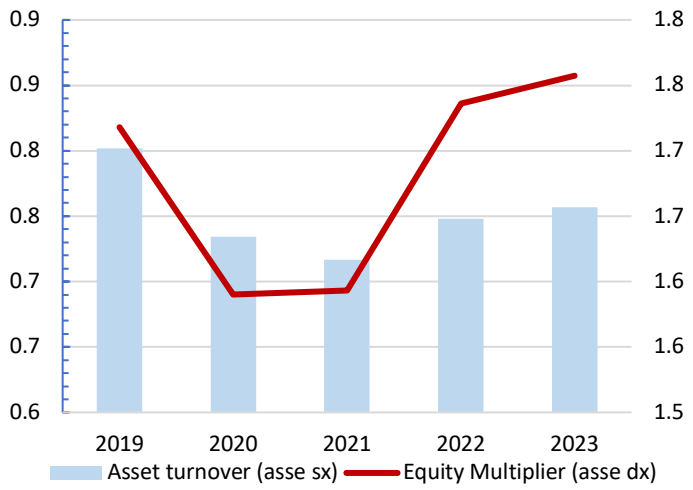
Cadence major profitability ratios (2019-2023)



Source: Minerva Investment Management Society

Exhibit 3.5: 5-step DuPont Analysis

5 Step DuPont Analysis (2019-2023)



Source: Minerva Investment Management Society

thus a low debt level also means a low net interest expense. Because of this structure, the EBIT generated, helped by interest returns on high liquidity, is more than enough to cover the relatively low expenses incurred from the debt held.

Profitability

Regarding profitability margins, we can observe how revenues and gross income rose at a 15% CAGR in the last five years, but very interesting is the fact that EBIT outperformed the latters by almost 11% (26.3% CAGR). Reading the graph below, we can notice how net income has grown as well from 2020 to 2023. In 2019, the value is the highest because of the benefits for income taxes.

Company's gross margin is at 88.9%, which has stayed similar for the entire considered period; looking at the other ratios, we can notice that EBIT margin slightly grew during the five years, thanks to the skill of the management to increase expenses in S&D and still maintain excellent margins, and net margin has grown as well after 2020 in the same way (remember that in 2019 the value is influenced by taxes).

CDNS's outperform the peers' median gross margin of 71.0%, and this is also valid for EBIT margin (median of 23.6%) and net margin (median of 19.5%). In conclusion, the results obtained so far are in line with the growth objectives set by the company, managing to invest while maintaining high economic performance. Anyway, it is also important to consider the industry outlook because it is probably one of the most hyped sectors nowadays because of AI technology and semiconductors applications.

5-Step DuPont Analysis

It may be useful to investigate which are the main variables that impact on shareholder profitability through the 5-step Dupont model. The DuPont analysis is a financial analysis method that decomposes a company's return on equity (ROE) into multiple components to understand which factors contribute most significantly to its performance.

Asset turnover changed over the decade, but after 2020 has settled at a relatively stable value, due to the constant growth of sales and assets through the entire period. Meanwhile, equity multiplier from 2019 seems to have settled around 1.7-1.8.

Even if the equity multiplier has been quite stable in the past years, ROE has gone up, because net margin has increased during the analysed period. In conclusion, due to the strong performance and the increase in shareholders' equity, the company is now characterized by a reduced leverage and much higher profitability.

Cash Conversion Cycle

The Cash Conversion Cycle (CCC) for Cadence is calculated using three key metrics: Days Sales Outstanding (DSO), Days of Inventory Outstanding (DIO), and Days Payables Outstanding (DPO). The CCC formula is employed to assess a company's efficiency in managing working capital. A shorter cash conversion cycle indicates that the company is more adept at selling inventories, recovering cash from sales, and paying suppliers. Moreover, a shorter CCC positively influences the company's cash flows due to increased cash availability.

Exhibit 3.6: Cadence high conversion cycle due to high inventory days

Cadence Cash Conversion Cycle

	2019	2020	2021	2022	2023
DSO	48	45	42	44	45
DIO	55	74	107	114	125
DPO	3	0	0	0	33
CCC	**100**	**119**	**149**	**158**	**137**

Source: Minerva Investment Management Society

DPO values are usually around 0, in line with the company's intention to create good relationships with suppliers, having regard to the delicate situation in the semiconductor industry, while inventory days have increased from 2019 and reached 125 in 2023. This could be a problem because Cadence inventories include high technology parts and components for complex emulation and prototyping hardware systems which are specialized in nature and may be subject to rapid technological obsolescence.

Throughout the cycle, DSO has stayed around 45, but the same cannot be said about the overall cash conversion cycle: it has risen from 100 in 2019 to 137 in 2023, which is a direct consequence of increased DIO.

Valuation: Discounted Cash Flow

Cost of Equity: Assumptions

The Capital Asset Pricing Model (CAPM) was utilized to estimate the cost of equity. The risk-free rate was assumed to be the current 10-year Treasury bond yield (4.42%). While this aligns with the time horizon employed in the discounted cash flow analysis, USA yields were chosen due to Cadence's headquarters location and projected yield curve movements

To compute the ERP, we followed a bottom-up approach. Differently from the computations carried out to get the measurement of beta, we used, instead of a business-segment division, a geographic division of revenues, as we concluded that the resulting number would be a better proxy of risk premium. We divided Cadence revenues in six main geographic sources: the United States, Other Americas, China, Asia (except China), EMEA and Japan. By computing the weighted average of the single ERPs (Damodaran) with the proportional share of revenues, the ERP resulted to be equal to 6.65%.

Exhibit 4.1: WACC calculation

Cadence Weighted Average Cost of Capital

WACC	
Cost of Equity - CAPM	
Risk free rate (10Y)	4.42%
Beta	1.096
ERP	6.65%
WACC Calculations	
Cost of equity	11.74%
Total debt 2023	649
Totale equity 2023	78.595
E/(D+E)	99.18%
Cost of debt	5.63%
D/(D+E)	0.82%
Tax rate	25%
WACC	**11.75%**

Source: Minerva Investment Management Society

Beta

To compute the beta of Cadence, we followed a bottom-up approach. We first selected a set of comparable companies, which are the same ones that would be later used in the multiples valuation. Those companies were selected according to different criteria: in particular, they had to be similar to Cadence in terms of business, size, and capital structure.

We first obtained the raw levered beta and then we computed the adjusted levered beta using the Blume adjustment:

$$\beta_{adj} = \beta_{raw} \cdot 2/3 + 1/3$$

Then, using the Hamada formula and the respective marginal tax rate for each company's country of incorporation, we calculated the unlevered betas. We then obtained the median unlevered beta from the set of comparables, and re-levered it for Cadence.

To compute the levered beta, we used the Hamada formula, with a marginal tax rate of 25% and Cadence's D/E ratio, and the levered beta is therefore equal to 1.096.

The cost of equity was then calculated as follows:

$$CoE = R_f + \beta * (R_m - R_f)$$

The cost of equity, therefore, is equal to 11.71%.

Cost of Debt

The debt rating Fitch Ratings assigned to the company (A-) was used to determine the cost of debt. This resulted in a cost of 5.63%. This finding is further supported by calculating Cadence's Interest Coverage Ratio, that thanks to its high values would place Cadence's in the top spot of Damodaran tables for calculating the synthetic ratings.

Weighted Average Cost of Capital (WACC)

Finally, the WACC was calculated by applying weights to the cost of equity and cost of debt:

$$WACC = \frac{E}{D+E} * CoE + \frac{D}{D+E} * CoD$$

Based on the chosen assumptions, the WACC for Cadence is estimated to be 11.75%.

Sales Forecast

Considering the strong double-digit growth that Cadence achieved in the past years, we forecasted that Cadence would be growing at a higher rate than the EDA market, since it is the main source of revenue. For the terminal year, we assume that growth declines toward a terminal growth rate of 3%, a projection that considers the high CAGR of the market even in the long term.

Profitability

Cadence's dominant position suggests continued profitability despite the high growth trajectory. On this matter, past data shows a constant growth in both EBITDA and EBIT margins, passing, respectively, from 24.6% and 19.1% in 2018 to 34.45% and 30.9% in 2023. Since we believe that the company has still not reached a maturity phase, we think that Cadence will be able to increase, and finally maintain its profitability margins in the future.

Financial Assumptions

Our 10-year goals for various financial items are closely aligned with those of the management and analysts. We considered that Cadence could benefit from scale transition effects in costs of services and SG&A, while, in order to keep its leading position in a highly innovative market, we kept R&D as a percentage of revenue constant. Capex estimates are approx. 10% of revenues, and are kept constant in the next 5 years, equal to 2023 levels, calculated as a percentage of revenues in the previous 5 years. Afterwards, we assume that the % weight of Capex on revenues will be equal to the % weight of D&As, approximately 2%.

DCF and sensitivity analysis

We calculated the estimated value per share by summing the present value of FCFF over the next 10 years and the present value of the terminal value:

$$Enterprise\ value = PV(Terminal\ value) + PV(FCFF)$$

We then subtracted net debt (gross debt less cash and cash equivalents), added back net surplus assets (the sum of nonoperating assets and liabilities), and subtracted non-controlling interests, in order to obtain an equity value of $33.8bn.

The target price we derived is therefore equal to $134.72, with a downside of ca. 53% compared to the last closing price of $286.31 (31/05). According to our sensitivity analysis, which we carried out by estimating the equity value by varying the terminal growth rate (range 1.50%-4.00%) and the WACC (range 10.75%-13.25%), the target price is more heavily influenced by changes in the cost of capital compared to changes in the TGR, ranging from $126.63/share, in case of 12.25% of WACC and 2.50% of TGR up to $144.87 in case of 11.25% of WACC and 3.50% of TGR.

Exhibit 4.2: Sensitivity Analysis (250 bps of WACC-TGR variation)

Cadence Sensitivity Analysis

Sensitivity analysis						
	TGR					
WACC	1.50%	2.00%	2.50%	3.00%	3.50%	4.00%
10.75%	$ 130.45	$ 134.71	$ 139.48	$ 144.87	$ 151.00	$ 158.04
11.25%	$ 126.63	$ 130.45	$ 134.71	$ 139.48	$ 144.87	$ 151.00
11.75%	$ 123.20	$ 126.64	$ 130.47	$ 134.72	$ 139.50	$ 144.89
12.25%	$ 120.06	$ 123.18	$ 126.63	$ 130.45	$ 134.71	$ 139.48
12.75%	$ 117.21	$ 120.06	$ 123.18	$ 126.63	$ 130.45	$ 134.71
13.25%	$ 114.60	$ 117.21	$ 120.06	$ 123.18	$ 126.63	$ 130.45

Source: Minerva Investment Management Society

Valuation: Multiples Analysis

To complement our assessment, we approached Cadence's valuation through the market multiples method, incorporating a set of comparable international companies.

These firms were selected based on their market capitalization, which mirrors Cadence's size within the industry, and their similarity in business models and financial trends, ensuring a comparative analysis that is as relevant and precise as possible.

In assessing Cadence's value, we examined industry benchmarks, specifically focusing on EV/Sales, EV/EBITDA, and P/E multiples.

The average EV/EBITDA multiple among the peer group is 36.5x, while the median is slightly higher at 41.4x, indicating a fairly tight distribution of data points around the central tendency. Cadence stands above the average with an EV/EBITDA multiple of 58.5x, suggesting a premium valuation compared to its peers. The average P/E multiple in the group is 43.6x, while the median is 42.8x. Cadence's P/E multiple at 73.6x signals that the market is willing to pay more for each unit of Cadence's earnings relative to the average of its competitors, potentially due to higher growth expectations or a stronger competitive position.

When considering the EV/Sales multiple, Cadence's figure is 19.2x, surpassing the group average of 11.3x and the median of 13.4x. This denotes that Cadence's sales are valued more highly in the market, perhaps reflecting its superior sales quality, market share, or margins.

By applying the mean multiple to Cadence's LTM SALES, EBITDA and EBIT figures, and proceeding with the calculation of Equity Value for the target, applying the Equity Bridge Value calculated using the SALES, EBITDA, EBIT and Earnings median multiple, dividing for the shares outstanding, and do the median of the values, the final value per share would be $206.27/share, slightly higher than the DCF valuation.

Exhibit 4.3: Multiples Valuation Analysis

	EV/Sales (x)	EV/EBITDA (x)	EV/EBIT (x)	P/E (x)
Cadence Design Systems	19.25x	58.47x	65.85x	73.59x
Synopsys	13.79x	48.08x	59.03x	59.87x
ANSYS	13.04x	37.40x	46.58x	58.28x
Keysight Tech	4.93x	17.69x	20.86x	27.29x
Altium	19.36x	56.15x	61.83x	80.72x
Rambus	14.19x	45.44x	71.49x	19.67x
Siemens	2.37x	14.14x	19.36x	15.66x
Average	**11.28x**	**36.48x**	**46.52x**	**43.58x**
Median	**13.42x**	**41.42x**	**52.80x**	**42.78x**

Source: Minerva Investment Management Society

Exhibit 4.4: Past Transaction Analysis

EBITDA LTM	Avg. w/o outliers
EBITDA LTM	**1.4**
EBITDA Multiple	23.6x
Enterprise Value	**33.2**
Net debt	0.4
Surplus Assets	0.6
Equity Value	**33.4**
Number of shares outstanding	**272748**
Value per share	**122.47**

Source: Minerva Investment Management Society

Valuation: Past Transaction

Finally, as a method of confirmation to the multiples and DCF analysis, we performed a past transaction multiples analysis, using the software Mergermarket. The parameters considered were: transactions no older than 3 years ago, transaction on a global scale, both minority and majority deals, with companies operating in the sub-sector of "software products and development". The results of the analysis are a median multiple and a mean multiple of 23.6x (EV/EBITDA).

By applying the mean multiple to Cadence's LTM EBITDA, the Enterprise Value would be around 33,2 billion USD. We then proceeded with the calculation of Equity Value for the target, applying the Equity Bridge Value calculated under the DCF approach and, lastly, dividing for the shares outstanding, the final value per share would be $122,47/share, broadly in line with the DCF valuation.

Final Valuation Methodology

In the valuation of Cadence, we secured our assessment of the company's last reported numbers when applying the industry's average EV/EBITDA multiple. This choice ensures that our valuation leverages a financial metric that incorporates both Cadence's revenue performance and its operational efficiency, yielding a valuation that reflects the company's profitability more holistically.

By multiplying the EV/EBITDA multiple by Cadence 's reported EBITDA, we obtained the enterprise value of the company. We then subtracted the net debt to arrive at the equity value. Finally, by dividing this equity value by the total number of diluted shares outstanding, we determined an intrinsic share price. This calculation provides a clear view of the company's value from an earnings perspective, which is particularly relevant in the high-growth environment of the semiconductor and EDA industry.

We then combined this share price with our DCF valuation, giving equal weight to both the intrinsic value calculated from the company's cash flows and the market-based value indicated by the multiples analysis. This synthesized valuation method captures the nuances of both Cadence's present financial standing and its expected future performance.

The equal weighting of DCF and multiples valuation in our final computation allows us to capture a comprehensive view of Cadence's worth, both from an intrinsic standpoint and relative to its peers. This methodologically robust approach led us to a target price that, when contrasted with the closing price of Cadence on June 2nd, 2024, reveals an important discrepancy, suggesting the potential for overvaluation in the market.

This evaluation supports a cautious stance for investors, indicating a careful reassessment of Cadence's share value in light of the latest financial data. Considering the overvaluation indicated by the target price obtained and the fact that we used optimistic assumptions in Cadence's reference market and margins growth, we personally opted for selling the stock.

Exhibit 4.6: Final Valuation Methodology

DCF Valuation	134.72$	*50%*
Multiples Valuation	206.27$	*50%*
Final Valuation	170.50$	

Source: Minerva Investment Management Society

Investment Risks

Upside Risk Factors

Higher demand for EDA tools: If the market for EDA tools continues to grow, increasing the demand by more than expected, Cadence will be there to capitalize, as its products are dominating the market. Also, Cadence exhibits negligible churn, with customer retention consistently around 100%, and has relationships with all major chip design companies in the United States.

Innovative product releases and development: Even though Cadence's products are already the cutting-edge technology in the industry, and it already has a big share of the market, a further improvement of the technology used will make the distance between Cadence and its competitors even bigger, increasing a potential cost of switching for its customers. Also, a development in the technology of its products may also lead to an increase in margins, which may improve Cadence profitability.

Secular trends in technology could boost turnover: Secular tailwinds in chip design such as 5G, Internet of Things, AI/ML, and others should increase demand for EDA tools and support growth for Cadence.

Appendix

Exhibit 5.1. Income Statement (Restated)

Income statement	2018	2019	2020	2021	2022	2023
Revenues	2.138	2.336	2.683	2.988	3.562	4.090
COGS	(154)	(156)	(178)	(184)	(258)	(308)
R&D	(885)	(936)	(1.034)	(1.134)	(1.252)	(1.442)
Other SG&A	(573)	(621)	(671)	(749)	(846)	(933)
EBITDA	526	623	800	920	1.206	1.408
D&A	(119)	(123)	(146)	(142)	(132)	(145)
EBIT	407	500	655	778	1.074	1.262
Interest income	8	9	10	3	10	30
Interest expense	(23)	(19)	(21)	(17)	(23)	(36)
Other income (expense), net	(5)	(3)	(2)	4	(15)	37
Unusual expenses	(11)	(9)	(9)	1	(0)	(11)
EBT	376	479	633	768	1.045	1.282
Income taxes	(31)	510	(42)	(72)	(196)	(241)
Net income	346	989	591	696	849	1.041

Exhibit 5.2. (Balance Sheet Restated)

Balance sheet	2018	2019	2020	2021	2022	2023
Fixed assets						
Net PPE	253	276	311	306	371	403
Goodwill	662	662	782	928	1.374	1.536
Acquired intangibles, net	225	172	211	233	355	337
Non-Current Other assets	222	345	436	439	476	537
Total fixed assets	1.363	1.456	1.740	1.907	2.577	2.813
Non-cash working capital						
Short term receivables, net	297	305	338	338	487	489
Inventories	28	56	76	116	128	182
Prepaid expenses and other	93	104	136	174	210	297
Revolving credit facility	(100)	-	-	-	(100)	-
Accounts payable	-	-	-	-	(47)	(91)
Accrued liabilities	(257)	(317)	(350)	(417)	(510)	(485)
Current portion of deferred revenue	(352)	(355)	(447)	(554)	(691)	(665)
Total non-cash working capital	(291)	(208)	(247)	(344)	(523)	(274)
Core capital employed	1.071	1.247	1.493	1.562	2.053	2.540
Surplus assets						
Non-current deferred taxes	155	732	732	764	854	880
Long-term portion of deferred revenue	(49)	(73)	(107)	(101)	(92)	(99)
Other long-term liabilities	(77)	(163)	(207)	(226)	(305)	(276)
Total surplus assets	29	496	418	437	458	505
Net capital employed	1.100	1.744	1.911	1.999	2.511	3.045
Debt						
Current portion of long-term debt	-	-	-	-	-	349
Long-term debt	345	346	347	348	648	300
Gross debt	345	346	347	348	648	649
Cash and cash equivalents	(533)	(705)	(928)	(1.089)	(882)	(1.008)
Net debt	(188)	(359)	(582)	(741)	(234)	(359)
Equity						
Preferred stock	-	-	-	-	-	-
Common stock	1.936	2.046	2.218	2.468	2.766	3.167
Treasury stock, at cost	(1.396)	(1.668)	(2.058)	(2.740)	(3.824)	(4.604)
Net retained earnings	748	1.725	2.333	3.013	3.804	4.842
Total equity	1.288	2.103	2.493	2.741	2.745	3.404
Total equity and liabilities	1.100	1.744	1.911	1.999	2.511	3.045

Exhibit 5.3. Unlevered Beta Calculation

Company	Country	Currency	Market cap	Cash & equivalents	Debt	Minorities	Pensions	Preferred shares	EV	Leverage	Raw levered beta	Adj. levered beta	Corporate Marginal Tax Rate	Unlevered beta
Synopsys	US	USD	86.451	1.275	17	36	-	-	85.229	-1.45%	1.203	1.135	25.0%	1.148
ANSYS	US	USD	28.609	1.071	754	-	12	-	28.304	-1.11%	1.277	1.185	25.0%	1.195
Keysight Tech	US	USD	27.459	1.748	1.817	-	-	-	27.528	0.25%	1.081	1.054	25.0%	1.052
Altium	AU	USD	5.901	177	-	-	-	-	5.724	-2.99%	1.035	1.023	30.0%	1.045
Rambus	US	USD	6.248	391	-	-	-	-	5.857	-6.26%	1.259	1.173	25.0%	1.230
Siemens	DE	USD	148.058	8.386	51.644	5.471	1.229	-	198.016	28.18%	1.240	1.160	30.0%	0.969
									Average	2.77%			Average	1.107
									Median	-1.28%			Median	1.100

Exhibit 5.4. Minerva's DCF Model

	Base year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Terminal year
	0	1	2	3	4	5	6	7	8	9	10	
Revenues	4.090	4.862	5.753	6.777	7.955	9.307	10.514	11.869	13.391	15.098	17.013	
Revenues growth rate	*14.83%*	*18.88%*	*18.31%*	*17.81%*	*17.38%*	*16.99%*	*12.97%*	*12.89%*	*12.82%*	*12.75%*	*12.68%*	
COGS	(308)	(315)	(372)	(436)	(506)	(584)	(621)	(701)	(791)	(892)	(1.005)	
COGS as a % of revenues	*7.53%*	*6.47%*	*6.47%*	*6.43%*	*6.37%*	*6.27%*	*5.91%*	*5.91%*	*5.91%*	*5.91%*	*5.91%*	
R&D	(1.442)	(1.702)	(2.013)	(2.372)	(2.784)	(3.257)	(3.680)	(4.154)	(4.687)	(5.284)	(5.954)	
R&D as a % of revenues	*35.25%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	*35.00%*	
Other SG&A	(933)	(1.033)	(1.147)	(1.263)	(1.380)	(1.493)	(1.577)	(1.780)	(2.009)	(2.265)	(2.552)	
SG&A as a % of revenues	*22.81%*	*21.24%*	*19.94%*	*18.64%*	*17.34%*	*16.04%*	*15.00%*	*15.00%*	*15.00%*	*15.00%*	*15.00%*	
EBITDA	1.408	1.813	2.220	2.706	3.285	3.973	4.636	5.233	5.904	6.657	7.501	
EBITDA margin	34.41%	37.29%	38.59%	39.93%	41.29%	42.68%	44.09%	44.09%	44.09%	44.09%	44.09%	
D&A	(145)	(86)	(108)	(134)	(164)	(199)	(215)	(234)	(255)	(280)	(308)	
EBIT	1.262	1.727	2.112	2.572	3.120	3.773	4.420	4.999	5.649	6.377	7.193	
EBIT margin	*30.86%*	*35.52%*	*36.71%*	*37.95%*	*39.22%*	*40.54%*	*42.04%*	*42.12%*	*42.18%*	*42.24%*	*42.28%*	
Operating taxes	(316)	(432)	(528)	(643)	(780)	(943)	(1.105)	(1.250)	(1.412)	(1.594)	(1.798)	
D&A	145	86	108	134	164	199	215	234	255	280	308	
Gross cash flows	1.092	1.381	1.692	2.063	2.505	3.029	3.531	3.983	4.492	5.063	5.703	
Change in non-cash working capital	(250)	88	67	77	88	102	104	103	116	130	146	
CAPEX	(91)	(454)	(537)	(633)	(743)	(869)	(215)	(234)	(255)	(280)	(308)	
FCFF	751	**1.015**	**1.222**	**1.507**	**1.850**	**2.262**	**3.419**	**3.853**	**4.352**	**4.913**	**5.541**	**5.707**
WACC		11.75%	11.75%	11.75%	11.75%	11.75%	11.75%	11.75%	11.75%	11.75%	11.75%	
Discount factor		0.895	0.801	0.717	0.641	0.574	0.514	0.460	0.411	0.368	0.329	
Present value of FCFF		**908**	**978**	**1.080**	**1.187**	**1.298**	**1.756**	**1.770**	**1.790**	**1.808**	**1.825**	
Terminal growth rate											3.00%	
Terminal value											**65.234**	

Exhibit 5.5. Minerva's DCF Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Assumptions
Electronic Design Automation Market	16 Billion $	Grow 10% a year	Grow 10% a year	Grow 3.00% a year	Using market forecasts provided in the Electronic Design Automation market section for the first ten years. Then assuming that growth declines toward a terminal growth rate of 3%, a projection that considers the high CAGR of the market even in the long term.
Cadence Market Share	27.00%	Increase 2% a year	Increase 1% a year	Stable at ca. 42%	The company is able to expand its market share in the next 5 years, and to continue increasing it little by little its market share in the markets in which it operates
Operating margin	30.90%	Gradually increasing to 40%	Increasing towards 42%	Stable around 42%	Calculated considering the average margins in the Global Semiconductors. We assume decreasing costs in costs of services and SG&A over time, driven by scale transition. In contrast, we kept R&D expenses constant (35% of revenues), to allow Cadence to maintain its market share over time
Capex	9.34%	Stable at 9.34%	Decrease to 2%	Stable at 2%	Based on historical data, that considers CAPEX as a % of revenues in previous 5 years. We assume that in the future the weight of Capex on revenues will be equal to the weight of D&As on revenues, approximately 2%
Cost of capital	11.75%		Stays at current levels		Calculated considering Damodaran's ERP divided by geography, actual debt rating of Cadence, Bottom-up Beta calculation using the same comparables as the multiple analysis, adjusted with the Bloom rule, 25% statutory tax rate

Exhibit 5.6. Multiples Analysis (Minerva Investment Management)

	EV/Sales		EV/EBITDA		EV/EBIT		P/E (x)	
	Average	Median	Average	Median	Average	Median	Average	Median
Multiple	11,28x	13,42x	36,48x	41,42x	46,52x	52,80x	43,58x	42,78x
Cadence Metric	4090,0	4090,0	1407,5	1407,5	1262,3	1262,3	3,8	3,8
Enterprise Value	46127,22	54871,72	51352,13	58299,13	58724,25	66647,69	-	-
(Net Debt)	359,00	359,00	359,00	359,00	359,00	359,00	-	-
Surplus Assets	505,00	505,00	505,00	505,00	505,00	505,00	-	-
Equity Value	46273,22	55017,72	51498,13	58445,13	58870,25	66793,69	45619,12	44784,63
Numbers of Shares	272,75	272,75	272,75	272,75	272,75	272,75	272,75	272,75
Equity Value per Share	**169,65**	**201,71**	**188,81**	**214,28**	**215,84**	**244,89**	**167,26**	**164,20**
Weighted Average (median)							206,27	

Closing price	286,31
Potential Upside	-42,32%

Exhibit 5.8. Past Transaction Analysis (Minerva Investment Management)

#	Target	Country	Stake	Bidder	Completed Date	EV (€ Mio)	Net Debt (€ Mio)	Equity Val. (€ Mio)	Deal Value (€ Mio)	Sales (€ Mio)	EBITDA (€ Mio)	EBIT (€ Mio)	EV / Sales	EV / EBITDA	EV / EBIT
1	Toshiba Corp	Japan	100%	Japan Industrial Partners Inc	dic-23	14.861	818	14.043	14.861	24.260	679	39	0.6x	22.2x	389.0x
2	GK Software SE	Germany	100%	Fujitsu Ltd	mag-23	395	(37)	432	432	146	25	19	2.7x	15.8x	21.2x
3	VMware LLC	USA	100%	Broadcom Inc	nov-23	91.170	9.489	81.681	91.170	11.528	2.731	2.199	7.6x	32.1x	39.8x
4	Xilinx Inc	USA	100%	Advanced Micro Devices, Inc.	feb-22	30.093	695	29.399	30.093	2.841	799	711	11.2x	40.0x	44.9x
5	NuFlare Technology Inc	Japan	32.3%	Toshiba Corp	apr-20	1.048	(89)	1.137	541	463	118	95	2.2x	8.5x	10.6x
6	Mellanox Technologies Ltd	Israel	100%	NVIDIA Corp	apr-20	6.012	(51)	6.063	6.012	950	186	98	6.2x	31.6x	60.3x
7	ManTech International Corp	USA	100%	Carlyle Group Inc	set-22	4.103	329	3.774	4.103	2.247	232	166	1.7x	16.2x	22.7x
8	Citrix Systems Inc	USA	100%	Vista Equity Partners LLC	set-22	14.851	2.651	12.200	14.851	2.830	613	299	5.2x	23.8x	48.9x
9	Blue Yonder Inc	USA	80%	Panasonic Holdings Corp	set-21	7.049	1.244	5.805	5.888	829	201	14	8.4x	34.6x	485.7x
10	VMware LLC	USA	80.7%	Dell Technologies Inc	nov-21	62.257	1.109	61.148	50.817	9.696	2.812	1.968	6.3x	21.8x	31.2x
	First quartile												*1.9x*	*16.0 x*	*21.9 x*
	Mediana												**2.7x**	**22.2 x**	**39.8 x**
	Media												**4.6x**	**23.8 x**	**84.1 x**
	Avg. w/o outliers												**4.1x**	**23.6 x**	**37.8 x**
	Third quartile												*6.9x*	*31.8 x*	*52.6 x*
	Minimo												*0.6x*	*8.5 x*	*10.6 x*
	Massimo												*11.2x*	*40.0 x*	*389.0 x*

Fonte: Elaborazioni Minerva su dati MergerMarket

EBITDA LTM	Avg. w/o outliers
EBITDA LTM	**1.4**
EBITDA Multiple	23.6x
Enterprise Value	**33.2**
Net debt	0.4
Surplus Assets	0.6
Equity Value	**33.4**
Number of shares outstandir	**272748**
Value per share	**122.47**

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