Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
342.37 USD 12 Oct 2022	620.00 USD 13 Oct 2022 19:24, UTC	0.52	44.33 USD Bil 12 Oct 2022	Wide	Stable	High	Exemplary	5 Oct 2022 05:00, UTC

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

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

[1]The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Lam Research Poised to Suffer From Latest Export Restrictions to China; Lowering FVE to $620

Analyst Note Abhinav Davuluri, CFA, Sector Strategist, 13 Oct 2022

We are lowering our fair value estimate for wide-moat Lam Research to $620 per share from $720 after incorporating recent export restrictions and weaker wafer fab equipment, or WFE, expectations for 2023. On Oct. 12, close peer Applied Materials lowered its fiscal fourth-quarter revenue outlook by $400 million due to the latest export restrictions intended to curb China's chip ambitions and ability to advance its military technology. We expect Lam to also be negatively impacted given its dominance in 3D NAND equipment and exposure to Yangtze Memory Technologies, or YMTC, China's NAND champion that is a qualified vendor for 128-layer 3D NAND for Apple's iPhones sold in China. We had already reduced our NAND equipment sales outlook for Lam stemming from Micron's recent capital expenditure cuts for its fiscal 2023, but we are further lowering our 2023 WFE assumptions as TSMC has also cut its capital expenditure budget for 2022 (from $40 billion to $36 billion) and is likely to reduce spending in 2023, in our view. While shares of Lam are undervalued at current levels, we think market conditions will remain volatile for several quarters as the firm navigates uncertainty related to export restrictions and tepid demand in 2023.

Lam generates about 32% of its sales from China, with roughly half of this revenue derived from domestic Chinese chipmakers (and the other half from multi-national customers such as TSMC, Samsung, and SK Hynix). This amounts to about $2.6 billion in revenue in fiscal 2022. We assume most of Lam's equipment sales to domestic Chinese chipmakers are for NAND and DRAM, which are likely to be impacted as well given the ban includes 128-layer and above 3D NAND and 18-nm and below DRAM. We think Lam will cease sales to these

Financial Summary and Key Statistics

	Actual		Forecast	
	2021	2022	2023	2024
Revenue (USD Mil)	14,626	17,227	16,076	15,140
Revenue Growth %	45.6	17.8	-6.7	-5.8
Operating Income (Mil)	4,482	5,382	4,740	4,103
Operating Margin %	30.6	31.2	29.5	27.1
Adjusted EBITDA (Mil)	4,789	5,716	5,098	4,429
Adjusted EBITDA Margin %	32.7	33.2	31.7	29.3
Earnings Per Share (Diluted) (USD)	26.90	32.75	29.41	25.79
Adjusted Earnings Per Share (Diluted) (USD)	27.25	33.11	29.86	26.34
Adjusted EPS Growth %	71.0	21.5	-9.8	-11.8
Price/Earnings	23.9	12.9	10.9	12.3
Price/Book	15.7	9.5	5.2	4.4
EV/EBITDA	19.4	10.3	9.0	10.3
Free Cash Flow Yield %	3.5	4.4	6.4	8.7

Source: Morningstar Valuation Model. Data as of 13 Oct 2022.

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Sector	Industry
Technology	Semiconductor Equipment & Materials

Business Description

Lam Research manufactures equipment used to fabricate semiconductors. The firm is focused on the etch, deposition, and clean markets, which are key steps in the semiconductor manufacturing process, especially for 3D NAND flash storage, advanced DRAM, and leading-edge logic/foundry chipmakers. Lam's flagship Kiyo, Vector, and Sabre products are sold in all major geographies to key customers such as Samsung Electronics, Micron, Intel, and Taiwan Semiconductor Manufacturing.

customers until it receives licenses or more guidance on its ability to ship to certain customers.

We believe the export restrictions from the U.S. Department of Commerce are more focused on leading-edge equipment. Consequently, we suspect Lam may be able to recover some of the lost sales in subsequent quarters, though it remains unclear where the U.S. government will draw the line (memory chips are used in all end markets including military applications).

Business Strategy & Outlook Abhinav Davuluri, Sector Strategist, 13 Oct 2022

Lam Research is a major vendor of semiconductor fabrication tools. The firm is the leader in dry etch, a critical step in the chipmaking process where material is selectively removed. We believe Lam has a wide economic moat as a result of cost advantages and intangible assets related to equipment design. Lam's leadership position creates scale advantages that fuel research and development spending at levels only Applied Materials and Tokyo Electron can match. At the end of 2021, Lam had an installed base of 75,000 units, up from 40,000 in 2015. This large installed base creates stickiness and offers Lam an intimate look into problems faced by chipmakers, providing valuable information it can use to implement solutions and additional capabilities in future tools.

Chipmakers that have continued along the trajectory prescribed by Moore's law have endured significant challenges in terms of cost and complexity. Equipment providers are vital to making the pursuit more economical via advanced chip manufacturing tools. Lam has benefited from the sharp rise in etch, deposition, and clean steps required as a result of major inflections, including FinFET transistors and planar to 3D NAND, that feature multiple patterning and vertical layers well suited for Lam's advanced etch and deposition offerings. Consequently, Lam is poised to grow faster than the overall equipment industry, as we think it can capture a larger share of the market with technically superior tools.

The volatile nature of demand for semiconductors directly affects the cyclicality of the equipment market. Lam, along with its peers, has benefited from an increase in service revenue in recent years, which we believe will mitigate the volatility of equipment orders. Specifically, maintenance and engineering costs and spare parts are tied into service contracts, that deliver a stable revenue stream distinct from tool purchases. As traversing Moore's law becomes increasingly difficult, we expect the service segment will grow as chipmakers increase their reliance on field service engineers from Lam and its peers, while also helping entrench vendors' installed base of tools at customer facilities.

Bulls Say Abhinav Davuluri, Sector Strategist, 13 Oct 2022

- Lam is a leader in the dry etch and deposition markets and counts major chipmakers, such as Samsung Electronics and Taiwan Semiconductor Manufacturing, as customers.
- Lam has achieved superior share gains in recent years due to its strong equipment offerings in etch and deposition, combined with the 3D NAND and multiple patterning inflections that require more of those particular tools.
- Demand is strong for advanced etch and deposition tools, because they help chipmakers continue down the path prescribed by Moore's law.

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Bears Say Abhinav Davuluri, Sector Strategist, 13 Oct 2022

- Lam faces competition from Applied Materials and Tokyo Electron, and would lose market share should it lose its technological edge to either firm.
- The firm operates in the cyclical semiconductor equipment industry.
- The rise of EUV lithography has the potential to curb growth in the multiple-patterning opportunity that has greatly benefited Lam in recent years.

Fair Value and Profit Drivers Abhinav Davuluri, Sector Strategist, 13 Oct 2022

Our fair value estimate is $620 per share, supported by a strong outlook for wafer fab equipment spending longer term. Our fair value estimate assumes an adjusted forward price/earnings ratio of 21 times. Lam Research enjoyed meaningful growth over the past few years via share gains in etch and deposition. That said, we do not believe Lam will be immune to weaker equipment spending or export restrictions to China, leading to fiscal 2023 and 2024 sales declining 7% and 6%, respectively. Thereafter, we believe the firm has enough levers to drive future growth, stemming from the continued progression to greater layer-counts in 3D NAND and foundry/logic transitions to the 5- and 3-nanometer process nodes that require additional multiple patterning steps (even as EUV lithography is adopted). Lam has capitalized on an expanded serviceable market attributed to recent technology inflections related to vertical scaling (3D NAND and fin field-effect transistors) that rely heavily on advanced etch and deposition tools. However, we note Lam has already benefited immensely from the initial planar to 3D NAND conversion and share gains from 2016 to 2018. We expect revenue to grow at a 6% CAGR from fiscal 2022 to fiscal 2027. We believe Lam will maintain a gross margin in the mid-40% range, while operating margins will remain around 30%.

Economic Moat Abhinav Davuluri, Sector Strategist, 13 Oct 2022

We believe Lam Research has a wide economic moat, thanks to cost advantages and intangible assets. We view the scale and resources required to compete for the business of leading-edge manufacturers as major barriers to entry, with firms such as Lam boasting R&D cost advantages over smaller peers. We also believe that incumbent tool providers have intangible assets related to equipment design derived from service contracts and customer collaboration during process development and subsequent high-volume manufacturing. Taken together, these two sources of competitive advantage allow leading equipment firms to earn excess returns on invested capital over extended periods of time.

Lam is the market leader in dry etch and a prominent player in the deposition segment of the wafer fab equipment, or WFE, industry. Deposition equipment applies thin-film layers to surfaces while etching selectively removes material. The combination of these two is critical during the chip fabrication process, along with photolithography, which produces the mask that exposes areas for materials to be deposited or removed. Lam provides customers with some of the most advanced tools in these segments, and its leadership position creates scale advantages that fuel research and development spending at levels only Applied Materials and Tokyo Electron can match. At the end of 2021, Lam had an installed base of 75,000 units, up from 40,000 in 2015. This large installed base creates stickiness that helps Lam maintain its leadership position in key process steps for

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chipmakers' process flows. It also offers Lam an intimate look into problems faced by chipmakers, providing valuable information it can use to implement solutions and additional capabilities in future tools.

The latest technological advances in WFE allow chipmakers to traverse along the pathway prescribed by Moore's law. Specifically, Gordon Moore's tenet claims that the number of transistors on the same area of silicon will double every two years (roughly), with process technology accounting for about 30% of the total innovation associated with Moore's law. Advances in lithography have been critical in the doubling of functionality or performance of a chip at the same cost.

However, the pursuit of Moore's law has become increasingly more challenging (both technologically and economically). Traditional immersion lithography approached its limits years ago and chipmakers adopted nonlitho workarounds, such as multiple patterning that features more advanced etch and deposition tools from the likes of AMAT, Lam Research, and Tokyo Electron.

From 2014 to 2019, Lam's end-market exposure was roughly two thirds memory (DRAM and NAND) and one-third logic/foundry. The introduction of 3D NAND during this time period was a major inflection in flash storage as chipmakers scaled vertically to increase capacity (as opposed to solely shrinking feature sizes). The increase in layer count from first-generation 32 layers to 128 layers more recently has led to significantly greater demand for advanced deposition and etch tools from Lam, AMAT, and Tokyo Electron. While we still expect the NAND and DRAM opportunities for Lam to continue to rise, we don't think the firm will enjoy the same type of success it did during the initial shift from planar to 3D NAND that drove Lam's top-line growth in fiscal 2017 and 2018 to 36% and 38%, respectively.

We note that memory capital spending has historically been more volatile than logic and foundry capital expenditure, as evidenced by the precipitous fall in memory equipment demand in 2019, and Lam's heavy exposure to the memory market and concentration in the competitive etch and deposition markets (relative to lithography or process diagnostic control) was a material concern for our assessment of the firm's economic moat. Specifically, during bouts of oversupply in the memory space, the market would often find itself in a race to the bottom as lower-tier memory chipmakers would struggle financially and larger players could purchase equipment and fab space at attractive prices (Micron buying Inotera in 2015, for example). Past downturns made it difficult for equipment firms to maintain the virtuous cycle of catering to leading-edge chipmakers while simultaneously investing in advanced technologies. With the consolidation of both WFE suppliers and chipmakers (leading-edge semiconductor manufacturing is dominated by a smaller cohort that includes Intel, Samsung, TSMC, Micron, and SK Hynix, we think the WFE market is now more supportive of maintained and resilient excess returns.

The transition to 10-nanometer and below processes at logic and foundry customers has significantly increased the number of multiple patterning-related process steps, which subsequently expanded Lam's served addressable market. Lam has capitalized by gaining share in many of the critical process steps, thus improving its competitive positioning. In 2015, Lam released a press release noting its current mainstream Kiyo etch platform for logic and foundry processes "was successful in expanding its applications base at the 10-nanometer node by greater than five-fold over the previous node at a leading U.S. logic manufacturer." We believe this customer is Intel, and with the leading chipmaker finally ramping its 10-nm process in earnest in 2019 (along with foundries such as TSMC and Samsung also spending heavily), Lam enjoyed growth in its aggregate logic and foundry revenue of 76%. This helped soften the blow of a weaker memory environment (Lam's total DRAM and NAND sales fell 35%), leading to a roughly even split between memory and logic/foundry sales for Lam in calendar 2019. Going forward, we have greater confidence in Lam's ability to drive a healthier mix of logic, foundry, and memory sales, that we think will allow Lam to bridge the gap in scale with wide-moat Applied Materials.

From an end-market perspective, large and mature markets such as PCs and smartphones have begun to make way for steady growth from wired and wireless infrastructure as well as servers/data centers (cloud buildouts). Emerging opportunities involving artificial intelligence, 5G, semi- and fully autonomous vehicles, and the broader "Internet of Things" collectively give us confidence in maintained semiconductor demand, especially as these broader end markets have more varied performance, efficiency, and connectivity requirements.

When chipmakers operate numerous fabs around the world, maximizing throughput and reducing process variability across their fleet of tools are top priorities. We believe incumbent tool providers, such as Lam Research, also have intangible assets derived from service contracts and customer collaboration during process development and subsequent high-volume manufacturing. Field service engineers that are on-site at customer fabs help troubleshoot high-value problems to improve yields and output, ultimately driving productivity and reducing cost. We believe a positive feedback loop is subsequently created in which top equipment vendors leverage existing relationships and insights into future customer technology needs to ultimately design and offer superior equipment. Furthermore, the resultant virtuous cycle cannot easily be replicated by potential new entrants.

Lam's customer support business group, or CSBG, includes spares, services, upgrades, and its Reliant business that helps customers in lagging-edge chip manufacturing refurbish older tools (some having seen 30-plus years of service) for applications such as Internet of Things that may not need the high performance often found in a PC or iPhone. We assume Lam's CSBG business accounts for about 20% of total revenue and is poised to grow faster than Lam's installed base (management anticipates a revenue CAGR of at least 9% from 2019 to 2023.

Spares revenue is comparable to an annuity stream from every chamber (each tool will have multiple chambers to simultaneously process more than one wafer) in Lam's installed base, and ranges from consumables to parts recleaning/recoating, repairs, and refurbishments. As artificial intelligence progresses, we expect Lam and its peers will be able to optimize chamber, tool, and fleet performance leading to less variability, higher yields, and thus more value for the customer. Upgrade revenue has been growing 50% faster than the installed base, with upgrades being either technology or productivity driven. Lastly, the Reliant specialty technologies subgroup has been growing 2 to 3 times faster than WFE (with overall specialty technology WFE at $6.2 billion in 2019 and on pace to reach $10 billion by 2023).

Moat Trend Abhinav Davuluri, Sector Strategist, 21 Apr 2022

We view Lam's moat trend as stable. We remain positive on the firm's ability to adroitly spend on research and development to augment its leadership positions, specifically in dry etch and certain deposition subgroups. However, we think various industry dynamics (shift to extreme ultraviolet lithography and away from multiple patterning, maturation of 3D NAND, and potential for disruption in traditional chip scaling) better support a stable trend rating from our prior view of positive.

With single-exposure lithography reaching its physical limit, chipmakers have resorted to other methods to continue shrinking dimensions along the cadence prescribed by Moore's law. Multiple patterning, which involves one lithography and multiple deposition and etch steps to define a single layer, has come to the forefront as the preferred technique in the cutting-edge technologies. As a result, Lam has benefited greatly from the heightened requirement for advanced etch and deposition tools. However, with EUV finally being inserted into high-volume manufacturing at the 7-nanometer process node, we believe chipmakers will be able to return to single patterning processes for some layers to simplify the process flow and thus curb the multiple patterning growth that Lam, AMAT, and Tokyo Electron have enjoyed in recent years. Beyond the overall growth in equipment sold, Lam and its peers also benefited from a larger process window and thus more intimate understanding of the challenges faced by chipmakers that would create a feedback loop into R&D for future tools.

To help offset the potential decline in etch and deposition share, Lam has begun pursuing another portion of the lithography supply chain: depositing the photoresist in EUV patterning. Tokyo Electron is the current leader in the $2 billion conventional wet resist patterning market. Lam has been working alongside ASML and the Interuniversity Microelectronics Centre, a leading semiconductor international research organization, to develop dry resist technology that would double Lam’s participation in the EUV process stack while also growing Lam’s SAM in resist (which it doesn’t currently serve). Management has quantified the revenue opportunity as $1.5 billion over five years.

The 3D NAND inflection in flash storage has also required advanced deposition and etch tools, resulting in greater share gains for Lam in recent years and SAM expansion. However, following a step function increase in spending with the initial transition from planar to 3D NAND, we expect more incremental growth in Lam’s addressable markets in memory. DRAM also featured some multiple patterning steps (though not as much as logic/foundry). However, with chipmakers expected to adopt EUV for some process steps in DRAM, Lam’s etch and deposition opportunity in DRAM may also begin to plateau.

By 2023, Lam anticipates another 4% to 8% share growth in both etch and deposition segments by capturing share in new critical steps via added capabilities and disrupting existing process steps via enhanced productivity. Management estimates that Lam’s served addressable market will be above 40% of WFE by 2023, underscoring its expectations for its core end markets and new opportunities. In dry etch, Lam has been the clear leader for the past 20 years, and we expect it to extend this leadership with its latest Sense.i etch tool for both advanced memory and logic.

The firm has also been investing aggressively into atomic layer deposition, or ALD, since 2012. ALD tools are used by chipmakers to produce thin and conformal films on wafers with precise control of thickness and composition

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at an atomic level. Traditionally employed only when absolutely needed because of how costly the equipment is (and lengthy process times), ALD tools are now increasingly being used as a result of continued scaling in line with Moore's law. Specifically, 3D architectures in memory and advanced logic and foundry require layers that are highly uniform. We note that no-moat ASM International is the current leader in ALD, but we expect Lam to encroach on its leadership in the coming years. Additionally, Lam has been striving to expand ALD adoption into areas dominated by older, more conventional processes such as furnaces, high-pressure chemical vapor deposition, and physical deposition. Many of these conventional segments are dominated by the likes of Applied Materials or smaller equipment suppliers.

Risk and Uncertainty Abhinav Davuluri, Sector Strategist, 21 Apr 2022

We assign a high uncertainty rating to Lam. In 2021, five firms accounted for over 70% of the equipment market. This consolidation is a result of the enormous investments required to build today's state-of-the-art semiconductors. Additionally, the cyclical nature of the chip industry is a threat to equipment makers, as capital expenditures for customers can be highly volatile. Lam competes with the likes of Applied Materials and Tokyo Electron, both of which have invested heavily to improve their products in etch to lessen Lam's technological lead. Thus, the firm must maintain a large R&D budget throughout business cycles to keep up with the latest trends in chip manufacturing, which could be challenging during downturns. Any lapse in innovation in the segments in which Lam competes could result in failure to defend key positions in customers' process flows. Meanwhile, the recent adoption of EUV in high-volume manufacturing at logic and foundry customers could negatively affect Lam's etch and deposition sales related to multiple patterning. Furthermore, the substantial equipment spending in 3D NAND in recent years could result in excess capacity, leading to a slowdown in Lam's sales to this end market (as occurred in 2019).

On the environmental, social, and governance front, we do not foresee any material issues on the horizon. Perhaps the greatest risk is the potential scarcity of experienced engineering talent within the industry, though we think Lam has an effective human capital management program. Lam and its peers have formed strong research partnerships with customers and align their product development activities with their process technology roadmaps, which could create potential IP risk. Furthermore, given the significant consolidation in the equipment industry, many recent proposed M&A deals have failed due to anti-competitive concerns. Future M&A is likely to be highly scrutinized and bears a low chance of being successful, in our view.

Financial Strength Abhinav Davuluri, Sector Strategist, 13 Oct 2022

Lam is in a solid financial position. As of March 27, 2022, the firm had $4.2 billion in cash and equivalents, versus $5.0 billion in long-term debt. The firm typically keeps a substantial cash position on its balance sheet, which we believe is appropriate for chip equipment firms. During cyclical downturns, the cash cushion allows Lam to continue investing heavily in research and development in order to maintain its leading technology and competitive positions.

Capital Allocation Abhinav Davuluri, Sector Strategist, 21 Apr 2022

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We assign Lam Research with an Exemplary capital allocation rating. The rating reflects our assessments of a sound balance sheet, exceptional investments associated with the firm's strategy and execution, and attractive and appropriate shareholder distribution policies. Lam raised its quarterly dividend in 2021 to $1.50 in addition to its ongoing share repurchases.

Lam has a sound balance sheet along with a reasonable financing policy. The firm has made a couple of significant acquisitions over the past decade-plus that we view as financially and strategically reasonable. In 2008, Lam made a cash purchase of SEZ for $483 million, net of cash acquired, in order to diversify from etch tools into the adjacent clean equipment market. We think the acquisition has worked out well, as management has streamlined SEZ's operations and Lam has achieved significant technology synergies with SEZ. In 2012, Lam acquired Novellus, a top supplier of deposition tools, in a $3.3 billion all-stock deal. We think the deal was strategically sound, and management has successfully executed its plans for incorporating Novellus, specifically its electrochemical deposition products.

In October 2015, Lam announced that it intended to acquire KLA-Tencor in a $10.6 billion cash/stock deal. However, the deal fell through roughly a year later because of regulatory concerns. While our overall view of the deal was positive, the supplier power commanded by the joint entity likely would have spurned customers. We expect Lam to focus on organic growth going forward, with the exception for opportunistic tuck-in M&A.

In December 2018, Lam announced that Tim Archer would be promoted to CEO from president and COO after former CEO Martin Anstice resigned due to allegations of misconduct. Archer was appointed president in January 2018 after serving solely as COO since June 2012, following Lam's acquisition of Novellus. We note Archer was designated to succeed Anstice, according to the board of directors' succession plan, though these allegations of misconduct accelerated the transition. Anstice had been CEO since January 2012, replacing Stephen Newberry, after joining Lam in 2001, and the firm was very successful in growing its presence in the wafer fabrication equipment space during his tenure. Newberry remains chairman.

We applaud Archer's efforts as COO. He played a major role in leading Lam's services business, where service sales are typically 3 times the cost of a piece of equipment over its lifetime and offer a solid annuity-like revenue stream for the firm. CFO Doug Bettinger joined Lam in February 2013, taking over from Ernest Maddock. Bettinger was previously the CFO of Avago Technologies.

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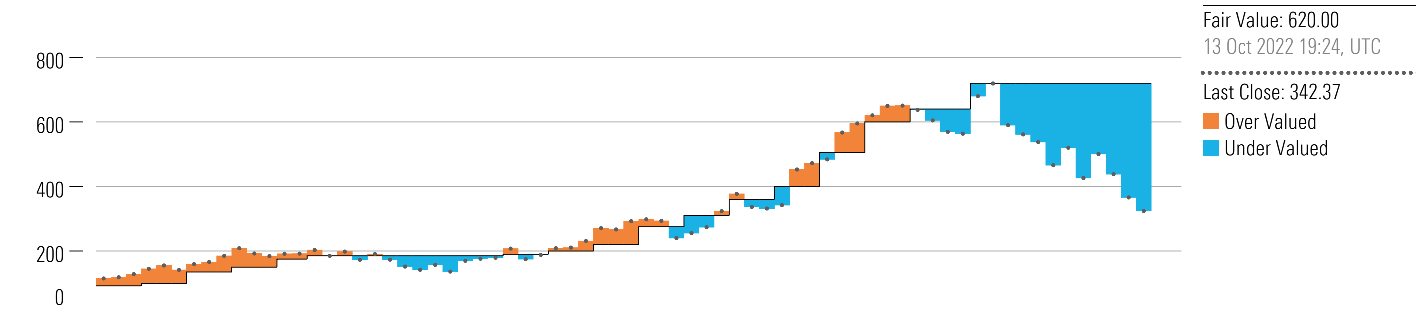
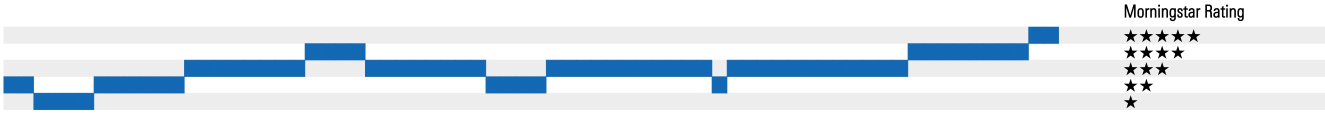
Price vs. Fair Value



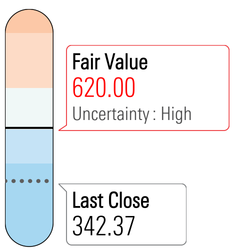
	2017	2018	2019	2020	2021	YTD	
	1.23	0.74	1.33	1.18	1.00	0.52	Price/Fair Value
	75.84	-23.96	118.04	63.19	53.46	-54.29	Total Return %

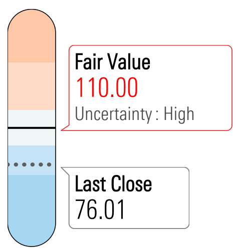
Morningstar Rating

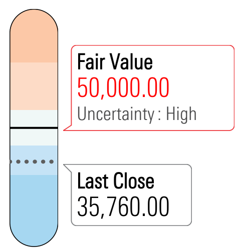


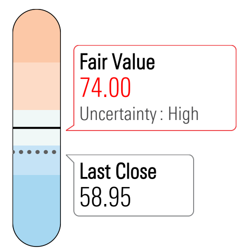
Competitors

	Lam Research Corp LRCX	Applied Materials Inc AMAT	Tokyo Electron Ltd 8035	ON Semiconductor Corp ON









	Lam Research Corp LRCX	Applied Materials Inc AMAT	Tokyo Electron Ltd 8035	ON Semiconductor Corp ON
Economic Moat	Wide	Wide	Narrow	Narrow
Moat Trend	Stable	Stable	Stable	Stable
Currency	USD	USD	JPY	USD
Fair Value	620.00 13 Oct 2022 19:24, UTC	110.00 13 Oct 2022 19:24, UTC1	50,000.00 13 Oct 2022 19:24, UTC2	74.00 13 Oct 2022 19:24, UTC3
1-Star Price	961.00	170.50	77,500.00	114.70
5-Star Price	372.00	66.00	30,000.00	44.40
Assessment	Significantly Undervalued 12 Oct 2022	Under Valued 12 Oct 2022	Under Valued 12 Oct 2022	Under Valued 12 Oct 2022
Morningstar Rating	★★★★★13 Oct 2022 19:29, UTC	★★★★12 Oct 2022 23:46, UTC	★★★★13 Oct 2022 16:57, UTC	★★★★12 Oct 2022 21:17, UTC
Analyst	Abhinav Davuluri, Sector Strategist	Abhinav Davuluri, Sector Strategist	Abhinav Davuluri, Sector Strategist	William Kerwin, Analyst
Capital Allocation	Exemplary	Exemplary	Standard	Standard
Price/Fair Value	0.52	0.69	0.72	0.80
Price/Sales	2.64	2.69	2.71	3.45
Price/Book	7.06	5.42	4.16	4.74
Price/Earnings	9.89	10.18	12.92	15.31
Dividend Yield	1.92%	1.32%	4.31%	—
Market Cap	44.33 Bil	65.39 Bil	5,465.26 Bil	25.54 Bil
52-Week Range	322.31—731.85	74.97—167.06	34,550.00—69,170.00	41.88—76.78
Investment Style	Large Core	Large Core	Large Core	Mid Growth

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Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
342.37 USD 12 Oct 2022	620.00 USD 13 Oct 2022 19:24, UTC	0.52	44.33 USD Bil 12 Oct 2022	Wide	Stable	High	Exemplary	5 Oct 2022 05:00, UTC

Morningstar Valuation Model Summary

Financials as of 13 Oct 2022	Actual			Forecast				
Fiscal Year, ends 30 Jun	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Revenue (USD Mil)	10,045	14,626	17,227	16,076	15,140	18,011	20,668	23,355
Operating Income (USD Mil)	2,674	4,482	5,382	4,740	4,103	5,315	6,353	7,453
EBITDA (USD Mil)	2,942	4,789	5,716	5,098	4,429	5,688	6,772	7,924
Adjusted EBITDA (USD Mil)	2,942	4,789	5,716	5,098	4,429	5,688	6,772	7,924
Net Income (USD Mil)	2,252	3,908	4,605	4,022	3,491	4,560	5,459	6,475
Adjusted Net Income (USD Mil)	2,376	3,960	4,657	4,084	3,565	4,648	5,566	6,587
Free Cash Flow To The Firm (USD Mil)	1,795	3,076	2,454	2,337	3,738	3,475	4,373	5,309
Weighted Average Diluted Shares Outstanding (Mil)	149	145	141	137	135	134	133	132
Earnings Per Share (Diluted) (USD)	15.10	26.90	32.75	29.41	25.79	34.01	41.09	49.16
Adjusted Earnings Per Share (Diluted) (USD)	15.94	27.25	33.11	29.86	26.34	34.67	41.89	50.00
Dividends Per Share (USD)	4.60	5.20	5.80	6.26	6.42	6.58	6.75	6.91

Margins & Returns as of 13 Oct 2022		Actual			Forecast					
	3 Year Avg	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**5 Year Avg**
Operating Margin %	29.5	26.6	30.6	31.2	29.5	27.1	29.5	30.7	31.9	29.8
EBITDA Margin %	—	29.3	32.7	33.2	31.7	29.3	31.6	32.8	33.9	—
Adjusted EBITDA Margin %	31.7	29.3	32.7	33.2	31.7	29.3	31.6	32.8	33.9	31.9
Net Margin %	25.3	22.4	26.7	26.7	25.0	23.1	25.3	26.4	27.7	25.5
Adjusted Net Margin %	25.9	23.7	27.1	27.0	25.4	23.5	25.8	26.9	28.2	26.0
Free Cash Flow To The Firm Margin %	17.7	17.9	21.0	14.2	14.5	24.7	19.3	21.2	22.7	20.5

Growth & Ratios as of 13 Oct 2022		Actual			Forecast					
	3 Year CAGR	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**5 Year CAGR**
Revenue Growth %	21.3	4.1	45.6	17.8	-6.7	-5.8	19.0	14.8	13.0	6.3
Operating Income Growth %	29.7	8.5	67.6	20.1	-11.9	-13.4	29.5	19.5	17.3	6.7
EBITDA Growth %	0.0	—	—	—	—	—	—	—	—	0.0
Adjusted EBITDA Growth %	27.3	6.1	62.8	19.3	-10.8	-13.1	28.4	19.0	17.0	6.8
Earnings Per Share Growth %	31.5	—	—	—	—	—	—	—	—	8.6
Adjusted Earnings Per Share Growth %	31.5	9.5	71.0	21.5	-9.8	-11.8	31.7	20.8	19.4	8.6

Valuation as of 13 Oct 2022	Actual			Forecast				
	2020	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Price/Earnings	20.3	23.9	12.9	10.9	12.3	9.3	7.7	6.5
Price/Sales	4.7	6.3	3.4	2.8	2.9	2.5	2.1	1.9
Price/Book	9.3	15.7	9.5	5.2	4.4	3.4	2.6	2.0
Price/Cash Flow	24.4	28.6	22.9	15.6	11.5	11.9	9.6	7.9
EV/EBITDA	15.9	19.4	10.3	9.0	10.3	8.0	6.7	5.8
EV/EBIT	17.5	20.7	11.0	9.6	11.1	8.6	7.2	6.1
Dividend Yield %	1.4	0.8	1.4	1.9	2.0	2.0	2.1	2.1
Dividend Payout %	30.5	19.3	17.7	21.3	24.9	19.4	16.4	14.1
Free Cash Flow Yield %	4.1	3.5	4.4	6.4	8.7	8.4	10.4	12.7

Operating Performance / Profitability as of 13 Oct 2022	Actual			Forecast				
Fiscal Year, ends 30 Jun	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
ROA %	17.0	25.7	27.8	23.5	19.6	22.9	23.7	23.7
ROE %	45.5	69.7	74.9	54.6	37.7	40.0	37.6	34.8
ROIC %	34.1	48.3	43.1	31.4	25.5	31.1	33.3	35.6

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Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

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Financial Leverage

Fiscal Year, ends 30 Jun	Actual			Forecast				
	2020	2021	2022	2023	2024	2025	2026	2027
Debt/Capital %	52.8	45.4	44.4	37.2	33.2	26.1	18.7	15.2
Assets/Equity	2.8	2.6	2.7	2.0	1.8	1.7	1.5	1.4
Net Debt/EBITDA	-0.3	-0.2	0.2	0.2	-0.2	-0.4	-0.7	-1.0
Total Debt/EBITDA	2.0	1.0	0.9	1.0	1.1	0.8	0.6	0.5
EBITDA/ Net Interest Expense	16.6	23.0	30.9	29.1	25.3	32.5	42.0	61.9

Key Valuation Drivers as of 13 Oct 2022

Cost of Equity %	9.0
Pre-Tax Cost of Debt %	5.5
Weighted Average Cost of Capital %	8.8
Long-Run Tax Rate %	13.0
Stage II EBI Growth Rate %	5.0
Stage II Investment Rate %	16.7
Perpetuity Year	20

Additional estimates and scenarios available for download at https://pitchbook.com/.

Discounted Cash Flow Valuation as of 13 Oct 2022

	USD Mil
Present Value Stage I	14,617
Present Value Stage II	40,607
Present Value Stage III	29,997
Total Firm Value	**85,220**
Cash and Equivalents	3,658
Debt	-5,006
Other Adjustments	-1,000
Equity Value	**82,872**
Projected Diluted Shares	137
Fair Value per Share (USD)	**620.00**

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Income Statement (USD)	Actual			Forecast				
Fiscal Year, ends 30 Jun	2020	2021	2022	2023	2024	2025	2026	2027
Revenue (Mil)	**10,045**	**14,626**	**17,227**	**16,076**	**15,140**	**18,011**	**20,668**	**23,355**
Cost of Goods Sold (Mil)	5,436	7,821	9,355	8,949	8,554	9,996	11,471	12,904
Gross Profit (Mil)	**4,609**	**6,805**	**7,872**	**7,127**	**6,586**	**8,015**	**9,197**	**10,451**
Selling, General, Administrative & Other Expenses (Mil)	682	830	886	773	788	836	869	904
Advertising & Marketing Expenses	—	—	—	—	—	—	—	—
Research & Development	—	—	—	—	—	—	—	—
Depreciation & Amortization (if reported separately) (Mil)	0	0	0	—	—	—	—	—
Adjusted Operating Income (Mil)	**2,674**	**4,482**	**5,382**	**4,740**	**4,103**	**5,315**	**6,353**	**7,453**
Financial Non-Cash (Gains)/Losses (Mil)	0	0	0	0	0	0	0	0
Irregular Cash (Gains)/Losses (Mil)	0	0	0	0	0	0	0	0
Operating Income (Mil)	**2,674**	**4,482**	**5,382**	**4,740**	**4,103**	**5,315**	**6,353**	**7,453**
Net Interest Expense (Mil)	99	111	189	117	90	74	78	10
Income Tax Expense (Mil)	323	462	588	601	522	681	816	968
After-Tax Items (Mil)	0	0	0	0	0	0	0	0
(Minority Interest) (Mil)	—	—	—	0	0	0	0	0
Net Income (Mil)	**2,252**	**3,908**	**4,605**	**4,022**	**3,491**	**4,560**	**5,459**	**6,475**
Adjusted Net Income (Mil)	**2,376**	**3,960**	**4,657**	**4,084**	**3,565**	**4,648**	**5,566**	**6,587**
Weighted Average Diluted Shares Outstanding (Mil)	149	145	141	137	135	134	133	132
Diluted Earnings Per Share	**15.10**	**26.90**	**32.75**	**29.41**	**25.79**	**34.01**	**41.09**	**49.16**
Diluted Adjusted Earnings Per Share	**15.94**	**27.25**	**33.11**	**29.86**	**26.34**	**34.67**	**41.89**	**50.00**
Dividends Per Common Share (USD)	4.60	5.20	5.80	6.26	6.42	6.58	6.75	6.91
EBITDA (Mil)	**2,942**	**4,789**	**5,716**	**5,098**	**4,429**	**5,688**	**6,772**	**7,924**
Adjusted EBITDA (Mil)	**2,942**	**4,789**	**5,716**	**5,098**	**4,429**	**5,688**	**6,772**	**7,924**

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Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
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Key Cash Flow Items (USD)	Actual			Forecast as of 13 Oct				
Fiscal Year, ends 30 Jun	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Cash from Working Capital (Mil)	-396	-586	-1,663	-1,286	272	-907	-884	-875
(Capital Expenditures) (Mil)	-203	-349	-546	-482	-454	-540	-620	-701
Depreciation (Mil)	202	237	256	322	303	360	413	467
Amortization (Mil)	66	71	78	37	23	13	6	3
Net New (Investment), Organic (Mil)	**-599**	**-833**	**-2,094**	**-1,824**	**145**	**-1,162**	**-1,160**	**-1,179**
(Purchases)/Sales of Companies & Assets (Mil)	0	0	0	0	0	0	0	0
Net New (Investment), Total (Mil)	**-599**	**-833**	**-2,094**	**-1,824**	**145**	**-1,162**	**-1,160**	**-1,179**
Other Non-Cash Items, From Cash Flows (Mil)	73	53	33	37	23	13	6	3
Free Cash Flow to the Firm (Mil)	**1,795**	**3,076**	**2,454**	**2,337**	**3,738**	**3,475**	**4,373**	**5,309**

Balance Sheet (USD)	Actual			Forecast				
Fiscal Year, ends 30 Jun	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Assets								
Cash and Equivalents (Mil)	4,915	4,418	3,522	3,893	5,684	6,712	8,371	11,761
Inventory (Mil)	1,900	2,689	3,966	3,794	3,627	4,238	4,863	5,471
Accounts Receivable (Mil)	2,097	3,026	4,314	4,026	3,791	4,510	5,175	5,848
Net Property, Plant and Equipment (Mil)	1,071	1,303	1,648	1,808	1,960	2,140	2,347	2,580
Goodwill (Mil)	1,484	1,490	1,515	1,515	1,515	1,515	1,515	1,515
Other Intangibles (Mil)	169	132	102	65	42	29	24	20
Other Operating Assets (Mil)	400	460	1,742	1,625	1,531	1,821	2,090	2,361
Non-Operating Assets (Mil)	727	1,061	252	252	252	252	252	252
Total Assets (Mil)	**14,559**	**15,892**	**17,196**	**17,114**	**18,536**	**21,352**	**24,772**	**29,943**
Liabilities								
Accounts Payable (Mil)	592	830	1,011	967	925	1,080	1,240	1,395
Debt (Mil)	5,811	5,002	5,006	4,998	4,998	4,498	3,748	3,748
Other Operating Liabilities (Mil)	2,972	4,034	4,900	2,705	2,547	3,030	3,477	3,929
Non-Operating Liabilities (Mil)	0	0	0	0	0	0	0	0
Total Liabilities (Mil)	**9,376**	**9,865**	**10,917**	**8,670**	**8,470**	**8,609**	**8,465**	**9,072**
Equity								
Shareholders' Equity (Mil)	5,183	6,027	6,278	8,444	10,066	12,743	16,307	20,871
Minority Interest (Mil)	0	0	0	0	0	0	0	0
Total Equity (Mil)	**5,183**	**6,027**	**6,278**	**8,444**	**10,066**	**12,743**	**16,307**	**20,871**

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Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

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Management & Ownership

Management Activity as of 31 Mar 2022

Name	Position	Share Held	Report Date*	Insider Activity
Abhijit Y. Talwalkar	Chairman of the Board	15,079	31 Mar 2022	477
Ava M. Hahn	Senior Vice President, Chief Legal Officer and Secretary	5,610	31 Mar 2022	5,614
Patrick J. Lord	Executive Vice President, CSBG and Global Operations	13,667	31 Mar 2022	25,667
Richard A. Gottscho	Executive Vice President and Chief Technology Officer	26,629	31 Mar 2022	32,421
Vahid Vahedi	Senior Vice President and General Manager, Etch Business Unit	25,469	31 Mar 2022	30,592
Seshasayee Varadarajan	Senior Vice President and General Manager, Deposition Business Unit	24,722	31 Mar 2022	32,109
Timothy M. Archer	Director, President and Chief Executive Officer	99,754	31 Dec 2022	168,090
Eric K. Brandt	Independent Director	27,852	31 Dec 2021	377
Leslie F. Varon	Independent Director	1,902	31 Dec 2021	377
Michael R. Cannon	Independent Director	17,747	31 Dec 2021	377

Fund Ownership as of 30 Sep 2022

Top Owners	% of Shares Held	% of Fund Assets	Change (k)	Portfolio Date
2ndVote Advisers LIF Index	20.13	0.64	0	30 Jun 2022
2ndVote Advisers SDI Index	10.03	0.34	0	30 Jun 2022
Vanguard US Total Market Shares ETF	3.01	0.15	1,249,049	31 Aug 2022
Vanguard Total Stock Market Index Fund	3.01	0.15	7,722	31 Aug 2022
Vanguard Instl Ttl Stck Mkt Idx Tr	2.99	0.16	4,090,395	30 Jun 2022
Concentrated Holders				
ABAKUS New Growth Stocks	0.00	6.49	0	31 Aug 2022
FT Value Line Target 25 1Q 2021	0.00	6.44	6	8 Apr 2022
Yuanta Gbl 5G&NexGen Telcmnctn Cmpn ETF	0.01	6.28	-3,565	31 Dec 2021
IVZ Buyback Leaders 2020-1	0.00	6.15	0	14 Jan 2022
Columbia Seligman Technology Growth	0.83	5.88	-124,575	30 Jun 2022

Institutional Transactions as of 30 Sep 2022

Top 5 Buyers	% of Shares Held	% of Fund Assets	Shrs Bought/Sold (k)	Portfolio Date
T. Rowe Price Associates, Inc.	0.90	0.07	949,749	30 Jun 2022
Artisan Partners Limited Partnership	0.61	0.61	841,514	30 Jun 2022
Viking Global Investors LP	0.51	1.35	694,026	30 Jun 2022
Sands Capital Management, LLC	1.37	2.77	564,607	30 Jun 2022
Aspex Management (HK) Ltd	0.42	6.19	510,000	30 Jun 2022
Top 5 Sellers				
Coatue Management LLC	0.00	—	-860,025	31 Mar 2022
FMR Inc	3.73	0.22	-701,029	30 Jun 2022
GQG Partners LLC	0.00	—	-688,500	31 Mar 2022
Morgan Stanley - Brokerage Accounts	0.49	0.05	-545,133	31 Mar 2022
D. E. Shaw & Co LP	0.01	0.00	-361,677	30 Jun 2022

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

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Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

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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.

Valuation Analysis as of 13 Oct 2022	**Price/Earnings**			**EV/EBITDA**			**Price/Free Cash Flow**			**Price/Book**			**Price/Sales**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	20.0	10.1	14.9	16.1	8.3	12.2	25.8	11.7	11.0	10.3	5.0	4.1	5.3	2.6	3.1
Tokyo Electron Ltd 8035	22.6	10.8	12.3	14.8	7.1	7.9	43.3	15.2	11.0	7.3	3.5	3.1	4.9	2.4	2.6
ON Semiconductor Corp ON	23.0	11.1	11.8	15.9	8.1	7.9	22.0	14.6	13.0	6.6	3.9	3.0	4.4	3.1	3.0
Average	21.9	10.7	13.0	15.6	7.8	9.3	30.4	13.8	11.7	8.1	4.1	3.4	4.9	2.7	2.9
Lam Research Corp LRCX	**12.9**	**10.9**	**12.3**	**10.3**	**9.0**	**10.3**	**22.9**	**15.6**	**11.5**	**9.5**	**5.2**	**4.4**	**3.4**	**2.8**	**2.9**

Returns Analysis as of 13 Oct 2022	**ROIC %**			**Adjusted ROIC %**			**Return on Equity %**			**Return on Assets %**			**Dividend Yield %**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	49.1	42.9	30.7	39.4	35.0	25.0	51.6	50.0	29.2	24.4	24.1	15.4	0.7	1.3	1.4
Tokyo Electron Ltd 8035	35.9	34.4	27.5	35.9	34.4	27.5	36.9	35.4	26.5	26.3	25.6	19.9	2.2	4.7	4.1
ON Semiconductor Corp ON	17.5	28.4	27.5	14.1	22.8	22.3	24.9	37.4	27.9	11.0	19.3	16.3	—	—	—
Average	34.2	35.2	28.6	29.8	30.7	24.9	37.8	40.9	27.9	20.6	23.0	17.2	1.5	3.0	2.8
Lam Research Corp LRCX	**43.1**	**31.4**	**25.5**	**38.0**	**28.3**	**23.2**	**74.9**	**54.6**	**37.7**	**27.8**	**23.5**	**19.6**	**1.4**	**1.9**	**2.0**

Growth Analysis as of 13 Oct 2022	**Revenue Growth %**			**EBIT Growth %**			**EPS Growth %**			**FCF Growth %**			**DPS Growth %**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	34.1	10.2	-17.4	65.0	5.1	-32.7	64.2	10.2	-32.2	43.9	4.8	15.0	8.1	5.0	5.0
Tokyo Electron Ltd 8035	43.2	17.3	-7.8	86.9	16.4	-12.7	79.9	19.0	-12.6	1129.9	571.7	39.2	79.6	18.5	-12.6
ON Semiconductor Corp ON	28.2	23.3	3.6	228.0	99.2	-1.8	247.1	79.3	-5.3	56.0	84.9	10.2	—	—	—
Average	35.2	16.9	-7.2	126.6	40.2	-15.7	130.4	36.2	-16.7	409.9	220.5	21.5	29.2	7.8	-2.5
Lam Research Corp LRCX	**17.8**	**-6.7**	**-5.8**	**20.1**	**-11.9**	**-13.4**	**21.5**	**-9.8**	**-11.8**	**-20.2**	**-4.8**	**59.9**	**11.5**	**8.0**	**2.5**

Profitability Analysis as of 13 Oct 2022	**Gross Margin %**			**EBITDA Margin %**			**Operating Margin %**			**Net Margin %**			**FCF Margin %**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	47.3	46.3	44.5	32.9	31.9	26.4	31.2	29.8	24.3	27.3	25.7	21.0	20.7	22.1	28.4
Tokyo Electron Ltd 8035	45.5	45.6	44.5	31.8	31.7	30.6	29.9	29.7	28.1	21.8	22.2	21.1	11.3	15.5	23.3
ON Semiconductor Corp ON	40.3	49.3	48.0	29.0	40.3	39.5	20.2	32.7	30.9	19.4	27.4	24.9	19.8	21.0	22.9
Average	44.4	47.1	45.7	31.2	34.6	32.2	27.1	30.7	27.8	22.8	25.1	22.3	17.3	19.5	24.9
Lam Research Corp LRCX	**45.7**	**44.3**	**43.5**	**33.2**	**31.7**	**29.3**	**31.2**	**29.5**	**27.1**	**27.0**	**25.4**	**23.5**	**14.8**	**17.7**	**25.5**

Leverage Analysis as of 13 Oct 2022	**Debt/Equity %**			**Debt/Total Cap %**			**EBITDA/Net Int. Exp**			**Total Debt/EBITDA**			**Asset/Equity**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	44.5	41.5	34.1	30.8	29.3	25.4	32.2	35.7	24.4	0.7	0.7	1.0	2.1	2.0	1.8
Tokyo Electron Ltd 8035	0.0	0.0	0.0	0.0	0.0	0.0	—	—	—	0.0	0.0	0.0	1.4	1.4	1.3
ON Semiconductor Corp ON	67.1	45.2	34.4	40.1	31.1	25.6	15.0	35.7	69.0	1.6	0.9	0.9	2.1	1.8	1.6
Average	37.2	28.9	22.8	23.6	20.1	17.0	23.6	35.7	46.7	0.8	0.5	0.6	1.9	1.7	1.6
Lam Research Corp LRCX	**79.7**	**59.2**	**49.7**	**44.4**	**37.2**	**33.2**	**30.9**	**29.1**	**25.3**	**0.9**	**1.0**	**1.1**	**2.7**	**2.0**	**1.8**

Liquidity Analysis as of 13 Oct 2022	**Cash per Share**			**Current Ratio**			**Quick Ratio**			**Cash/Short-Term Debt**			**Payout Ratio %**		
Company/Ticker	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)	2022	2023(E)	2024(E)
Applied Materials Inc AMAT	5.4	4.7	9.3	2.5	2.5	3.3	1.9	1.7	2.5	—	—	—	14.7	13.5	21.0
Tokyo Electron Ltd 8035	2,145.5	2,795.6	4,556.1	3.0	3.4	3.9	2.0	2.3	2.8	—	—	—	50.2	50.0	50.0
ON Semiconductor Corp ON	3.0	6.1	10.2	2.5	3.3	4.2	1.6	2.4	3.4	8.4	161.0	267.1	0.0	0.0	0.0
Average	8.4	9.8	15.4	2.7	3.4	3.9	1.8	2.4	3.0	121.4	40.3	69.6	20.7	21.2	24.0
Lam Research Corp LRCX	**25.0**	**28.5**	**42.0**	**2.7**	**4.4**	**4.3**	**1.8**	**3.0**	**3.2**	**477.2**	**—**	**11.4**	**17.7**	**21.3**	**24.9**

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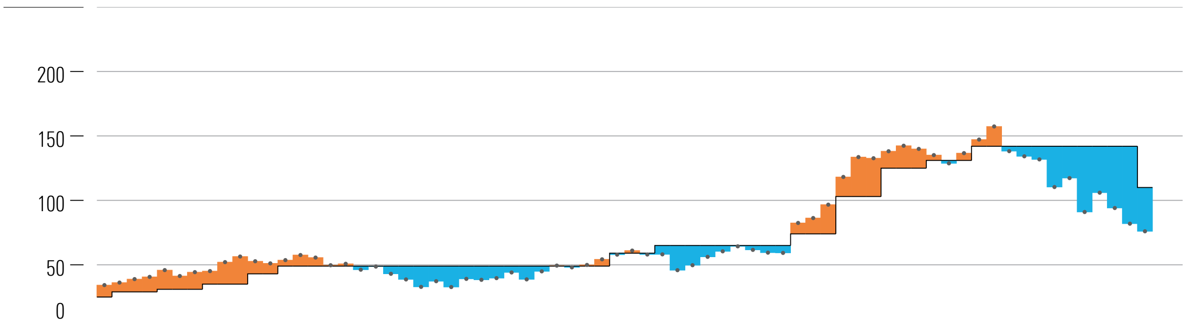
Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Competitors Price vs. Fair Value

Applied Materials Inc AMAT

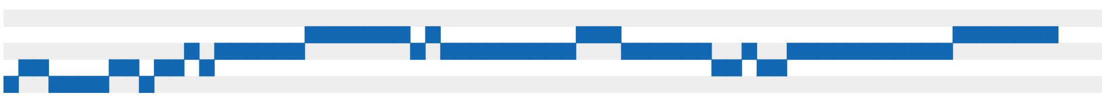


Fair Value: 110.00
12 Oct 2022 23:45, UTC

Last Close: 76.01
Over Valued
Under Valued

2017	2018	2019	2020	2021	YTD	
1.19	0.67	1.03	1.17	1.11	0.69	Price/Fair Value
59.65	-34.59	88.97	42.81	83.43	-51.21	Total Return %

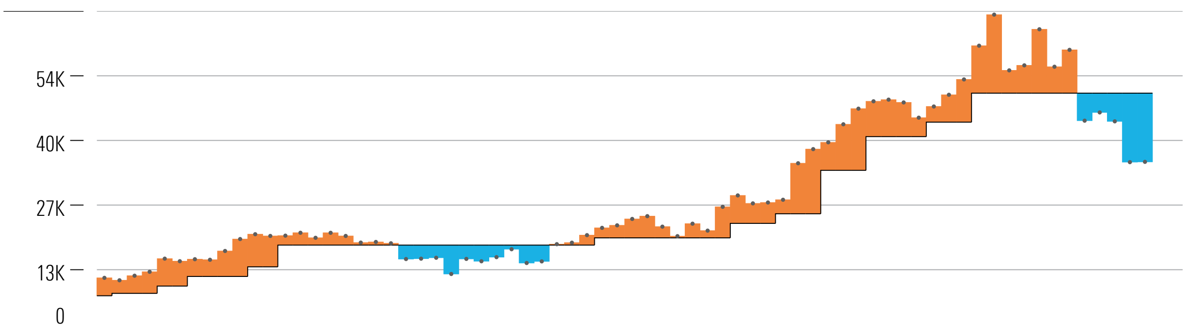
Morningstar Rating



★★★★★
★★★★
★★★
★★
★

Total Return % as of 12 Oct 2022. Last Close as of 12 Oct 2022. Fair Value as of 12 Oct 2022 23:45, UTC.

Tokyo Electron Ltd 8035

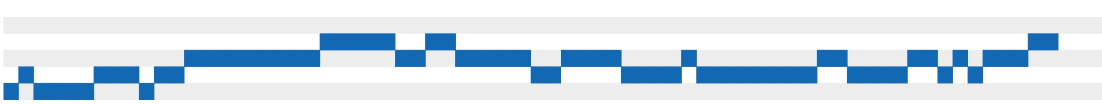


Fair Value: 50,000.00
12 Nov 2021 17:52, UTC

Last Close: 35,760.00
Over Valued
Under Valued

2017	2018	2019	2020	2021	YTD	
1.46	0.68	1.20	1.54	1.33	0.72	Price/Fair Value
89.23	-34.93	95.89	63.44	74.76	-44.23	Total Return %

Morningstar Rating



★★★★★
★★★★
★★★
★★
★

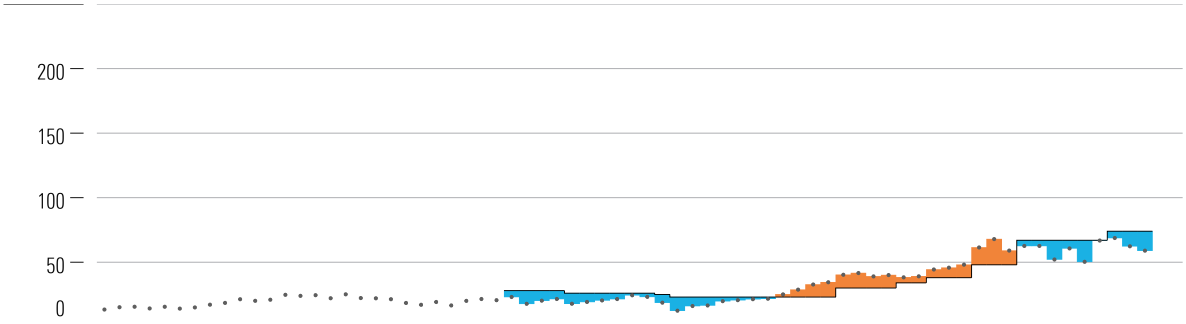
Total Return % as of 13 Oct 2022. Last Close as of 13 Oct 2022. Fair Value as of 12 Nov 2021 17:52, UTC.

Morningstar Equity Company Report | Report as of 13 Oct 2022 19:36, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Competitors Price vs. Fair Value (Continued)

ON Semiconductor Corp ON



Fair Value: 74.00
1 Aug 2022 17:59, UTC

Last Close: 58.95
Over Valued
Under Valued

2017	2018	2019	2020	2021	YTD	
—	—	0.94	1.42	1.42	0.80	Price/Fair Value
64.11	-21.16	47.67	34.25	107.52	-13.21	Total Return %

Morningstar Rating
★★★★★
★★★★
★★★
★★
★

Total Return % as of 12 Oct 2022. Last Close as of 12 Oct 2022. Fair Value as of 1 Aug 2022 17:59, UTC.

Recent Analyst Notes

Lam Shrugs Off Micron's Capital Expenditure Cut Plans with Strong Q4 Results and Q1 Outlook Abhinav Davuluri, CFA, Sector Strategist, 27 Jul 2022

Wide-moat Lam Research reported fiscal fourth-quarter results that came in ahead of our expectations. We note Lam and its peers have been dealing with supply chain constraints that have prevented equipment suppliers from fulfilling robust wafer fab equipment, or WFE, demand. Although Micron recently lowered its capital-expenditure outlook, Lam has benefited from greater exposure to foundry and logic chipmakers such as TSMC and Intel. Despite weaker PC and smartphone demand, Lam provided strong September quarter guidance, which we attribute to unfulfilled demand at logic/foundry customers. Looking ahead, we think WFE levels are likely to decline in 2023 mainly due to weaker memory capital expenditure spending. Our $720 fair value estimate is intact, and we think prospective investors should find current levels attractive based on Lam's favorable long-term prospects.

June quarter sales were up 12% year over year and 14% sequentially to $4.6 billion. Sequential increases in NAND, logic, and foundry equipment sales were partially offset by a decline in DRAM. We expect logic and foundry equipment revenue to improve in the coming quarters to support robust investment plans from the likes of Intel and TSMC. Services revenue was up 18% year over year. We believe this sticky business has proven instrumental in mitigating the volatility in Lam's results, relative to past down cycles, and is critical during the ongoing chip shortage as we expect customers are upgrading existing capacity to improve productivity. Gross margins rose 60 basis points sequentially to 45.3% due to improved execution as Lam deals with broad-based inflation in its supply chain.

Fiscal 2022 revenue rose 18% to $17.2 billion. We were impressed with Lam's full-year logic sales that more than doubled year over year to $1.6 billion, which we attribute to share gains for Lam's etch tools in Intel's latest process technologies. Management expects September quarter revenue to be at a midpoint of $4.9 billion.

March Quarter Supply Chain Woes Don't Constrain Our Long-Term Optimism for Wide-Moat Lam Research Abhinav Davuluri, CFA, Sector Strategist, 21 Apr 2022

Wide-moat Lam Research reported fiscal third-quarter results that came in below our expectations and the midpoint of management's guidance due to delays in system components and broad supply chain hurdles. Nonetheless, management remained confident that equipment demand is still robust and anticipates calendar 2022 wafer fab equipment, or WFE, spending of around $100 billion, which is consistent with our estimates. Supporting this growth in WFE are large 2022 capital expenditure budgets from TSMC ($44 billion) and Intel ($27 billion). Although Lam has historically had greater exposure to memory end markets, we think it has improved its foundry and logic design wins in recent years sufficiently to achieve healthy growth in 2022 once it is able to overcome supply chain headwinds. Our $720 fair value estimate remains intact, and we think prospective investors should find current levels attractive, particularly amidst the recent sell-off in technology stocks.

March quarter sales were up 6% year over year but down 4% sequentially to $4.1 billion. Sequential increases in NAND, DRAM, and logic equipment sales were more than offset by declines in the foundry end market, which we attribute to the timing of customer investments. We expect foundry equipment revenue to improve in the coming quarters to support robust investment plans from the likes of TSMC and its smaller peers. Services revenue was up 8% year over year but down 5% sequentially. We believe this sticky business has proven instrumental in mitigating the volatility in Lam’s results, relative to past down cycles, and is also critical during the ongoing chip shortage as we expect customers are upgrading existing capacity to improve productivity. Gross margins were down about 200 basis points sequentially to 44.7% due to higher costs related to supply chain headwinds, increased freight rates, and inflation. We expect these margin headwinds to persist over the coming quarters.

Lam Not Immune to Chip Shortage for Its Own Chipmaking Equipment in Fiscal Q2; Shares Undervalued

Abhinav Davuluri, CFA, Sector Strategist, 27 Jan 2022

Wide-moat Lam Research reported fiscal second-quarter results that came in below our expectations and the midpoint of management's guidance due to delays in system components and broad supply chain hurdles, similar to equipment peer ASML. Due to the component delays, December quarter sales fell short by more than $200 million. Nonetheless, management remains confident that equipment demand is still robust and anticipates calendar 2022 wafer fab equipment, or WFE, spending of around $100 billion, which is consistent with our estimates. Supporting this growth in WFE are large 2022 capital expenditure budgets from TSMC ($44 billion) and Intel ($25 billion to $28 billion). Although Lam has historically had greater exposure to memory end markets, we think it has improved its foundry and logic design wins in recent years sufficiently to achieve healthy growth in 2022 once it is able to overcome its aforementioned supply chain headwinds. Our $720 fair value estimate remains intact, and we think prospective investors should find current levels attractive, particularly amid the recent sell-off in technology stocks.

December quarter sales were up 22% year over year but down 2% sequentially to $4.2 billion, with sequential declines in NAND partially offset by sequential increases in DRAM and foundry system sales. Services revenue was up 8% sequentially. We believe this sticky business has proven instrumental in mitigating the volatility in Lam’s results, relative to past down cycles, and is also critical during the ongoing chip shortage as we expect customers are upgrading existing capacity to improve productivity. For calendar 2021, Lam's chamber count grew 13% year over year to about 75,000 units, with revenue per chamber up about 24% year over year. Gross margins were up about 90 basis points sequentially to 46.8% due to a more favorable product mix. Management expects March quarter revenue to be at a midpoint of $4.25 billion.

Lam Research Is Our Top Chip Equipment Pick; Raising FVE to $720 from $640 Abhinav Davuluri, CFA, Sector Strategist, 15 Nov 2021

We are raising our fair value estimate for wide-moat Lam Research to $720 per share from $640 based on our more bullish outlook for the firm’s revenue growth in 2022. Lam is the market leader in etch, a critical material removal step in the chipmaking process. The firm has benefited from the sharp rise in etch and deposition steps required due to major inflections, including 3D structures across all chip types, but especially 3D NAND. Although the firm has historically had material exposure to memory chipmakers, we're impressed by its increasing share at logic and foundry customers. We believe Lam is poised to outgrow the overall WFE industry, as we think it can capture a larger share of the market with technically superior tools, particularly in etch, while striking a better balance between memory and foundry/logic end markets, in addition to enjoying continued strength in China. Specifically, we think Lam will increase its equipment revenue at an 11% compound annual rate over the next five years, whereas we think the WFE market will grow at a 9% CAGR over the same time frame.

Beyond Lam's established dominance in etch, we see growth opportunities for the firm in atomic layer deposition and photoresist patterning to support EUV lithography. We don't believe the market is fully appreciating Lam's opportunities to gain share in these new areas or the strong WFE growth potential for 2022 and beyond. We think investors looking for exposure to the semiconductor market and its promising avenues for growth (artificial intelligence, 5G, auto, cloud,) should find the WFE space highly attractive, as every chip is made with tools from the likes of Lam.

Lam Research Enjoys Sixth Straight Quarter of Sequential Growth; Shares Look Undervalued Abhinav Davuluri, CFA, Sector Strategist, 21 Oct 2021

Wide-moat Lam Research reported fiscal first-quarter results that came in consistent with our expectations, led by strength in equipment sales to DRAM and logic chipmakers. We appreciate the fact that Lam has become more diversified in end-market exposure, whereas historically Lam’s equipment sales were more memory-centric. Based on large capital expenditure budgets at TSMC and Intel for 2021 and the coming years, we expect Lam to experience solid growth in logic and foundry for the foreseeable future, though we note there will be some quarter-to-quarter lumpiness. Concerning memory, management expects DRAM to be up in the second half of calendar 2021 versus the first half, whereas NAND is expected to be more balanced half on half. Our $640 fair value estimate is intact and we think prospective investors should find current levels attractive.

September quarter sales were up 4% sequentially to $4.3 billion, with DRAM and logic strength more than offsetting sequential declines in NAND and foundry sales. Services revenue was flat sequentially. We believe this sticky business has proven instrumental in mitigating the volatility in Lam’s results, relative to past down cycles, and is also critical during the ongoing chip shortage as we expect customers are upgrading existing capacity to improve productivity. Gross margins were effectively flat from the prior quarter at 46%.

Management expects December quarter revenue to be at a midpoint of $4.4 billion. Similar to ASML, Lam is also dealing with supply chain challenges that are negatively impacting revenue and gross margins, with unmet demand expected to persist into next year. We think the equipment market is likely to grow again in 2022 due to the ongoing global chip shortage and the increasing global push towards domestic chipmaking capabilities to mitigate the concentration risk of Asia-based foundries (that currently hold the lion’s share of advanced fabs).

Morningstar Equity Company Report | Report as of 13 Oct 2022 19:36, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 21 of 25

Lam Research Corp LRCX ★★★★★ 13 Oct 2022 19:29, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
342.37 USD 12 Oct 2022	620.00 USD 13 Oct 2022 19:24, UTC	0.52	44.33 USD Bil 12 Oct 2022	Wide	Stable	High	Exemplary	5 Oct 2022 05:00, UTC

Record Fiscal Q4 for Lam Research Thanks to Impressive Equipment Demand; Raising FVE to $640 Abhinav Davuluri, CFA, Sector Strategist, 29 Jul 2021

Wide-moat Lam Research reported fiscal fourth-quarter results that came in ahead of our expectations, led by sales to NAND and foundry chipmakers. We appreciate that Lam has become more diversified in end-market exposure, whereas historically Lam's equipment sales were more memory-centric. Based on large capital expenditure budgets at TSMC and Intel as well as improved memory spending, we now think the wafer fab equipment market will be up 30% in 2021 (up from 20%). After incorporating Lam's guidance for the September quarter ($4.3 billion in revenue at the midpoint) and positive outlook for calendar 2021, we raise our fair value estimate to $640 per share from $600. Shares look modestly undervalued at current levels.

June quarter sales were up 8% sequentially to $4.1 billion, as foundry sales were up 17% over the prior quarter. Revenue from China grew 25% sequentially, which we attribute to both domestic and multinational chipmakers with fabs in the country. Services revenue was up 6% sequentially. We believe this sticky business has proven instrumental in mitigating the volatility in Lam's results, relative to past down cycles, and is also critical during the ongoing chip shortage as we expect customers are upgrading existing capacity to improve productivity. Gross margins were effectively flat from the prior quarter at 46%.

We think management's positive outlook makes sense based on customer capex plans to assuage the global chip shortage and increasing global focus of domestic chipmaking capabilities to mitigate the concentration risk of Asia-based foundries. Lam and its equipment peers are poised to benefit from the heightened equipment demand related to secular trends such as AI, 5G, and the Internet of Things as well as the short-term chip supply shortages. However, the localization of supply chains will likely increase the inefficiency of the semiconductor industry that in turn increases the long-term risk of a cyclical downturn due to overcapacity.

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, indepth 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 shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm approach.

Morningstar's equity research group ("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 singlepoint 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.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

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 workingcapital 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.

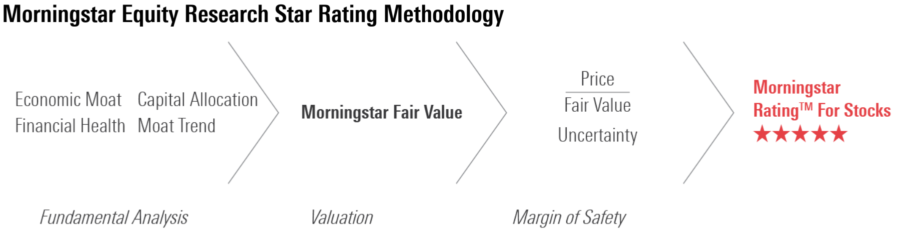
Stage III: Perpetuity

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 present 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 Equity Research Star Rating Methodology



Morningstar Equity Company Report | Report as of 13 Oct 2022 19:36, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Research Methodology for Valuing Companies

Morningstar's Uncertainty Rating is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future outcomes for the intrinsic value of a company, and anything that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

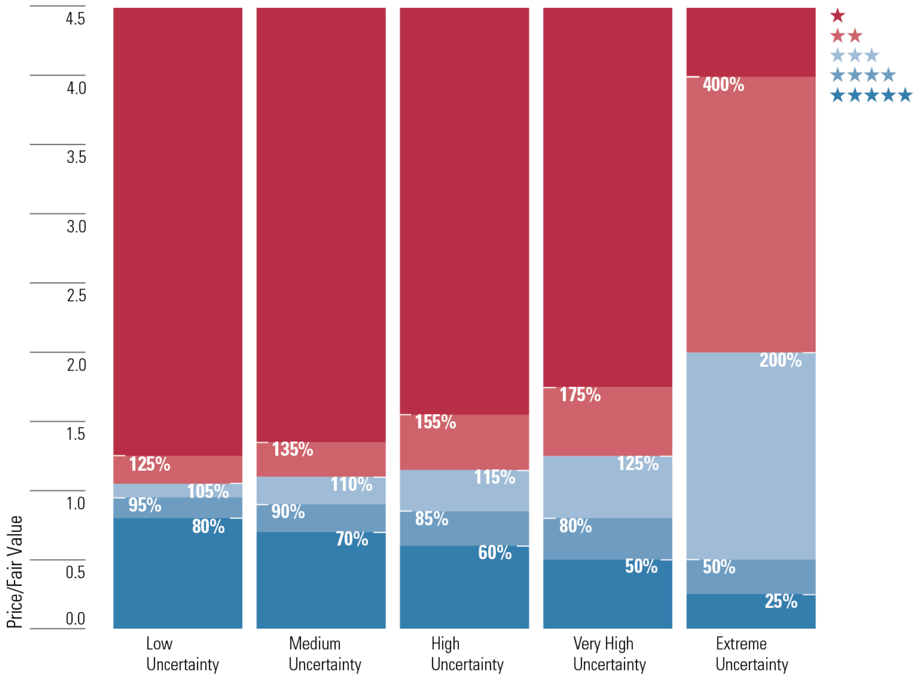
Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, the greater the discount we require relative 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 are: Low, Medium, High, Very High, and Extreme.

Qualitative Analysis Uncertainty Ratings	Margin of Safety ★★★★★Rating	★Rating
Low	20% Discount	25% Premium
Medium	30% Discount	35% Premium
High	40% Discount	55% Premium
Very High	50% Discount	75% Premium
Extreme	75% Discount	300% Premium

Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

Morningstar Equity Research Star Rating Methodology



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 details about our methodology, please go to https://shareholders.morningstar.com.

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:

★★★★★ 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.

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

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

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

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear

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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.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

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Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors.

Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

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