ADVA

(SDAX, Software/IT, ADV GR)

WARBURG RESEARCH

Buy	
EUR 15.00	
Price	EUR 10.62
Upside	41.2 %

Value Indicators:	EUR
DCF:	15.12
FCF-Value Potential 2022e:	14.26
Peer group:	16.55

Warburg ESG Risk Score:	3.5
ESG Score (MSCI based):	4.0
Balance Sheet Score:	4.5
Market Liquidity Score:	2.0

Description:

ADVA develops, manufactures and sells systems and solutions for optical networking

Market Snapshot:	EUR m
Market cap:	536.3
No. of shares (m):	50.5
EV:	557.3
Freefloat MC:	405.4
Ø Trad. Vol. (30d):	1.48 m

Shareholders:	
Freefloat	75.6 %
Teleios Capital Partners	14.8 %
Egora Group	9.6 %
Janus Henderson	*3.3 %*
Dimensional Fund Advisors	*3.2 %*

Key Figures (WRe):	2021e
Beta:	1.2
Price / Book:	1.8 x
Equity Ratio:	54 %

The light at the end of the fibre; Initiation with Buy

ADVA is a leading supplier for optical communication equipment, critical for both cloud and carrier networks. After a long consolidation phase in the market, ADVA is one of the last European players in large parts of its portfolio. With growing concern for the security of critical telecommunication infrastructure, especially regarding large Chinese suppliers like Huawei or ZTE, ADVA should benefit from de-globalization in the coming years.

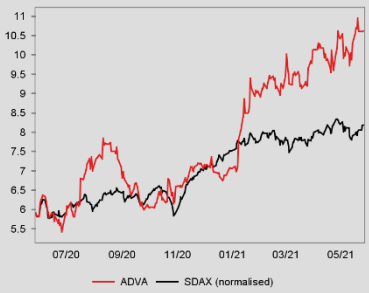
The business with communication service providers (CSP), which represents approx. 70% of ADVA's top line, is driven by a growing demand for bandwidth and the ongoing 5G roll-out, which relies on optical networks to connect radio towers to the core network (backhaul). Over the next five years, the average bandwidth is expected to double. During the pandemic, the use of home office and streaming platforms increased, while investments in both the 5G and carrier grid infrastructure were postponed. We expect a notable catch-up effect in the coming years.

Outside the CSP business, ADVA supplies internet content providers (ICP) and enterprises with equipment for their cloud and data center infrastructure. ADVA's high R&D efforts throughout the challenging consolidation phase has earned the company leading market positions globally for enterprise data center interconnect and cloud access equipment. We expect this business segment, driven by mega-trends such as big data, cloud computing and IoT, to increase its sales share within the next three years from 30% to 40%. On group level, this should translate into a CAGR 20-23 of 8.6%. Moreover, ADVA takes advantage of the ongoing virtualization of network functions especially at the cloud's edge with its Ensemble software, which should help to increase the revenue share of software and services from 23% in 2020 to 30% by 2023.

The higher share of both non-CSP customers as well as software and services should have a positive impact on ADVA's profitability. While the primary goal of CSPs is to provide bandwidth at highly competitive prices for ICPs and enterprises, cutting-edge performance is often directly linked to their operating success. The resulting willingness to pay for advanced technological solutions translates into higher margin contributions for ADVA. We estimate that the current gross margin in these verticals is more than 45% compared to 30% in the CSP business and that it will increase further, with a growing share of software and services. On the adj. EBIT line, we expect the margin-increase from 4.5% to 6.0% in 2020 to continue and we estimate an adj. EBIT margin of 9.4% by 2023. After a strong Q1, with an adj. EBIT margin of 8.9%, ADVA increased the upper end of its target range for the full year from 9% to 10%, which is already above our mid-term estimate.

Based on our estimates, we use a DCF model, which yields a fair value per share of EUR 15.12. Our FCF Value Potential model confirmed our findings with a fair value of EUR 14.26 per share for 2023. Moreover, the FCF Value Potential for 2020 of EUR 9.09 is only slightly below the current market valuation, indicating that future growth and margin potential is not reflected in the share price. Compared to a larger peer group, we found a fair value of EUR 16.55, close to the result of the other metrics. Focusing on the closest peers in our peer group yields an even higher upside. These are priced at an EV/EBIT 22e of 19.5x and a PE 22e of 25.9x compared to ADVA's valuation at an EV/EBIT of 10.8x and a PE of 14.1x.

Against this background, we consider ADVA an attractive investment opportunity and initiate the coverage with a target price of EUR 15.00 and a Buy recommendation.



Rel. Performance vs SDAX:	
1 month:	6.4 %
6 months:	31.6 %
Year to date:	41.6 %
Trailing 12 months:	43.2 %

Company events:	
22.07.21	Q2
21.10.21	Q3

FY End: 31.12. in EUR m	CAGR (20-23e)	2017	2018	2019	2020	2021e	2022e	2023e
Sales	8.3 %	514.5	502.0	556.8	565.0	609.0	660.2	718.3
Change Sales yoy		-9.2 %	-2.4 %	10.9 %	1.5 %	7.8 %	8.4 %	8.8 %
Gross profit margin		*32.3 %*	*36.2 %*	*34.3 %*	*34.8 %*	*36.8 %*	*37.0 %*	*37.2 %*
EBITDA	11.6 %	46.6	64.4	74.2	92.2	109.1	118.8	128.1
Margin		*9.1 %*	*12.8 %*	*13.3 %*	*16.3 %*	*17.9 %*	*18.0 %*	*17.8 %*
EBIT	30.8 %	4.4	15.0	12.0	27.5	44.5	51.5	61.4
Margin		*0.9 %*	*3.0 %*	*2.2 %*	*4.9 %*	*7.3 %*	*7.8 %*	*8.6 %*
EBIT adj.	25.9 %	19.5	23.3	24.8	33.8	50.3	57.4	67.5
Margin		*3.8 %*	*4.6 %*	*4.5 %*	*6.0 %*	*8.3 %*	*8.7 %*	*9.4 %*
Net income	30.7 %	-4.2	9.7	7.0	20.3	33.4	38.1	45.3
EPS	30.1 %	-0.09	0.19	0.14	0.40	0.66	0.75	0.88
DPS	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dividend Yield		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FCFPS		-0.55	0.24	0.13	0.77	0.78	0.80	0.91
FCF / Market cap		-7.1 %	3.8 %	1.8 %	11.8 %	7.3 %	7.5 %	8.4 %
EV / Sales		0.9 x	0.8 x	0.8 x	0.7 x	0.9 x	0.8 x	0.7 x
EV / EBITDA		9.8 x	5.9 x	6.1 x	4.2 x	5.1 x	4.4 x	3.8 x
EV / EBIT		103.6 x	25.3 x	38.0 x	14.1 x	12.6 x	10.2 x	7.9 x
P / E		n.a.	34.0 x	51.7 x	16.3 x	16.1 x	14.2 x	12.1 x
FCF Potential Yield		1.4 %	7.0 %	8.7 %	10.8 %	9.4 %	10.8 %	12.4 %
Net Debt		44.0	32.4	68.9	34.1	-4.3	-45.3	-90.6
ROCE (NOPAT)		39.8 %	4.2 %	3.1 %	7.2 %	12.0 %	13.7 %	16.0 %
Guidance:		2021: Sales EUR 580-610m, adj. EBIT margin 6-10%						

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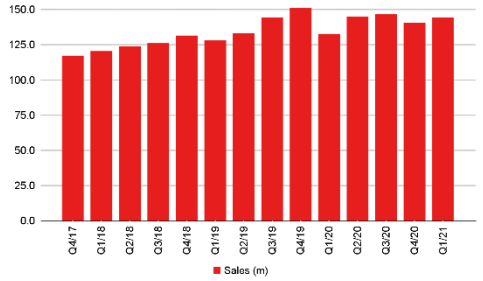
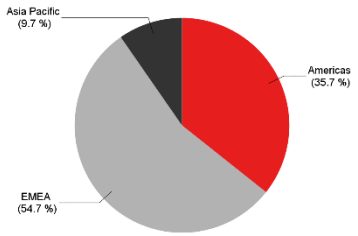
Sales development
in EUR m



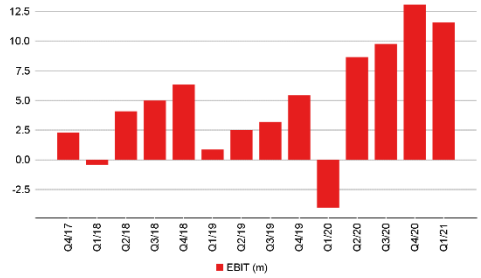
Source: Warburg Research

Sales by regions
2020; in %



Source: Warburg Research

EBIT development
in EUR m



Source: Warburg Research

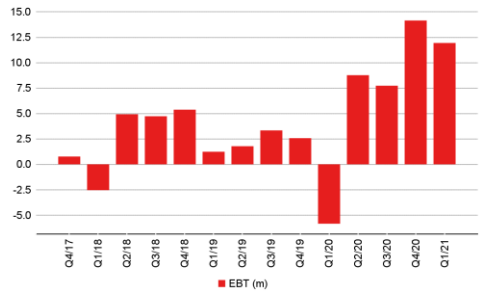
Company Background

- ADVA develops, manufactures and sells networking solutions for fibre-optic transmission, cloud access and precise timing synchronization of networks.
- The product portfolio includes WDM-based optical networking system (FSP 3000), programmable, network access solution (FSP 150), NFV-optimized infrastructure (Ensemble) and synchronization equipment (Oscilloquartz)
- ADVA's customer base consists of communication services providers (CPS), internet content providers (ICP) and enterprises that rely on fast and secure access to their data centers
- Geographically, the company is focused on Europe (EMEA 55% of sales) and the US (Americas 36% of sales). Only approx. 9% of sales are generated in Asia

Competitive Quality

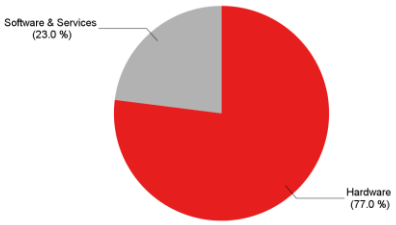
- Leading optical transmission technology based on two decades of high R&D efforts reflected in more than 450 granted individual patents in 197 patent families
- Well-positioned to benefit from mega-trends that rely on optical data transmission such as 5G, IoT, could computing, and streaming services
- Long-standing customer with multiple Fortune 500 companies relying on ADVA's technology for fast and low latency access to their data centers
- After years of consolidation, ADVA is the only remaining expert in security crucial optical networks and synchronization systems
- As a Europe-based company ADVA is a trusted provider of critical infrastructure and encryption technology in Europe and the US

EBT development
in EUR m



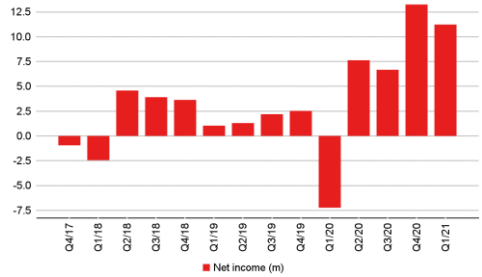
Source: Warburg Research

Sales by segments
2020; in %



Source: Warburg Research

Net income development
in EUR m



Source: Warburg Research

Summary of Investment Case

Investment triggers

- Catch-up effects and increasing bandwidth demand after the pandemic should lead to a **continuation of the dynamic sequential development** of the last five quarters and yield a strong Q2 result above the current market estimates (cons.: Q2 adj. EBIT margin 8%).
- The **share of software and service revenue**, which increased from 20% to 23% in 2020, reached 26% in Q1. We expect further improvements, which should translate into an increasing gross margin
- The lower end of the current adj. EBIT margin guidance of 6-10% reflects the low visibility regarding possible supply bottlenecks in H2. We believe that ADVA is well prepared for the shortage, which implies room for an additional **guidance upgrade** at the lower end of the current range.

Valuation

- We based our target price on a DCF model and confirmed our finding with an FCF Value Potential calculation and a Peer Group analysis. **All metrics indicate significant upside** to the current market valuation
- Our DCF model yields a **fair value of EUR 15.12 per share**, which is confirmed by the finding of the FCFVP for 2022 (EUR 14.26) and the Peer Group analysis (EUR 16.55)
- The Free Cash Flow Value Potential for 2020 (EUR 9.09) is slightly below the current market valuation, indicating **the future growth and margin potential is not reflected in the share price**
- Focusing on the **closest peers in our peer group yields an even higher upside**. These are priced at an EV/EBIT 22e of 19.5x and an PE 22e of 25.9x compared to ADVA's valuation at an EV/EBIT of 10.8x and a PE of 14.1x

Growth and profitability

- The market for optical transmission technology is driven by the growing demand for bandwidth required to enable **global mega-trends including 5G roll-out, video streaming, cloud computing and IoT,** which rely on optical network infrastructure. These trends are expected to double the average bandwidth within the next three years.
- **Growing security concerns regarding Chinese competitors** such as Huawei and ZTE should lead to a growing market share of local players like ADVA, especially in the EMEA region.
- ADVA's leading technology portfolio and software solutions are aligned with mega-trends and have **yielded leading market positions for more profitable enterprise and ICP solutions**. Driven by cloud and IoT applications, ADVA should be able to achieve the goals of its transformation strategy. These include increasing the revenue share of non-CSP verticals from 30% to 40% and the share of software and services from 23% to 30% over the next three years.
- With these factors and an anticipated catch-up effect after pandemic-related lull in 2020, we estimate a **CAGR 20-23 of 8.6%**
- The growing sales share of non-CSP verticals and software should improve ADVA's product-mix. As a result, we expect that the margin expansion, already seen last year, will continue and estimate the **adj. EBIT margin to increase by 3.4pp to 9.4% in 2023**.

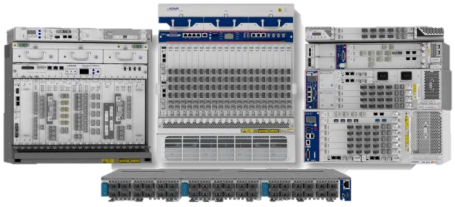
Competitive quality

- ADVA is a **technology leader for optical communication equipment** as a result of high R&D effort throughout a long market consolidation phase
- The technological leadership yielded **strong market positions especially in the more profitable verticals** including the global #1 position for enterprise DCI and #2 for Carrier Ethernet (CE) access
- In several optical equipment product categories, ADVA is **one of the last remaining European suppliers**, which puts the company in a strong competitive position as security concerns, especially regarding leading Chinese suppliers, are growing.

For the module-level production, ADVA relies on leading EMS partners, all of which operate production sites outside of China. In addition, the company will increase its own production capacity in Germany, which enables a **high level of flexibility to meet their customers "Country of Origin" CoO requirements.**

Company Overview

ADVA Optical, enables open next-generation networks with a mission to be an innovative leader focused on customer experience by building better networking solutions.

Cloud interconnect	Cloud access	Networking synchronization
		
Solutions that deliver scalable bandwidth for access, metro and long-haul networks; high levels of open interworking, programmability and ease-of-use.	Solutions that enable CSPs to deliver software-defined, differentiated and performance-assured wholesale, mobile backhaul and business services.	Solutions to deliver accurate and scalable time and frequency synchronization for mobile network infrastructure, media distribution networks, financial services, distributed data bases and meteorology.

Clients

Private Companies

Communication services providers

Internet content provicers

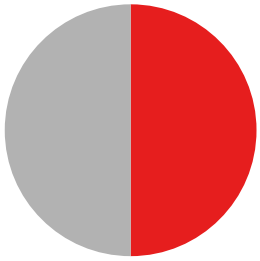
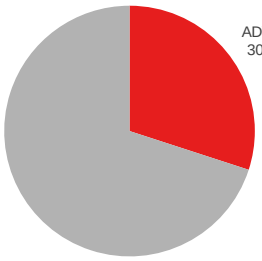
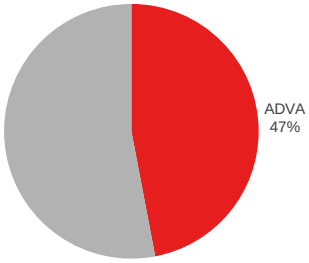
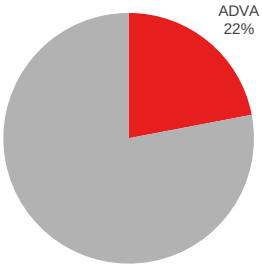
Partners

Production partners

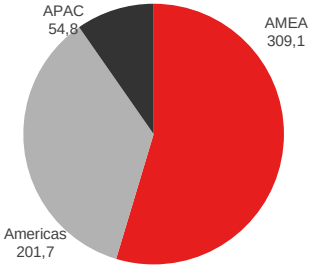
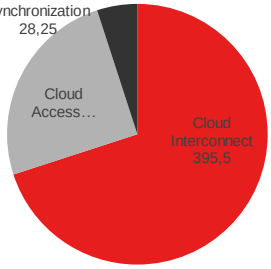
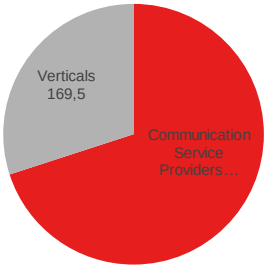
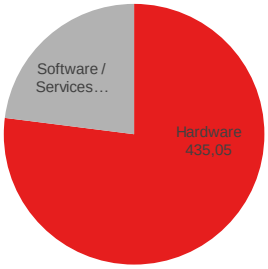
Sales partners

Competitors & peers

Market position

Enterprise DCI		Carrier Ethernet (CE) Access	
EMEA	World	EMEA	World
			

Revenue split

by region	by products	by customers	by Technical
			

Source: ADVA, Warburg Research

Competitive Quality

- ADVA is a technology leader for optical communication equipment as a result of high R&D efforts throughout a long market consolidation phase
- The technological leadership yielded strong market positions especially in the more profitable verticals including the global #1 position for enterprise DCI and #2 for Carrier Ethernet (CE) access
- In several optical equipment product categories, ADVA is the only remaining European supplier, which puts the company in a strong competitive position as security concerns are growing, especially regarding leading Chinese suppliers

ADVA's strong competitive position is based on a cutting-edge portfolio, in which the company has invested heavily over more than two decades. After a long consolidation period during which many players exited the market, ADVA is in a strong position to benefit from current de-globalization in the supply chain for critical network infrastructure, the ongoing demand for bandwidth, the 5G roll-out and increasing cloud infrastructure owned by enterprises instead of relying on carrier networks.

Well-positioned in a healing market

Internet boom led to significant fibre over-capacities

For a long time, the market for optical telecommunication equipment was extremely challenging with a fierce competitive landscape. By the end of the internet boom in the early 2000s, the market for optical telecommunication saw a sharp decline after years of growth led to significant overcapacity. Between 1998 and 2001, approximately 39 million miles of fibre optic cable were installed in the US, while only 2.6% were actually in use according to Merrill Lynch.

Confronted with a declining overall market, large equipment manufacturers at the time including Nortel, Alcatel, Ericsson, Nokia and Lucent, competed for the smaller, but still growing market for optical systems for metropolitan networks. The competition intensified as larger Asian players including Fujitsu, Huawei, UT Starcom, and ZTE entered the market.

European and US market consolidated significantly

Today, most non-Asian players have been consolidated or have left the market. Nortel filed for bankruptcy in 2009, Alcatel and Lucent merged and were acquired by Nokia in 2015 and Ericsson discontinued large parts of its optical portfolio.

After the market consolidation and years of declining investments by European and US CSPs (Communication Service Provider), the market for telecommunications equipment is in a state of upheaval again. Besides increasing telco capex in both bandwidth and the 5G infrastructure, accelerated by the increased usage during the pandemic, large cloud service providers and enterprises are investing in their own infrastructure. The demand, especially outside the traditional carrier networks, is less cost sensitive and more focused on cutting-edge technology for higher speed, lower latency and state-of-the-art security and encryption features.

ADVA is one of the last remaining European suppliers

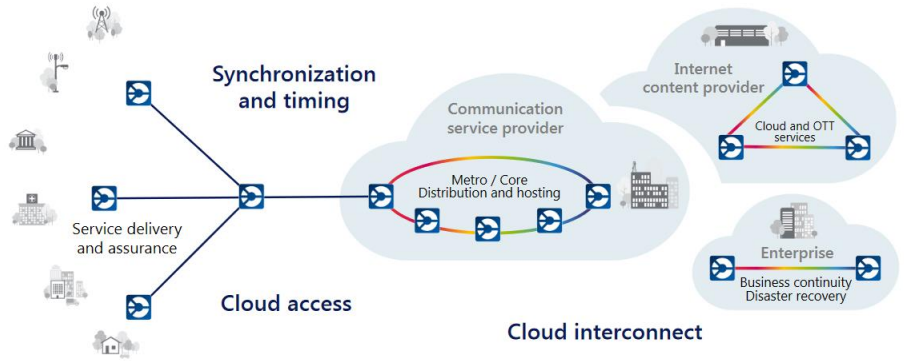
ADVA with its technological leadership in several optical transmission technologies, including Wavelength Division Multiplexing (WDM), cloud access solutions and Network Function Virtualization (NFV) software is well-positioned in numerous promising applications in these recovering and growing markets. As a Europe-based company, ADVA should benefit additionally from the growing security concerns around the large Chinese suppliers such as Huawei.

Leading expert in optical transmission technology

ADVA's high R&D efforts continued throughout the consolidation

Despite the challenging market environment, ADVA continuously invested in its technological excellence. The significant R&D effort is reflected in the more than 450 granted individual patents in 197 patent families held by the company. The technology ranges from cloud interconnect and cloud access solutions to advanced synchronization systems for Communication Service Providers (CSP), Internet Content Providers (ICP) and enterprises.

ADVA product range



Source: ADVA

Solid market position in the CSP business

Well-positioned to benefit from 5G roll-out

Today, however, the largest customer group with a revenue share of approx. 70%, is still CSP (Communication Service Provider). CSPs are building and operating large-scale networks with the predominant goal of providing internet access and bandwidth to private households and radio access networks (RAN) such as 5G, which also rely on an optical connection to the core network (backhaul).

As home-office connectivity and streaming services like Netflix or Amazon Prime are driving the demand for bandwidth, CSPs face the challenge of providing market-competitive connectivity to as many customers as possible at the lowest possible cost, which results in a highly price-sensitive equipment market.

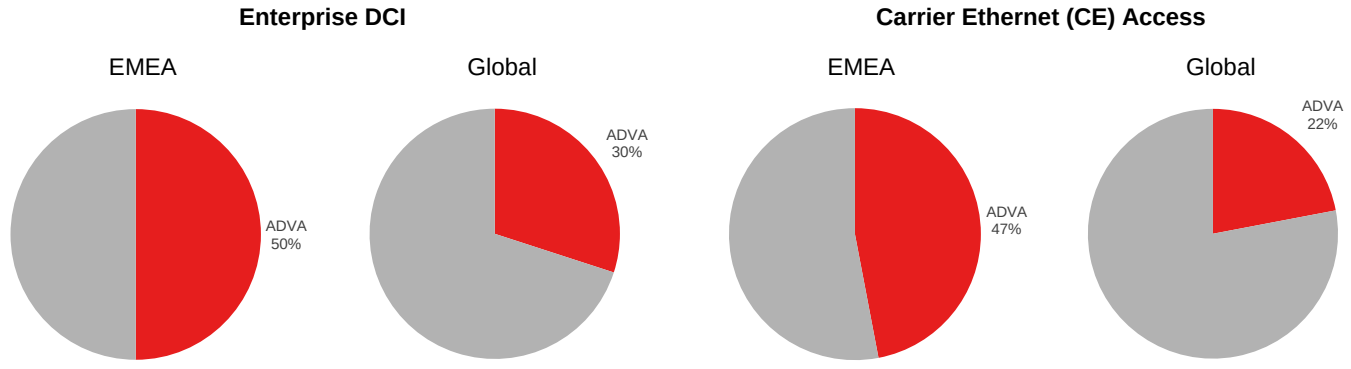
ADVA's multiplexer product-line FSP 3000 allows seamless data transport from the customer's premises to the core of the network and to bypass smaller access nodes, which saves infrastructure costs. However, we estimate the margin potential in this area is limited.

Expectational position in advanced applications

ADVA's technological edge is especially relevant when it comes to advanced applications such as new edge cloud solutions, highly precise network synchronization or security sensitive data transmission for enterprises and Internet Content Providers (ICP). These customer groups only contribute approx. 30% to ADVA's top line, but since the performance and integrity of their networks is often mission-critical and/or linked to their operating performance, they have a higher willingness to pay for technological excellence. As a result, we estimate that their share of ADVA's gross profits should be above 40%.

The demand of these customers is driven by multi-or hyper-cloud concepts with high data volumes as well as AI, big data and IoT applications relying on highly precise synchronization. ADVA's highly innovative portfolio has earned the company strong positioning in key applications to these customer groups.

Market positions



Source: Omdia

Leading market position for enterprise and cloud access solutions

In the EMEA region, ADVA is the market leader in enterprise DCI (data center interconnect) solutions with a market share of 50% and a global market share of 30%. With regards to cloud access solutions, ADVA holds the number one position for Carrier Ethernet (CE) access (market share 47%) and number two position worldwide (market share 22%) (source: Omdia). With its synchronization technology, the company is gaining market share with a CAGR 2017-20 of 23%, based on its technology leadership.

We consider this a highly attractive area with regards to both growth and margin potential and ADVA's continued R&D efforts give it a clear competitive edge.

Trusted partner in data security

The security of data infrastructure and the trustworthiness of suppliers of critical infrastructure components has gained importance over the last couple of years. Especially concerns in some western nations regarding leading Chinese communication equipment manufacturers, such as Huawei and ZTE, have prompted a shift in demand from the Far-East back to Europe and the US.

ADVA should benefit from bans on Chinese competitors

After the US ban on Huawei technology in 2019, the UK and Sweden both followed in 2020 with plans to phase out Huawei technology in their telecommunication infrastructures by 2027 and 2025 respectively.

While large European equipment suppliers such as Nokia and Ericsson should benefit from increasing demand in 5G RAN technology, ADVA has also gained a unique selling point as one of the last remaining experts in optical networks and synchronization systems in Europe.

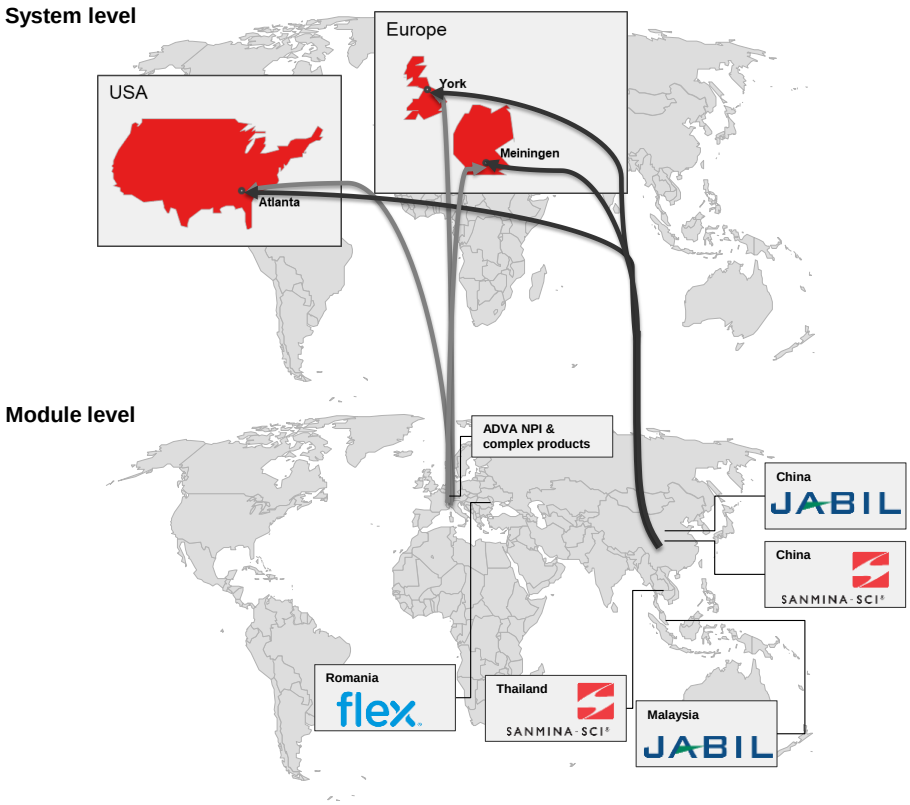
In addition to the demand for the 5G roll-out, ADVA has a strong reputation among enterprise and ICP customers and offers trusted solutions in the field of secure data transmission. Today, the company is the only supplier worldwide to offer 100Gbit/s technology approved by the German Federal Ministry for Information Security (BSI) for the transmission of highly confidential information. In addition, ADVA's ConnectGuard technology is implemented in many of the company's products, offering encryption on the optical level, adding an additional layer of security to the usual IP level encryption.

Strong EMS network provides CoO profitability

Flexible international manufacturing network

The strong global network of EMS providers (Electronic Manufacturing Services) enables ADVA to focus its investment on the development of its portfolio, while large parts of the asset-heavy production is outsourced. At the same time, the company can meet CoO (Country of Origin) requirements of its customers. ADVA works closely with three of the top five EMS providers (flex, jabil, Sanmina), flex is based in Romania, Jabil and Sanmina offer EMS both within and outside of China.

Global EMS network

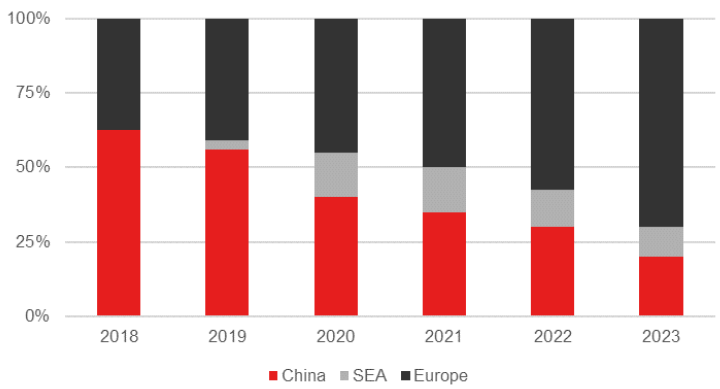


Source: ADVA, Warburg Research

"Made in Germany/Europe" share should increase

Additionally, as the label "Made in Germany" is experiencing a renaissance with customers, ADVA will invest EUR 10m in a new production site in Germany. The construction of the new highly automated Terafactory will start this year and the investments will be partly subsidized by government programmes. The chart below shows the past and planned development of the CoO shares of ADVA's production.

CoO Development



Source: ADVA, Warburg Research

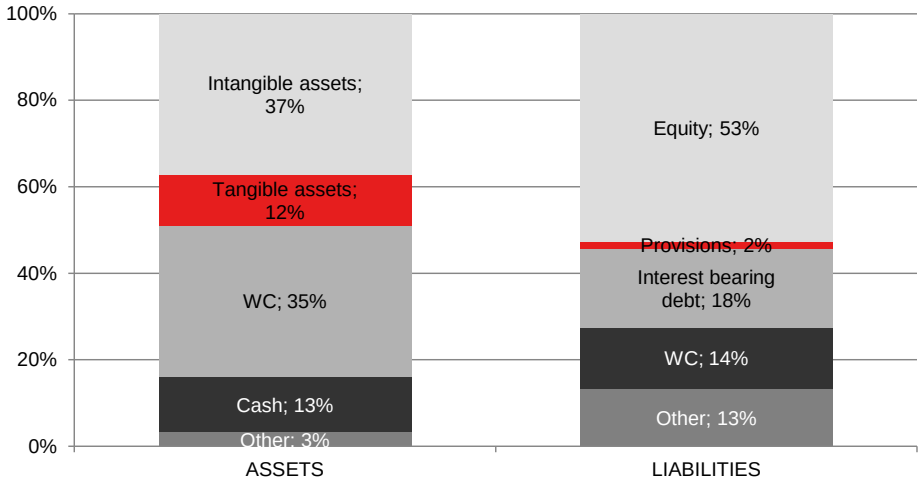
Analysis of Return on Capital

- Solid balance sheet with a 53% equity ratio and a net debt/EBITDA of 0.4x
- Assets reflect continuation of high R&D efforts throughout the market consolidation
- Close cooperation with leading EMS partners limits capex requirements
- NWC position temporarily burdened by bottlenecks in the electronics supply chain
- Expected profitability improvements and stable capital employed should yield significant ROCE expansion

Solid balance sheet

We consider ADVA's balance sheet as solid with an equity ratio of 53% and a net debt position of EUR 34.1m (net debt/EBITDA 0.4x). Regarding financial debt alone and excluding both the IFRS 16 related lease liabilities of EUR 27.8m and the pensions of EUR 8.5m, the company held a net cash position of EUR 2.3m.

Balance sheet 2020



Source: ADVA, Warburg Research

Assets reflect significant R&D investment

Capitalized R&D represents 53% of intangible assets

ADVA continuously invested in its technology, even in a challenging market environment. As a result, intangible assets (EUR 185.9m) represented 37% of the company's balance sheet in 2020. The capitalized R&D costs of EUR 98.6m made up 53.0% of the intangible assets. Within the last five years, this figure has grown at a CAGR of 9.6%.

The goodwill of EUR 67.0m stems mainly from the acquisitions of MRV Communications in 2017, Overture Networks in 2016 and Oscilloquartz SA in 2014. In addition, ADVA has capitalized PPA from the acquisitions that amounted to EUR 15m by the end of 2020.

PPAs fully amortized by 2024

The company still has EUR 15m intangible assets from PPA on its balance sheet, which should be fully amortized by mid-2024 with a residual of only EUR 1.7m by the end of 2023. As a result, we expect the total fixed assets to be stable over the next three years.

EMS network limits Capex requirements

The tangible assets of EUR 56.6m represent only 11.3% of the balance sheet, of which 44.8% or EUR 25.4m are right-of-use assets in accordance with IFRS 16. The low figure is the result of ADVA's outsourcing strategy. For manufacturing, ADVA works closely with well-known EMS providers such as flex, Sanmina and Jabil. Through this network, ADVA is able to produce in Europe and Asia, both within and outside of China, depending on the customers' CoO (country of origin) preferences.

Working capital burdened by mitigation of supply-chain risk

By the end of 2020 the net working capital stood at EUR 102m or 18.2% of sales. This figure is in line with the five-year average NWC/sales of 18.2%, but considering that this figure was still burdened by supply-chain risk mitigation measures, there should still be room for improvement.

On the asset side, inventories decreased by 14.5% to EUR 90.1m. Inventory turn improved from 5.3x to 6.3x. The rather low turn-over of 2019 compared to the five-year average of 6.1x was driven by trade tensions between the USA and China. Considering the current bottleneck for a variety of electronic components, we assume that even the improved levels of 2020 still include some risk prevention measures.

Account receivables decreased as well by 12.8% to 83.9. The collection period ((receivablesx365)/sales) was shortened by 9 days to 54 days, which is a significant improvement to the five-year average of 59 days.

Premature settlements of payables to mitigate bottleneck risks

On the liability side, however, there was an even stronger decrease in trade payables of 38.9% to EUR 44.2m. The collection period declined by 19 days to 29 days and thus fell significantly below the five-year average of 40 days. This was the result of premature settling in order to secure the supply of materials and components that might be affected by shortages. The figure already improved to EUR 56.1m in Q1 and should return to normalcy over the next 12 months.

Capital employed

No increases in capital employed expected in the next three years

During the last five years, ADVA has invested on average 18.3% of its revenue in working capital and 10.2% in capex. The 2020 figures of 18.2% NWC/sales and 10.3% were in line with historical averages. In combination with the acquisitions of MRV and Overture, this has resulted in an average annual growth of the capital employed of 12.0% over the last five years to EUR 297.3m. We estimate that ADVA will be able to maintain that level until 2023, despite the expected growth as a result of the narrowing gap between amortization and capitalization of R&D and working capital improvements.

Capitalized R&D expected to stabilize

The largest part of ADVA's capex is allocated to R&D. Of the 10.2% capex/sales 7.1pp were dedicated to the capitalization of R&D costs. The amortization of capitalized R&D however, only accounted for 5.6% on average over the last five year. As a result, capitalized R&D grew at a CAGR 2015-2020 of 9.6%.

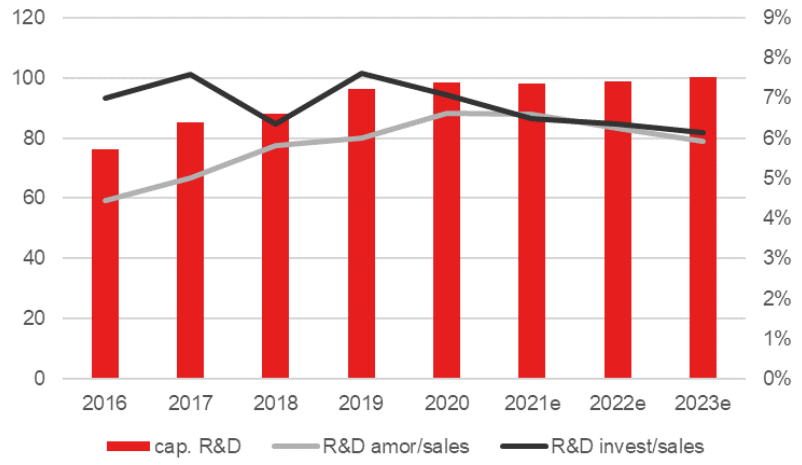
The heavy investments in R&D have laid the groundwork for the company's technological leadership and the strong market position especially for advanced and more profitable applications, for example enterprise DCI. We anticipate further investments in ADVA's portfolio, for example in the new MicroMux product line, but we expect the capitalization to grow at a slower pace and the amortization to catch up. In 2020, the gap between capitalization (7.1% of sales) and amortization (6.6% of sales) already narrowed to 0.5pp.

R&D capitalization on par with amortization going forward

By 2023, we expect R&D investments in terms of sales to decrease to 6.1% and R&D amortization to come close to that level at 5.9%. As a result, the average annual growth of capitalized R&D should decline significantly from 9.6% to 3.3% (CAGR 20-23).

In addition, the remaining EUR 15m intangible assets from PPA should be almost amortized by 2023 with a residual of only EUR 1.7m. This decrease will be offset by a slight increase in tangible assets from a EUR 10m investments in ADVA's production facility in Germany. As a result, we expect the total fixed assets to remain approx. on the same level over the next three years.

R&D capitalization vs amortization



Source: ADVA, Warburg Research

Working capital with visible improvement potential

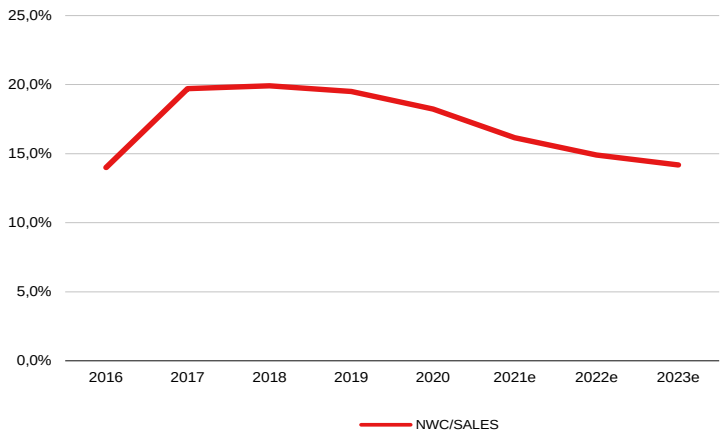
Historically, ADVA was confronted with significant price pressure. The resulting weak negotiation position should also have negatively affected the working capital. Despite the consolidation of the market and the improved position of ADVA, the investments in working capital remain at historical levels. As argued above, working capital was burdened by both the trade tensions between China and the US and current shortages in the electronics industry. As a result, we expect an improving NWC/sales ratio.

For the inventory turn-over (sales/inventory) we estimate a slight improvement this year from 6.3x to 6.4x to reflect the continuation of the strained situation on the supply side. Until 2023 however, we anticipate an improvement to 6.7. As regards the trade receivables, we already saw a significant improvement in 2020 with a decline in the collection period of 9 days to 54 days. Going forward, we estimate a collection period of 55 days.

Trade payables expected to normalize

On the liabilities site, we expect a normalization after the significant drop in the collection period from 48 to 29 days. Again, reflecting the current supply situation, we estimate an increase to 37 days this year and a further improvement to 44 by 2023. As a result, the NWC/sales should improve from 18.2% in 2020 to 14.2% by 2023.

Working capital

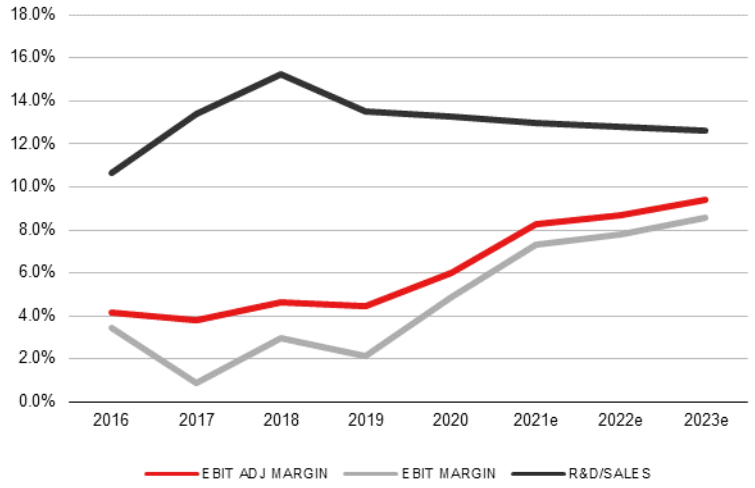


Source: ADVA, Warburg Research

Returns

Within the last five years, ADVA has earned an average EBIT margin of 2.9%. This figure was burdened however by significant M&A-related and restructuring one-offs and to a lesser extent by effects from the stock option programme. Adjusted for the one-offs, the average EBIT margin was 4.6%.

Operating profitability



Source: ADVA, Warburg Research

Significant profitability improvement in Q1

In 2020, the adjusted EBIT margin increased significantly from 4.5% to 6.0%. This was driven by the successful implementation of restructuring measures and a positive product-mix effect in conjunction with diminishing price pressure. In Q1, the positive development continued and the adjusted EBIT margin reached a new record level of 8.9%. For the full year, ADVA expects an EBIT margin between 6% an 10%. The lower end of the range reflects risks from possible bottlenecks in the second half of the year.

For the current year, we expect ADVA to reach the midpoint of its target range with an adj. EBIT margin of 8.3%. Until 2023, we estimate a margin expansion to 9.4%, which we consider cautious, as the guidance implies that our 2023 target could be surpassed by the end of this year. The following factors should drive the profitability improvement:

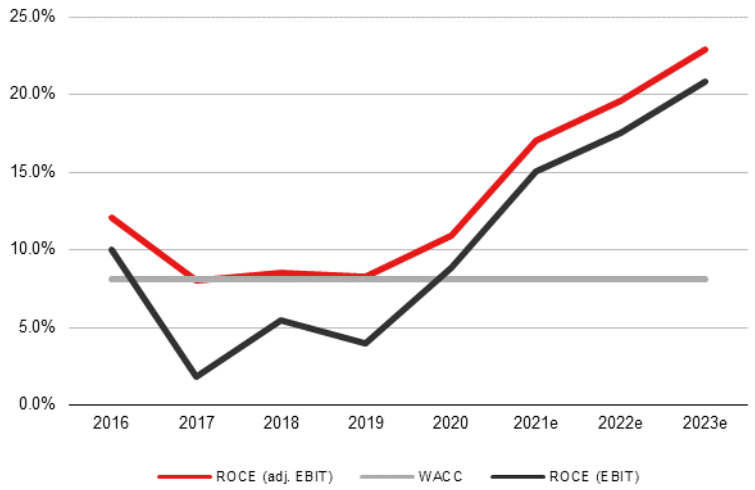
- **Diminishing price pressure**: After the consolidation over the last couple of years, players such as Nortel, Alcatel or Lucent were acquired or left the market and large Asian competitors like Huawei and ZTE lost market share in Europe and the US due to security concerns. This should ease the price pressure in the market notably.
- **Improved customer-mix**: Business with CSPs still represents close to 70% of ADVA's top-line. Compared to ICPs and larger enterprises, CSPs are focused on cost-efficient solutions with limited willingness to pay for cutting edge security of synchronization features, which have a significantly higher gross margin contribution. We expect the share of non-CSP customers to increase to 40% until 2023.
- **Increasing revenue share from software and services**: With the rise of NFV architecture, several network functions can be virtualized with software standard servers, switches and storage devices, or even cloud computing infrastructure, instead of having custom hardware appliances for each network function. ADVA's Ensemble software is a powerful virtualization suite and drove the share of software and service sales from 20% to 23% in 2020 and even further to 26% in Q1 2021. Until 2023, we expect the share of these highly scalable revenues to increase further to 29%.

Regarding the reported EBIT in 2023, we estimate a slight increase in the non-cash charges associated with the stock option programme (EUR 1.5m) and a stable level of PPA amortization (EUR 4.4m), leading to an EBIT margin of 8.6%.

ROCE

Between 2016 and 2019, avg. capital employed grew by an annual average of 14.2%, while the adj. EBIT only grew by 1.9%. As a result, the ROCE (adj. EBIT) declined notably from 12.1% in 2016 to 8.2% in 2019. In 2020, this trend was turned around. The capital employed decreased from EUR 324.7m to EUR 297.3m, mainly driven by a goodwill impairment and PPA amortization. The average capital employed throughout the year only increased by 3.4% and thus at a significantly lower rate than the adj. EBIT, which grew at 36.4%. As a result, the ROCE improved to 10.9%.

ROCE



Source: Warburg Research

ROCE (EBIT) should reach 20% by 2023

As argued above, we estimate the capital employed will remain stable at the current level until 2023. At the same time, we expect the adj. EBIT to grow at a CAGR 20-23 of 25.9%. As a consequence, the ROCE based on the adjusted EBIT should improve to 22.9%. The ROCE (EBIT) should be approx. 2pp below that figure at 20.8%. With the complete amortization of the PPAs by mid-2024, the gap should have narrowed significantly by 2025. On an after-tax-basis we anticipate a ROCE (NOPAT) of 16.0% in 2023.

Growth / Financials

- Demand driven by global mega-trends including 5G roll-out, video streaming, cloud computing and IoT which all rely on optical network infrastructure
- Growing security concerns regarding Chinese competitors should lead to a growing market share, especially in the EMEA region
- Leading technology portfolio and software solutions that are aligned with mega-trends should increase market share especially outside the CSP segment
- Higher share of revenue generated with software and non-CSP customers should improve product-mix and profitability

Technological mega-trends drive bandwidth demand

Technological advances in the age of information require advances in data transmission technology. While this is often measured in bandwidth, modern applications especially in the field of IoT (Internet of Things), also heavily rely on low latency and precision in timing.

The demand for bandwidth is driven in three dimensions. The number of users or households connected, the number of connected devices per user or household and the average bandwidth of a device.

Globally, the total number of internet users is expected to increase from 3.9bn in 2018 to 5.3bn by 2023 (CAGR 6%). This trend is mainly driven by the APAC region, where currently only 52% of the population is connected to the internet, compared to 82% in Western Europe and 90% in Northern America.

Mega-trends drive bandwidth demand

The number of devices and their respective bandwidth, however, is driven by the following technological mega-trends:

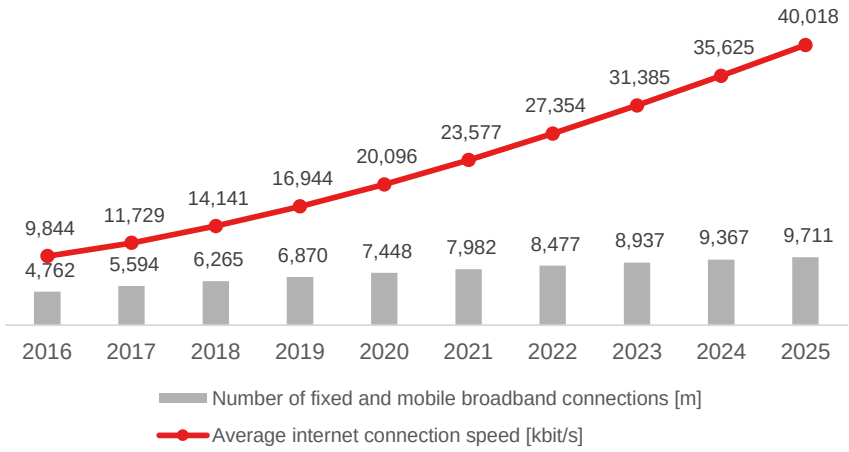
- **5G**: 5G connections are estimated to grow over 100-fold from approx. 13m in 2019 to 1.4bn by 2023 (source: Cisco Systems). Since 5G uses higher frequency, the reach is lower than LTE/4G. The increased number of cellular phone antennas will require an optical connection to the core grid (backhaul).
- **IoT**: Smart homes, cars and cities as well as industrial IoT applications will drive M2M connections from 6.1bn in 2018 to 14.7bn by 2023, implying average annual growth of 19.2% (source: Cisco Systems)
- **Edge and cloud computing**: The increasing importance of big data storage and computing for internet content providers and enterprises leads to ongoing growth of the global data sphere, which is estimated to grow at a CAGR 18-25 of 27% to 175 zetabytes (Source: IDC). The data is computed in the cloud or at the "edge" of a cloud or on-premise servers, increasing not only requirements for bandwidth but for latency and synchronization of the connection.
- **Video streaming**: With IP-based video broadcasting from large ICPs such as Netflix, Amazon Prime or YouTube as well as video communication platforms such as Zoom, Skype or WebEx, video streaming is increasing the demand for bandwidth. In addition, new video formats like UHD or 4K will more than double the video bit rate compared to HD. By 2023, Cisco estimates that 66% of the installed TVs will use 4K/UHD, up from 33% in 2018.

Number of connected devices expected to increase by 2023

The average number of devices per user is expected to increase from 2.4 in 2018 to 3.6 by 2023, according to Cisco's Annual Internet Report, with the biggest increases occurring in Northern America (8.2 to 13.4) and Western Europe (5.6 to 9.4).

On a global scale, the number of connections is expected to grow at a CAGR 20-25 of 5.8% from 7.4bn to 9.8bn. The average bandwidth, driven by the aforementioned mega-trends should growth significantly faster at an average annual rate of 14.8% from 20 to 40 Mbit/s during the same timeframe.

Global average connection speed and the number of connections

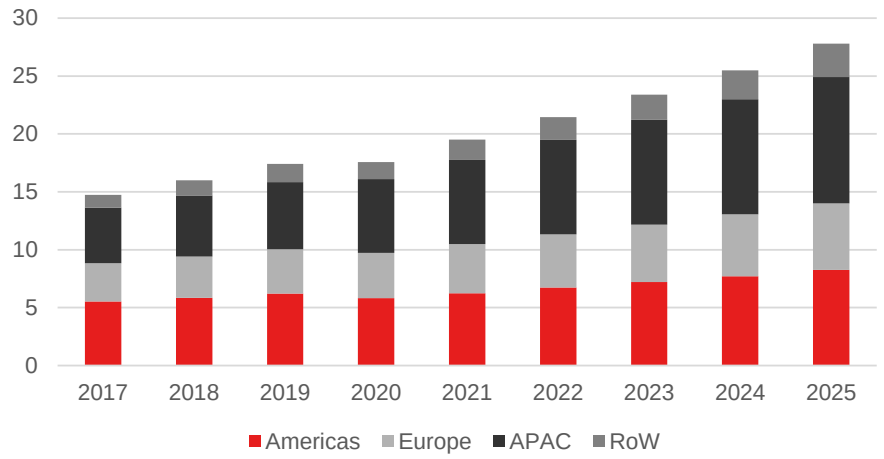


Source: Statista, ITU, Warburg Research

Optical equipment

Optical fibre is the fastest and most cost-efficient medium to transmit large data volumes over long distances and significantly exceeds the bandwidth-over-distance capabilities of other mediums such as copper or WiFi. Although DSL still relies on copper phone or TV lines for "the last mile" because of the time- and cost-intensity of fibre-to-the-home (FTTH) or fibre-to-the-building (FTTB) initiatives, fibre optic transmission is the foundation at the core of all high-speed networks. As a consequence, increasing the bandwidth of carrier, cloud and enterprise networks requires investment in optical communication equipment.

Global market for optical communication equipment (in USD bn)



Source: MarketsAndMarkets, Warburg Research

5G roll-out expected to continue after COVID-related postponements

The global market volume for optical communication and networking equipment was estimated between USD 16.0bn (source: Dell'Oro) and USD 18.9bn (source: MarketsAndMarkets) in 2020. During the pandemic, the demand for bandwidth grew driven by an increase in the number of people working from home and increased use of streaming entertainment. At the same time, lockdowns slowed down plans for the 5G grid expansion. By the end of the year, the market volume had grown by only 1% but should have an increased backlog for planned investments. From a geographical perspective, the APAC region outside of China saw the largest growth with 13%, while China with 1% and EMEA with 2% were close to the global development. Northern America even declined by 6%.

Regional growth rate in 2020	
North America	-6%
EMEA	2%
China	1%
APAC (excl. China)	13%
Caribbean and Latin America	-14%
Worldwide	1%

Source: Dell'Oro

With last year's postponements, especially regarding the 5G grid expansion, and the increased demand for bandwidth by both households and enterprises, driven by the factors listed above, the market for optical communication and network equipment is expected to grow at an average annual growth rate of 8% until 2025 (source: MarketsAndMarkets) and at more than 6% until 2030 (source: Prescient Strategic Intelligence).

Although we expect above-average growth rates in the APAC region, where large Asian competitors like Huawei, ZTE, Fujitsu or NEC dominate the market, the growing security concerns, especially regarding Chinese suppliers, should lead to attractive opportunities for local players in the West. While the US still has several companies in the market, including Cisco, Ciena, Infinera or ADTRAN, in Europe the list of relevant competitors for ADVA is mostly limited to Nokia and Ericsson, with unique selling points across ADVA's portfolio.

Wavelength division multiplexing

Within the market for optical transmission equipment, wavelength division multiplexing (WDM) technology is the application with the largest volume. WDM allows for the simultaneous transmission of data through a single optical fibre by dividing light into different wavelengths or colours. Each of the more than 100 wavelengths can carry a distinct data stream that is combined with others (i.e. multiplexing) in a fibre and separated again at their destination (de-multiplexing).

The global WDM market had an estimated value of USD 3.6bn in 2019 (source: Allied Market Research) and should remain roughly on the same level in 2020, in line with the overall market development for optical communication equipment. Until 2027, the market is projected to grow at an CARG 6.4% to USD 5.6bn (source: Allied Market Research).

Growth to a more favourable product-mix

Over the course of the last three years, ADVA grew its top line at an annual average of 3.2%. After a revenue decline in 2018 as the result of losing a large US internet content provider as a customer in 2017, the company returned to a significant 10.6% sales growth in 2019.

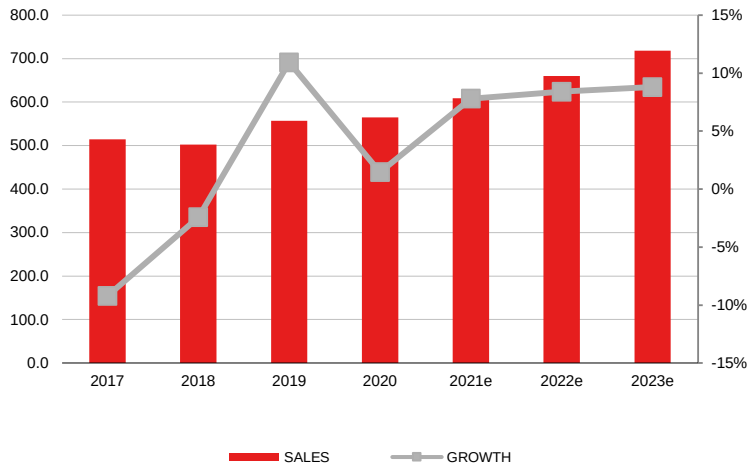
Last year, the market growth was burdened by the pandemic, with a 2% growth rate in the EMEA region and a decline of 6% in North America. Since these are the most important regions for ADVA with revenue shares of 55% and 36% respectively, group sales only grew by 1.5%. Despite the weak environment, ADVA was able to outperform the market in the EMEA regions with 3.3% growth and to maintain its US market share with a sales decline of 5.7%.

Considering ADVA's strong technological expertise and market position as well as growing demand for bandwidth accelerated by the pandemic and last year's investment postponements, we expect the growth momentum to increase starting this year. For the full year, ADVA is aiming for a revenue range of EUR 580-610m.

Strong Q1 growth despite ongoing lockdown in important regions

Although large parts of the EMEA region and North America were still in lockdown in Q1, ADVA was able to grow its top line by 8.9% to EUR 144.5m compared to the pre-COVID Q1 2020 and saw the highest Q1 order intake in the company's history. Against this background, we estimate 2021 sales will be at the upper end of the guided range at EUR 609.0m.

Revenue development



Source: ADVA, Warburg Research

Until 2023, we expect the company to reach EUR 718m in sales (CAGR 8.6%), driven by market trends such as 5G, IoT, cloud computing and general growth in bandwidth demand. As one of the last Europe-based suppliers of optical transmission technology, ADVA should be able to benefit from the growing security concerns, especially regarding Chinese competitors, and to gain market share. In addition, we expect ADVA's product strategy to drive growth by focusing on technologically advanced solutions for enterprise customers, the new highly cost-efficient multiplexer plugs (MicroMux) and an increasing share of software and service revenues.

Expanding multiplex portfolio

Multiplexing equipment and especially the FSP 3000 family should contribute the largest part to ADVA's group sales today (WRe 70%). Considering that the expected 6.2% WDM equipment growth will be driven by the APAC region, we only estimate a CAGR 20-23 of 3.7% for the FSP 3000 product line.

In addition, ADVA recently expanded its optical MicroMux series of pluggable multiplex sub-modules. The plugs enable network operators to fan out 10Gbit/s, 100Gbit/s or 400Gbit/s interfaces into multiple lower-speed interfaces. This offers an easy and highly cost-efficient way to expand infrastructure while maintaining expensive legacy hardware.

MicroMux Quattro and Nano

Source: ADVA

MicroMux series expected to contribute 15% to group sales by 2025

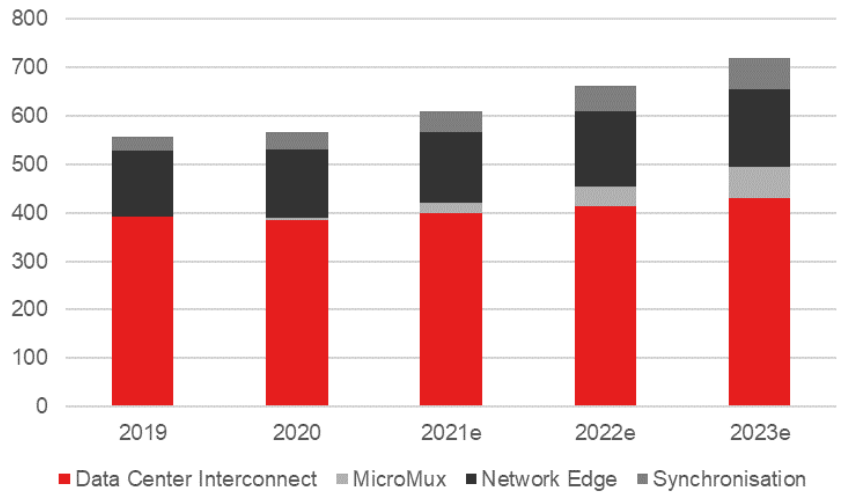
With the new MicroMux Nano and Quattro released this year, the revenue contribution of the series should still be low, but ADVA expects it to contribute 15% to group sales by 2025. For 2023, we estimate MicroMux sales of EUR 64.6m of 9.0% of the group's top line. In total, we expect the revenue from multiplexing equipment to grow at a CAGR 20-23 of 8.2%.

High growth momentum for synchronization tools

Under the brand Oscilloquartz, ADVA offers complete end-to-end network synchronization solutions. Highly accurate timing information is crucial for effective transmission of digital signals. Approx. 90% of the demand comes from CSPs that rely on precise timing especially for their mobile networks. CSP demand saw a spike in 2015 and 2016 with the LTE/4G roll-out and should spike again with the 5G roll-out. The smaller cells with higher radio density require sub-nanosecond timing accuracy compared to the +/- 5 nanosecond accuracy required for LTE/4G.

Outside CSP, financial institutions and power utilities rely on synchronization for highly precise timing of data. In many use-cases for these industries, timing is mission-critical or directly tied to the operating performance. Hence, customers from these sectors have an increased willingness to pay for technologically leading solutions.

Revenue split by product category (WRe)



Source: ADVA, Warburg, Research

Synchronization equipment sales expected to grow at 24% annually

Based on its technological leadership, ADVA has gained market share in this segment and was able to grow its synchronization business at an annual average rate of 23% over the last three years. The business is still comparably small and should, in our estimation, only have contributed approx. 6% to 2020 group sales. Considering both the high technological expertise and strong demand drivers, we estimate this business segment will grow at a CAGR 20-23 of 24.3%, which should lead to a revenue share of 9.1% by 2023.

Well-positioned for opportunities outside CSP

ADVA's competitive quality is mainly based on its technological expertise while CSPs often focus on cost-efficiency. Even with advanced solutions that enable less complex and thus more cost-efficient infrastructure, this customer segment remains highly price-sensitive. As a result, we estimate that the gross margin within this segment is limited to approx. 30%.

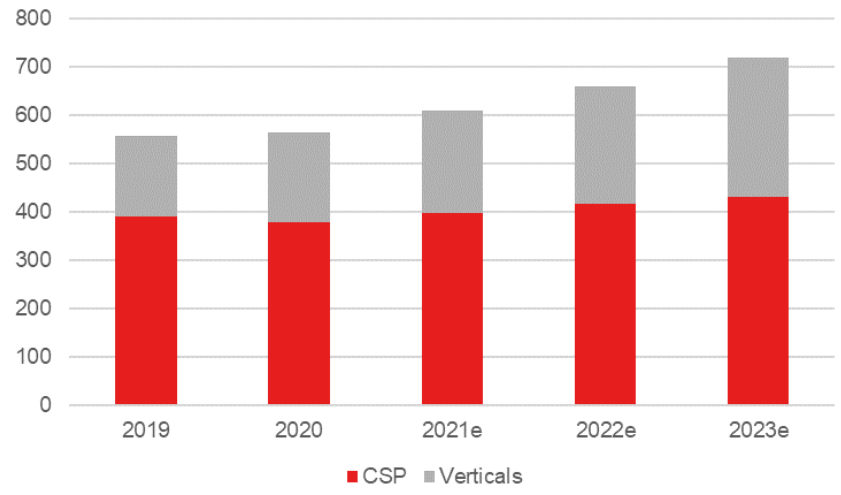
In other verticals, i.e. ICPs and enterprises, the performance of the network infrastructure is often more directly linked to the operating success. Examples are high-frequency trading in the financial industry, real-time dynamic pricing in e-commerce, faster edge computing for cloud service providers or power grid stability for power utilities. As a result, IPCs are invested heavily in private optical fibre networks connecting their data centres. Here, we expect a higher willingness to pay for advanced technological solutions and estimate that ADVA is able to achieve gross margins above 50% with some solutions in this segment.

Today, ADVA still generates approx. 70% of its revenue with CSPs (WRe 2020 68%). We expect however that both the growth prospect, driven by trends such as cloud, IoT and streaming, and the competitive position of ADVA's technological leadership are greater in verticals outside the CSP segment.

Profitable non-CSP sales share should increase from 30% to USD 40

Against this background, ADVA's stated goal to increase the share of these verticals from 30% to 40% by 2023 appears feasible. We estimate that CSP sales will grow by an average of 4.4% p.a. until 2023, which is conservative considering the capex requirements for the 5G roll-out and the increasing demand for bandwidth. The driving factor for our growth forecast are ICPs and enterprises, for which we estimate an annual average sales increase of 15.5%.

Revenue split by customer group (WRe)

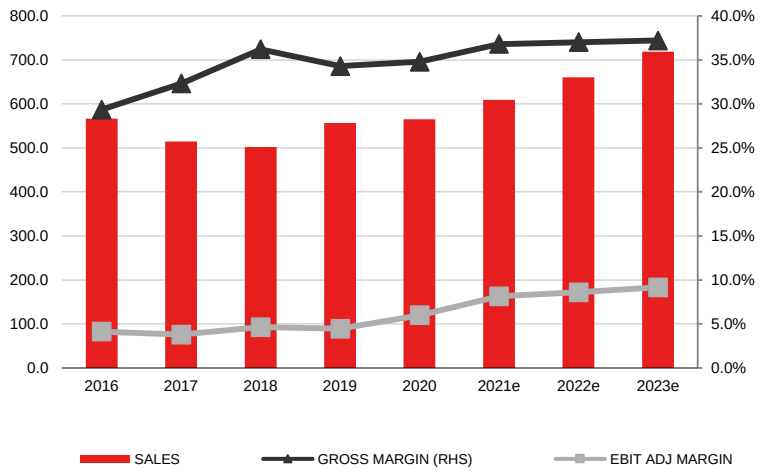


Source: ADVA, Warburg, Research

Record profitability within reach

ADVA's profitability, when adjusted for M&A-related effects, restructuring costs and non-cash charges in association with the SOP, was rather stable between 2016 and 2019 with an average adjusted EBIT margin of 4.3% that peaked in 2018 at 4.6% and hit a low in 2017 at 3.8%.

EBIT development



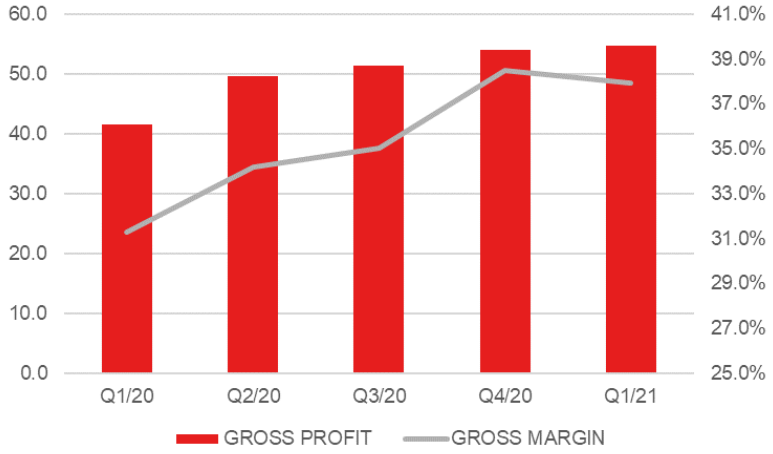
Source: ADVA, Warburg Research

In 2020, the adjusted EBIT margin increased notably to 6.0%, despite the low top-line growth (+1.5%). Besides some minor improvements in the gross margin (+0.5pp) and the R&D cost ratio (+0.2pp), this was mainly because of a significant decrease in marketing expenses of EUR 12.0m (marketing cost ratio -2.2pp). This significant improvement was in part driven by restructuring efforts that burdened the 2019 figure by EUR 2.0m and its positive cost effect in 2020, but also by the reduction in marketing efforts as a result of the pandemic.

Strong sequential margin improvement over the last five quarters

Taking a closer look at the quarterly development reveals a significant improvement in the gross margin throughout the year. Starting with 31.3% in Q1, the margin improved to 34.2% in Q2, 35.0% in Q3 and finished the year with a strong 38.5% in Q4. While Q4 is usually 1pp to 3pp above Q1, we consider a >7pp improvement to far exceed the usual seasonality.

Quarterly gross margin development



Source: ADVA, Warburg Research

10% EBIT margin at the upper end of the FY guidance

In Q1 2021, ADVA continued the trend with a gross margin of 37.9%, 6.6pp above Q1 2020. The adjusted EBIT margin increased by almost 10pp from -1.3% to 8.9%. For the full year, ADVA guided for an adjusted EBIT margin between 6% and 10%. While the upper end of the range should be within reach without friction in the supply chain, we expect some negative effects from bottlenecks for electronic components in H2 and thus estimate an adjusted EBIT margin of 8.3% for the full year.

However, the strong quarterly development underpins that underlying structural improvements such as diminishing price pressure and positive product-mix effects have already had an impact but are overshadowed by temporary negative effects such as the pandemic and trade tensions between the US and China.

Diminishing price pressure

During the internet boom of the late 90s, communication equipment suppliers grew significantly both in number and in revenue. This led to significant overcapacity in the optical network capacity. By 2002, the capacity utilization of optical cable installed in the US was only 2.6% (source: Merrill Lynch). This started a long period of high price-pressure and consolidation that lasted until the mid-2010s.

As a result, ADVA's gross margin improved from 29.3% in 2016 to 32.3% in 2017 and to 36.2% in 2018. In 2019, as a consequence of the trade tension between the US and China, ADVA had to reallocate production from EMS sites in China to other locations. Although this reallocation was executed quickly and successfully, the gross margin decreased again to 34.3%.

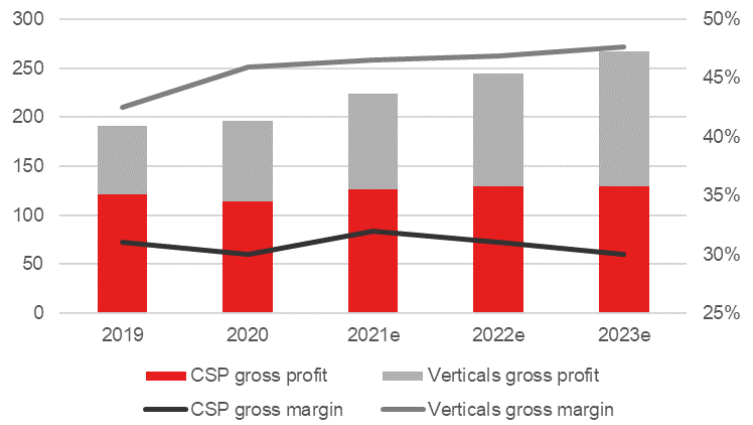
In 2021 so far, ADVA has managed to recover even though the Covid pandemic is still impeding growth and global supply chains. Going forward, we expect diminishing pricing pressure and at least stable gross-margin development in the respective customer and product segments.

Favourable customer and product-mix

Non-CSP gross margin estimated above 45%

As argued above, we expect the forecast growth to be driven by verticals outside the CSP segment, leading to a decline in the CSP revenue share from 68% to 60%. This should have a significant positive effect on the gross margin, since we estimate the gross margin in the CSP segment to be only at approx. 30%, while the margin with non-CSP should have been at 46%.

Gross profit split by customer group (WRe)



Source: ADVA, Warburg, Research

In addition, we expect an improving gross margin in this segment driven by a higher revenue share from software and services compared to hardware. Although software is an

important component in all product categories (data/cloud interconnect, cloud access/edge network, network synchronization), it is currently gaining in importance, especially at the network's edge. With the virtualization of network functions (NFV architecture) several functions that traditionally required specific hardware, such as switches, can be programmed and automated on standard hardware. This decreases hardware costs and increases flexibility, especially with regards to computing power (scale-up and/or scale-out capability), which makes it especially attractive to cloud- or hyper-scale data centres.

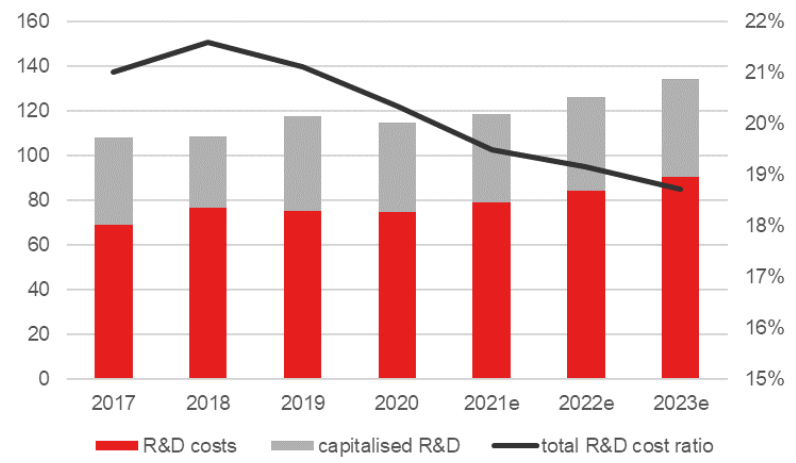
Software and service revenues reached 26% of sales in Q1

This trend led to growing demand for ADVA's virtualization suite ensemble and was a driving factor behind the increase in the revenue share of software and services from 20% to 23% last year. In Q1, the share increased further to 26%, bringing it closer to ADVA's 2023 target of 30%. By 2023, we expect the increasing software and service revenue share to drive the non-CSP gross margin from 45.9% to 47.6%. In combination with the increasing share of non-CSP sales, the group gross margin should improve by 34.8% in 2020 to 37.2% by 2023.

Economies of scale in R&D should improve profitability

During the consolidation, ADVA maintained its high R&D effort. Combining the direct and capitalized R&D costs, the total R&D costs stood at 21.6% of group sales in 2018. In 2020, this figure has already decreased to 20.3%.

Total R&D costs



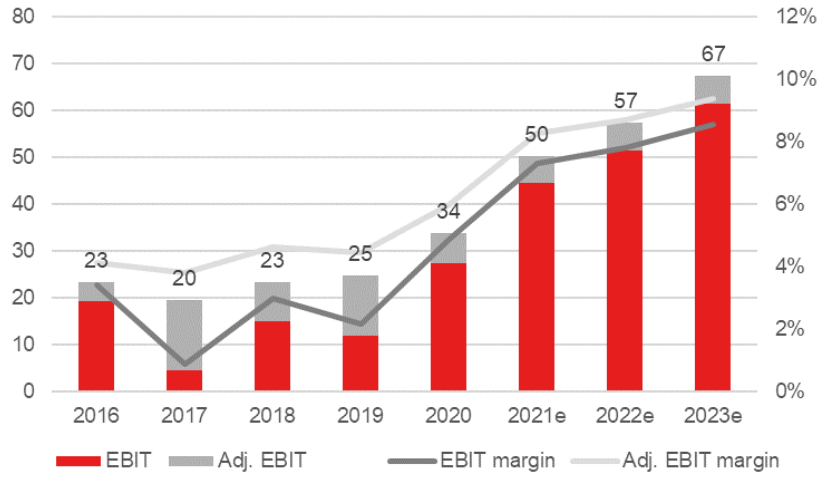
Source: ADVA, Warburg Research

Going forward, we anticipate that ADVA will continue to invest in its portfolio, but since the portfolio is already well-aligned with the trends that will drive the market in the coming years, we expect the R&D efforts to grow at slower pace than the top line. As a consequence, we estimate total R&D costs in terms of sales to decline further to 18.7% by 2023.

As argued above, we especially expect the capitalization of R&D to slow down, which implies that anticipated increase in R&D will predominantly affect the R&D expenses in the P&L. Hence, we estimate only a slight improvement in the R&D ratio from 13.3% in 2020 to 12.6% by 2023. In the mid-term however, this should increase return on capital and decrease amortization rates.

Driven by the increasing gross margin and decreasing R&D ratio, we estimate the adjusted EBIT margin to increase from 6.0% in 2020 to 9.4% in 2023. Considering that ADVA already achieved an adjusted EBIT margin of 8.9% in Q1 and that the upper end of the guidance range for the full year of 10% exceeds our 2023 estimate, we consider our projections to be rather cautious.

Adjusted EBIT development



Source: ADVA, Warburg Research

PPA adjustments to phase out in 2024

While the adjusted EBIT margin was rather stable between 2016 and 2019 with a significant uptick in 2020, the adjustments were highly volatile throughout the years, ranging from EUR 4.0m in 2016 to EUR 15.1m in 2017.

EBIT adjustments

in EUR m	2016	2017	2018	2019	2020	2021e	2022e	2023e
EBIT	**19,4**	**4,4**	**15,0**	**12,0**	**27,5**	**44,5**	**51,5**	**61,4**
margin	*3,4%*	*0,9%*	*3,0%*	*2,2%*	*4,9%*	*7,3%*	*7,8%*	*8,6%*
PPA amortisation and impairments	**3,0**	**4,4**	**5,5**	**5,7**	**4,4**	**4,4**	**4,4**	**4,4**
SOP effects	**1,1**	**1,3**	**1,4**	**1,5**	**1,2**	**1,4**	**1,5**	**1,6**
Restructuring		**9,4**	**1,3**	**5,7**	**0,7**			
Adj. EBIT	**23,4**	**19,5**	**23,3**	**24,8**	**33,8**	**50,3**	**57,4**	**67,5**
margin	*4,1%*	*3,8%*	*4,6%*	*4,5%*	*6,0%*	*8,3%*	*8,7%*	*9,4%*

Source: ADVA, Warburg Research

The adjustments consist of PPA amortization, goodwill impairments, non-cash charges associated with the stock option programme and one-offs from restructuring measures. Effects from stock option programme that stem from stock price effects on the valuation of stock options have been rather stable between EUR 1.1m and EUR 1.5m. As we do not estimate future stock volatility, we assume a slight increase from EUR 1.4m in 2021 to EUR 1.6m in 2023.

PPAs expected to be fully amortized by 2024

PPA amortization and impairments increased in 2017 and 2018, driven by the acquisition of Overture Networks in 2016 and MRV Communications in 2017, from EUR 3.0m to EUR 5.5m. With some additional impairments, this figure increased to EUR 5.7m in 2019 before it dropping to EUR 4.4m last year. Going forward, we estimate annual PPA amortization of EUR 4.4m, leading to a remaining capitalized PPA of EUR 1.7m by the end of 2023. Thus, in H1 2024 the PPA amortization should be complete.

Restructuring measures have been the most significant factor behind the volatility of the adjustments, reaching as hig as EUR 9.4m in 2017 to EUR 0m in 2016. Currently, no future restructuring measures are scheduled and hence, are not included in our estimates.

Without future restructuring measures and PPAs expected to be fully amortized by mid-2024, the gap between the adjusted and reported EBIT will close in and be reduced to SOP effect, which we estimate at 0.2% of sales in 2023.

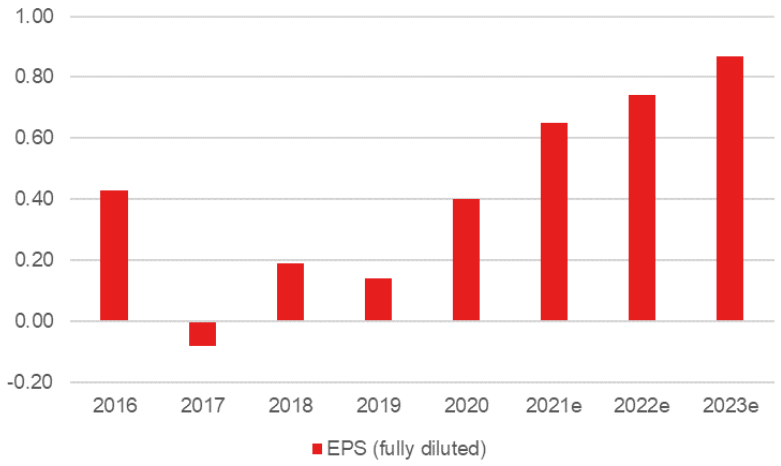
EPS expected to double by 2023

Our forecast is not anticipating significant investments that would require additional funding and we expect the free cash flow to grow at a CAGR 20-23 of 6.4%, driven by the revenue growth and margin expansion. Against this background, we assume a stable level of financial debt and a stable financial result of EUR -2.7m. The projected EBIT growth should therefore result in an EBT margin increase from 4.4% in 2020 to 8.2% in 2023.

ADVA holds significant tax loss carry forwards, which were utilized to reduce the average tax rate of the last three years to 20.6%. By the end of 2020, tax loss carry forwards still stood at EUR 22.3m. In our forecast, we assume a slight increase in the tax rate from 20% in 2020 to 23% in 2023. The complete utilization of the tax losses is expected in 2027. Applying our estimated tax rate results in a net income margin increase from 3.6% in 2020 to 6.3% in 2023.

We expect ADVA to continue its stock option programme, which will be satisfied with the creation of new shares. As a result, we estimate the number of fully diluted shares to grow by 1% annually to 52.1m by 2023. In conjunction with the projected net income development, this will result in an increase in the EPS from EUR 0.40 in 2020 to EUR 0.87 in 2023.

EPS development



Source: ADVA, Warburg Research

Valuation

- We based our target price on a DCF analysis and confirmed our findings with an FCF Value Potential calculation and a Peer Group analysis
- All methods indicate a significant undervaluation of the stock
- In addition, our FCF Value Potential analysis, based on the 2020 figures and excluding future opportunities, indicates a fair value close to the current market valuation
- Hence, the growth in profitability prospects discussed in this research note is not yet reflected in the share price

All metrics indicate significant upside

We based our target price on a DCF model that indicates a fair value per share of EUR 15.12. In addition, we calculated the free cash flow value potential and compared ADVA's current market valuation to a peer group.

The FCF potential confirmed the findings of our DCF model with a fair value of EUR 14.26 based on our estimates for 2022. Even based on the 2020 figures, the FCF Value Potential of EUR 9.09 is only slightly below the current valuation, indicating that the growth prospect and margin potential is not reflected in the share price.

The peer group analysis, based on PE and EV/EBIT multiples for 2021 to 2023 suggest a fair value per share of EUR 16.55, which is in line with our DCF model and our FCF Value Potential calculation. Focusing on the closest peers alone yield an even higher valuation.

These are priced at an EV/EBIT 22e of 19.5x and an PE 22e of 25.9x compared to ADVA's valuation at an EV/EBIT of 10.8x and a PE of 14.1x.

In conclusion all methods applied indicate significant upside potential for ADVA.

Discounted cash flow model

Our DCF model reflects the growth opportunities from the 5G roll-out, the growing bandwidth requirements and the ongoing digitalization of business through the implementation of IoT and cloud strategies as well as the margin expansion resulting from an improved customer- and product-mix.

Assumptions

Our DCF model estimates and assumptions can be summarised as follows:

- Until 2023, we estimate average growth of 8.3%. driven by the growing demand for bandwidth, the 5G roll-out as well as by investments in the cloud and IoT infrastructure outside the CSP sector.
- Thereafter, we used a transactional period to bridge the last estimated growth rate of 8.8% in 2023 and the perpetual growth rate in the terminal value 2.5%.
- The EBIT margin increases from 6.0% in 2020 to 8.9% in 2023 driven by the increasing sales share of more profitable non-CSP business and software.
- Until 2025, we expect the EBIT margin to further increase to 9.3% as a consequence of the full amortization of PPAs consistent with the anticipated decrease in the D&A
- IFRS 16 effects are adjusted in the “Other” line between 2021 and 2023 and were excluded from our estimates beyond 2023. The debt was adjusted for IFRS 16 liabilities.
- Considering the low historical profitability, we assumed an EBIT margin of 7.0% to calculate the terminal value and used the period between 2025 to 2033 as a transitional period.
- For the assumed revenue growth, we estimate capex/sales of 8.5% and NWC/sales of 14.0% to be sufficient.
- The applied beta range of 1.24 reflects the strong equity ratio 52.6% as well as the company’s historically low growth rates and profitability.
- The beta and the assumed long-term debt ratio of 6% yield a WACC of 8.1%

DCF indicates a fair value of EUR 15.12 per share

Our DCF analysis yields a fair value of EUR 15.12 for ADVA’s share price.

DCF model

	Detailed forecast period			Transitional period										Term. Value
Figures in EUR m	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e	2031e	2032e	2033e	
Sales	609.0	660.2	718.3	775.7	833.9	892.3	950.3	1,007.3	1,057.7	1,110.6	1,166.1	1,212.7	1,243.1	
Sales change	*7.8 %*	*8.4 %*	*8.8 %*	*8.0 %*	*7.5 %*	*7.0 %*	*6.5 %*	*6.0 %*	*5.0 %*	*5.0 %*	*5.0 %*	*4.0 %*	*2.5 %*	*2.5 %*
EBIT	44.5	51.5	61.4	69.8	77.6	80.3	80.8	80.6	79.3	81.1	84.0	86.1	87.0	
EBIT-margin	*7.3 %*	*7.8 %*	*8.6 %*	*9.0 %*	*9.3 %*	*9.0 %*	*8.5 %*	*8.0 %*	*7.5 %*	*7.3 %*	*7.2 %*	*7.1 %*	*7.0 %*	
Tax rate (EBT)	*20.0 %*	*22.0 %*	*23.0 %*	*24.0 %*	*25.0 %*	*27.0 %*	*29.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	
NOPAT	35.6	40.2	47.3	53.1	58.2	58.6	57.4	56.4	55.5	56.7	58.8	60.3	60.9	
Depreciation	64.6	67.3	66.7	63.6	69.2	75.0	80.8	85.6	89.9	94.4	99.1	103.1	105.7	
in % of Sales	*10.6 %*	*10.2 %*	*9.3 %*	*8.2 %*	*8.3 %*	*8.4 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	
Changes in provisions	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.6	0.4	
Change in Liquidity from														
- Working Capital	-4.6	0.0	3.5	7.5	7.4	8.2	8.1	8.0	7.1	7.4	7.8	6.5	4.2	
- Capex	63.0	64.4	61.8	65.9	70.9	75.8	80.8	85.6	89.9	94.4	99.1	103.1	105.7	
Capex in % of Sales	*10.3 %*	*9.8 %*	*8.6 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	
Other	5.5	5.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Free Cash Flow (WACC Model)	36.2	38.1	44.7	43.9	49.8	50.3	49.9	49.1	49.1	50.0	51.7	54.3	57.0	58
PV of FCF	34.8	33.9	36.8	33.4	35.1	32.7	30.1	27.4	25.3	23.8	22.8	22.1	21.5	393
share of PVs	**13.66 %**			**35.50 %**										**50.84 %**

Model parameter

Derivation of WACC:		Derivation of Beta:	
Debt ratio	5.00 %	Financial Strength	1.10
Cost of debt (after tax)	4.2 %	Liquidity (share)	1.20
Market return	7.00 %	Cyclicality	1.40
Risk free rate	1.50 %	Transparency	1.20
		Others	1.30
WACC	**8.11 %**	**Beta**	**1.24**

Valuation (m)

Present values 2033e	380		
Terminal Value	393		
Financial liabilities	65		
Pension liabilities	9		
Hybrid capital	0		
Minority interest	0		
Market val. of investments	0		
Liquidity	65	No. of shares (m)	50.5
Equity Value	**764**	**Value per share (EUR)**	**15.12**

Sensitivity Value per Share (EUR)

		Terminal Growth						
Beta	WACC	1.75 %	2.00 %	2.25 %	**2.50 %**	2.75 %	3.00 %	3.25 %
1.43	9.1 %	12.24	12.42	12.62	12.84	13.07	13.32	13.59
1.34	8.6 %	13.15	13.38	13.62	13.89	14.17	14.49	14.83
1.29	8.4 %	13.66	13.91	14.18	14.48	14.80	15.15	15.54
1.24	8.1 %	14.20	14.48	14.79	**15.12**	15.48	15.88	16.32
1.19	7.9 %	14.80	15.11	15.45	15.82	16.23	16.69	17.19
1.14	7.6 %	15.44	15.79	16.18	16.60	17.06	17.58	18.15
1.05	7.1 %	16.91	17.36	17.85	18.40	19.00	19.69	20.46

		Delta EBIT-margin						
Beta	WACC	-1.5 pp	-1.0 pp	-0.5 pp	**+0.0 pp**	+0.5 pp	+1.0 pp	+1.5 pp
1.43	9.1 %	10.01	10.95	11.89	12.84	13.78	14.72	15.67
1.34	8.6 %	10.82	11.84	12.86	13.89	14.91	15.93	16.95
1.29	8.4 %	11.28	12.34	13.41	14.48	15.54	16.61	17.68
1.24	8.1 %	11.77	12.89	14.00	**15.12**	16.24	17.35	18.47
1.19	7.9 %	12.32	13.49	14.66	15.82	16.99	18.16	19.33
1.14	7.6 %	12.91	14.14	15.37	16.60	17.83	19.05	20.28
1.05	7.1 %	14.30	15.67	17.03	18.40	19.76	21.12	22.49

- In the "others" line we adjusted IFRS 16 depreciations on right-of-use
- After 2023 we excluded right-of-use depreciation, leading to a decrease in D&A
- The financial debt was adjusted for lease liabilities from IFRS 16 accounting
- The EBIT margin increase in 2024 is the result of the complete amortization of PPA assets

Free cash flow value potential

Warburg Research's valuation tool "FCF Value Potential" reflects the ability of the company to generate sustainable free cash flows. It is based on the "FCF potential" – a FCF "ex growth" figure - which assumes unchanged working capital and pure maintenance capex. A value indication is derived from the perpetuity of a given year's "FCF potential" with consideration of the weighted costs of capital.

Hence, we can derive the value of a free cash flow, adjusted for the exceptionally high capex needed for future growth. The deviation from the fair value derived from our DCF model reflects value added by the growth we estimate beyond the period for which the FCF potential is calculated.

Assumptions

Our FCF Value Potential assumptions can be summarised as follows:

- The assumptions for the operating performance and for the WACC are consistent with the DCF model
- We estimate the maintenance capex to be stable around 7.0% of the top line, mainly reflecting R&D costs not reflected in the EBIT margin
- IFRS 16 effects on the cash flow and the enterprise value were adjusted in the respective "Other" lines

FCF value potential calculated at EUR 14.26 per share for 2022

We calculated a free cash flow value potential of EUR 14.26 per share for our 2022 estimates.

Free Cash Flow Value Potential

Warburg Research's valuation tool "FCF Value Potential" reflects the ability of the company to generate sustainable free cash flows. It is based on the "FCF potential" - a FCF "ex growth" figure - which assumes unchanged working capital and pure maintenance capex. A value indication is derived via the perpetuity of a given year's "FCF potential" with consideration of the weighted costs of capital. The fluctuating value indications over time add a timing element to the DCF model (our preferred valuation tool).

in EUR m	2017	2018	2019	2020	2021e	2022e	2023e
Net Income before minorities	-4.2	9.7	7.0	20.3	33.4	38.1	45.3
+ Depreciation + Amortization	42.2	49.4	62.2	64.7	64.6	67.3	66.7
- Net Interest Income	-4.6	-2.5	-3.1	-2.7	-2.7	-2.6	-2.6
- Maintenance Capex	36.0	35.1	39.0	39.5	42.6	46.2	50.3
+ Other	0.0	0.0	6.5	-6.1	-5.5	-5.0	-4.0
= Free Cash Flow Potential	**6.6**	**26.4**	**39.9**	**42.1**	**52.6**	**56.8**	**60.3**
FCF Potential Yield (on market EV)	1.4 %	7.0 %	8.7 %	10.8 %	9.4 %	10.8 %	12.4 %
WACC	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %
= Enterprise Value (EV)	**456.3**	**379.6**	**456.2**	**388.0**	**560.9**	**527.7**	**487.9**
= Fair Enterprise Value	**81.3**	**325.5**	**491.2**	**518.5**	**647.8**	**700.4**	**743.3**
- Net Debt (Cash)	25.5	25.5	25.5	25.5	-12.9	-53.9	-99.2
- Pension Liabilities	8.5	8.5	8.5	8.5	8.5	8.5	8.5
- Other	25.4	25.4	25.4	25.4	25.4	25.4	25.4
- Market value of minorities	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Market value of investments	0.0	0.0	0.0	0.0	0.0	0.0	0.0
= Fair Market Capitalization	**21.8**	**266.0**	**431.7**	**459.0**	**626.7**	**720.3**	**808.5**
Number of shares, average	49.6	49.8	50.0	50.3	50.6	51.1	51.6
= Fair value per share (EUR)	**0.44**	**5.34**	**8.63**	**9.13**	**12.40**	**14.11**	**15.68**
premium (-) / discount (+) in %					16.7 %	32.8 %	47.6 %

Sensitivity Fair value per Share (EUR)

11.11 %	n.a.	3.53	5.92	6.32	8.95	10.52	12.04
10.11 %	0.11	3.99	6.63	7.06	9.87	11.52	13.10
9.11 %	0.26	4.56	7.48	7.96	11.00	12.74	14.40
WACC **8.11 %**	**0.43**	**5.27**	**8.55**	**9.09**	**12.41**	**14.26**	**16.01**
7.11 %	0.66	6.17	9.92	10.53	14.21	16.21	18.08
6.11 %	0.96	7.38	11.73	12.45	16.61	18.80	20.83
5.11 %	1.38	9.05	14.25	15.11	19.94	22.40	24.65

- Assumptions on the beta and WACC are consistent with the DCF model
- IFRS effects on both the FCF and the net debt are adjusted in the "others" lines

Peer group analysis

In our peer group analysis, we focused on companies driven by similar market trends as ADVA. As a consequence, leading Chinese competitors such as Huawei and ZTE were excluded from the peer group, since these companies are driven by the faster growing Asian market and have been banned in several countries in ADVA's focus regions EMEA and North America. In addition, we excluded larger companies with a significant share in the telecommunication equipment market, if revenues from that market are not representing the majority of the group's revenues, such as Fujitsu or NEC.

Among the selected companies we consider Ciena, Infinera and ADTRAN to be the closest peers. With the remaining companies, the product overlap is limited, but since all companies are focused on telecommunication equipment in the region in which ADVA is most active, the growth prospect is driven by similar trends.

Since the peers differ in profitability and capex intensity, we consider sales and EBITDA based multiples as less useful and focus our analysis on the PE and EV/EBIT. The average of the median PE and EV/EBIT multiples for 2021 to 2023 yields a fair value per share of EUR 16.55, which confirms the findings of our DCF model and our FCF Value Potential calculation.

Peer group shows significant discount to closest peers

We consider our analysis conservative as all median multiples applied are below the multiples at which the closed peers are currently priced. For the EV/EBIT 22e, the closest peers are valued at an average of 19.5x compared to ADVA's market valuation of 10.8x. Regarding the PE, the closest peers are priced at 25.9x compared to ADVA's 14.1x. Both multiples indicate a significant discount for ADVA.

Peer profiles

Ciena Corporation

Headquartered in Hanover, Maryland, Ciena Corp. provides networking and communications infrastructure. It is specialized in developing and manufacturing hardware for optical transport, routing, switching, and aggregation of data traffic on communications networks. The company also sells software to manage and automate network, as well as services for designing, deploying, and managing networks. Main customers include communications service providers and cable and multiservice operators, as well as governments and private enterprises. In 2020, the company generated sales of USD 3.5bn (70% of which in US) with an EBIT margin of 18%.

Infinera Corporation

The California-based company Infinera is a supplier of digital optical networking systems, comprising both hardware and software. Products offered include optical transport platforms, converged packet-optical transport platforms, compact modular platforms, optical line systems, disaggregated router platforms, as well as networking and automation software offerings, and related services. However, the company's main focus is photonic integrated circuits (PICs), which are designed to replace many components in optical networks. Besides private enterprises and governmental institutions, customers include nine of the 10 top tier network operators, as well as seven of the top nine ICPs. Infinera generated a net loss of USD 0.2bn on revenues of USD 1.4bn (50% US, 30% from Europe).

ADTRAN, Inc.

The US company ADTRAN Inc. is a provider of networking and communications platforms and services focused on the broadband access market. The product portfolio is focused on high-speed digital transmission products and spans from the cloud edge (data centre) to the subscriber edge (customer premise) and also includes a line of multiplexers. Products are used by network operators as well as ICPs to implement advanced digital

data services over existing networks. Revenues amounted to USD 506.5m and EBIT to USD -3.5m in 2020.

Calix, Inc.

Calix, Inc., headquartered in San Jose, California, develops and markets cloud and software platforms, systems and services required for CSPs to realize a unified access network. Thus, CSPs can optimally master and monetize the complex infrastructure between their subscribers and the cloud. Customers include communication service providers of all sizes. In 2020, Calix generated revenues of USD 541.2m and an EBIT of 43.1m, implying a margin of 8%.

NeoPhotonics Corporation

Headquatered in San Jose, California, NeoPhotonics Corp. engages in the design, manufacture, and sale of ultra-pure light lasers and optoelectronic products that transmit, receive and switch digital optical signals. These are of special interest for cloud and hyper-scale data centers, internet content providers and telecommunication networks. NEOPhotonics generated revenues of USD 371.2m (~50% China) and a 1.7m EBIT in 2020.

Cisco Systems, Inc.

Cisco Systems, Inc. is a multinational technology company based in San Jose, USA and one of the largest developers and manufacturers of Internet Protocol based networking equipment. The company also offers services related to the communications and information technology industry. Cisco Systems, Inc. annual revenue for 2020 was USD 49.3bn, a 5% decline from 2019. EBIT was USD 14.1bn, implying a margin of 28.6%.

Nokia Oyj

The Finnish electronics and technology company Nokia Oyj develops, manufactures, and sells a wide variety of network equipment, software, services and licensing products. These include equipment for interconnectivity of networks and devices as well as software for self-optimizing intelligent systems. The company reported annual revenues of EUR 21.9bn (~25% Europe, ~20% North America) and an EBIT of EUR 2.1bn for fiscal 2020, implying an EBIT margin of 9.6%.

Peergroup - Key Figures

Company	LC	Price in LC	MC in LC m	EV in LC m	EPS 21e	EPS 22e	EPS 23e	Sales 21e	Sales 22e	Sales 23e	EBITDA 21e	EBITDA 22e	EBITDA 23e	EBIT 21e	EBIT 22e	EBIT 23e
Clostest peers																
Ciena Corporation	USD	53.00	8,215.2	7,943.4	2.66	3.10	3.62	3,588.2	3,889.1	4,156.6	645.5	721.7	750.6	550.4	636.9	728.6
Infinera Corporation	USD	9.23	1,892.1	2,204.0	0.02	0.33	0.70	1,432.5	1,555.1	1,704.0	123.3	206.1	256.0	33.0	107.8	189.1
ADTRAN, Inc.	USD	19.52	944.7	888.6	0.54	0.60	0.78	558.8	601.7	641.3	28.9	39.8	48.5	19.8	34.9	42.6
Wider peers																
Calix, Inc.	USD	43.37	2,726.0	2,775.2	1.15	1.13	1.84	626.8	701.6	876.2	n.a.	n.a.	n.a.	79.4	103.4	174.7
NeoPhotonics Corporation	USD	10.23	525.1	455.8	-0.37	0.26	0.51	288.5	362.7	402.5	9.4	43.8	n.a.	-18.0	16.9	31.0
Cisco Systems, Inc.	USD	53.31	225,063.6	213,880.8	3.20	3.37	3.58	49,707.4	51,781.0	53,220.5	18,367.3	18,931.5	19,367.8	16,554.5	17,376.0	18,150.0
Nokia Oyj	EUR	4.11	23,136.5	20,654.8	0.24	0.27	0.34	21,591.0	21,948.6	22,516.5	2,671.1	2,971.0	3,288.6	2,043.0	2,360.0	2,681.6
ADVA AG Optical Networking	**EUR**	**10.60**	**531.9**	**556.3**	**0.66**	**0.75**	**0.88**	**609.0**	**660.2**	**718.3**	**109.1**	**118.8**	**128.1**	**44.5**	**51.5**	**61.4**

Peergroup - Valuation Multiples

Company	LC	Price in LC	MC in LC m	EV in LC m	P / E 21e	P / E 22e	P / E 23e	EV / Sales 21e	EV / Sales 22e	EV / Sales 23e	EV / EBITDA 21e	EV / EBITDA 22e	EV / EBITDA 23e	EV / EBIT 21e	EV / EBIT 22e	EV / EBIT 23e
Clostest peers																
Ciena Corporation	USD	53.00	8,215.2	7,943.4	20.0 x	17.1 x	14.6 x	2.2 x	2.0 x	1.9 x	12.3 x	11.0 x	10.6 x	14.4 x	12.5 x	10.9 x
Infinera Corporation	USD	9.23	1,892.1	2,204.0	461.5 x	28.0 x	13.2 x	1.5 x	1.4 x	1.3 x	17.9 x	10.7 x	8.6 x	66.8 x	20.4 x	11.7 x
ADTRAN, Inc.	USD	19.52	944.7	888.6	36.1 x	32.5 x	25.0 x	1.6 x	1.5 x	1.4 x	30.7 x	22.3 x	18.3 x	44.9 x	25.4 x	20.9 x
Wider peers																
Calix, Inc.	USD	43.37	2,726.0	2,775.2	37.7 x	38.6 x	23.6 x	4.4 x	4.0 x	3.2 x	n.a.	n.a.	n.a.	34.9 x	26.8 x	15.9 x
NeoPhotonics Corporation	USD	10.23	525.1	455.8	n.a.	39.3 x	20.1 x	1.6 x	1.3 x	1.1 x	48.7 x	10.4 x	n.a.	-25.4 x	27.0 x	14.7 x
Cisco Systems, Inc.	USD	53.31	225,063.6	213,880.8	16.7 x	15.8 x	14.9 x	4.3 x	4.1 x	4.0 x	11.6 x	11.3 x	11.0 x	12.9 x	12.3 x	11.8 x
Nokia Oyj	EUR	4.11	23,136.5	20,654.8	17.1 x	15.1 x	12.2 x	1.0 x	0.9 x	0.9 x	7.7 x	7.0 x	6.3 x	10.1 x	8.8 x	7.7 x
Average					98.2 x	26.6 x	17.7 x	2.4 x	2.2 x	2.0 x	21.5 x	12.1 x	11.0 x	22.7 x	19.0 x	13.4 x
Median					28.1 x	28.0 x	14.9 x	1.6 x	1.5 x	1.4 x	15.1 x	10.9 x	10.6 x	14.4 x	20.4 x	11.8 x
ADVA AG Optical Networking	**EUR**	**10.60**	**531.9**	**556.3**	**16.1 x**	**14.1 x**	**12.0 x**	**0.9 x**	**0.8 x**	**0.8 x**	**5.1 x**	**4.7 x**	**4.3 x**	**12.5 x**	**10.8 x**	**9.1 x**
Valuation difference to Median					75%	98%	24%	74%	75%	79%	196%	132%	144%	15%	89%	30%
Fair value per share based on Median					18.52	20.98	13.10	18.81	18.94	19.35	32.31	25.20	26.53	12.30	20.49	13.94

Sources: Warburg Research, FactSet (closing prices, 26.05.2021)

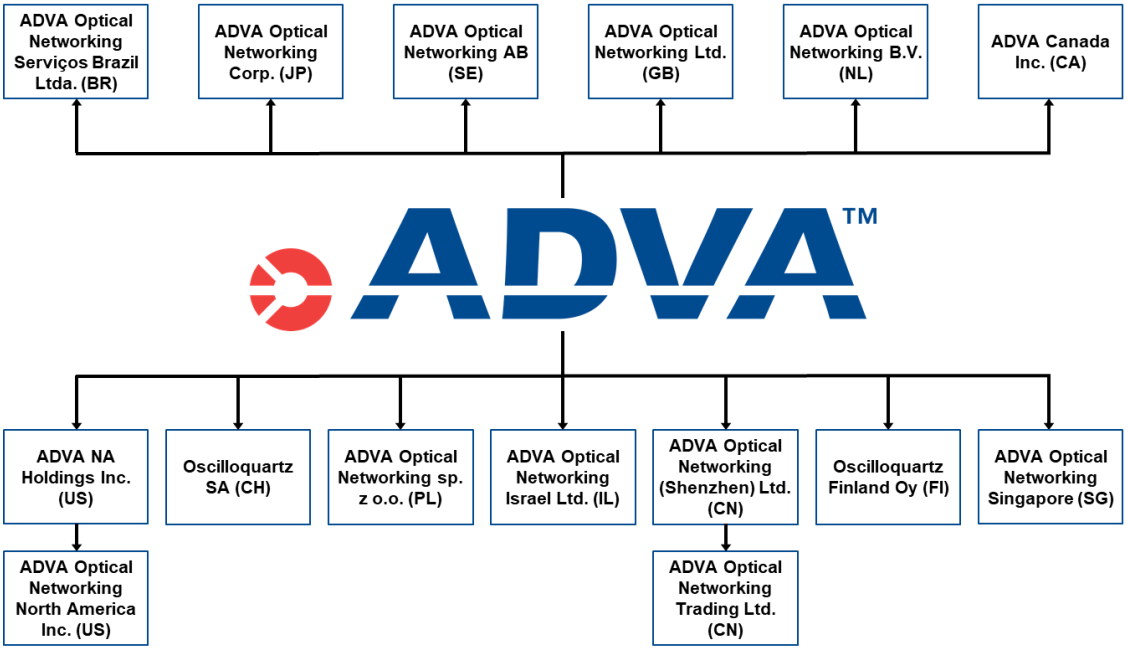
Company Background

Business Overview

ADVA, headquartered in Munich in Germany, is a leading equipment supplier for open next-generation optical networks. Founded in 1994, ADVA Optical has more than 25 years of experience and more than 1,850 employees across the Americas, EMEA and Asia-Pacific regions.

The company supplies its customers in three core areas: fibre-optic transmission technology, cloud access technology, and solutions for precise timing and synchronization of networks. In 2020, ADVA Optical generated revenues of EUR 565m and an EBITDA of EUR 86m (EBITDA margin 15.2%).

ADVA Optical: Simplified Company Structure



Source: Company data, Warburg Research

Company structure

ADVA Optical Network SE, headquartered in Meiningen, Germany, is the parent of the ADVA Group. The holding company is responsible for securing refinancing of its subsidiaries, global marketing and R&D as well as providing various management services, including compliance and risk management.

ADVA Optical Network SE also operates the Group's main production and R&D facility, which is also located in Meiningen, Germany. In addition to the main production site, ADVA Group operates facilities in York (UK) and Atlanta (USA), where final assembly and quality testing take place. Module production is outsourced to partners in Romania (flex), Thailand (Sanmina-SCI), Malaysia (Jabil) and China (Jabil, Sanmina-SCI). Recently, ADVA's management has set the goal of transferring production back to Europe, thus reducing the share of production in China to 20% in 2023. To compensate for the higher overhead costs, this transformation process is accompanied by an automation of production.

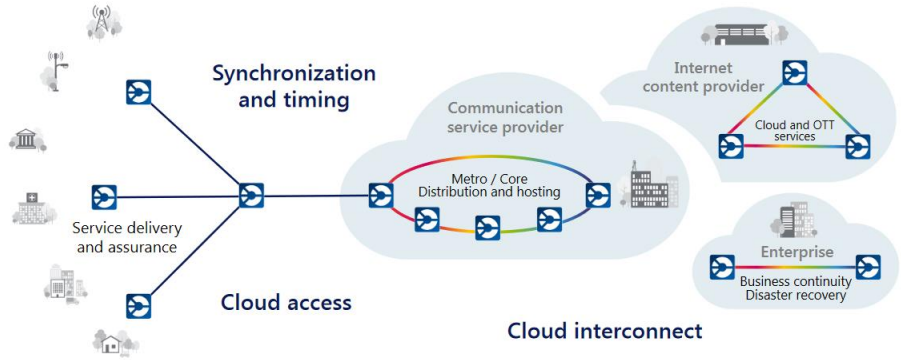
ADVA Optical Network SE has local offices of subsidiaries in more than 10 countries, which are responsible for customer relationship management, sales and services. These national companies form the basis of the global service and distribution network, which enables ADVA to be present in all relevant markets. Under the Oscilloquartz brand, ADVA combines a broad product portfolio for the synchronization of distributed systems and network elements.

Products

In the field of networking solutions, ADVA's portfolio can be divided into three core areas:

- Interconnect (approx. 70% of revenues): Fibre-optic transmission technology
- Access (approx. 25% of revenues): Cloud access technology for rapid creation of innovative services
- Synchronization (approx. 5% of revenues): Solutions for precise timing and synchronization of networks

ADVA Optical: Product range



Source: ADVA, Warburg Research

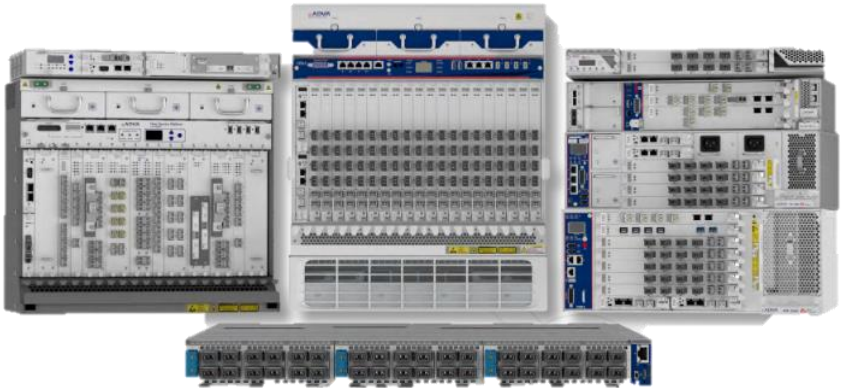
Interconnect

As the bandwidth over distance capabilities of optical fibres far exceed those of previous technology generations (e.g. copper or wireless technologies), fibre optic transport is the foundation for modern high-speed networks.

ADVA's optical transmission solutions are based on Wavelength Division Multiplexing (WDM) technology, which allows multiple data streams to be transmitted simultaneously (i.e. more efficiently) over a single optical fibre. In the transmission process of WDM technology, each data stream (e.g. voice, data or streaming traffic) is assigned to a different wavelength (color) of laser light.

The laser lights are combined (multiplexed) at one end of the fibre, transmitted, and ultimately separated (de-multiplexed) at the other end of the fibre. Thus, the open-line systems provide faster delivery of data traffic and lean connections for data centers.

ADVA Optical: FSP 3000



Source: ADVA, Warburg Research

The **FSP 3000** is ADVA's most prominent solution for open optical transport, based on WDM technology. The platform offers open terminals that bundle data streams and generate transmission rates of up to 600Gbit/s per wavelength. High element upgrade flexibility allows transponders to be upgraded and replaced without swapping the entire DWDM system, which is a very efficient solution given the high innovation rate of network technologies. The FSP 3000 terminals support a wide range of services and use cases, allowing the transponders to interoperate with any OLS in place. Furthermore, it provides additional security through ADVA's ConnectGuard encryption technology, which is especially important for private and state-owned enterprises.

The proprietary Open Line System platform can be optimized for access, metro and long-haul applications. The latest generation of the FSP 3000 OLS supports transmission capacities of more than 50Tbit/s per fibre, enabling network operators to reduce data transmission costs and optimize their numerous network scenarios.

In February 2021, **ADVA announced a new product portfolio, MicroMux, consisting of two multiplexers (Nano and Quattro)**, offering communication service providers to optimize the capacity of their transport and DCI networks. Both aggregation devices can be plugged into existing transmitters. Nano fits into 10GbE sockets and fans out 10 1GbE interfaces, which increases flexibility and efficiency of the network edge, whereas Quattro converts 400GbE client ports into four 100GbE ports, reducing cost and complexity at the core of the network. With the MicoMux product platform, ADVA now offers technology leading multiplexers that are standards- and legacy-compliant. As CSPs require affordably scaling of data-center access and transport networks, ADVA's management expects the MicroMux Platform to contribute 15% of revenue in 2025.

Access

The Cloud Access segment combines Ethernet-optimized transmission solutions offered by ADVA for fibre-based cloud networks as well as Network Function Virtualization technology products. ADVA’s cloud access solutions are based on packet-based data transmission technology and innovative network operating systems to run on open compute and switching platforms.

To backhaul traffic from mobile base stations or to connect enterprise customers to the cloud, transmission solutions based on Carrier Ethernet technology are integrated at the so-called network edge. ADVA's technology has the primary goal of enabling faster and more secure solutions for aggregating data streams.

Network Function Virtualization (NFV) technology dissolves the tight coupling between hardware and software in network elements, allowing individual network functions to be developed and deployed independent of the underlying hardware. ADVA's Ensemble software leads the way in NFV infrastructure applications. As the importance of software in networks is rapidly increasing and this area promises significantly higher margins, this business area represents an important component of ADVA's future strategy.

Networking synchronization

For the effectiveness of transmission of digital signals, reference sources that deliver stable frequency and time-of-day information are crucial. Especially in mobile networks, the availability of accurate synchronization and timing information is crucial for the end-user experience. ADVA is marketing its end-to-end solution portfolio under the Oscilloquartz brand. Products include self-contained frequency sources (e.g., cesium clocks), SSUs, GNSS receivers, as well as NTP solutions among others. In the network-based timing technology, ADVA is market leader.

Besides, ADVA offers services to support customers in planning, operating and maintaining networks. Competences are bundled in ADVA’s network operation center.

Customers

Ongoing digitalization in all parts of the society and ecosystems leads to an inevitable growth in demand for more universally available bandwidth, faster provisioning of specialized communication services and high-precision time and frequency synchronization in distributed systems. ADVA offers solutions that are crucial for network transformation, especially with the rise of cloud solutions and high-speed networks.

Communication service providers

70% of ADVA's revenues is generated with communication service providers (CSPs). These include mobile providers, wireline and wholesale providers, as well as cable/multi-service operators. As ICPs build and operate large-scale networks for all kinds of communication services, they have a huge demand for data center interconnect capacities. The relentlessly growing bandwidth demand of private households (e.g., home office and home schooling, as well as VoD / streaming) puts pressure on carriers to expand their network infrastructure to handle huge traffic loads. ADVA supports carriers to transform their networks. Furthermore, as customers require high data security and speed, CSPs tend to upgrade their network edge and deploy packet-based Carrier Ethernet (CE) technology as a data-optimized transmission solution in their infrastructure. In this technology, ADVA serves CSPs as market leader and innovation leader.

Internet content providers (ICP) and enterprises

The remaining 30% of revenues are generated with government organizations and enterprises operating in sectors such as finance, energy and media, as well as internet content providers (ICPs) and institutions for research and education. Due to the criticality of data and application availability, especially governmental institutions and enterprises in Europe and North America have gone down the path of operating their own data centers (in-house or outsourced) connected via private fibre optic networks. To create more secure and locally operated networks, they are increasingly focused on local manufacturers and suppliers. Thus, ADVA sees huge growth potential among these customers.

ICPs, such as Apple, Facebook, Google and Microsoft, operate enormous data centers. To strengthen the power of the cloud and optimize costs, ICPs tend to rent dark fibre and equip it with their own transmission technology, rather than leasing lines from traditional communication service providers for the connection of data center sites. Due to their size and purchasing power, ADVA sees high growth potential in the business with ICPs. Consequently, the company optimized the FSP 3000 platform for the needs of ICPs.

ADVA Optical: Customers

Private Enterprises	Communication Service Providers	Internet Content Provider
Georgia Tech, Media Broadcast, NASA, HEP, BCNET, Credit Suisse, The University of Alabama, Texas A&M University, NYP	T, TATA, colt, Lumen, KDDI, openreach, BT, Telecom Italia, Post Luxembourg	Microsoft, iweb, INEXIO, Yandex, DE-CIX, Hetzner Online

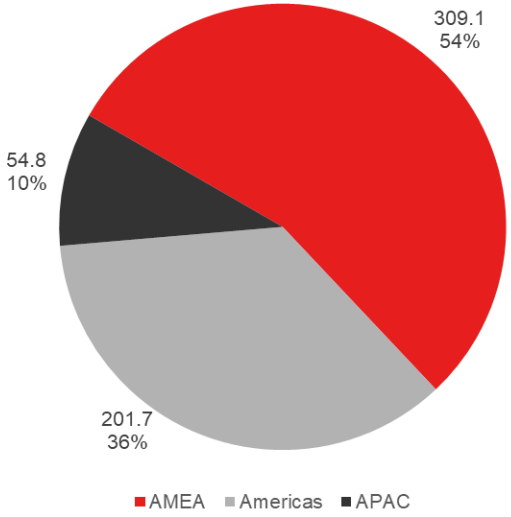
Source: ADVA, Warburg Research

Regions

ADVA reports and operates in three distinct regions covering all major markets. **EMEA** consists of Europe, the Middle East and Africa. It is the strongest region for ADVA and delivered more than half of the Group's total revenues in 2020 (EUR 309.1m). As ADVA is the market leader in enterprise DCI (market share: 50%) and Carrier Ethernet access (market share 47%) in the EMEA region, and communications providers in particular investing heavily in broadband and network expansion, revenues in this region grew by more than 3% in 2020.

The second-largest region, **Americas**, comprises North America and Latin America. Revenue amounted to EUR 201.7m (yoy: -5.7%), representing 35.7% of the group's total revenue in 2020. **APAC** is the third region and includes Australia, New Zealand, China, India, Japan and Southeast Asia. As ADVA focuses on selected countries and applications in this region and has only a few major customers, revenues in APAC are rather volatile. In 2020, the region contributed EUR 54.8m (yoy: +24.1%) or 10% of the Group's total revenues.

ADVA Optical: Revenue split by regions (in EURm)



Source: ADVA, Warburg Research

Company history

1994	ADVA Optical was founded Meiningen with four people.
1995	The first product, an ESCON multiplexer, was launched for the Westfälische Landesbank.
1997	ADVA Optical sold inexpensive media converters to its first carrier customer, COLT.
1998	The second product generation, the Optical Channel Multiplexer 4, 8, and 16 were built.
1999	An OEM partnership with Alcatel was signed to increase the global reach followed by OEM agreements with Cisco Systems and Siemens Communications a year later.
1999	With the launch of ADVA Optical's third generation of products, the company went public.
2000	ADVA Optical used the proceeds to acquire Sotrage Area Networks Ltd., Cellware Breitband Technologie GmbH, FirstFibre Ltd., and the Siemens Norway Telecom R&D Team.
2001	The construction of the state-of-the-art R&D, production and administration facility in Meiningen was completed.
2003	During the dotcom bubble, ADVA Optical increased its market share from 0.2% to 2% just by generating constant revenues.
2004	ADVA Optical acquired Metro Packet Systems to react to the increasing importance of ethernet.
2006	Covaro Networks and Movaz Networks were acquired to increase the expertise in ethernet OAM, optical control plane and ROADM arenas.
2010	ADVA Optical grew to more than 1,200 employees on five continents and moved from an enterprise to carrier with a mix of 70% carrier and 30% enterprise customers.
2012	ADVA AG Optical Networking converts into ADVA Optical Networking SE followed by a strategic investment in Saguna Networks in response to the growing demand for content caching in mobile backhaul networks.
2013	Cachejack was developed to improve mobile user experience and enable location-based services through an application-aware radio access network.
2014	Oscilloquartz and all its network timing expertise was acquired, which helped ADVA Optical to become a leading provider of end-to-end solutions for the delivery and assurance of synchronization technology.
2016	ADVA Optical completed a strategic purchase of Overture to establish the position as the industry's NFV powerhouse.
2017	In addition to the acquisition of MRV Communications, the company strengthened the cloud access portfolio and increased its North American and Asian footprint.
2019	ÂDVA Optical increased the levels of automation to DCI networks and introduced disaggregated cell site gateway technologies for 5G connectivity.
2020	To tackle access network bottlenecks, ADVA Optical launched a pluggable, self-tuning G.metro solution.

Management Board

Brian Protiva (CEO)

Brian Protiva co-founded ADVA Optical in 1994 and studied electrical engineering at Stanford University. Upon graduating in 1987, Mr. Protiva joined AMS Technologies AG where he later served as managing director, focusing on co-managing the subsidiaries. Under Mr. Protiva's leadership as chief executive officer, ADVA Optical advanced to become a global market leader in ethernet access devices and one of the main global players in metro wavelength division multiplexing. Mr. Protiva is responsible for the areas of strategy, human resources and quality management.

Dr. Christoph Glingener (CTO)

Dr. Christoph Glingener was appointed Chief Technology Officer of ADVA Optical in 2007 after joining the company a year earlier to assume responsibility for all global research and development activities. He holds a Ph.D. in electrical engineering from the University of Dortmund. Before joining ADVA Optical, Dr. Glingener worked in several leadership positions at Siemens Communications and Marconi Communications. At ADVA Optical, he is defining the product strategy and has helped to build the company's standing as a global innovator in optical networking. Strategic partnerships and M&A activities support this process.

Ulrich Dopfer (CFO)

Ulrich Dopfer was appointed Chief Financial Officer of ADVA Optical in 2015 and president of the North American subsidiary, assuming full legal responsibilities for the region. He is a graduate in business administration from the Verwaltungs- und Wirtschaftsakademie Munich. Mr. Dopfer joined the company in 2004 as global sales controller before moving into leadership positions for the financial planning of the company. Prior to joining ADVA Optical, Mr. Dopfer held various positions at ESCADA AG and FJH AG.

Scott St. John (CMSO)

Scott St. John was appointed Chief Marketing and Sales Officer of ADVA Optical in 2017 after joining the company earlier the same year. He received a Bachelor of Arts in economics from Syracuse University. Before joining ADVA Optical, Mr. St. John worked in several leadership positions at Overture Networks and MRV Communications where he was responsible for global sales and services as senior vice president. Moreover, Mr. St. John has held leadership positions at Saisei, Larscom and VINA Technologies, as well as sales, marketing and finance roles at Lucent Technologies and AT&T.

Supervisory Board

Nikos Theodosopoulos (Chairman)

Nikos Theodosopoulos was appointed chairman of the supervisory board in 2015 after becoming a member of the supervisory board in 2014. As an independent member, he is the chairman of the compensation and nomination committee and a member of the audit committee. Mr. Theodosopoulos is the founder and managing member of NT Advisors LLC. In addition to his engagement at ADVA Optical, he is a board member of Arista Networks, Harmonic, and Driving Management Systems.

Johanna Hey (Vice Chairwoman)

Johanna Hey was appointed vice chairwoman of the supervisory board in 2013 after joining the supervisory board in 2011. She is an independent member and the chairwoman of the audit committee. As a professor for tax law at the University of Cologne, she is in charge of the institute of tax law at the university.

Michael Aquino

Michael Aquino has been a member of the supervisory board of ADVA Optical since 2018. As an independent member, he is a member of the compensation and nomination committee. Before joining the supervisory board, Mr. Aquino had served as chief strategy officer of the company since 2016. In addition to his engagement at ADVA Optical, Mr. Aquino is a technology strategy consultant at Peachtree City in Georgia, USA.

Stock option plan

Besides fixed components, the remuneration of the members of the Management Board also includes variable components. Within a stock option plan, the members of the Executive Board have the opportunity to leverage their financial income with positive share performance. Thus, the interests of the management are aligned with those of the shareholders. The stock options entitle the members of the Management Board to acquire a fixed number of ADVA shares within a certain exercise period (three years), if a predefined vesting period (four years) has expired and the target of increasing the share price by at least 20% during this period has been achieved. In case of termination of the employment contract, option rights expire.

In 2020, 1,756,369 option rights were issued to members of the Executive Board. The weighted average exercise price for the 901,667 options outstanding at December 31, 2020 was EUR 6.90. Of these, 476,667 options are exercisable for a weighted average exercise price of EUR 8.14.

ADVA Optical: management remuneration [2020]

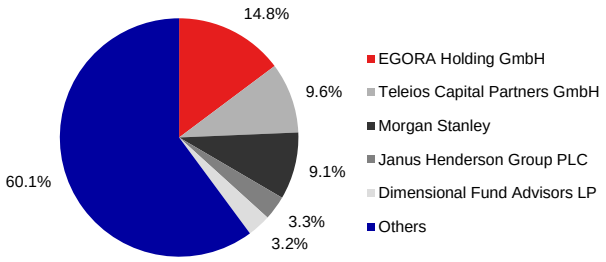
[EUR]	Fixed	[%]	STIP	[%]	LTIP	[%]	Share options	[%]	**Total**
Brian Protiva	260,000	32.2%	335,000	41.5%	0	0.0%	213,000	26.4%	**808,000**
Christoph Glingener	263,000	30.2%	243,000	27.9%	0	0.0%	366,000	42.0%	**872,000**
Ulrich Dopfer	267,000	44.9%	219,000	36.9%	0	0.0%	108,000	18.2%	**594,000**
Scot St. John	267,000	53.5%	232,000	46.5%	0	0.0%	0	0.0%	**499,000**

Source: Bloomberg, Warburg Research

Shareholder structure

The Munich-based and tech-focused investment group EGORA Holding holds the majority stake in ADVA Optical with a total share of 14.8%. The second-biggest shareholder with 9.6% is Teleios Capital Partners, a Zug-based private equity company. Morgan Stanley holds the third-largest stake in ADVA Optical with 9.1%. Janus Henderson Group and Dimensional Fund Advisors hold 3.3% and 3.2% of the shares, respectively. CEO and co-founder, Brian Protiva, still holds a share of approximately 0.8% in the company.

ADVA Optical: Shareholder Structure



Source: Bloomberg, Warburg Research

DCF model

	Detailed forecast period			Transitional period										Term. Value
Figures in EUR m	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e	2031e	2032e	2033e	
Sales	609.0	660.2	718.3	775.7	833.9	892.3	950.3	1,007.3	1,057.7	1,110.6	1,166.1	1,212.7	1,243.1	
Sales change	*7.8 %*	*8.4 %*	*8.8 %*	*8.0 %*	*7.5 %*	*7.0 %*	*6.5 %*	*6.0 %*	*5.0 %*	*5.0 %*	*5.0 %*	*4.0 %*	*2.5 %*	*2.5 %*
EBIT	44.5	51.5	61.4	69.8	77.6	80.3	80.8	80.6	79.3	81.1	84.0	86.1	87.0	
EBIT-margin	*7.3 %*	*7.8 %*	*8.6 %*	*9.0 %*	*9.3 %*	*9.0 %*	*8.5 %*	*8.0 %*	*7.5 %*	*7.3 %*	*7.2 %*	*7.1 %*	*7.0 %*	
Tax rate (EBT)	*20.0 %*	*22.0 %*	*23.0 %*	*24.0 %*	*25.0 %*	*27.0 %*	*29.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	*30.0 %*	
NOPAT	35.6	40.2	47.3	53.1	58.2	58.6	57.4	56.4	55.5	56.7	58.8	60.3	60.9	
Depreciation	64.6	67.3	66.7	63.6	69.2	75.0	80.8	85.6	89.9	94.4	99.1	103.1	105.7	
in % of Sales	*10.6 %*	*10.2 %*	*9.3 %*	*8.2 %*	*8.3 %*	*8.4 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	
Changes in provisions	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.6	0.4	
Change in Liquidity from														
- Working Capital	-4.6	0.0	3.5	7.5	7.4	8.2	8.1	8.0	7.1	7.4	7.8	6.5	4.2	
- Capex	63.0	64.4	61.8	65.9	70.9	75.8	80.8	85.6	89.9	94.4	99.1	103.1	105.7	
Capex in % of Sales	*10.3 %*	*9.8 %*	*8.6 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	*8.5 %*	
Other	5.5	5.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Free Cash Flow (WACC Model)	36.2	38.1	44.7	43.9	49.8	50.3	49.9	49.1	49.1	50.0	51.7	54.3	57.0	58
PV of FCF	34.8	33.9	36.8	33.4	35.1	32.7	30.1	27.4	25.3	23.8	22.8	22.1	21.5	393
share of PVs	**13.66 %**			**35.50 %**										**50.84 %**

Model parameter

Derivation of WACC:		Derivation of Beta:	
Debt ratio	5.00 %	Financial Strength	1.10
Cost of debt (after tax)	4.2 %	Liquidity (share)	1.20
Market return	7.00 %	Cyclicality	1.40
Risk free rate	1.50 %	Transparency	1.20
		Others	1.30
WACC	**8.11 %**	**Beta**	**1.24**

Valuation (m)

Present values 2033e	380		
Terminal Value	393		
Financial liabilities	65		
Pension liabilities	9		
Hybrid capital	0		
Minority interest	0		
Market val. of investments	0		
Liquidity	65	No. of shares (m)	50.5
Equity Value	**764**	**Value per share (EUR)**	**15.12**

Sensitivity Value per Share (EUR)

		Terminal Growth						
Beta	WACC	1.75 %	2.00 %	2.25 %	**2.50 %**	2.75 %	3.00 %	3.25 %
1.43	9.1 %	12.24	12.42	12.62	12.84	13.07	13.32	13.59
1.34	8.6 %	13.15	13.38	13.62	13.89	14.17	14.49	14.83
1.29	8.4 %	13.66	13.91	14.18	14.48	14.80	15.15	15.54
1.24	8.1 %	14.20	14.48	14.79	**15.12**	15.48	15.88	16.32
1.19	7.9 %	14.80	15.11	15.45	15.82	16.23	16.69	17.19
1.14	7.6 %	15.44	15.79	16.18	16.60	17.06	17.58	18.15
1.05	7.1 %	16.91	17.36	17.85	18.40	19.00	19.69	20.46

		Delta EBIT-margin						
Beta	WACC	-1.5 pp	-1.0 pp	-0.5 pp	**+0.0 pp**	+0.5 pp	+1.0 pp	+1.5 pp
1.43	9.1 %	10.01	10.95	11.89	12.84	13.78	14.72	15.67
1.34	8.6 %	10.82	11.84	12.86	13.89	14.91	15.93	16.95
1.29	8.4 %	11.28	12.34	13.41	14.48	15.54	16.61	17.68
1.24	8.1 %	11.77	12.89	14.00	**15.12**	16.24	17.35	18.47
1.19	7.9 %	12.32	13.49	14.66	15.82	16.99	18.16	19.33
1.14	7.6 %	12.91	14.14	15.37	16.60	17.83	19.05	20.28
1.05	7.1 %	14.30	15.67	17.03	18.40	19.76	21.12	22.49

- In the "others" line we adjusted IFRS 16 depreciations on right-of-use
- After 2023 we excluded right-of-use depreciation, leading to a decrease in D&A
- The financial debt was adjusted for lease liabilities from IFRS 16 accounting
- The EBIT margin increase in 2024 is the result of the complete amortization of PPA assets

Free Cash Flow Value Potential

Warburg Research's valuation tool "FCF Value Potential" reflects the ability of the company to generate sustainable free cash flows. It is based on the "FCF potential" - a FCF "ex growth" figure - which assumes unchanged working capital and pure maintenance capex. A value indication is derived via the perpetuity of a given year's "FCF potential" with consideration of the weighted costs of capital. The fluctuating value indications over time add a timing element to the DCF model (our preferred valuation tool).

in EUR m	2017	2018	2019	2020	2021e	2022e	2023e
Net Income before minorities	-4.2	9.7	7.0	20.3	33.4	38.1	45.3
+ Depreciation + Amortization	42.2	49.4	62.2	64.7	64.6	67.3	66.7
- Net Interest Income	-4.6	-2.5	-3.1	-2.7	-2.7	-2.6	-2.6
- Maintenance Capex	36.0	35.1	39.0	39.5	42.6	46.2	50.3
+ Other	0.0	0.0	6.5	-6.1	-5.5	-5.0	-4.0
= Free Cash Flow Potential	**6.6**	**26.4**	**39.9**	**42.1**	**52.6**	**56.8**	**60.3**
FCF Potential Yield (on market EV)	1.4 %	7.0 %	8.7 %	10.8 %	9.4 %	10.8 %	12.4 %
WACC	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %	8.11 %
= Enterprise Value (EV)	**456.3**	**379.6**	**456.2**	**388.0**	**560.9**	**527.7**	**487.9**
= Fair Enterprise Value	**81.3**	**325.5**	**491.2**	**518.5**	**647.8**	**700.4**	**743.3**
- Net Debt (Cash)	25.5	25.5	25.5	25.5	-12.9	-53.9	-99.2
- Pension Liabilities	8.5	8.5	8.5	8.5	8.5	8.5	8.5
- Other	25.4	25.4	25.4	25.4	25.4	25.4	25.4
- Market value of minorities	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Market value of investments	0.0	0.0	0.0	0.0	0.0	0.0	0.0
= Fair Market Capitalization	**21.8**	**266.0**	**431.7**	**459.0**	**626.7**	**720.3**	**808.5**
Number of shares, average	49.6	49.8	50.0	50.3	50.6	51.1	51.6
= Fair value per share (EUR)	**0.44**	**5.34**	**8.63**	**9.13**	**12.40**	**14.11**	**15.68**
premium (-) / discount (+) in %					16.7 %	32.8 %	47.6 %

Sensitivity Fair value per Share (EUR)

11.11 %	n.a.	3.53	5.92	6.32	8.95	10.52	12.04
10.11 %	0.11	3.99	6.63	7.06	9.87	11.52	13.10
9.11 %	0.26	4.56	7.48	7.96	11.00	12.74	14.40
WACC **8.11 %**	**0.43**	**5.27**	**8.55**	**9.09**	**12.41**	**14.26**	**16.01**
7.11 %	0.66	6.17	9.92	10.53	14.21	16.21	18.08
6.11 %	0.96	7.38	11.73	12.45	16.61	18.80	20.83
5.11 %	1.38	9.05	14.25	15.11	19.94	22.40	24.65

- Assumptions on the beta and WACC are consistent with the DCF model
- IFRS effects on both the FCF and the net debt are adjusted in the "others" lines

Valuation

	2017	2018	2019	2020	2021e	2022e	2023e
Price / Book	1.7 x	1.3 x	1.4 x	1.2 x	1.8 x	1.6 x	1.4 x
Book value per share ex intangibles	37.03	1.10	1.26	1.53	2.22	3.02	3.92
EV / Sales	0.9 x	0.8 x	0.8 x	0.7 x	0.9 x	0.8 x	0.7 x
EV / EBITDA	9.8 x	5.9 x	6.1 x	4.2 x	5.1 x	4.4 x	3.8 x
EV / EBIT	103.6 x	25.3 x	38.0 x	14.1 x	12.6 x	10.2 x	7.9 x
EV / EBIT adj.*	23.4 x	16.3 x	18.4 x	11.5 x	11.2 x	9.2 x	7.2 x
P / FCF	n.a.	26.6 x	56.4 x	8.5 x	13.7 x	13.3 x	11.8 x
P / E	n.a.	34.0 x	51.7 x	16.3 x	16.1 x	14.2 x	12.1 x
P / E adj.*	n.a.	34.0 x	51.7 x	16.3 x	16.1 x	14.2 x	12.1 x
Dividend Yield	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
FCF Potential Yield (on market EV)	1.4 %	7.0 %	8.7 %	10.8 %	9.4 %	10.8 %	12.4 %

*Adjustments made for: Adjustments for restructuring and SOP

Consolidated profit and loss

In EUR m	2017	2018	2019	2020	2021e	2022e	2023e
Sales	**514.5**	**502.0**	**556.8**	**565.0**	**609.0**	**660.2**	**718.3**
Change Sales yoy	-9.2 %	-2.4 %	10.9 %	1.5 %	7.8 %	8.4 %	8.8 %
COGS	348.3	320.3	365.9	368.4	384.9	415.9	451.1
Gross profit	**166.2**	**181.7**	**190.9**	**196.5**	**224.1**	**244.3**	**267.2**
Gross margin	*32.3 %*	*36.2 %*	*34.3 %*	*34.8 %*	*36.8 %*	*37.0 %*	*37.2 %*
Research and development	69.0	76.6	75.2	75.0	79.2	84.5	90.5
Sales and marketing	62.9	63.6	72.8	60.8	68.2	73.3	77.6
Administration expenses	36.3	35.0	35.1	35.9	35.9	38.3	40.9
Other operating expenses	0.6	0.5	0.5	1.2	1.2	1.3	1.4
Other operating income	7.0	8.9	4.8	3.8	4.9	4.6	4.7
Unfrequent items	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EBITDA	**46.6**	**64.4**	**74.2**	**92.2**	**109.1**	**118.8**	**128.1**
Margin	*9.1 %*	*12.8 %*	*13.3 %*	*16.3 %*	*17.9 %*	*18.0 %*	*17.8 %*
Depreciation of fixed assets	10.1	11.5	19.8	19.7	19.8	20.1	19.6
EBITA	**36.5**	**52.9**	**54.4**	**72.5**	**89.2**	**98.7**	**108.6**
Amortization of intangible assets	32.1	37.9	42.3	45.0	44.8	47.2	47.1
Goodwill amortization	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EBIT	**4.4**	**15.0**	**12.0**	**27.5**	**44.5**	**51.5**	**61.4**
Margin	*0.9 %*	*3.0 %*	*2.2 %*	*4.9 %*	*7.3 %*	*7.8 %*	*8.6 %*
EBIT adj.	**19.5**	**23.3**	**24.8**	**33.8**	**50.3**	**57.4**	**67.5**
Interest income	0.2	0.2	0.4	0.1	0.0	0.0	0.0
Interest expenses	1.0	1.6	2.7	2.7	2.7	2.6	2.6
Other financial income (loss)	-3.8	-1.1	-0.8	0.0	0.0	0.0	0.0
EBT	**-0.2**	**12.5**	**8.9**	**24.8**	**41.8**	**48.9**	**58.9**
Margin	*0.0 %*	*2.5 %*	*1.6 %*	*4.4 %*	*6.9 %*	*7.4 %*	*8.2 %*
Total taxes	4.0	2.8	1.9	4.5	8.4	10.8	13.5
Net income from continuing operations	**-4.2**	**9.7**	**7.0**	**20.3**	**33.4**	**38.1**	**45.3**
Income from discontinued operations (net of tax)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net income before minorities	**-4.2**	**9.7**	**7.0**	**20.3**	**33.4**	**38.1**	**45.3**
Minority interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net income	**-4.2**	**9.7**	**7.0**	**20.3**	**33.4**	**38.1**	**45.3**
Margin	*-0.8 %*	*1.9 %*	*1.3 %*	*3.6 %*	*5.5 %*	*5.8 %*	*6.3 %*
Number of shares, average	49.6	49.8	50.0	50.3	50.6	51.1	51.6
EPS	**-0.09**	**0.19**	**0.14**	**0.40**	**0.66**	**0.75**	**0.88**
EPS adj.	-0.09	0.19	0.14	0.40	0.66	0.75	0.88

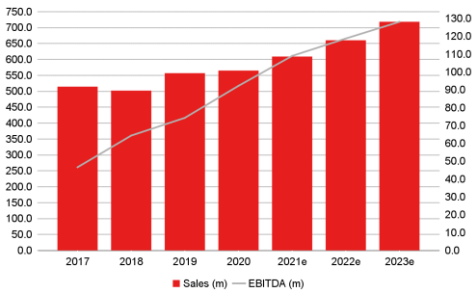
*Adjustments made for: Adjustments for restructuring and SOP

Guidance: 2021: Sales EUR 580-610m, adj. EBIT margin 6-10%

Financial Ratios

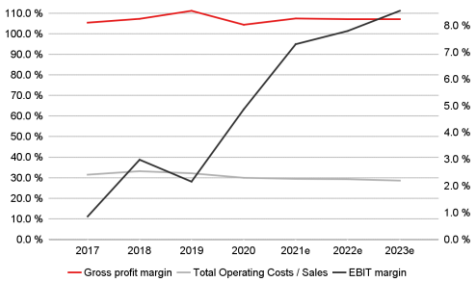
	2017	2018	2019	2020	2021e	2022e	2023e
Total Operating Costs / Sales	31.5 %	33.2 %	32.1 %	29.9 %	29.5 %	29.2 %	28.7 %
Operating Leverage	8.4 x	-99.0 x	-1.8 x	88.2 x	7.9 x	1.9 x	2.2 x
EBITDA / Interest expenses	48.0 x	39.6 x	27.7 x	33.9 x	40.9 x	45.8 x	50.1 x
Tax rate (EBT)	-2113.6 %	22.5 %	21.1 %	18.2 %	20.0 %	22.0 %	23.0 %
Dividend Payout Ratio	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Sales per Employee	271,632	266,162	292,602	302,117	306,505	309,654	315,588

Sales, EBITDA
in EUR m



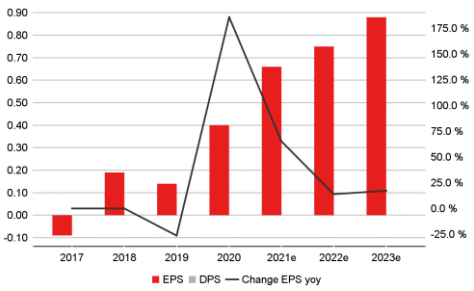
Source: Warburg Research

Operating Performance
in %



Source: Warburg Research

Performance per Share



Source: Warburg Research

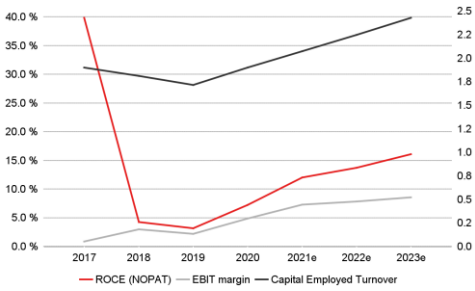
Consolidated balance sheet

In EUR m	2017	2018	2019	2020	2021e	2022e	2023e
Assets							
Goodwill and other intangible assets	190.0	189.9	192.8	185.9	185.2	183.2	182.4
thereof other intangible assets	36.8	31.5	24.6	20.3	20.1	17.3	15.0
thereof Goodwill	68.0	70.4	72.0	67.0	67.0	67.0	67.0
Property, plant and equipment	26.9	29.1	64.6	56.6	58.3	60.4	59.8
Financial assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other long-term assets	3.7	3.1	3.4	2.6	2.6	2.6	2.6
Fixed assets	**220.6**	**222.0**	**260.8**	**245.2**	**246.1**	**246.2**	**244.8**
Inventories	81.7	85.7	105.4	90.1	95.2	100.0	107.2
Accounts receivable	81.3	97.9	96.2	83.9	91.8	99.5	108.2
Liquid assets	58.4	62.7	54.3	64.9	100.3	139.3	184.1
Other short-term assets	21.9	18.2	19.8	15.9	15.9	15.9	15.9
Current assets	**243.3**	**264.5**	**275.6**	**254.8**	**303.2**	**354.7**	**415.4**
Total Assets	**463.9**	**486.5**	**536.4**	**500.0**	**549.3**	**600.9**	**660.2**
Liabilities and shareholders' equity							
Subscribed capital	49.7	49.9	50.2	50.5	50.8	51.6	52.1
Capital reserve	314.0	316.1	318.6	320.7	321.7	323.9	325.5
Retained earnings	-127.0	-131.4	-121.7	-114.6	-81.2	-43.1	2.2
Other equity components	-9.8	10.0	8.7	6.7	6.7	6.7	6.7
Shareholders' equity	227.0	244.6	255.8	263.2	298.0	339.1	386.5
Minority interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total equity	**227.0**	**244.6**	**255.8**	**263.2**	**298.0**	**339.1**	**386.5**
Provisions	35.7	27.1	25.2	26.3	26.3	26.3	26.3
thereof provisions for pensions and similar obligations	5.8	5.5	7.8	8.5	8.5	8.5	8.5
Financial liabilities (total)	96.6	89.5	115.4	90.4	87.4	85.4	84.9
Short-term financial liabilities	79.1	19.4	19.2	15.5	15.5	15.5	15.5
Accounts payable	39.2	63.2	73.4	44.2	61.7	74.2	86.6
Other liabilities	65.4	62.2	66.6	75.9	75.9	75.9	75.9
Liabilities	**236.9**	**241.9**	**280.6**	**236.8**	**251.3**	**261.8**	**273.7**
Total liabilities and shareholders' equity	**463.9**	**486.5**	**536.4**	**500.0**	**549.3**	**600.9**	**660.2**

Financial Ratios

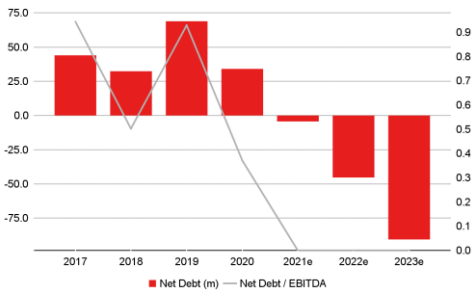
	2017	2018	2019	2020	2021e	2022e	2023e
Efficiency of Capital Employment							
Operating Assets Turnover	4.0 x	3.9 x	3.2 x	3.5 x	3.9 x	4.2 x	4.4 x
Capital Employed Turnover	1.9 x	1.8 x	1.7 x	1.9 x	2.1 x	2.2 x	2.4 x
ROA	-1.9 %	4.4 %	2.7 %	8.3 %	13.6 %	15.5 %	18.5 %
Return on Capital							
ROCE (NOPAT)	39.8 %	4.2 %	3.1 %	7.2 %	12.0 %	13.7 %	16.0 %
ROE	-1.8 %	4.1 %	2.8 %	7.8 %	11.9 %	12.0 %	12.5 %
Adj. ROE	-1.8 %	4.1 %	2.8 %	7.8 %	11.9 %	12.0 %	12.5 %
Balance sheet quality							
Net Debt	44.0	32.4	68.9	34.1	-4.3	-45.3	-90.6
Net Financial Debt	38.2	26.8	61.1	25.5	-12.9	-53.9	-99.2
Net Gearing	19.4 %	13.2 %	26.9 %	13.0 %	-1.5 %	-13.4 %	-23.4 %
Net Fin. Debt / EBITDA	81.9 %	41.7 %	82.4 %	27.7 %	n.a.	n.a.	n.a.
Book Value / Share	227.0	4.9	5.1	5.2	5.9	6.6	7.4
Book value per share ex intangibles	37.0	1.1	1.3	1.5	2.2	3.0	3.9

ROCE Development



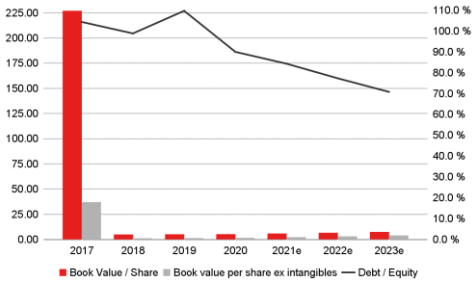
Source: Warburg Research

Net debt
in EUR m



Source: Warburg Research

Book Value per Share
in EUR



Source: Warburg Research

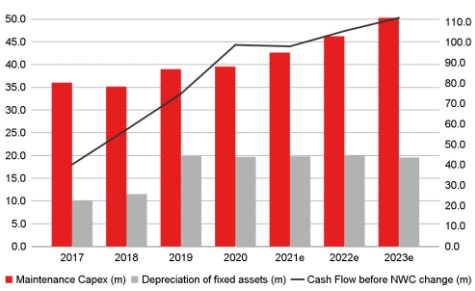
Consolidated cash flow statement

In EUR m	2017	2018	2019	2020	2021e	2022e	2023e
Net income	-4.2	9.7	7.0	20.3	33.4	38.1	45.3
Depreciation of fixed assets	10.1	11.5	19.8	19.7	19.8	20.1	19.6
Amortization of goodwill	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Amortization of intangible assets	32.1	37.9	42.3	45.4	44.8	47.2	47.1
Increase/decrease in long-term provisions	-12.4	-6.2	1.4	0.1	0.0	0.0	0.0
Other non-cash income and expenses	14.4	4.3	4.2	13.2	0.0	0.0	0.0
Cash Flow before NWC change	**40.0**	**57.2**	**74.9**	**98.6**	**98.0**	**105.4**	**112.0**
Increase / decrease in inventory	17.9	-4.0	-19.6	15.2	-5.1	-4.8	-7.2
Increase / decrease in accounts receivable	8.2	-16.8	1.4	12.5	-7.9	-7.7	-8.7
Increase / decrease in accounts payable	-38.9	24.0	10.2	-29.2	17.5	12.5	12.4
Increase / decrease in other working capital positions	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Increase / decrease in working capital (total)	-12.9	3.1	-8.0	-1.5	4.6	0.0	-3.5
Net cash provided by operating activities [1]	**27.1**	**60.4**	**66.9**	**97.1**	**102.6**	**105.4**	**108.5**
Investments in intangible assets	-44.0	-34.2	-43.6	-44.7	-44.0	-45.2	-46.4
Investments in property, plant and equipment	-10.6	-14.0	-16.9	-13.6	-19.0	-19.2	-15.4
Payments for acquisitions	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financial investments	36.0	-0.2	-0.2	0.0	0.0	0.0	0.0
Income from asset disposals	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net cash provided by investing activities [2]	**-90.5**	**-48.1**	**-60.3**	**-58.4**	**-63.0**	**-64.4**	**-61.8**
Change in financial liabilities	37.2	-7.1	-11.3	-21.1	0.0	0.0	0.0
Dividends paid	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Purchase of own shares	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital measures	1.0	0.8	1.3	1.3	1.3	2.9	2.1
Other	-1.3	-2.0	-4.5	-7.0	-5.5	-5.0	-4.0
Net cash provided by financing activities [3]	**36.9**	**-8.2**	**-14.5**	**-26.8**	**-4.2**	**-2.1**	**-1.9**
Change in liquid funds [1]+[2]+[3]	**-26.5**	**4.1**	**-7.9**	**12.0**	**35.4**	**39.0**	**44.8**
Effects of exchange-rate changes on cash	0.0	0.2	-0.4	-1.4	0.0	0.0	0.0
Cash and cash equivalent at end of period	58.4	62.7	54.3	64.9	100.3	139.3	184.1

Financial Ratios

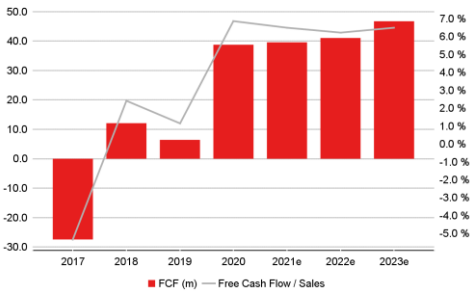
	2017	2018	2019	2020	2021e	2022e	2023e
Cash Flow							
FCF	-27.4	12.1	6.4	38.8	39.6	41.0	46.7
Free Cash Flow / Sales	-5.3 %	2.4 %	1.2 %	6.9 %	6.5 %	6.2 %	6.5 %
Free Cash Flow Potential	6.6	26.4	39.9	42.1	52.6	56.8	60.3
Free Cash Flow / Net Profit	649.0 %	124.9 %	91.1 %	190.8 %	118.4 %	107.6 %	103.1 %
Interest Received / Avg. Cash	0.3 %	0.4 %	0.6 %	0.2 %	0.0 %	0.0 %	0.0 %
Interest Paid / Avg. Debt	1.2 %	1.7 %	2.6 %	2.6 %	3.0 %	3.0 %	3.0 %
Management of Funds							
Investment ratio	10.6 %	9.6 %	10.9 %	10.3 %	10.3 %	9.8 %	8.6 %
Maint. Capex / Sales	7.0 %	7.0 %	7.0 %	7.0 %	7.0 %	7.0 %	7.0 %
Capex / Dep	129.2 %	97.8 %	97.2 %	90.2 %	97.5 %	95.7 %	92.6 %
Avg. Working Capital / Sales	17.6 %	20.1 %	18.7 %	18.7 %	16.5 %	14.9 %	13.9 %
Trade Debtors / Trade Creditors	207.5 %	155.0 %	131.1 %	190.0 %	148.8 %	134.1 %	124.9 %
Inventory Turnover	4.3 x	3.7 x	3.5 x	4.1 x	4.0 x	4.2 x	4.2 x
Receivables collection period (days)	58	71	63	54	55	55	55
Payables payment period (days)	41	72	73	44	59	65	70
Cash conversion cycle (Days)	79	74	75	73	61	54	50

CAPEX and Cash Flow
in EUR m



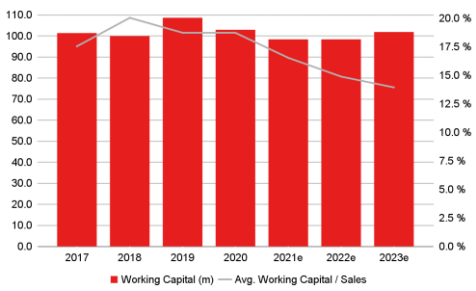
Source: Warburg Research

Free Cash Flow Generation



Source: Warburg Research

Working Capital



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Company	Disclosure	Link to the historical price targets and rating changes (last 12 months)
ADVA	5	http://www.mmwarburg.com/disclaimer/disclaimer_en/DE0005103006.htm

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-B-	**Buy:**	The price of the analysed financial instrument is expected to rise over the next 12 months.
-H-	**Hold:**	The price of the analysed financial instrument is expected to remain mostly flat over the next 12 months.
-S-	**Sell:**	The price of the analysed financial instrument is expected to fall over the next 12 months.
"-"	**Rating suspended:**	The available information currently does not permit an evaluation of the company.

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Rating	Number of stocks	% of Universe
Buy	150	70
Hold	55	26
Sell	5	2
Rating suspended	5	2
Total	**215**	**100**

WARBURG RESEARCH GMBH – ANALYSED RESEARCH UNIVERSE BY RATING …

… taking into account only those companies which were provided with major investment services in the last twelve months.

Rating	Number of stocks	% of Universe
Buy	43	88
Hold	3	6
Sell	0	0
Rating suspended	3	6
Total	**49**	**100**

PRICE AND RATING HISTORY ADVA AS OF 27.05.2021

Markings in the chart show rating changes by Warburg Research GmbH in the last 12 months. Every marking details the date and closing price on the day of the rating change.

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