ASML Holding NV ASML (XAMS) | ★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Intel Announces Foundry Collaboration With ARM at Intel Developer Forum; No Change to FVE

See Page 2 for the full Analyst Note from 16 Aug 2016

Abhinav Davuluri
Equity Analyst
abhinav.davuluri@morningstar.com
+1 (312) 244-7400

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The primary analyst covering this company does not own its stock.

Research as of 16 Aug 2016
Estimates as of 20 Jul 2016
Pricing data through 30 Aug 2016
Rating updated as of 30 Aug 2016

Currency amounts expressed with "$" are in U.S. dollars (USD) unless otherwise denoted.

Contents

Investment Thesis 20 Jul 2016

ASM Lithography is the primary source of photolithography tools for semiconductor manufacturers. Photolithography is the process in which a light source is used to expose circuit patterns from a photomask onto a semiconductor wafer. A photomask is a flat, transparent quartz plate containing the the microscopic circuit pattern. The latest technological advances in this field allow chipmakers to continually increase the number of transistors on the same area of silicon.

Lithography tools account for a significant portion of chipmakers' capital expenditures, with leading-edge platforms ranging from $60 million to over $100 million. ASML's immersion lithography tools have allowed the firm to capture and maintain the leading position in the marketplace, while competitors like Nikon and Canon do not have the scale or resources to compete on the leading edge.

To continue pursuing Moore's law, chipmakers will require next-generation extreme ultraviolet lithography tools, which have been in development by ASML. The top three customers of the firm (Intel, Samsung, and Taiwan Semiconductor) have committed to help fund a portion of research and development for EUV technologies and also acquired an aggregate 23% minority equity stake in ASML. In 2013, ASML acquired a key supplier, Cymer, for its light source technology that has since accelerated the development of EUV. The latest EUV lithography tool is considerably more expensive than incumbent tools, with a price tag of over $100 million. In June 2016, ASML announced that it intends to acquire Hermes Microvision, a major wafer inspection provider. ASML expects to leverage Hermes' expertise to provide detailed patterning information that ASML can then use to optimize its EUV lithography systems.

We expect ASML to materially benefit from the proliferation of EUV, though the exact timing of adoption in high-volume manufacturing is uncertain. The most likely scenario, in our opinion, is for the technology to be fully implemented in the 7-nanometer process node, which we don't expect to begin ramping until at least 2018. Until then, chipmakers will rely on immersion lithography

Vital Statistics

Market Cap (EUR Mil)	40,961
52-Week High (EUR)	100.50
52-Week Low (EUR)	70.54
52-Week Total Return %	18.3
YTD Total Return %	18.3
Last Fiscal Year End	31 Dec 2015
5-Yr Forward Revenue CAGR %	6.6
5-Yr Forward EPS CAGR %	11.7
Price/Fair Value	1.31

Valuation Summary and Forecasts

Fiscal Year:	2014	2015	*2016(E)*	*2017(E)*
Price/Earnings	29.4	23.2	*27.4*	*21.4*
EV/EBITDA	24.2	18.5	*21.0*	*17.7*
EV/EBIT	29.0	22.0	*25.0*	*20.5*
Free Cash Flow Yield %	1.7	4.6	*2.8*	*4.0*
Dividend Yield %	0.7	0.8	*1.1*	*1.1*

Financial Summary and Forecasts (EUR Mil)

Fiscal Year:	2014	2015	*2016(E)*	*2017(E)*
Revenue	5,856	6,287	*6,548*	*7,181*
Revenue YoY %	11.7	7.4	*4.1*	*9.7*
EBIT	1,282	1,565	*1,568*	*1,913*
EBIT YoY %	22.4	22.1	*0.2*	*22.0*
Net Income, Adjusted	1,197	1,387	*1,366*	*1,731*
Net Income YoY %	17.8	15.9	*-1.5*	*26.7*
Diluted EPS	3.02	3.56	*3.53*	*4.52*
Diluted EPS YoY %	16.2	17.8	*-1.0*	*28.1*
Free Cash Flow	609	1,436	*1,040*	*1,497*
Free Cash Flow YoY %	65.6	136.0	*-27.6*	*44.0*

Historical/forecast data sources are Morningstar Estimates and may reflect adjustments.
Analyst Note: Non per share data is displayed in Euro; EPS (ex charges) and Dividends are in USD

Profile

Founded in 1984 and based in the Netherlands, ASM Lithography is a leading manufacturer of photolithography systems used in the production of semiconductors. ASML markets its lithography systems to semiconductor manufacturers in the United States, Asia, and Europe, among other regions.

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Morningstar Analysis

Intel Announces Foundry Collaboration With ARM at Intel Developer Forum; No Change to FVE 16 Aug 2016

At the Intel Developer Forum in San Francisco, Intel announced a flurry of news with far-reaching implications across the semiconductor landscape. The most important announcement for Intel, in our view, is that the chip leader will be licensing technology from ARM Holdings to offer foundry customers access to ARM physical intellectual property at the 10-nanometer process node. We note that this will allow Intel to compete with Taiwan Semiconductor Manufacturing and Samsung foundries for the business of the likes of Qualcomm and Apple. Second, Intel announced that LG Electronics will be a new foundry customer for its 10-nanometer internally developed chips for its phones, which has negative repercussions on Qualcomm, which counts LG as an important supplier. The news isn't especially shocking, however, as LG was long rumored to be building its own processor business and we anticipate that ongoing vertical integration will weigh on Qualcomm's chip business going forward. Finally, Mark Bohr, Intel's head of process architecture, said the firm will not be using ASML's advanced EUV lithography for the 10-nanometer process, and the technology isn't ready for the 7-nanometer node, either. This is consistent with our thesis for ASML, as we don't expect EUV to be a major factor in semiconductor manufacturing until the 7-nanometer process. We will maintain our fair value estimates for $31 for Intel, $68 for Qualcomm, and $82 for ASML in light of these announcements. Shares of ASML were lower following the news, though we continue to view the narrow-moat entity as significantly overvalued. We recommend prospective investors for both Intel and ASML to remain on the sidelines for the time being and we see a slight margin of safety in Qualcomm today.

Physical IP licenses from ARM allow Intel's customers to deploy ARM's physical IP on their respective manufacturing processes, and lead to royalties over the course of the process life. We believe the ARM ecosystem will benefit from bring Intel's manufacturing expertise into the fold, as foundries pursuing Moore's Law face numerous challenges in progressing to advanced process nodes. This move is also consistent with our view that foundry offerings represent a good way for Intel to leverage its expertise and utilize excess capacity, especially as it faces a declining PC market. All in, this doesn't change our fair value estimates for ARM Holdings, which are still at GBX 1,700 per share and $67 per U.S. ADR, respectively, and represent the SoftBank offer price.

Regarding the LG foundry agreement, we note LG is following a trend carved out by Apple and later Samsung and Huawei, specifically of internally designing processors in lieu of utilizing those sold by the likes of Qualcomm. It remains unclear the extent to which LG will use its own chips, but we surmise the firm will limit its initial rollout to certain phones and tablets, while continuing to use Qualcomm chips for its marquee devices. As a result, we are not altering our $68 fair value estimate for Qualcomm, and note that shares continue to trade a modest discount and may be appealing to investors.

Based on Intel's rumored design win for a portion of modems used in the next iPhone, we speculate Intel's relationship with Apple in the smartphone space may be in its early innings. In particular, the ARM-licensing deal and LG business may lead to future business with Apple, should Intel be able to exhibit adequate yields on its 10-nanometer process. This may lead to Apple dual-sourcing future iPhone chips with TSMC and Intel. All in, this would represent significant exposure to the smartphone space that Intel has been seeking for years, and also acknowledgement from a premium smartphone OEM that could lead to further foundry business.

We continue to believe the market has priced overly ambitious expectations for EUV lithography pioneered by ASML, and still see multiple patterning as the chief method

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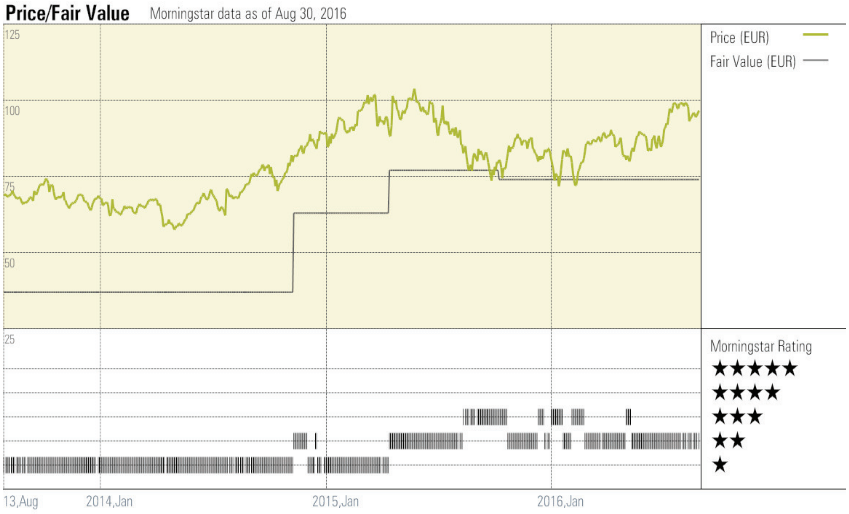
Price/Fair Value Morningstar data as of Aug 30, 2016



for continued pursuit of Moore's Law over the next few years. The latter requires significant deposition and etch equipment, provided by the likes of Applied Materials, Lam Research, and Tokyo Electron. Intel's announcement supports our view, and we believe EUV will be ultimately utilized for a few layers at the 7-nanometer node. For further insight into these particular trends, please see our Technology Observer "When the Chips Are Down, Bet on Capital Equipment Firms."

Valuation, Growth and Profitability 20 Jul 2016

Our fair value estimate is EUR 74 per share. We project that revenue will grow only 4.1% in 2016, up from 2.5%, as 10-nanometer-related logic and foundry spending offsets decelerating memory demand. Going forward, we think the firm can grow in the mid to high single-digits, with a compound annual growth rate of 6.5% over the next five years. We think ASML will begin seeing material benefits from its EUV lithography tools toward the tail end of the 10-nanometer process node before being widely adopted for customers' 7-nanometer process. After accounting for roughly 14% of semiconductor equipment spending in 2015, per Gartner, we project the firm's share will come close to 20% by 2020 thanks to the EUV technology. Our gross margin projection for 2016 is 45%, which we believe will expand 300 basis points by 2020 due to the maturation of EUV. Furthermore, as EUV matures, research and development expenses as a percentage of sales should track lower to about 15%. Our fair value estimate implies long-term price/earnings of 20 times and an enterprise value/EBITDA multiple of 15 times.

Scenario Analysis

In our bull case, our fair value estimate is EUR 91 per share. Over the next five years, the firm has a compound annual growth rate of about 10% due to earlier-than-expected adoption of EUV. As a result, the firm outgrows the broader chip equipment industry. We project gross and operating margins would incrementally track higher to 50% and 32%, respectively, as the product mix is more heavily skewed to EUV tools.

Our fair value estimate for a bear scenario would be EUR 57 per share. The chip equipment industry would endure a prolonged downturn as end demand is considerably weaker and chipmakers consequently cut back on capital expenditures. This causes customers to decelerate their pursuit of Moore's law, and as a result process nodes become longer. EUV also encounters development issues and is not adopted in high-volume manufacturing. Thus, immersion lithography tools are still the prevalent technology and competitors such as Nikon are able to steal market share from ASML. In this scenario, sales for the firm track the broader semiconductor market, at a CAGR of about 3% over the next five years. Additionally, gross margins remain in the mid-40s as ASML must cut prices amid the downturn.

Economic Moat

We believe ASML has a narrow economic moat. As the leading provider of photolithography equipment, the firm exhibits considerable scale and technological superiority relative to its competitors. The technical expertise and large

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R&D budget serve as barriers to entry, but competitors do exist (Nikon and Canon), albeit in a smaller capacity. ASML uses Zeiss as its sole supplier of lenses, mirrors, collectors, and other critical optical components that enable photolithography; this contributes to limiting the firm's moat to narrow. Additionally, there exists uncertainty around the timing of EUV adoption that limits our clairvoyance regarding the firm's economic moat, as a prolonged delay or weak implementation of the technology could erode ASML's competitive positioning as chipmakers find alternative solutions to continue pursuing Moore's Law.

Moat Trend

We assign ASML a positive moat trend. The firm is at the forefront of extreme ultraviolet lithography, a key technology that will enable the continued pursuit of Moore's law in an economical manner: with less process steps to achieve smaller critical dimensions. While this technology has been delayed, the minority equity stakes taken by Intel, TSMC, and Samsung (totaling 23% in exchange for EUR 3.85 billion) show how committed these chipmakers are to the proliferation of EUV, likely by the 7-nanometer process node. Once it is used in high-volume manufacturing, EUV will help solidify ASML's position at key customers' manufacturing facilities and widen its economic moat.

Earlier this year, ASML announced an agreement with a major U.S. customer (we believe Intel) to provide at least 15 EUV tools. The road to fully harnessing EUV technology has been a bumpy one that has yet to bear much fruit. Over the past few years, there have been multiple reports of significant continuous throughput of wafers through EUV tools, albeit without actually printing anything. One of the critical issues with the technology has been the lack of reliable source power. The higher the source power, the shorter the process time, which consequently makes EUV economically attractive. This explains the motivation for ASML's acquisition of Cymer, a leading supplier of lithography light sources. At the outset of the combination in 2013, Cymer's EUV light sources exposed wafers to 11 watts of source power, resulting in production of 7 wafers per hour. During ASML's first-quarter results, management reported exposure of 43 wafers per hour to an 80-watt source configuration at a customer site. Another crucial factor is the availability of the tool itself, as ASML targets 80% to be viable for high-volume manufacturing, but has achieved on average less than 70%. More recently, the firm announced a new EUV factory that will enable output of 24 EUV systems by 2017 with further output capacity growth up to 60 systems in subsequent years. This clearly shows the confidence ASML has in EUV, with the adoption schedule and future expected orders of EUV tools being a function of customers' specific road maps and risk appetite.

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Bulls Say/Bears Say

Bulls Say

- ASML is a market leader and innovator in photolithography, an integral part of chip manufacturing.
- The extensive technical expertise needed to develop lithography tools, which are highly complex and play a critical role in semiconductor manufacturing, serves as a barrier to entry.
- ASML has focused on operational efficiency in recent years to improve profitability throughout industry cycles.

Bears Say

- ASML depends on a handful of powerful customers and will sell only 100-200 systems each year.
- Dependence on a limited number of suppliers for key components exposes ASML to pricing power and possible disruptions to its supply chain.
- The firm operates in the deeply cyclical semiconductor industry.

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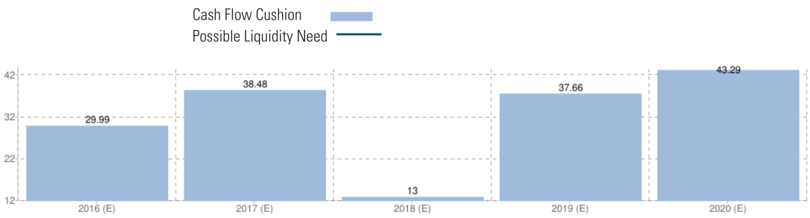
Five Year Adjusted Cash Flow Forecast (EUR Mil)

	2016(E)	2017(E)	2018(E)	2019(E)	2020(E)
Cash and Equivalents (beginning of period)	2,459	2,589	3,109	3,508	4,371
Adjusted Available Cash Flow	313	1,167	1,337	1,515	1,614
Total Cash Available before Debt Service	2,772	3,756	4,445	5,023	5,985
Principal Payments	-4	-4	-242	-28	-28
Interest Payments	-36	-36	-36	-36	-36
Other Cash Obligations and Commitments	-52	-57	-63	-69	-74
Total Cash Obligations and Commitments	-92	-98	-342	-133	-138

Cumulative Annual Cash Flow Cushion



Adjusted Cash Flow Summary

	EUR Millions	% of Commitments
Beginning Cash Balance	2,459	305.9
Sum of 5-Year Adjusted Free Cash Flow	5,945	739.7
Sum of Cash and 5-Year Cash Generation	8,404	1,045.6
Revolver Availability	—	—
Asset Adjusted Borrowings (Repayment)	—	—
Sum of Cash, 5-Year Cash Generation, Revolver and Adjustments	8,404	1,045.6
Sum of 5-Year Cash Commitments	-804	—

Financial Health

ASML has a solid financial position. At the end of the second quarter of 2016, the firm had almost EUR 3 billion in cash and short-term investments and EUR 900 million in long-term debt on its balance sheet.The firm typically holds a significant cash position, which is appropriate given the cyclical nature of the semiconductor equipment industry. During downturns, the cash cushion allows ASML to continue investing heavily in research and development in order to maintain its cutting-edge technology position. This is especially critical in the highly arcane lithography market, where firms that failed to stay at the technological forefront have seen their competitive positions erode in the past. Nonetheless, ASML has more debt on its balance sheet than the typical chip equipment firm, which we think is justified as its cash flow generation has become much more consistent during the past decade.ASML's debt primarily consists of EUR 238 million worth of 5.75% notes due 2017 and EUR 750 million worth of 3.375% notes due 2023. In 2012, the firm created a customer co-investment program, in which three customers acquired minority equity stakes totaling 23% in ASML for an aggregate EUR 3.85 billion and committed to funding a portion of R&D over the next five years. ASML has since returned the EUR 3.85 billion to shareholders via a synthetic buyback. The firm acquired Cymer in 2013 in a EUR 1.95 billion stock and cash deal, which used up about EUR 0.5 billion of ASML's cash. ASML generally returns excess cash to shareholders via annual dividend payments and share buybacks.In June 2016, ASML announced that it intended to acquire Hermes Microvision in an all-cash transaction valued at EUR 2.75 billion. While the deal is expected to close in the fourth quarter of 2016, ASML placed EUR 1.5 billion in eurobonds in an offering in early July 2016 intended for partial finance of the acquisition.

Enterprise Risk

The primary risk faced by ASML is the timing of EUV adoption for customers' high-volume manufacturing. The potential for delayed or even minimal implementation of the technology serves as the main reasoning for our medium uncertainty rating. A secondary source of risk is the inherent cyclicality of the semiconductor industry, driven by the fluctuation of demand for chip-embedded devices including smartphones and personal computers. ASML is indirectly dependent on chipmakers creating advanced chips with its tools, and their inability to do so would have major ramifications for all parties involved. Zeiss is a major supplier for ASML's lithography tools, and any disruption of this symbiotic relationship could be detrimental to ASML. However, the two have worked with each other since 1997, and there have not been any indications that the partnership is weakening.

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Management & Ownership

Management Activity

Name	Position	Shares Held	Report Date*	InsiderActivity
NA	NA	NA	NA	NA

*Represents the date on which the owner's name, position, and common shares held were reported by the holder or issuer.

Fund Ownership

Top Owners	% of Shares Held	% of Fund Assets	Change (k)	Portfolio Date
VA CollegeAmerica EuroPacific Growth	3.18	1.20	263	30 Jun 2016
VA CollegeAmerica Growth Fund of America	1.56	0.49	—	30 Jun 2016
VA CollegeAmerica New Perspective	1.45	1.07	119	30 Jun 2016
VA CollegeAmerica AMCAP	1.42	1.34	380	30 Jun 2016
VA CollegeAmerica Fundamental Investors	1.23	0.72	100	30 Jun 2016
Concentrated Holders				
iShares STOXX Europe 600 Technology (DE)	0.02	11.67	—	26 Aug 2016
SPDR® MSCI Europe Technology ETF	—	11.11	—	31 Jul 2016
AEGON Dutch Equity Index Fund	0.02	9.01	-1	30 Apr 2016
SPDR® AEX ETF	0.01	8.85	—	31 Jul 2016
iShares MSCI Netherlands	0.03	8.79	—	26 Aug 2016

Institutional Transactions

Top 5 Buyers	% of Shares Held	% of Fund Assets	Shares Bought/ Sold (k)	Portfolio Date
BlackRock Advisors LLC	6.35	—	4,949	31 Dec 2015
Capital Research and Management Company	11.56	0.66	1,066	30 Jun 2016
Fidelity Management & Research Company	0.36	0.48	999	31 Jul 2016
BlackRock Investment Management (UK) Ltd.	0.81	1.48	479	31 Jul 2016
T. Rowe Price Associates, Inc.	0.96	0.99	382	30 Jun 2016
Top 5 Sellers				
State Street Global Advisors	0.14	0.29	-164	31 Jul 2016
AXA Investment Managers	0.01	0.28	-156	30 Jun 2016
BNP Paribas Invt Partners Fds (Ne) N.V.	0.03	1.24	-136	31 Jul 2016
THEAM	0.15	2.97	-119	31 Jul 2016
UBS Asset Management (UK) Ltd	0.13	1.00	-100	25 Aug 2016

Management 20 Jul 2016

Peter Wennink took over as CEO from Eric Meurice in July 2013. Wennink was CFO of ASML and has been with the firm since 1999. Most members of the current executive team have more than a decade of experience at ASML. Relative to peers, management's compensation looks reasonable. However, management holds a minimal ownership stake in ASML.

We believe management has been a good steward of shareholder capital. It has done a great job of helping the firm strengthen its competitive and market positions in the lithography tool segment of the chip equipment industry. The firm has taken a technology lead in the past several years, which has resulted in market share gains at the expense of Nikon and Canon. However, ASML has not rested on its laurels and continues to invest heavily in research and development. The firm has been ramping up its investments to develop next-generation lithography tools in order to maintain its strong technology position.

In 2012, management created a customer co-investment program in which major customers Intel, Samsung, and Taiwan Semiconductor took an aggregate 23% minority stake in ASML for EUR 3.85 billion and committed EUR 1.85 billion to help fund ASML's R&D development of extreme ultraviolet lithography tools and future lithography tools for creating circuits on 450-millimeter diameter semiconductor wafers. We think the program is a smart and innovative way for ASML to help fund the costly R&D investments that will be needed to successfully commercialize EUV and 450-millimeter lithography tools, and it helps align customer interests with those of the firm. ASML has returned the cash proceeds from the share issuance transactions for the minority equity stakes under its customer co-investment program to shareholders, which we view as responsible stewardship.

ASML acquired key lithography light source supplier Cymer in 2013 for EUR 1.95 billion in stock and cash in an effort to accelerate EUV lithography commercialization. While the price tag seems hefty, Cymer's light source is critical to the success of EUV.

Management has shown a willingness to return excess cash to shareholders. The firm began paying an annual dividend in 2008, and the payment fluctuates each year, depending on management's forecast liquidity requirements for ASML. The firm also makes stock repurchases to return cash to shareholders. In early 2016, management proposed to increase its dividend by 50% to a level of EUR 1.05 per share. Additionally, the firm announced an additional EUR 1 billion in share repurchases over 2016 and 2017 on top of the remaining EUR 500 million from its prior program.

In June 2016, ASML announced that it has entered into an agreement to acquire Hermes Microvision, a major wafer inspection equipment provider, in an all-cash transaction valued at TWD 100 billion (approximately EUR 2.75 billion). We view the strategic rationale of this deal through the same lens as the Lam Research-KLA-Tencor tie-up: capital equipment firms are increasingly trying to marry process and process control. While the deal price is fairly steep, ASML expects to leverage Hermes' expertise in the lithography realm, which should theoretically provide detailed patterning information that ASML can then use to optimize its EUV lithography systems. A major aspect of the deal likely revolves around Hermes' e-beam systems specifically designed to identify pattern defects in EUV lithography that is being pioneered by ASML. Consequently, the acquisition supports ASML's EUV ramp.

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Analyst Notes

ASML's Second-Quarter Results Benefit From Strong Logic Ramp; Shares Remain Overvalued 20 Jul 2016

ASML reported second-quarter results that were in line with our estimates as strong system sales to Intel drove impressive sequential top-line growth. These lithography systems are most likely in support of Intel's 10-nanometer efforts, which we expect to ramp in 2017. The firm's extreme ultraviolet lithography progress is also coming along nicely, as its productivity target of 1,500 wafers per day was nearly reached at an ASML site, while its availability target of 80% has been achieved on five customer systems over a four-week period. EUV revenue recognition and system shipments are typically not aligned, and relevant sales have been and will continue to be lumpy for the foreseeable future--which may cause quarterly results to fluctuate. Shares of ASML, along with its peers, were up modestly in trading after the earnings release, as it appears logic and foundry customers' 10-nm-related appetite will satiate any previously expected shortfall from declining memory equipment purchases. However, we continue to view shares of narrow-moat ASML as overvalued relative to our unchanged fair value estimate of $82, as we believe the market's expectations for EUV lithography are too aggressive. We recommend prospective investors wait for a wider margin of safety.

Second-quarter revenue was EUR 1.74 billion, up 30% sequentially on the aforementioned sale to Intel as well as the revenue recognition of two EUV systems. Memory-related sales were understandably lower than the same period a year earlier (18%), as 2015 marked several customer technology transitions. Gross margin was roughly flat from the prior quarter at 42.6% but significantly lower than historical norms in the mid-40s, as expected. This is due to the fact that present margins for EUV tools are considerably lower than the corporate average and the intended EUV target of 40% by 2020. Management expects this gap to be bridged as customers and suppliers alike progress along the steep learning curve for both manufacturing and operating the tool itself. Bookings were up 88% sequentially to EUR 1.5 billion, with memory declines offset by stronger foundry and logic 10-nm-related orders, consistent with Taiwan Semiconductor Manufacturing's recent commentary on EUV implementation and future process roadmaps.

Sales in the upcoming quarters will be bolstered by 10-nm investments, with third quarter revenue estimated at EUR 1.7 billion, which is in-line with our model. Management expects gross margins to track back up to 47%, as ASML will not be recognizing any EUV product revenue or costs during the period. Looking further ahead, ASML's backlog is at a robust level of EUR 3.37 billion, with sharp regional upticks in Taiwan and Europe. The former is in support of TSMC, while the latter is likely for Intel's fabrication facility in Ireland. ASML also recorded new orders for four EUV systems from foundry and memory customers, resulting in a total EUV backlog of 10 units worth about EUR 1 billion. These systems are intended for volume production rather than research and development, which is a good sign for ASML. CEO Peter Wennink also expects additional EUV orders in the second half of 2016. On the planned Hermes Microvision acquisition, management said the transaction is expected to close in the fourth quarter of 2016, subject to customary regulatory approval. We reiterate our positive view on the strategic rationale of the deal, as the line between process and process control continues to blur.

ASML Agrees to Purchase Hermes Microvision as Capital Equipment Industry Continues to Consolidate 16 Jun 2016

On June 16, ASML announced it has entered into an agreement to acquire Hermes Microvision, a major wafer inspection equipment provider, in an all-cash transaction valued at TWD 100 billion (approximately EUR 2.75 billion). This price implies a premium of 31% over HMI's 30-day

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Analyst Notes

volume-weighted average price, per ASML. We view the strategic rationale of this deal through the same lens as the Lam Research-KLA-Tencor tie-up--capital equipment firms are increasingly endeavoring to marry process and process control. ASML shares remained relatively flat following the announcement, as we believe the product synergies likely offset the premium paid. We are maintaining our fair value estimate for this narrow-moat firm at $82 and recommend prospective investors wait for a wider margin of safety, as we believe the market's expectations for extreme ultraviolet (EUV) lithography are too aggressive.

While we concede the HMI deal price is quite steep, as it implies a price/earnings ratio of 43 times based on trailing EPS, we note that 2015 was a relatively weak year for the broader wafer inspection and defect review market (down 12%, per Gartner). This was primarily due to a mix shift in spending toward more NAND and DRAM spending, which doesn't require as intensive process control equipment relative to logic and foundry segments. Management expects the deal to close in the fourth quarter of 2016 and is subject to review by Taiwanese, U.S., and international regulators. We don't anticipate any major obstacles for ASML to garner the necessary approvals. The deal will be financed with EUR 1.5 billion of debt, EUR 500 million of new ASML equity, and the remainder (EUR 750 million) in cash. Based on ASML's healthy balance sheet, we don't expect any major concerns regarding the subsequent shift in capital structure.

As semiconductor manufacturers continue pushing the limits of feature sizes on the chips they fabricate, equipment vendors have faced escalating costs in research and development to keep pace. In the process control arena, inspection tools are used to detect and analyze defects on wafers, but traditional optical defect inspection tools have hit a wall in recent years. HMI was founded to develop an electron beam (e-beam) wafer inspection tool, one that is able to more accurately identify defects at higher resolutions. The e-beam market, dominated by HMI with 86% market share in 2015 (per Gartner), is roughly $250 million. This is relatively small compared with the optical inspection market that amounts to almost $2 billion. However, we note that multiple firms, including Applied Materials (8% market share in 2015), have attempted to develop their own e-beam tools as the need for such equipment rises with the pursuit of Moore's Law.

Currently, e-beam inspection is mainly used for engineering analysis in research and development groups, as these tools are generally more expensive and have slower inspection rates relative to optical tools. KLA-Tencor, the dominant vendor in process control, currently has an immaterial presence in e-beam with only 6% market share. In response to a question regarding e-beam, KLA-Tencor's CEO Rick Wallace has claimed, "There are certain types of defects that e-beam will see like electrical defects, but that's not a big part of the market. Most of the market is what is called small physical defects." That being said, the advent of 3D structures, including FinFET and 3D NAND, may contain defects that are more embedded. Over the past few years, the use of e-beam inspection for detection of physical defects has picked up, though limitations related to throughput remain concerns.

ASML expects to leverage HMI's expertise in the lithography realm. E-beam metrology should theoretically provide detailed patterning information that ASML can then utilize to optimize its lithography systems. We also note the two firms have an existing relationship and ultimately came to the realization that the combined company would be greater than the sum of its parts. We believe a major aspect of the deal likely revolves around HMI's e-beam systems specifically designed to identify pattern defects in EUV lithography that is being pioneered at ASML. Consequently, the acquisition of HMI supports ASML's EUV ramp, which

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Analyst Notes

the firm expects to be in volume production of semiconductors beginning in 2018. While we agree with this sentiment, we only expect the technology to be used for a few process steps. Please refer to our April 29 Observer, "When the Chips Are Down, Bet on Capital Equipment Firms," for our thoughts on EUV lithography.

ASML Reports In-Line First-Quarter Results and Second-Quarter Guidance; Shares Overvalued 20 Apr 2016

ASM Lithography reported first-quarter results that came in slightly ahead of our estimates, led by a pickup in sales to foundry customers in support of older 28-nanometer capacity additions. Even four years after initial introduction, this process has enjoyed a longer-than-expected life because of the disproportionate mix of customers that skews to the lagging edge, and accounted for 24% of system sales. This longer-tail cadence is expected to carry over to future process technologies, supporting our view of elevated design and manufacturing costs at the leading edge serving as barriers to entry in semiconductor fabrication. Shares were down 4% in trading after the earnings release, as memory equipment spending subsides relative to elevated levels in 2015. We believe shares of narrow-moat ASML are overvalued relative to our unchanged fair value estimate of $82 and would recommend prospective investors wait for a wider margin of safety.

First-quarter revenue was EUR 1.3 billion, down 7% sequentially and 19% year over year. While the service segment was up 18% from the same period a year ago, memory equipment sales accounted for the majority of the overall decline. Specifically, 3-D NAND and advanced DRAM equipment spending was cumulatively down 48% from the first quarter of 2015. We expect a slight rebound in upcoming quarters, as new NAND capacity is planned in China and Singapore (by Intel and Micron, respectively). Gross margin was down 340 basis points from the prior quarter, mainly as a result of lower unit volume and the higher mix of older tools to older manufacturing processes (28-nanometer). Bookings were down 29%, at EUR 835 billion, with memory declines offset by stronger foundry and logic 10-nanometer-related orders.

Sales in the upcoming quarters are projected to be bolstered by 10-nanometer investments, with second-quarter revenue estimated at EUR 1.7 billion. This guidance includes EUR 110 million for two EUV systems to be recognized in the quarter. However, only part of the system revenue (normally EUR 100 million for each tool) is recognized, whereas the full cost is recognized. As a result, gross margins will be lower by roughly 500 basis points, as full revenue recognition depends on performance criteria being satisfied. Customer commentary at a recent lithography conference illustrating EUV progress was highlighted by management, and remains consistent with our expectation of insertion into the 7-nanometer process node sometime in 2018 or 2019. Finally, we favorably view ASML's expected 50% dividend increase to EUR 1.05 per share.

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Morningstar Analyst Forecasts

Financial Summary and Forecasts

Fiscal Year Ends in December

Growth (% YoY)	3-Year Hist. CAGR	2013	2014	2015	*2016* (Forecast)	*2017* (Forecast)	*5-Year Proj. CAGR*
Revenue	*9.9*	10.9	11.7	7.4	*4.1*	*9.7*	*6.6*
EBIT	*10.6*	-9.4	22.4	22.1	*0.2*	*22.0*	*9.8*
EBITDA	*11.5*	-5.0	20.4	21.2	*0.2*	*18.5*	*8.5*
Net Income	*6.6*	-11.4	17.8	15.9	*-1.5*	*26.7*	*10.6*
Diluted EPS	*6.1*	-12.7	16.2	17.8	*-1.0*	*28.1*	*11.7*
Earnings Before Interest, after Tax	*11.1*	-1.5	10.3	26.0	*-16.9*	*26.5*	*6.6*
Free Cash Flow	*42.1*	-26.7	65.6	136.0	*-27.6*	*44.0*	*6.9*

Profitability	3-Year Hist. Avg	2013	2014	2015	*2016*	*2017*	*5-Year Proj. Avg*
Operating Margin %	*22.3*	20.0	21.9	24.9	*24.0*	*26.6*	*27.1*
EBITDA Margin %	*26.7*	24.3	26.2	29.6	*28.5*	*30.8*	*31.0*
Net Margin %	*20.6*	19.4	20.4	22.1	*20.9*	*24.1*	*24.5*
Free Cash Flow Margin %	*13.4*	7.0	10.4	22.9	*15.9*	*20.8*	*20.7*
ROIC %	*17.6*	18.9	17.1	16.7	*15.1*	*16.5*	*17.2*
Adjusted ROIC %	*22.3*	22.6	22.4	21.9	*19.8*	*21.3*	*21.9*
Return on Assets %	*10.6*	10.7	10.1	10.9	*10.1*	*12.1*	*12.4*
Return on Equity %	*17.5*	18.5	16.6	17.5	*15.8*	*18.5*	*18.2*

Leverage	3-Year Hist. Avg	2013	2014	2015	*2016*	*2017*	*5-Year Proj. Avg*
Debt/Capital	*0.13*	0.13	0.13	0.12	*0.11*	*0.10*	*0.08*
Total Debt/EBITDA	*0.73*	0.84	0.75	0.61	*0.60*	*0.51*	*0.41*
EBITDA/Interest Expense	*114.58*	52.17	178.71	112.85	*51.53*	*61.06*	*66.78*

Valuation Summary and Forecasts

	2014	2015	*2016(E)*	*2017(E)*
Price/Fair Value	1.41	—	—	—
Price/Earnings	29.4	23.2	*27.4*	*21.4*
EV/EBITDA	24.2	18.5	*21.0*	*17.7*
EV/EBIT	29.0	22.0	*25.0*	*20.5*
Free Cash Flow Yield %	1.7	4.6	*2.8*	*4.0*
Dividend Yield %	0.7	0.8	*1.1*	*1.1*

Key Valuation Drivers

Cost of Equity %	9.0
Pre-Tax Cost of Debt %	5.8
Weighted Average Cost of Capital %	8.9
Long-Run Tax Rate %	9.4
Stage II EBI Growth Rate %	5.0
Stage II Investment Rate %	20.4
Perpetuity Year	15

Additional estimates and scenarios available for download at http://select.morningstar.com.

Discounted Cash Flow Valuation

	EUR Mil	Firm Value (%)	Per Share Value
Present Value Stage I	6,187	21.8	14.46
Present Value Stage II	9,818	34.7	22.95
Present Value Stage III	12,333	43.5	28.82
Total Firm Value	**28,337**	**100.0**	**66.23**
Cash and Equivalents	3,409	—	7.97
Debt	-1,130	—	-2.64
Preferred Stock	—	—	—
Other Adjustments	-400	—	-0.93
Equity Value	**30,216**	**—**	**70.62**
Projected Diluted Shares	428		
Fair Value per Share (EUR)	—		

The data in the table above represent base-case forecasts in the company's reporting currency as of the beginning of the current year. Our fair value estimate may differ from the equity value per share shown above due to our time value of money adjustment and in cases where probability-weighted scenario analysis is performed.

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Morningstar Analyst Forecasts

Income Statement (EUR Mil)

Fiscal Year Ends in December	2013	2014	2015	*Forecast 2016*	*Forecast 2017*
Revenue	**5,245**	**5,856**	**6,287**	***6,548***	***7,181***
Cost of Goods Sold	3,068	3,260	3,392	*3,623*	*3,877*
Gross Profit	**2,177**	**2,596**	**2,896**	***2,924***	***3,303***
Selling, General & Administrative Expenses	312	321	346	*359*	*366*
Research & Development	882	1,074	1,068	*1,090*	*1,113*
Other Operating Expense (Income)	-64	-81	-83	*-94*	*-90*
Depreciation & Amortization (if reported separately)	—	—	—	*1*	*1*
Operating Income (ex charges)	**1,048**	**1,282**	**1,565**	***1,568***	***1,913***
Restructuring & Other Cash Charges	—	—	—	—	—
Impairment Charges (if reported separately)	—	—	—	—	—
Other Non-Cash (Income)/Charges	—	—	—	—	—
Operating Income (incl charges)	**1,048**	**1,282**	**1,565**	***1,568***	***1,913***
Interest Expense	24	9	17	*36*	*36*
Interest Income	—	—	—	*21*	*25*
Pre-Tax Income	**1,023**	**1,274**	**1,549**	***1,553***	***1,902***
Income Tax Expense	8	77	161	*186*	*171*
Other After-Tax Cash Gains (Losses)	—	—	—	—	—
Other After-Tax Non-Cash Gains (Losses)	—	—	—	—	—
(Minority Interest)	—	—	—	—	—
(Preferred Dividends)	—	—	—	—	—
Net Income	**1,015**	**1,197**	**1,387**	***1,366***	***1,731***
Weighted Average Diluted Shares Outstanding	433	440	433	*430*	*425*
Diluted Earnings Per Share	**2.34**	**2.72**	**3.21**	***3.18***	***4.07***
Adjusted Net Income	1,015	1,197	1,387	*1,366*	*1,731*
Diluted Earnings Per Share (Adjusted)	**2.34**	**2.72**	**3.21**	***3.18***	***4.07***
Dividends Per Common Share	0.67	0.78	0.78	*1.17*	*1.22*
EBITDA	**1,277**	**1,537**	**1,862**	***1,865***	***2,210***
Adjusted EBITDA	**1,277**	**1,537**	**1,862**	***1,865***	***2,210***

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Morningstar Analyst Forecasts

Balance Sheet (EUR Mil)

Fiscal Year Ends in December	2013	2014	2015	*Forecast 2016*	*2017*
Cash and Equivalents	2,331	2,419	2,459	*2,589*	*3,109*
Investments	680	335	950	*989*	*1,085*
Accounts Receivable	1,129	1,249	1,084	*1,166*	*1,279*
Inventory	2,393	2,550	2,574	*2,730*	*2,815*
Deferred Tax Assets (Current)	157	203	152	*146*	*133*
Other Short Term Assets	336	390	489	*489*	*489*
Current Assets	**7,026**	**7,146**	**7,708**	***8,110***	***8,910***
Net Property Plant, and Equipment	1,218	1,448	1,621	*1,699*	*1,777*
Goodwill	2,089	2,358	2,625	*2,625*	*2,625*
Other Intangibles	698	724	738	*738*	*738*
Deferred Tax Assets (Long-Term)	140	29	29	*29*	*29*
Other Long-Term Operating Assets	345	500	575	*599*	*657*
Long-Term Non-Operating Assets	—	—	—	—	—
Total Assets	**11,514**	**12,204**	**13,295**	***13,799***	***14,735***
Accounts Payable	626	496	603	*644*	*637*
Short-Term Debt	4	4	4	*4*	*242*
Deferred Tax Liabilities (Current)	—	—	—	—	—
Other Short-Term Liabilities	2,238	2,388	2,500	*2,473*	*2,577*
Current Liabilities	**2,869**	**2,889**	**3,107**	***3,122***	***3,457***
Long-Term Debt	1,070	1,150	1,126	*1,121*	*879*
Deferred Tax Liabilities (Long-Term)	365	237	257	*257*	*257*
Other Long-Term Operating Liabilities	288	415	417	*396*	*376*
Long-Term Non-Operating Liabilities	—	—	—	—	—
Total Liabilities	**4,591**	**4,691**	**4,906**	***4,896***	***4,968***
Preferred Stock	—	—	—	—	—
Common Stock	40	39	40	*40*	*40*
Additional Paid-in Capital	2,913	3,002	3,005	*3,005*	*3,005*
Retained Earnings (Deficit)	4,377	4,649	5,500	*6,414*	*7,678*
(Treasury Stock)	-365	-389	-350	*-750*	*-1,150*
Other Equity	-42	212	194	*194*	*194*
Shareholder's Equity	**6,922**	**7,513**	**8,389**	***8,903***	***9,767***
Minority Interest	—	—	—	—	—
Total Equity	**6,922**	**7,513**	**8,389**	***8,903***	***9,767***

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Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Morningstar Analyst Forecasts

Cash Flow (EUR Mil)

Fiscal Year Ends in December	2013	2014	2015	*Forecast 2016*	*Forecast 2017*
Net Income	1,015	1,197	1,387	*1,366*	*1,731*
Depreciation	229	255	297	*297*	*297*
Amortization	—	—	—	—	—
Stock-Based Compensation	52	63	59	*61*	*63*
Impairment of Goodwill	—	—	—	—	—
Impairment of Other Intangibles	—	—	—	—	—
Deferred Taxes	—	—	—	*6*	*13*
Other Non-Cash Adjustments	159	118	265	—	—
(Increase) Decrease in Accounts Receivable	-183	-114	164	*-82*	*-113*
(Increase) Decrease in Inventory	-518	-293	-24	*-156*	*-85*
Change in Other Short-Term Assets	-33	-112	150	—	—
Increase (Decrease) in Accounts Payable	321	-136	107	*41*	*-7*
Change in Other Short-Term Liabilities	11	48	-380	*-27*	*103*
Cash From Operations	**1,054**	**1,025**	**2,026**	***1,507***	***2,002***
(Capital Expenditures)	-211	-358	-372	*-375*	*-375*
Net (Acquisitions), Asset Sales, and Disposals	-448	-3	-1	—	—
Net Sales (Purchases) of Investments	290	345	-615	*-39*	*-96*
Other Investing Cash Flows	—	—	-172	*-45*	*-78*
Cash From Investing	**-368**	**-16**	**-1,160**	***-459***	***-548***
Common Stock Issuance (or Repurchase)	-268	-660	-532	*-400*	*-400*
Common Stock (Dividends)	-216	-268	-302	*-452*	*-467*
Short-Term Debt Issuance (or Retirement)	—	—	—	*0*	*238*
Long-Term Debt Issuance (or Retirement)	368	-4	-4	*-4*	*-242*
Other Financing Cash Flows	3	4	4	*-61*	*-63*
Cash From Financing	**-113**	**-928**	**-834**	***-917***	***-934***
Exchange Rates, Discontinued Ops, etc. (net)	-10	8	8	—	—
Net Change in Cash	**563**	**89**	**39**	***131***	***519***

ASML Holding NV ASML (XAMS) | ★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

Comparable Company Analysis

These companies are chosen by the analyst and the data are shown by nearest calendar year in descending market capitalization order.

Valuation Analysis

		Price/Earnings			EV/EBITDA			Price/Free Cash Flow			Price/Book			Price/Sales		
Company/Ticker	Price/Fair Value	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*
Canon Inc CAJ USA	0.98	15.8	*18.1*	*17.2*	5.4	*6.0*	*6.2*	17.8	*11.4*	*10.7*	1.3	*1.1*	*1.1*	1.0	*0.9*	*0.9*
Average		15.8	*18.1*	*17.2*	5.4	*6.0*	*6.2*	17.8	*11.4*	*10.7*	1.3	*1.1*	*1.1*	1.0	*0.9*	*0.9*
ASML Holding NV ASML NL	**1.31**	**23.2**	***27.4***	***21.4***	**18.5**	***21.0***	***17.7***	**21.8**	***36.2***	***25.2***	**4.3**	***4.6***	***4.2***	**5.7**	***6.3***	***5.7***

Returns Analysis

		ROIC %			Adjusted ROIC %			Return on Equity %			Return on Assets %			Dividend Yield %		
Company/Ticker	Last Historical Year Total Assets (Mil)	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*
Canon Inc CAJ USA	4,427,773 JPY	9.5	*6.6*	*6.8*	9.5	*6.6*	*6.8*	7.4	*6.1*	*6.3*	5.0	*4.1*	*4.2*	4.4	*4.0*	*4.1*
Average		9.5	*6.6*	*6.8*	9.5	*6.6*	*6.8*	7.4	*6.1*	*6.3*	5.0	*4.1*	*4.2*	4.4	*4.0*	*4.1*
ASML Holding NV ASML NL	**13,295** EUR	**16.7**	***15.1***	***16.5***	**21.9**	***19.8***	***21.3***	**17.5**	***15.8***	***18.5***	**10.9**	***10.1***	***12.1***	**0.8**	***1.1***	***1.1***

Growth Analysis

		Revenue Growth %			EBIT Growth %			EPS Growth %			Free Cash Flow Growth %			Dividend/Share Growth %		
Company/Ticker	Last Historical Year Revenue (Mil)	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*	2015	*2016(E)*	*2017(E)*
Canon Inc CAJ USA	3,800,271 JPY	2.0	*-7.1*	*-3.7*	-2.3	*-23.5*	*-1.2*	-12.0	*-17.8*	*5.0*	-96.1	*NM*	*5.7*	22.1	*-27.5*	*5.0*
Average		2.0	*-7.1*	*-3.7*	-2.3	*-23.5*	*-1.2*	-12.0	*-17.8*	*5.0*	-96.1	*—*	*5.7*	22.1	*-27.5*	*5.0*
ASML Holding NV ASML NL	**6,287** EUR	**7.4**	***4.1***	***9.7***	**22.1**	***0.2***	***22.0***	**17.8**	***-1.0***	***28.1***	**136.0**	***-27.6***	***44.0***	**—**	***50.0***	***4.6***

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Comparable Company Analysis

These companies are chosen by the analyst and the data are shown by nearest calendar year in descending market capitalization order.

Profitability Analysis

Company/Ticker	Last Historical Year Net Income (Mil)	Gross Margin % 2015	2016(E)	2017(E)	EBITDA Margin % 2015	2016(E)	2017(E)	Operating Margin % 2015	2016(E)	2017(E)	Net Margin % 2015	2016(E)	2017(E)	Free Cash Flow Margin % 2015	2016(E)	2017(E)
Canon Inc CAJ USA	220,209 JPY	50.9	*49.5*	*48.2*	16.5	*15.1*	*15.2*	9.4	*7.7*	*7.9*	5.8	*5.1*	*5.5*	5.8	*7.9*	*8.7*
Average		50.9	*49.5*	*48.2*	16.5	*15.1*	*15.2*	9.4	*7.7*	*7.9*	5.8	*5.1*	*5.5*	5.8	*7.9*	*8.7*
ASML Holding NV ASML NL	**1,387** EUR	**46.1**	***44.7***	***46.0***	**29.6**	***28.5***	***30.8***	**24.9**	***24.0***	***26.6***	**22.1**	***20.9***	***24.1***	**26.3**	***17.3***	***22.7***

Leverage Analysis

Company/Ticker	Last Historical Year Total Debt (Mil)	Debt/Equity % 2015	2016(E)	2017(E)	Debt/Total Cap % 2015	2016(E)	2017(E)	EBITDA/Interest Exp. 2015	2016(E)	2017(E)	Total Debt/EBITDA 2015	2016(E)	2017(E)	Assets/Equity 2015	2016(E)	2017(E)
Canon Inc CAJ USA	1,569 JPY	0.1	*0.1*	*0.1*	0.1	*0.1*	*0.1*	1,076.3	*819.1*	*794.1*	0.0	*0.0*	*0.0*	1.5	*1.5*	*1.5*
Average		0.1	*0.1*	*0.1*	0.1	*0.1*	*0.1*	1,076.3	*819.1*	*794.1*	—	—	—	1.5	*1.5*	*1.5*
ASML Holding NV ASML NL	**1,130** EUR	**13.5**	***12.6***	***11.5***	**11.9**	***11.2***	***10.3***	**112.8**	***51.5***	***61.1***	**0.6**	***0.6***	***0.5***	**1.6**	***1.5***	***1.5***

Liquidity Analysis

Company/Ticker	Market Cap (Mil)	Cash per Share 2015	2016(E)	2017(E)	Current Ratio 2015	2016(E)	2017(E)	Quick Ratio 2015	2016(E)	2017(E)	Cash/Short-Term Debt 2015	2016(E)	2017(E)	Payout Ratio % 2015	2016(E)	2017(E)
Canon Inc CAJ USA	31,004 USD	580.22	*673.40*	*786.31*	2.52	*2.56*	*2.57*	1.91	*1.97*	*2.00*	920.95	*1,062.23*	*1,223.98*	79.3	*70.0*	*70.0*
Average		580.22	*673.40*	*786.31*	2.52	*2.56*	*2.57*	1.91	*1.97*	*2.00*	920.95	*1,062.23*	*1,223.98*	79.3	*70.0*	*70.0*
ASML Holding NV ASML NL	**40,961** EUR	**5.68**	***6.02***	***7.31***	**2.48**	***2.60***	***2.58***	**1.65**	***1.72***	***1.76***	**585.40**	***614.93***	***12.83***	**21.8**	***33.1***	***27.0***

Research Methodology for Valuing Companies

Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, in-depth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss short-term market-price movements), but we believe these negatives are mitigated by deep analysis and our long-term approach.

Morningstar, Inc. and its affiliates ("Morningstar", "we", "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk-adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our single-point star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

To assess the sustainability of excess profits, analysts perform ongoing assessments of the moat trend. A firm's moat trend is positive in cases where we think its sources of competitive advantage are growing stronger; stable where we don't anticipate changes to competitive advantages over the next several years; or negative when we see signs of deterioration.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in working-capital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total pres-

Morningstar Research Methodology for Valuing Companies

Research Methodology for Valuing Companies

ent value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty around that fair value estimate
Morningstar's Uncertainty Rating captures a range of likely potential intrinsic values for a company and uses it to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating represents the analysts' ability to bound the estimated value of the shares in a company around the Fair Value Estimate, based on the characteristics of the business underlying the stock, including operating and financial leverage, sales sensitivity to the overall economy, product concentration, pricing power, and other company-specific factors.

Analysts consider at least two scenarios in addition to their base case: a bull case and a bear case. Assumptions are chosen such that the analyst believes there is a 25% probability that the company will perform better than the bull case, and a 25% probability that the company will perform worse than the bear case. The distance between the bull and bear cases is an important indicator of the uncertainty underlying the fair value estimate.

Our recommended margin of safety widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the estimated value of the equity, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the uncertainty rating provides guidance in portfolio construction based on risk tolerance.

Our uncertainty ratings for our qualitative analysis are low, medium, high, very high, and extreme.

- ►**Low:** margin of safety for 5-star rating is a 20% discount and for 1-star rating is 25% premium.
- ►**Medium:** margin of safety for 5-star rating is a 30% discount and for 1-star rating is 35% premium.
- ►**High:** margin of safety for 5-star rating is a 40% discount and for 1-star rating is 55% premium.
- ►**Very High:** margin of safety for 5-star rating is a 50% discount and for 1-star rating is 75% premium.
- ►**Extreme:** Stock's uncertainty exceeds the parameters we have set for assigning the appropriate margin of safety.

4. Market Price
The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more detail information about our methodology, please go to http://global.morningstar.com/equitydisclosures

Morningstar Star Rating for Stocks
Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time, generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

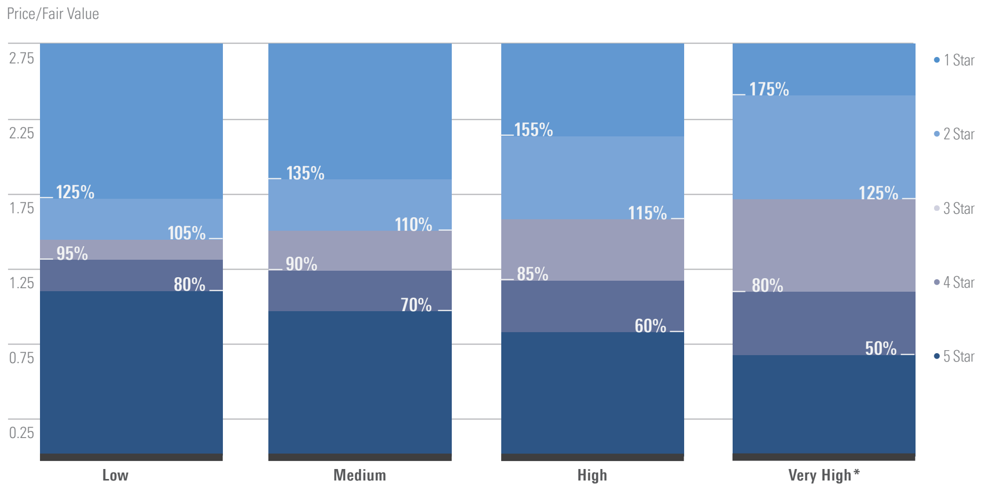
The Morningstar Star Ratings for stocks are defined below:

Five Stars ★★★★★
We believe appreciation beyond a fair risk-adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

Four Stars ★★★★
We believe appreciation beyond a fair risk-adjusted return is likely.

Three Stars ★★★
Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

Morningstar Research Methodology for Valuing Companies



* Occasionally a stock's uncertainty will be too high for us to estimate, in which case we label it Extreme.

Research Methodology for Valuing Companies

Two Stars ★★
We believe investors are likely to receive a less than fair risk-adjusted return.

One Star ★
Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions:

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Stewardship Rating: Represents our assessment of management's stewardship of shareholder capital, with particular emphasis on capital allocation decisions. Analysts consider companies' investment strategy and valuation, financial leverage, dividend and share buyback policies, execution, compensation, related party transactions, and accounting practices. Corporate governance practices are only considered if they've had a demonstrated impact on shareholder value. Analysts assign one of three ratings: "Exemplary," "Standard," and "Poor." Analysts judge stewardship from an equity holder's perspective. Ratings are determined on an absolute basis. Most companies will receive a Standard rating, and this is the default rating in the absence of evidence that managers have made exceptionally strong or poor capital allocation decisions.

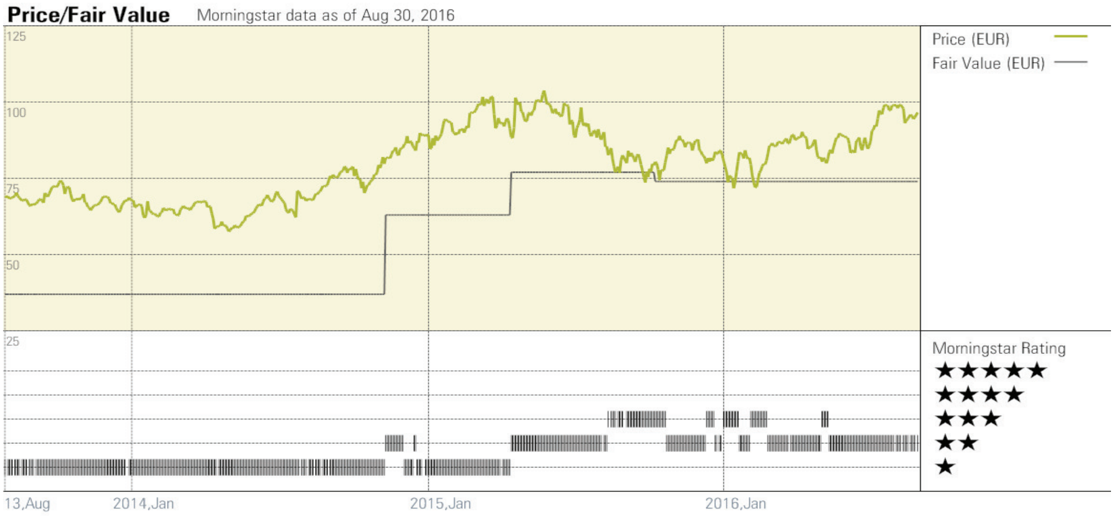
Quantitative Valuation: Using the below terms, intended to denote the relationship between the security's Last Price and Morningstar's quantitative fair value estimate for that security.

- **Undervalued:** Last Price is below Morningstar's quantitative fair value estimate.
- **Farily Valued:** Last Price is in line with Morningstar's quantitative fair value estimate.
- **Overvalued:** Last Price is above Morningstar's quantitative fair value estimate.

Risk Warning
Please note that investments in securities are subject to market and other risks and there is no assurance or guarantee that the intended investment objectives will be achieved. Past performance of a security may or may not be sustained in future and is no indication of future performance. A security investment return and an investor's principal value will fluctuate so that, when redeemed, an investor's shares may be worth more or less than their original cost. A security's current investment performance may be lower or higher than the investment performance noted within the report. Morningstar's Uncertainty Rating serves as a useful data point with respect to sensitivity analysis of the assumptions used in our determining a fair value price.

ASML Holding NV ASML (XAMS) | ★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors



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ASML Holding NV ASML (XAMS) | ★★

Last Price	Fair Value	Uncertainty	Economic Moat™	Moat Trend™	Stewardship	Industry Group
96.64 EUR	74.00 EUR	Medium	Narrow	Positive	Standard	Semiconductors

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