ASML Holding NV (ASML)

HOLD: € 728.66 (-12.66%)

Equity Research Division | 24th April 2024

Analysts

Andrea Barra - Lead

andrea.barra3@studbocconi.it

Lorenzo Lucicesare

lorenzo.lucicessare@studbocconi.it

Salma El Hamdi

salma.elhamdi@studbocconi.it

Sara De Padova

sara.depadova@studbocconi.it

Stelian Cujba

stelian.cujba@studbocconi.it

Supervisors

Luigi Savarese, Head of Equity Research

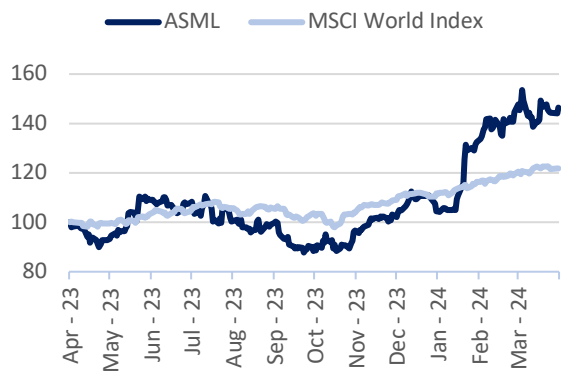
luigi.savarese@studbocconi.it

Dan-Arthur Coseru, Co-Head of Equity Research

danarthur.coseru@studbocconi.it

Basic Information	
Last Closing Price	€ 834.3
Target Price	€ 728.66
+/- Potential	-12.66%
Bloomberg Ticker	ASML:NA
GICS Sector	Information Technology
GICS Sub-Industry	Semiconductor Equipment

1Y Cumulative Returns (re-based to 100)



Market Cap	329,404
Basic Shares O/S	394.6
52-Wk High	958.40
52-Wk Low	534.40
Fiscal Year End	31 Dec. 2023

€(million)	FY20A	FY21A	FY22A	FY23A
Gross profit	6,630	9,651	10,474	13,836
EBITDA	4,527	6,991	7,141	9,829
EBIT	4,052	6,536	6,501	9,042
Net Income	3,554	5,883	5,624	7,839

Source: Bloomberg

Key Executives	
Peter Wennink	President, CEO
Matin van den Brink	President, CTO
Roger Dassen	Executive VP, CFO

Investment Thesis

ASML Holding NV (ASML) is the dominant player in its core market with its close-to-monopoly market share. The company is expected to face higher demand from its customers as new investments are made in order to expand their chip capacity to better serve the AI boom. While favorable macro trends will cause its deliveries of new systems to rise in the short term, maintenance and enhancement of these same facilities will provide with a secure revenue stream even in years to come.

ASML has demonstrated a strong capacity to grow its revenues at an incredible pace, while also keeping a >50% gross margin throughout the process. To grasp the reason behind such numbers, it is sufficient to notice that the cheapest equipment that a customer could buy costs more than 300 million dollars. The reason why willingness to pay is so high is that no substitute products exist yet, and no other company sells comparable machinery.

Despite those tailwinds and the company's competitive advantage, at the current valuation, we assess the risk-reward profile as reasonably balanced. Accordingly, we recommend a HOLD rating for ASML Holding NV.

Valuation

We are valuing ASML using a 50/50 blend of intrinsic value (DCF) and relative valuation, arriving at a target price of €728.66, a 12.66% decrease from its last close price.

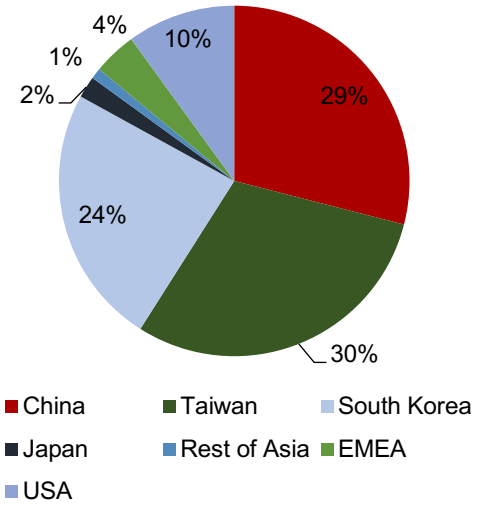
Key Risks:

Upside risks: Stronger than expected pricing power and faster increase in growth rates.

Downside risks: Loss in market share and delays in customers 'production plans.

Exhibit 1.1: Four main customers account for ~80% of revenues

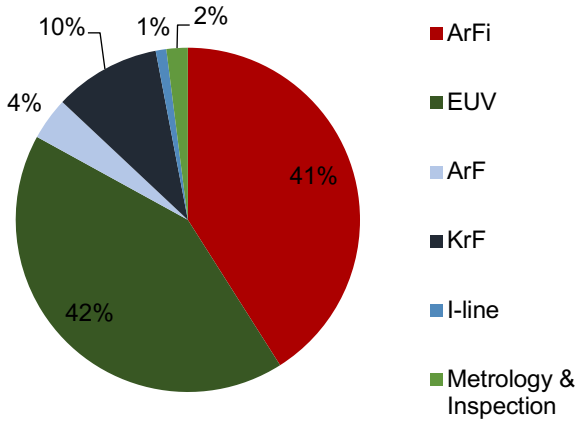
Revenue breakdown by Geography (FY2023)



Source: Company Filings

Exhibit 1.2: Leader in two distinct technologies

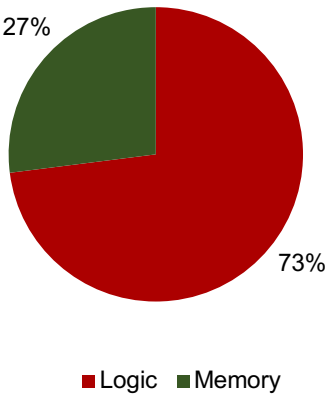
Revenue breakdown by Technology (FY2023)



Source: Company Filings

Exhibit 1.3: Few end markets but with a dominant position

Revenue breakdown by End-Use (FY2023)



Source: Company Filings

Company Overview

ASML is a Dutch company based in Veldhoven, the Netherlands, that designs and builds systems and software used in the production of semiconductor chips. It is the only company in the world that currently manufactures extreme ultraviolet (EUV) lithography machines, which enables the production of smaller, faster, more powerful microchips through the use of a shorter wavelength of light.

Product Offering

ASML was founded as a joint venture between Philips and ASM International, the name 'Advanced Semiconductor Materials Lithography'.

The company is one of the world's leading manufacturers of chip-making equipment. They design and manufacture the lithography machines that are an essential component in chip manufacturing. Their customers are companies such as Intel, who use their machines in 'fabs' – microchip manufacturing plants – to create microchips that are eventually used in many electronic devices, including smartphones, laptops and much more.

Recent Developments

In 2023, ASML reported an excellent financial performance, with sales up by 30% and a gross margin of 51.3%. When taking the macro environment into account – inflation, high interest rates, falling GDPs, geopolitical tensions and a downturn in the semiconductor industry – this achievement was little short of remarkable.

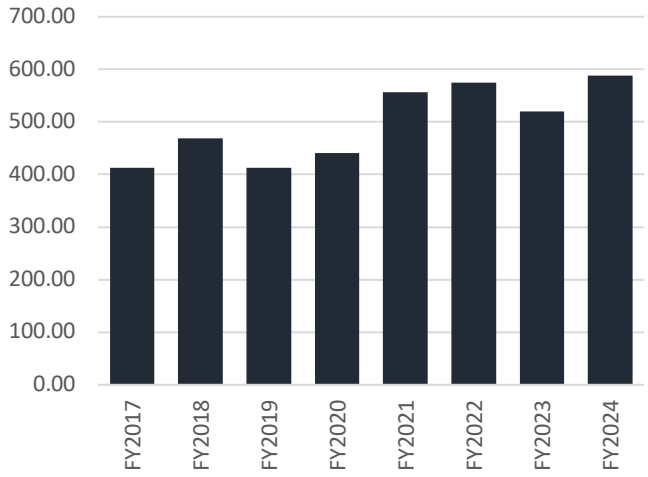
Firstly, they had been significantly supply-constrained in both 2021 and 2022, and over the last 12 months they saw those constraints ease. The supply bottlenecks created by COVID-19 restrictions have now worked their way through the system. This meant that over 2021 and 2022, they built up a very significant backlog that they could start eating into in 2023.

Secondly, although ASML have received significant orders from customers in China for a number of years, their fill rate has been less than 50%. This meant that, while some of their other customers were understandably taking their foot off the accelerator, they could take the opportunity to step up their China order fill rate this year.

They believe that the market has now reached the lowest point of the dip and although they cannot predict the exact nature of the slope ahead, the recovery is nascent. They expect 2024 to be a transition year with revenue broadly similar to 2023 and a slight decrease in margins.

Exhibit 2.1: Semiconductors industry revenue worldwide

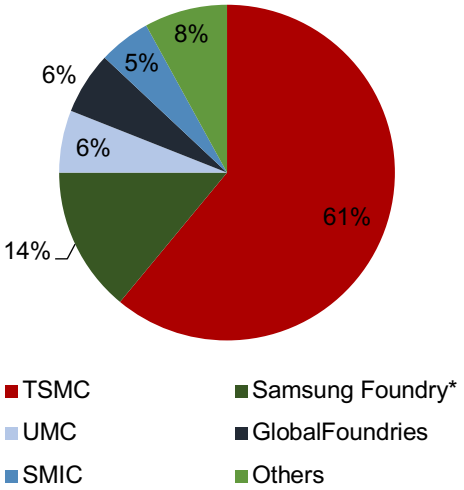
Revenue worldwide from 2017 to 2024 ($ billion)



Source: Statista

Exhibit 2.2 A concentrated customer base

Revenue breakdown by customer (FY2023)



Source: Company Filings

Industry Outlook

Semiconductor Industry

The semiconductor industry, with its integral role in powering electronic devices, stands at the forefront of technological advancement. Chips, the fundamental components of virtually all electronic devices, are not only omnipresent in our current landscape but are set to play an even more pivotal role in our future. As our economy becomes increasingly digitized, semiconductor technology becomes indispensable.

Revolutionary products like the metaverse underscore the significance of semiconductors, as they power complex electronic services that drive efficiency and innovation. Consequently, the future of the semiconductor industry is viewed with optimism, as it continues to evolve to meet the demands of an ever-changing technological landscape.

The broad global semiconductor equipment market is expected to reach a valuation of USD 1,307.7 billion by 2032, with a projected Compound Annual Growth Rate (CAGR) of 8.8% from 2023 to 2032. Regionally, China leads in semiconductor sales, followed by the Asia Pacific region, the Americas, Europe, and Japan.

This distribution underscores Asia's dominance in both semiconductor manufacturing and consumption, as it accounts for 51.5% of the worldwide semiconductor market and is driving its expansion with its dynamic semiconductor market. Key players, commanding a substantial market share, include ASML, KLA and LAM Research.

The semiconductor industry faces significant challenges despite its promising outlook. The recent chip shortage crisis, particularly notable in 2020 and 2021, highlighted vulnerabilities in the supply chain, worsened by geopolitical conflicts and disruptions. The escalating chip war between the United States and China amplifies these challenges. Heightened competition and technological rivalry between these economic powerhouses have disrupted semiconductor manufacturing and innovation.

Trade restrictions, export controls, and sanctions complicate global supply chains, affecting the flow of critical components. This geopolitical conflict not only disrupts industry dynamics but also poses significant risks to the stability and resilience of the semiconductor ecosystem. Semiconductors must navigate these complexities to maintain growth and innovation.

Balancing innovation with resilience due to concerns over a potential slowdown in Moore's Law and economic uncertainties adds complexity. Additionally, cybersecurity threats, including targeted attacks on valuable intellectual property, present further hurdles.

Porter's 5 Forces

Threat of New Entrants: Moderate. The threat of new entrants for ASML is relatively low. As a matter of fact, the Semiconductor industry requires important investments in research and development and is highly capital-intensive. This high capital requirement makes it challenging for new entrants to enter the market and compete with established players like ASML. Furthermore, ASML's established itself with a notorious standing in quality and reliability, and economies of scale provide significant barriers to entry for new competitors. Additionally, the Semiconductor industry is subject to fluctuations in demand and supply, which could impact the barrier to entry for new competitors. For instance, during periods of high demand, the barrier to entry may be relatively low, as new players may be able to secure business more easily due to high demand. Conversely, during periods of low demand, the barrier to entry may be higher, as the established players may be better able to tackle the contraction.

Bargaining Power of Buyers: Low. ASML faces a relatively low bargaining power from its key customers, including TSMC, Samsung, and Intel, which together account for 77% of its sales. These major players in the semiconductor industry rely heavily on ASML's lithography machines to produce advanced integrated circuits (ICs) for a wide range of applications, including consumer electronics, telecommunications, automotive, and healthcare. ASML's revenue is primarily derived from the sale of its lithography systems, which gives it a strong position in negotiations with customers. Additionally, ASML holds a monopoly in the extreme ultraviolet (EUV) lithography market, which represents 42% of its sales, and has a 90% market share in ArFi (Argon Fluoride immersion) lithography, accounting for 41% of its sales. EUV lithography uses extreme ultraviolet light to create patterns on silicon wafers, allowing for more precise and complex circuit designs. ArFi lithography, on the other hand, uses a high-energy laser and immersion technology to achieve high resolution in semiconductor manufacturing. These technologies are essential to produce next-generation semiconductor devices, giving ASML a strong bargaining position with its key customers.

Threat of Substitutes: Low. The threat of substitutes for ASML is relatively low. Semiconductors have the attribute of polyvalence; they are indeed present in our everyday electronic devices, including smartphones, refrigerators, computers, and servers, which establishes a solid foundation for semiconductors, making it difficult for substitutes to emerge. The production system is significantly exhaustive and requires high capital investment and expertise, which only long-established companies can afford. Additionally, the prominent level of complexity and precision required in semiconductor manufacturing means that the barriers to entry for potential substitutes are extremely high. Furthermore, ASML invests heavily in research and development, allowing it to stay ahead of potential substitutes in terms of technology and innovation.

Industry Rivalry: Moderate. The Semiconductor industry is highly competitive, and the level of rivalry is intense. As a leading semiconductor supplier, ASML faces significant competition from other suppliers such as Nikon and Canon, particularly in the high-end segment of the market. Technology development is a key factor in the level of rivalry between semiconductor companies. As the industry evolves, companies must invest heavily in research and development to remain competitive. Indeed, ASML holds a dominant position in the market, particularly in the advanced nodes where EUV technology is crucial. On another note, ASML's strong customer relationships provide it with a competitive advantage, indeed it has long-term relationships with leading semiconductor companies which helps to mitigate the risk of losing customers to competitors. ASML has also a history of collaborations including suppliers, research institutions, and customers, which fosters innovative solutions and gives ASML access to critical resources, which strengthen its position in the semiconductor industry.

Bargaining Power of Suppliers: Moderate. The bargaining power of suppliers for ASML is moderate. Indeed, ASML relies on a network of suppliers for a wide range of inputs, including silicon wafers, chemicals, gases, and equipment used in its lithography machines. Some suppliers may have significant bargaining power due to their unique technologies or resources. ASML may be more reliant on specific suppliers and may have difficulty finding alternative sources. The bargaining power of suppliers varies depending on the nature of the input. For specialized inputs, such as certain chemicals or equipment, the bargaining power of suppliers is higher. This is because there may be a limited number of suppliers capable of providing these inputs, which gives the suppliers greater leverage in negotiations. It is worth noting that ASML has significant purchasing power due to its large scale and market share, as well as its ability to develop long-term relationships with its suppliers, which allows it to negotiate favorable terms and provides some degree of stability in the supply chain.

Tailwinds	Headwinds
Semiconductor industry's high R&D investment and capital intensity deter new entrants	Fluctuations in demand and supply impact entry barriers for new competitors.
Key customers heavily rely on ASML's lithography machines	Intense competition from other suppliers, especially in the high-end segment, requires continuous R&D investment
Complex semiconductor manufacturing and ASML's innovation make substitutes unlikely.	Managing diverse customer preferences and needs adds complexity and risk.
ASML's dominant position and strong customer relationships mitigate competitive pressures.	Exposure to fluctuating commodity prices impacts cost structures and profitability.
ASML's purchasing power and relationships ensure stable supplies despite moderate supplier leverage	Suppliers' unique technologies or resources may impact ASML's operations and supply chain

Swot Analysis

Strengths

Technological Leadership: ASML is at the forefront of developing cutting-edge lithography technology. Its machines enable the production of smaller, more powerful semiconductor chips, driving the advancement of various industries such as electronics, telecommunications, and computing.

Strategic Partnerships: ASML has strategic partnerships with major semiconductor manufacturers worldwide. These partnerships help the company stay abreast of industry needs, gain insights into future technology trends, and ensure a steady demand for its products.

Intellectual Property Portfolio: ASML possesses a significant intellectual property portfolio, including patents covering various aspects of its lithography technology. This helps protect its market position and provides opportunities for licensing revenue.

Weaknesses

Regulatory Challenges: ASML operates in a highly regulated industry, facing scrutiny from governments regarding technology exports and intellectual property protection. Compliance with various regulations adds complexity and may restrict the company's ability to do business in certain regions.

Competition and Innovation Risk: While ASML currently enjoys a dominant position in the market, competition from other lithography equipment manufacturers and emerging technologies poses a risk. Any failure to innovate or adapt to changing industry dynamics could erode the company's market share over time.

Opportunities

Computing Distribution: Through connectivity, computing power will be available to all people 'on device', enabling a connected world. These global megatrends in the electronics industry, supported by a highly profitable and fiercely innovative ecosystem, are expected to continue to fuel growth across the semiconductor market. This translates into increased wafer demand at both advanced and mature nodes.

Investments in Wafer Capacity: The continued push of countries around the globe for technological sovereignty is expected to drive increased capital intensity. This means that the industry is expected to make significant investments in wafer capacity, with increasing spend on lithography. The semiconductor end markets, such as automotive, data centers, industrial and consumer electronics, are expected to grow.

Threats

Geopolitical Tensions: Geopolitical tensions and the strive for technological sovereignty may lead to a decoupled ecosystem and – in longer term – overcapacity. Additional export restrictions have been imposed during 2023. There is a risk that future trade restrictions (e.g. raw materials, technology, systems, investments) further limit our ability to source parts and/or sell and service systems to certain customers.

Pressure on Innovation in Ecosystem: ASML's strengths are based on the innovation power in its ecosystem and the ability to protect its IP. There is a risk that it will not be able to deliver on its technology roadmap. In addition, there is significant pressure on know-how and IP protection for ASML and its open innovation partners. ASML and its partners experience cyberattacks and other security threats.

Quotes on ASML

"The mirrors guiding this light, made of sandwiched layers of silicon and molybdenum, are ground so precisely that, if scaled to the size of Germany, they would have no bumps bigger than a millimeter. "

"ASML boasts its EUV system controls beams of light so accurately that it is equivalent to shining a light torch from the earth and hitting a 50 eurocent coin placed on the moon."

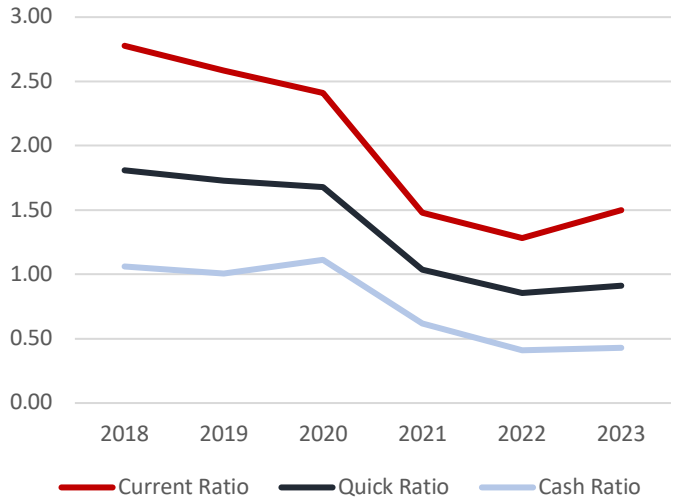
"In November 2020 TSMC placed another order with ASML which could be valued at $2.3 billion. You could build five state of the art Tesla Gigafactories or buy 25 new Boeing 737s for that price."

Source: Company's press releases

Source: Minerva Investment Management Society

Exhibit 3.1: ASML liquidity ratios plunge in FY21

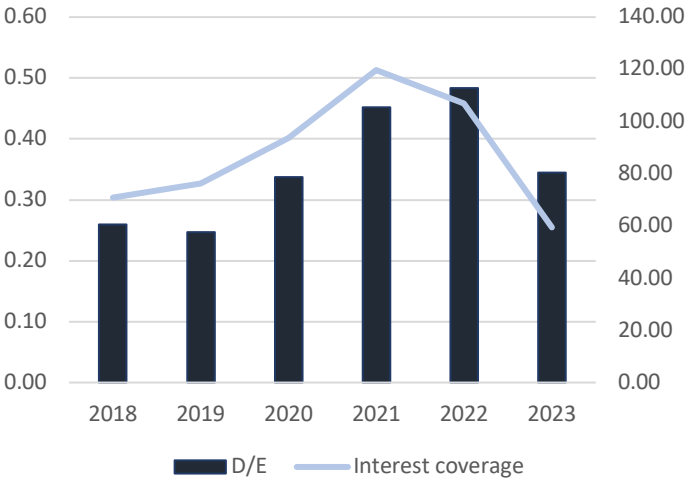
ASML Current, Quick and Cash ratios (2018-2023)



Source: Minerva Investment Management Society

Exhibit 3.2: ASML Solvency progression in the past years

ASML D/E ratio (left, Interest Coverage Ratio (right)



Source: Minerva Investment Management Society

Liquidity

For the purpose of analyzing ASML'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 FY21 due to a disproportionate increase in current liabilities compared to the current assets, arriving at a level that has been maintained since then. The main cause of the sudden increase in liabilities is the surge in Contract Liabilities which denote received payments for goods or services that have not yet been provided. This, in turn was caused by the disruption created by the pandemic in the supply chain and the higher demand experienced in the industry.

The current ratio has Is been above one, suffering a decrease from figures around 2.5 before FY21, to values in the neighborhood of 1.5 afterwards, indicating a strong ability to cover the short-term obligations with current assets.

On the same note, for the past three years, ASML has managed to maintain a quick ratio close to 1 (1.03 to 0.91), 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 0.62 in FY21 to 0.43 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, ASML having a reduced customer base with which it has strong and long-lasting relationships, these liabilities do not pose any point of concern.

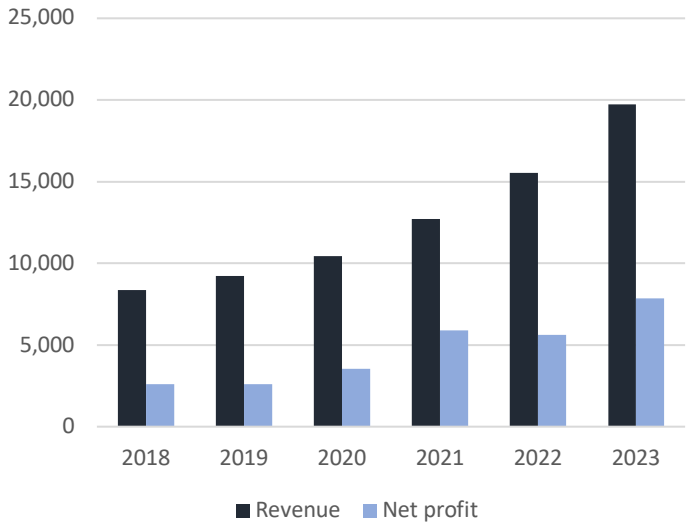
Solvency

In order to analyze ASML'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 later 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. We can observe a slight increase starting in FY20, mainly caused by a marginal increase in Long Term Debt and a reduction in equity, bringing the values closer to 0.5. Thus, it is clear that ASML 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 FY21 of 120 because of a consistently increasing operating income and a stable interest expense. In the last 2 years, the interest expense has increased which resulted in the lower ICR of 60 in FY23. The main reason for such high values is that ASML doesn't rely on debt to fund its operations, 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.

Exhibit 3.3: ASML experienced a sizeable increase in revenue and net profit

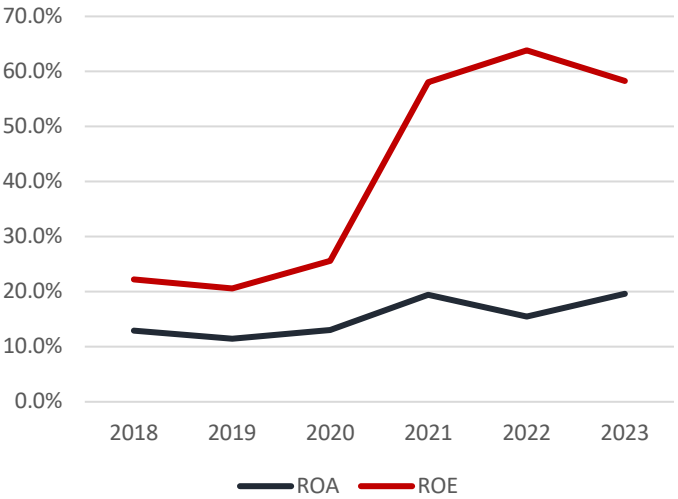
ASML's revenue and net profit (€ million)



Source: Minerva Investment Management Society

Exhibit 3.4: ROE experiencing a sizeable increase in FY21 due to change in capital structure

ASML ROA and ROE for FY18-FY23 (%)



Source: Minerva Investment Management Society

Profitability

ASML shows strong performance regarding its profitability margins in the period analyzed. Overall, revenue grew at an accelerated 20.3% CAGR in the FY18-FY23 period, proving the rapid growth of the company and its industry. In 2023, two thirds of the sales generated have been attributed to the Extreme Ultraviolet (UEV) and Argon Fluoride Immersion (ArF) technologies that have been rapidly growing in the past years and by the management's estimations, the revenue will grow till 2030 to a level around 44 to 60 billion. Meanwhile, the net profit growth has outperformed the revenue by more than 4% (24.8% CAGR over the past 5 years), demonstrating the improvements in the efficiency of the company and its processes.

The Gross and Net Profit Margin have been following the same trend for the past years, better improvement proving to be found in the latter margin. While the Gross Margin got from 44.8% in FY18 to 50.2% in FY23, the Net Margin has grown from 23.7% to 28.4% in the same period. Most of the improvement has been observed from 2019 to 2021, where the semiconductor industry has experienced a sudden surge due to increasing demand for microchips. Additionally, ASML expects to maintain a Gross Margin of around 54-56% throughout 2025 and then experience an improvement in efficiency till 2030, getting at a Gross Margin in the neighborhood of 56-60%.

A similar story Is presented by the growth In Return on Assets, that from 2018, grew by around 6.5%, sitting at 19.6%, caused by the strong increase in Net Profit that has been experienced by ASML. While this in itself is an impressive figure, the Return on Equity outshines it, with a growth of more than 35 percentual points since FY18, peaking at 63.8% in 2021 and stabilizing at 58.3% in FY23.

To analyze this growth of ROE, we can employ a 5-Step DuPont analysis, which calculates the return on equity as a product of the following 5 ratios: Tax Burden, Operating Income, Interest Burden, Asset Turnover, and Financial Leverage. While the first three ratios have been relatively stable for the period analyzed, there has been some growth in Asset Turnover mainly due to an accelerated increase in Revenue relative to the growth of assets. This is further confirmed by the high reinvestment rate, 56% in 2023, meaning that a big part of the operating profit after tax is reinvested in the growth of the company, also signaling the confidence of the shareholders in the further development of ASML. However, the key driver in the growth of ROE has been the Financial Leverage, that has been responsible for around 24.4% of the improvement experienced. This change in leverage has been mainly due to the decrease in equity on ASML's balance sheet in FY21 and FY22. However, since both Debt/Equity and Debt/Assets are still at very low levels, this doesn't signify a higher intrinsic risk in the capital structure.

Cash Conversion Cycle

The Cash Conversion Cycle (CCC) for ASML is calculated using three key metrics: Days Sales Outstanding (DSO), which signify the average number of days that it takes ASML to collect payment for a sale, Days of Inventory Outstanding

Exhibit 3.5: ASML high conversion cycle due to high inventory days

ASML Cash Conversion Cycle

	2019	2020	2021	2022	2023
DSO	51	42	45	75	66
DIO	225	235	221	239	243
DPO	55	61	71	80	65
CCC	**220**	**217**	**195**	**233**	**244**

Source: Minerva Investment Management Society

Exhibit 4.1: The discount rate calculation

ASML Weighted Average Cost of Capital

WACC	
Cost of Equity - CAPM	
Risk-Free Rate (10Y)	3.00%
Beta	1.55
ERP	5.37%
WACC Calculations	
Cost of Equity	11.3%
Total Debt 2023	4632
Total Equity 2023	13452
E/(D+E)	74%
Cost of Debt	3.1%
D/(D+E)	26%
Tax Rate	15%
WACC	**9.2%**

Source: Minerva Investment Management Society

(DIO), which is the average time it takes for Inventory to turn into a sale and Days Payable Outstanding (DPO) – the average number of days ASML takes to pay its trade creditors.

The CCC formula is employed to assess a company's working capital management efficiency. 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 has a positive influence on the company's cash flows due to the increased availability of cash.

For the past 6 years, all these metrics have been slightly increasing. DSO grew the most, oscillating from 54 in FY18 till 66 in FY23. Inventory days grew by 11%, arriving at 243 in 2023, while DPO increased till 65 days in FY23. Consequently, the Cash Conversion Cycle is quite long, of 244 days, mainly due to a disproportionately large DIO, signaling a lower inventory turnover and that a large amount of ASML's cash is locked here.

However, a high DIO makes sense considering the industry ASML is part of. Since it mainly manufactures chip-making equipment that is a time-consuming process, it is expected that the Inventory will have a lower turnover rate. All in all, by ASML's projections, the CCC is anticipated to slightly improve, stabilizing at under 200 days until 2030, which is in line with what we have observed in the historical data.

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 Eurozone government bond yield (3%). While this aligns with the time horizon employed in the discounted cash flow analysis, European yields were chosen due to ASML's headquarters location and projected yield curve movements.

For the equity risk premium (ERP), a geographically weighted average based on ASML's revenue distribution was calculated, resulting in a premium of 5.37%. This number has then been used to obtain the expected market return by adding it to the risk-free rate.

Beta

A bottom-up approach was employed to determine ASML's beta. Given that 100% of revenue originates from the semiconductor machinery and equipment industry, the unlevered beta (NYU) for this industry served as the starting point. Subsequently, the Bloom adjustment and a capital structure re-leveraging were applied, considering ASML's debt-to-equity ratio, corporate tax rate (15%), and significant short-term liabilities. This resulted in a beta of 1.67. While exceeding some analysts' estimates, this reflects the substantial portion of non-debt liabilities (short-term and contract liabilities) alongside high cash reserves. When adjusting for these factors, the beta falls to 1.43.

The cost of equity was then calculated as follows:

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

Due to the varying beta results, separate cost of equity calculations were performed, ultimately leading to a range between 10.6% and 11.9%. A value of 11.3% was chosen as a representative estimate.

Cost of Debt

The weighted average yield to maturity (YTM) of ASML's outstanding bonds, with a combined weighted maturity of 3 years, was used to determine the cost of debt. This resulted in a cost of 3.1%. This finding is further supported by applying rating risk spreads to the risk-free rate, considering ASML's strong credit rating. Due to the limited number of outstanding bonds and the alignment of both methods, this cost is deemed reliable.

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 ASML is estimated to be 9.2%. Again, this estimate is strongly dependent on beta adjustments and sensitivity analysis should be relied upon to enhance the results.

Net System Sales Forecast

Forecasting net system sales is a crucial step due to the dynamic nature of ASML's business environment. Our approach combines management expectations (proven moderately reliable in the past) with analyst estimates and cost increase estimates from ASML's four main customers, who represent approximately 80% of the company's revenue.

The best case incorporates a one-year halt in growth following the exceptional surge experienced in 2023. This is followed by a strong recovery fueled by government incentives and chip producer capacity expansion plans. Analysis of competitor statements and potential machine needs suggests 25% growth during this phase. However, competitor threats may erode this growth to approximately 15% in a second phase as they capture a portion of ASML's customer base, particularly in the then mid-quality segments.

Net Service and Field Option Sales

This segment exhibits more predictable growth compared to net system sales and is therefore projected to grow at a slightly slower pace. Its stability stems from its direct tie to existing system usage and lower investment requirements focused on maintenance and upgrades.

Profitability

ASML's dominant position suggests continued profitability despite the high growth trajectory. However, future competition may lead to a slight decrease in margins. Management estimates suggest that 2023 will be a peak year for gross margins on system sales, with service revenues likely maintaining similar margins.

Financial Assumptions

Our 10-year goals for various financial items are closely aligned with those of management and analysts. We adopted a slightly more conservative approach for non-capitalized R&D expenses, acknowledging the intense competitive landscape ASML faces. Capex estimates range from 5% to 8% of revenue, reflecting historical investment patterns.

Sensitivity to Growth Halts

To assess the impact of potential growth disruptions, we ran a separate DCF scenario incorporating two years of near-zero growth within the forecast period. This scenario highlights the significant impact on share price, with 2033 revenue potentially falling from €80 billion to €57.2 billion and EBIT from €38.4 billion to €24.7 billion.

Free Cash Flow (FCFF)

The chosen formula for calculating FCFF resulted in a wide range between €19.3 billion and €30.2 billion due to potential growth halts, which also impacts terminal value. However, the high weight of present value of free cash flows in the valuation is mitigated by ASML's historical tendency to return 90%-100% of FCF through a combination of dividends (known for their stability) and opportunistic buybacks.

Exhibit 4.2: Financial forecasts for 2025 and 2030

ASML selected forecasted financials for 2025 and 2030 (€ million)

Base Case	2023	2025	2030
Total Sales	27559	29836	47751
Installed Base Management	5620	6800	10952
System Sales	21939	23036	36800
Gross Margin	51%	53%	56%
R&D	3981	4316	6419
SG&A	1113	1200	1583
Capex	2094	2194	3143
Effective Tax Rate	16%	16%	17%

Optimistic Case	2023	2025	2030
Total Sales	27559	33886	60074
Installed Base Management	5620	6463	11893
System Sales	21939	27423	48180
Gross Margin	51%	48%	58%
R&D	3981	4545	6702
SG&A	1113	1215	1532
Capex	2094	2343	3604
Effective Tax Rate	16%	16%	16%

Exhibit 4.3: ASML Implied Share Price in 3 cases

Base Case	
TEV	218,229 €
Equity Value	220,602 €
Diluted Shares Outsanding	394 €
Price per share	**560 €**

Optimistic Case	
TEV	323,617 €
Equity Value	325,990 €
Diluted Shares Outsanding	394
Price per share	**827 €**

Combined Case	
Base case	30%
Best case	70%
Fair price	**747 €**
Last closing price	834 €
Downside	**-10.5%**

Source: Minerva Investment Management Society

Sensitivity Analysis

	8.2%	8.7%	9.2%	9.7%	10.2%
2.5%	804	729	666	612	565
3.0%	861	775	703	642	590
3.5%	930	829	747	678	620
4.0%	1015	895	799	720	654
4.5%	1123	977	862	770	695

Source: Minerva Investment Management Society

Exhibit 4.4: Multiples Valuation Analysis

Company name	EV/ Sales	EV/ EBITDA	EV/ EBIT	P/ E
LAM RESEARCH CORP	8,94	30,18	33,01	36,75
KLA CORP	10,15	26,00	29,60	33,44
ASM INTERNATIONAL NV	10,68	33,72	43,07	45,84
APPLIED MATERIALS INC	6,53	20,99	22,61	30,58
TOKYO ELECTRON LTD	32,01	35,30	35,30	37,10
Average	13,66	29,24	32,72	36,74
Median	10,15	30,18	33,01	36,75

Source: Minerva Investment Management Society

Fair Price

Considering the business and financial analysis, a 70% probability is assigned to the best-case scenario and a 30% probability to the base scenario. Discounted cash flows lead to an enterprise value of €218.2 and €323.6 billion respectively. By applying the chosen weights and with further adjustments using the equity bridge and share count, a final share price of € 747 is obtained.

Valuation: Multiples

To complement our assessment, we approached ASML'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 ASML'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 ASML'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 28.0x, while the median is slightly higher at 29.54x, indicating a fairly tight distribution of data points around the central tendency. ASML stands above the average with an EV/EBITDA multiple of 35.8x, suggesting a premium valuation compared to its peers. The average P/E multiple in the group is 35.7x, closely aligned with the median of 36.4x. ASML's P/E multiple at 45.0x signals that the market is willing to pay more for each unit of ASML'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, ASML's figure is 12.7x, surpassing the group average of 8.87x and the median of 8.75x. This denotes that ASML's sales are valued more highly in the market, perhaps reflecting its superior sales quality, market share, or margins.

Final Valuation Methodology

In the valuation of ASML, 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 leverage a financial metric that incorporates both ASML'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 ASML'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 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 ASML'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 ASML'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 ASML on April 3rd, 2024, reveals a modest discrepancy, suggesting the potential for overvaluation in the market.

This evaluation supports a cautious stance for investors, indicating a careful reassessment of ASML's share value in light of the latest financial data. Considering that the decision is between a hold and a sell, we personally opted for holding the stock, given our optimistic assumptions in both valuation approaches.

Finally, we believe that in the short term better buying opportunities will arise as interest in AI stocks eventually decreases.

Exhibit 4.6: Final Valuation Methodology

DCF Valuation	747€	*50%*
Multiples Valuation	710.32€	*50%*
Final Valuation	728.66€	

Source: Minerva Investment Management Society

Investment Risks

Downside Risk Factors

Partial decline in market share in EUV or ArFi: ASML's competitors could eventually catch up. Right now these technologies are covered by patents and target the higher end segments of the market, but in a longer time horizon new technologies will be developed, threatening AMSL's "monopoly".

Halts in growth: Although the industry outlook entails several positive developments, there are several causes which could lead to supply chain disruptions, temporary declines in demand and subsequently to delays in revenue growth. With company's trading at such high P/E ratios, slower growth could lead to multiple depression, leaving a huge part of the upside on the table.

Reliance on government incentives: Chip makers investment strategy is usually closely linked to government subsidies. Think of the chip acts in the last years all around the world and the race between countries to bring producers in their own territories. Any cut in subsidies could impact ASML's customers and their capital expenditures on new machines for product enhancements.

High customer concentration: Having >80% of revenues coming from only 4 customers is usually considered not aligned with the general principles of diversification. However, the special nature of the business partially mitigates this risk as any newcomer in the market would probably have to rely on ASML's products to steal the spot of top chipmaker.

Upside Risk Factors

Higher demand for chips: If the market for semiconductors continues to grow, increasing the demand for chips by more than expected, ASML will be there to capitalize, as its products are crucial to most of the top chipmakers. One of the causes that may promote this surge in demand may be a continuous growth of the AI industry, which requires large computing capabilities and still has an uncertain future regarding its development.

Innovative product releases and development: Even though ASML'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 ASML 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 ASML profitability.

Improvement in the geopolitical effects on the industry: Considering the geopolitical tensions that affect the semiconductor industry, a relaxation of the trade restrictions, export controls or sanctions would benefit the supply chain and would improve the dynamics and certainty of the industry, meaning a potential reduction in costs for ASML and a better ability to navigate the further development of the company.

Appendix

Exhibit 5.1. Sensitivity Analysis: Discount Rate & Terminal Growth

Sensitivity Analysis Optimistic Case

	8.2%	8.7%	9.2%	9.7%	10.2%
2.5%	891	807	736	675	623
3.0%	955	858	778	710	652
3.5%	1032	919	827	750	685
4.0%	1127	994	886	797	723
4.5%	1249	1085	957	854	769

Sensitivity Analysis Base Case

	8.2%	8.7%	9.2%	9.7%	10.2%
2.5%	601	548	502	463	429
3.0%	642	580	528	485	447
3.5%	691	619	560	510	468
4.0%	752	666	597	540	493
4.5%	829	725	642	576	522

Sensitivity Analysis

	8.2%	8.7%	9.2%	9.7%	10.2%
2.5%	804	729	666	612	565
3.0%	861	775	703	642	590
3.5%	930	829	747	678	620
4.0%	1015	895	799	720	654
4.5%	1123	977	862	770	695

Exhibit 5.2. Cost of Debt: Yield on existing bonds (Factset)

Outstanding Amount	Weight	Coupon	YTW	Maturity
1000	21.1%	3.50%	3.3%	gen-25
1000	21.1%	1.38%	3.2%	lug-26
750	15.8%	1.63%	3.1%	mag-27
750	15.8%	0.63%	2.9%	mag-29
750	15.8%	0.25%	2.9%	feb-30
500	10.5%	2.25%	2.9%	mag-32
4750				
CoD	**3.1%**			
Weighted maturity	**3.0**			

Notes/Bonds		**4,750.0**	**4,750.0**									
N07046GK0	ASML Holding NV	1,000.0	1,000.0	3.500%	Fixed	06/23	12/25	EUR	SNR ...	100.29	3.28	-0.77
N07046AB6	ASML Holding NV	1,000.0	1,000.0	1.375%	Fixed	07/16	07/26	EUR	SNR ...	96.05	3.16	10.87
N07046AC4	ASML Holding NV	750.0	750.0	1.625%	Fixed	11/16	05/27	EUR	SNR ...	95.66	3.05	18.34
N07046GH7	ASML Holding NV	750.0	750.0	0.625%	Fixed	05/20	05/29	EUR	SNR ...	89.07	2.93	26.54
N07046GG9	ASML Holding NV - MTN	750.0	750.0	0.250%	Fixed	02/20	02/30	EUR	SNR ...	85.71	2.89	25.77
N07046GJ3	ASML Holding NV	500.0	500.0	2.250%	Fixed	05/22	05/32	EUR	SNR ...	95.29	2.89	26.51

Exhibit 5.3. Management's Financial Model (Investor Day Presentation)

ASML updated financial model

	Actuals 2021	CMD 2021 Low - High market 2025	CMD 2022 Low - High market 2025	CMD 2022 Low - High market 2030
Total sales	18.6€bn	~24 – 30€bn	~30 – 40€bn	~44 – 60€bn
Installed Base Management*	5.0€bn	~6 – 7€bn	~7 – 8€bn	~11 – 13€bn
System sales	13.6€bn	~18 – 23€bn	~23 – 32€bn	~33 – 47€bn
Gross margin	52.7%	~54 – 56%	~54% – 56%	~56% – 60%
R&D	2.5€bn (14%)	~3.4 – 3.7€bn	~4.3 – 4.8€bn	~6.0 – 6.6€bn
SG&A	0.7€bn (4%)	~1.0€bn	~1.3€bn	~1.6€bn
Capex	0.9€bn (5%)	~1.0€bn	~1.5€bn	~1.5€bn
Cash Conversion Cycle	219 days	<200 days	<200 days	<200 days
Effective Tax Rate	15%	~16%	~16.5%**	~16.5%**

* Installed Base Management equals our net service and field option sales
** Estimated Effective Tax Rate is based on 2022 tax legislation, and currently expected changes

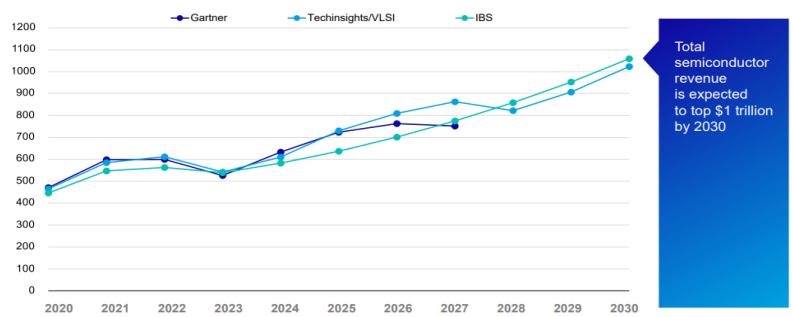
ASML November 11, 2022

Exhibit 5.4. Minerva's Best Case Financial Model

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Net system sales	4719	6424	8259	8996	10317	13653	15430	21939	21939	27423	32908	36199	39819	43800	48180	52999	58298	64128
growth %	*n.a.*	*36%*	*29%*	*9%*	*15%*	*32%*	*13%*	*42%*	*0%*	*25%*	*20%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*
Net service and field option sales	2156	2538	2685	2824	3662	4958	5743	5620	5620	6463	7432	8547	9829	10812	11893	13083	14391	15830
growth %	*n.a.*	*18%*	*6%*	*5%*	*30%*	*35%*	*16%*	*-2%*	*0%*	*15%*	*15%*	*15%*	*15%*	*10%*	*10%*	*10%*	*10%*	*10%*
Total net sales	**6875**	**8963**	**10944**	**11820**	**13979**	**18611**	**21173**	**27559**	**27559**	**33886**	**40340**	**44746**	**49648**	**54613**	**60074**	**66081**	**72689**	**79958**
growth %	*n.a.*	*30%*	*22%*	*8%*	*18%*	*33%*	*14%*	*30%*	*0%*	*23%*	*19%*	*11%*	*11%*	*10%*	*10%*	*10%*	*10%*	*10%*
Cost of system sales	-2424	-3440	-4141	-4676	-5169	-6483	-7582	-10151	-10969	-13986	-16948	-18823	-17918	-19251	-20683	-22222	-23875	-25651
Cost of service and field option sales	-1306	-1503	-1774	-1864	-2012	-2319	-2891	-3271	-3260	-3477	-3710	-3958	-3932	-4325	-4757	-5233	-5756	-6332
Total cost of sales	-3730	-4943	-5915	-6540	-7181	-8802	-10473	-13422	-14229	-17463	-20658	-22781	-21850	-23576	-25441	-27455	-29632	-31983
Gross profit	**3145**	**4020**	**5029**	**5280**	**6797**	**9809**	**10700**	**14136**	**13330**	**16423**	**19683**	**21964**	**27798**	**31036**	**34633**	**38626**	**43058**	**47975**
growth %																		
Research and development costs	-1106	-1260	-1576	-1969	-2201	-2547	-3254	-3981	-3836	-4545	-5213	-5572	-5958	-6319	-6702	-7108	-7539	-7996
Selling, general and administrative costs	-375	-417	-488	-521	-545	-726	-946	-1113	-1049	-1215	-1363	-1425	-1489	-1511	-1532	-1554	-1577	-1599
Other income	94	96				214	-	-	-	-	-	-	-	-	-	-	-	-
Income from operations	**1759**	**2440**	**2965**	**2791**	**4052**	**6750**	**6501**	**9042**	**8445**	**10663**	**13106**	**14967**	**20351**	**23207**	**26399**	**29964**	**33942**	**38380**
growth %	*n.a.*	*39%*	*22%*	*-6%*	*45%*	*67%*	*-4%*	*39%*	*-7%*	*26%*	*23%*	*14%*	*36%*	*14%*	*14%*	*14%*	*13%*	*13%*
Interest and other, net	34	-50	-28	-25	-35	-45	-45	41	46	58	71	81	109	124	141	160	181	204
Income before income taxes	**1792**	**2389**	**2937**	**2766**	**4017**	**6706**	**6456**	**9084**	**8491**	**10721**	**13177**	**15049**	**20460**	**23331**	**26540**	**30123**	**34123**	**38584**
Provision for income taxes	-234	-306	-352	-192	-552	-1021	-970	-1436	-1345	-1703	-2098	-2402	-3274	-3733	-4246	-4820	-5460	-6173
Income after income taxes	**1558**	**2083**	**2585**	**2574**	**3465**	**5684**	**5486**	**7648**	**7146**	**9018**	**11079**	**12647**	**17186**	**19598**	**22293**	**25304**	**28663**	**32410**
growth %	*n.a.*	*34%*	*24%*	*0%*	*35%*	*64%*	*-3%*	*39%*	*-7%*	*26%*	*23%*	*14%*	*36%*	*14%*	*14%*	*14%*	*13%*	*13%*
Profit (loss) related to equity method investments	-	-17	6	18	89	199	138	191	200	201	202	203	204	205	206	207	208	209
Net income	**1558**	**2067**	**2592**	**2592**	**3554**	**5883**	**5624**	**7839**	**7346**	**9219**	**11281**	**12850**	**17390**	**19803**	**22499**	**25511**	**28871**	**32619**
growth %	*n.a.*	*33%*	*25%*	*0%*	*37%*	*66%*	*-4%*	*39%*	*-6%*	*26%*	*22%*	*14%*	*35%*	*14%*	*14%*	*13%*	*13%*	*13%*
Depreciation	n.a.	n.a.	423	449	491	471	584	740	756	951	1158	1313	1489	1638	1802	1982	2181	2399
Change in NWC	n.a.	n.a.	-68	96	513	4654	2156	-3312	0	0	0	0	0	0	0	0	0	0
Adj operating cash flow	**n.a.**	**n.a.**	**2946**	**3137**	**4557**	**11008**	**8363**	**5267**	**8102**	**10170**	**12439**	**14163**	**18880**	**21441**	**24302**	**27493**	**31052**	**35018**
Adj capex	n.a.	n.a.	-494	-1158	-1117	-277	-789	-2094	-1998	-2343	-2660	-2815	-2979	-3277	-3804	-3965	-4361	-4797
Free cash flow	**n.a.**	**n.a.**	**2452**	**1979**	**3440**	**10731**	**7574**	**3173**	**6105**	**7827**	**9779**	**11348**	**15901**	**18165**	**20697**	**23528**	**26691**	**30221**
Terminal value																		**548744**
Discount factor									0.92	0.84	0.77	0.70	0.64	0.59	0.54	0.49	0.45	0.41
Present value									**5590**	**6564**	**7509**	**7981**	**10240**	**10713**	**11178**	**11636**	**12088**	**240119**

Exhibit 5.5. Management's Predictions on Market Conditions (Latest Presentation)

Market expectations remain unchanged: around 1 trillion of sales by 2030



ASML January 24, 2024 Page 7 Public

Exhibit 5.6. Multiples Analysis (Minerva Investment Management)

Valuation Multiple								
($ in millions)	ASML	LAM RESEARCH CORP	KLA CORP	ASM INTERNATIONAL NV	APPLIED MATERIALS INC	TOKYO ELECTRON LTD	**AVERAGE**	**MEDIAN**
Latest Closing Share Price	$901.57	$958.62	$688.85	$638.23	$209.00	$243.61		
Total Diluted Shares Outstanding (mm)	393	131	135	49	831	468		
Equity Value (Market Capitalization)	**$354,678**	**$125,867**	**$93,133**	**$31,337**	**$173,658**	**$114,107**		
(+) Net Debt	(2,632)	(654)	2,741	(668)	($1,606.00)	(3,464)		
Enterprise Value (TEV)	**$352,046**	**$125,213**	**$95,874**	**$30,669**	**$172,052**	**$110,643**		
Financial Data								
Revenue (LTM)	$29,805	$14,317	$9,671	$2,849	$26,485	$13,132		
EBIT (LTM)	$9,781	$3,877	$3,317	$707	$7,651	$3,317		
EBITDA (LTM)	$10,580	$4,239	$3,777	$903	$8,240	$3,657		
Net Income (LTM)	$8,478	$3,458	$2,706	$813	$7,158	$2,551		
Enterprise Value Multiples								
EV/Revenue	11.8x	8.7x	9.9x	10.8x	6.5x	8.4x	8.87x	8.75x
EV/EBIT	36.0x	32.3x	28.9x	43.4x	22.5x	33.4x	32.1x	32.30x
EV/EBITDA	33.3x	29.5x	25.4x	34.0x	20.9x	30.3x	28.0x	29.54x
Equity Value Multiples								
P/E Ratio	41.8x	36.4x	34.4x	38.5x	24.3x	44.7x	35.7x	36.4x

PRICE (Multiples)	$759.86
USD/EUR	$0.93
Price in EUR	710.32 €

Disclaimer

This research material has been prepared by Minerva Invest. Minerva Invest specifically prohibits the redistribution of this material in whole or in part without the written permission of Minerva Invest. The research officer(s) primarily responsible for the content of this research material, in whole or in part, certifies that their views are accurately expressed and they will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this research material. Whilst we have taken all reasonable care to ensure that the information contained in this publication is not untrue or misleading at the time of publication, we cannot guarantee its accuracy or completeness, and you should not act on it without first independently verifying its contents. Any opinion or estimate contained in this report is subject to change without notice. We have not given any consideration to and we have not made any investigation of the investment objectives, financial situation or particular needs of the recipient or any class of persons, and accordingly, no warranty whatsoever is given and no liability whatsoever is accepted for any loss arising whether directly or indirectly as a result of the recipient or any class of persons acting on such information or opinion or estimate. You may wish to seek advice from a financial adviser regarding the suitability of the securities mentioned herein, taking into consideration your investment objectives, financial situation or particular needs, before making a commitment to invest in the securities. This report is published solely for information purposes, it does not constitute an advertisement and is not to be construed as a solicitation or an offer to buy or sell any securities or related financial instruments. No representation or warranty, either expressed or implied, is provided in relation to the accuracy, completeness or reliability of the information contained herein. The research material should not be regarded by recipients as a substitute for the exercise of their own judgement. Any opinions expressed in this research material are subject to change without notice.