

## Semiconductors

### Moore's Bend: Transistor/CPU Inflection = "Bigger Chips" and Secular WFE Growth

March 17, 2022

#### Key Takeaway

Our analysis of transistor count in CPUs indicates a clear inflection associated with multi-core processors that we call "Moore's Bend." CPUs today have 4x the transistors than the original transistor curve predicted, and over the past 3-to-5 years CPU die sizes have increased by 5x-9x for INTC and Apple - supporting our thesis that demand for WFE is secular. We also observe that our SCE Index relative to the SPX is at the same level it bottomed at in 2018.

**Moore's Bend = Bigger Chips and Secular Demand for WFE.** Our analysis of transistor count per CPU shows a clear "bend" in the Transistor/CPU growth curve over the past 15 years. The historical Transistor/CPU growth curve established before multi-core processors started shipping would predict today's CPUs ship with 20bn transistors, but the new growth curve, and indeed data, indicate 80bn. Said another way, transistors/CPU are 4x higher in 2022 than the single-core CPU growth rate established between 1970 and 2000 would have predicted. We believe that this supports our SCE thesis that bigger chips are supporting secular growth in WFE

**"Bigger Chips" Case Study #1: Data Center CPUs.** Over the past 5 years, INTC's Xeon Server CPU has increased from the 300 sq mm "Broadwell" (2017) to 1,600 sq mm "Sapphire Rapids" (2022). This is a 5x increase over 5 years, or a 40% die size CAGR over the same period. INTC will need 5x the wafers to make the same number of Sapphire Rapids CPUs as it did its 2017 Broadwell CPU.

**"Bigger Chips" Case Study #2: Apple M1 ARM CPUs.** Over the past 3 years, Apple's M1 process has increased in size from its original 120 sq mm, to 250 sq mm for the M1 PRO, 430 sq mm for the M1 Max and most recently 860 sq mm for the M1 Ultra, 7x the size of the original M1. We estimate that it takes 9x the wafers to make the same number of M1 Ultras as the original M1 CPUs.

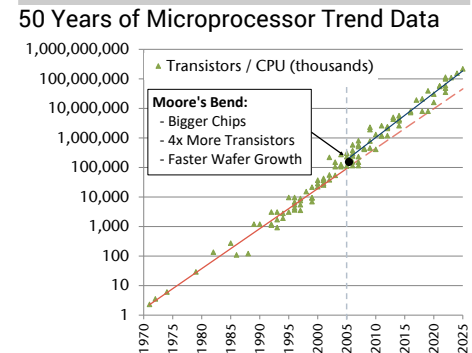
**CPU Wafer CAGR = 17%.** Due to increasing CPU die sizes, we estimate that the number of wafers required to make notebook, desktop and server CPUs will have increased at a 17% CAGR between 2017 and 2023 - well in excess of CPU unit growth of 2%.

**SCE Cycle Thoughts - Similar to 2018 Relative Bottom.** We observe that relative to the SPX, our index of SCE stocks bottomed in 2018 at 6% below the level of the mid-cycle correction. This is where that index is now.

**Be Greedy When Others are Fearful - Buy SCE Stocks.** We have also argued that the P/E ratios of many of our SCE stocks would ultimately expand to a 10%-20% premium to the market over the next 3-to-5 years due to 1) faster growth due to larger chips, 2) lower beta due to attenuating downward revisions, 2) higher profitability, improved cash flow margins and higher capital returns. Based on the current 25% discount to the market many of these stocks are trading at, we view the current risk-reward ratio as particularly compelling. We favor KLAC, AMAT, LRCX, ASML, Tokyo Electron and ACRM.



**Chart 1 - Moore's Bend: Transistors/CPU Inflection = Bigger Chips and Secular WFE Growth**



Source: Jefferies. Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten. New plot and data collected for 2010-2021 by K. Rupp.

#### Links to Related Research

[Initiate AMAT, KLAC, LRCX at Buy. Tectonic Shift to Growth + Expanding P/E](#)

[Semis on Fire: Semi-Cap Summary & Feedback \[Watch the Video\]](#)

[Semiconductor Peak-Cycle Handbook](#)

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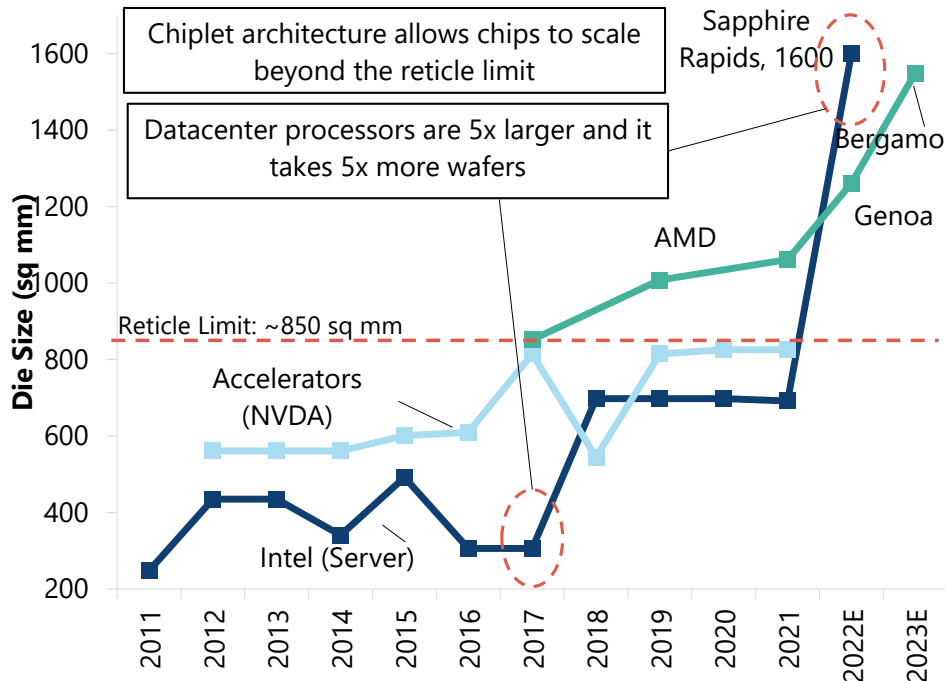
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Please see analyst certifications, important disclosure information, and information regarding the status of non-US analysts on pages 13 to 18 of this report.

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Chart 2 - Chiplet Architectures Enable Larger, Multi-Core CPUs - Driving WFE Demand



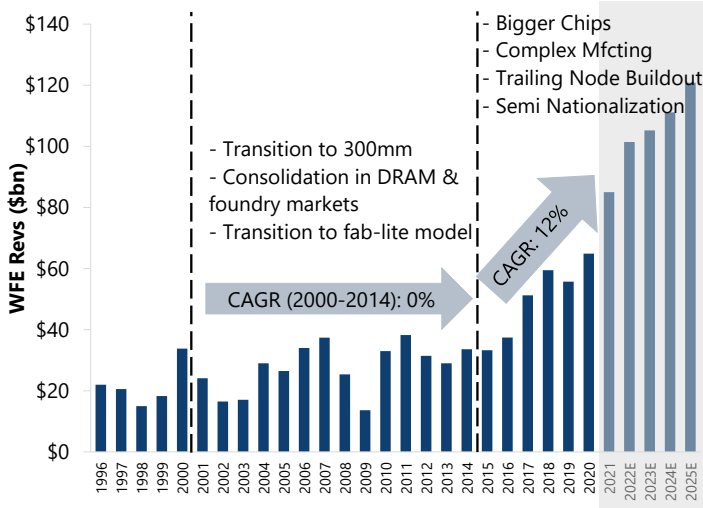
Source: Jefferies, Anandtech, wccftch.com, techpowerup.com, Company data

In our Jan-2022 Semi-Cap Equipment initiation note (link [here](#)), we argued that starting in 2017, market demand shifted to larger, multi-core CPUs, which consequently transitioned the wafer fab equipment (WFE) industry to secular, growth-cyclical from ex-growth, pure cyclical

In our original note, we showed the progression of die size increases of datacenter processors from INTC and NVDA made from monolithic die. Those processors approached the "reticle limit" (aka photomask) of about 850 sq mm, represented by the red dashed line on the chart to the left

In this updated chart, we show that "chiplet" architectures are extending the growth of processor die size well past the reticle limit of 850 sq mm. The new data gives us increased conviction in our thesis that WFE demand is now on a secular growth trajectory due to the demand of larger, multi-core processors

Chart 3 - WFE Has Seen a Secular, Tectonic Shift to Growth



Source: Gartner, Jefferies

We view "Bigger Chips" as the primary driver of secular WFE growth, but summarize three additional drivers below

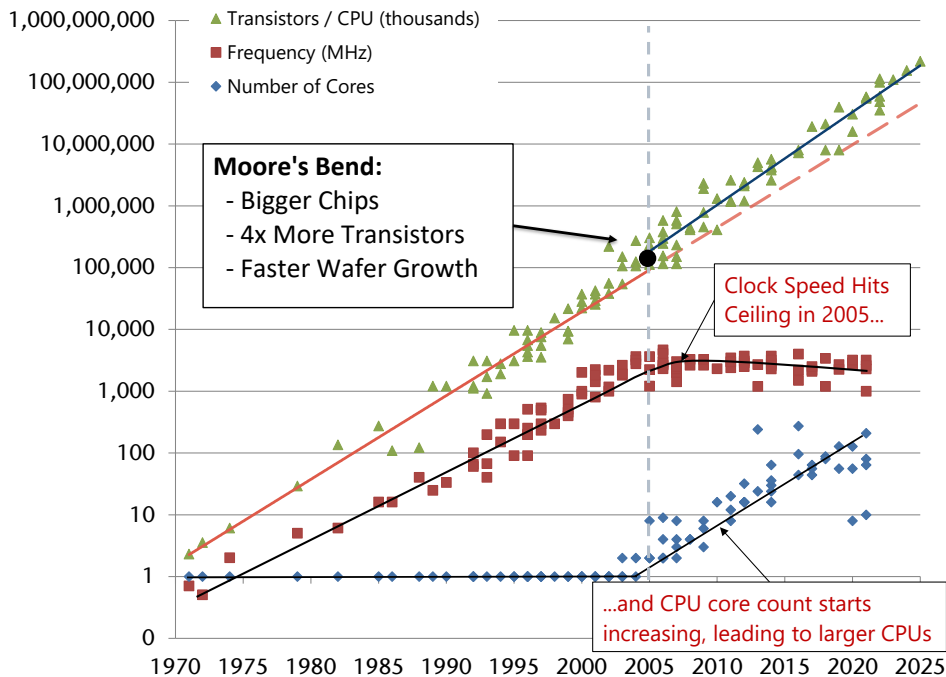
1) Bigger Chips. CPU size was historically a constant: 120mm<sup>2</sup> for PCs, 300mm<sup>2</sup> for servers, but physics capped clock speed increases, dictating a **Tectonic Shift to a "Parallel Processing Era"** with larger chips w/ more processing cores

2) More Complex Manufacturing. Between 2004 and 2015, the number of manufacturing process steps increased at a rate of 5% per transistor node (90nm->14nm), however, since 2015, it has been increasing at a rate of 27% per node

3) Trailing Node Buildout. A Tectonic Shift to a Computing Era w/ 10s of billions of IoT devices shipping annually, layers demand for trailing node MCU and analog ICs on top of leading edge logic and memory ICs, which have historically driven WFE spend

4) Semiconductor Nationalization Drives Competition and CapEx. We believe recent government efforts to support building regional semiconductor supply chains sustains for the foreseeable future and translates to increased foundry and IDM competition and higher CapEx

**Chart 4 - Moore's Bend: Transistors/CPU Inflected with Multi-Core CPUs in 2005**



Source: Jefferies. Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten. New plot and data collected for 2010-2021 by K. Rupp.

When clock speeds (red scatter) hit a ceiling in 2005, INTC and AMD started introducing multi-core CPUs (blue scatter), which required larger-die CPUs. We've argued this inflection of core count signaled a Tectonic Shift to a Parallel Processing Era ([link to note here](#))

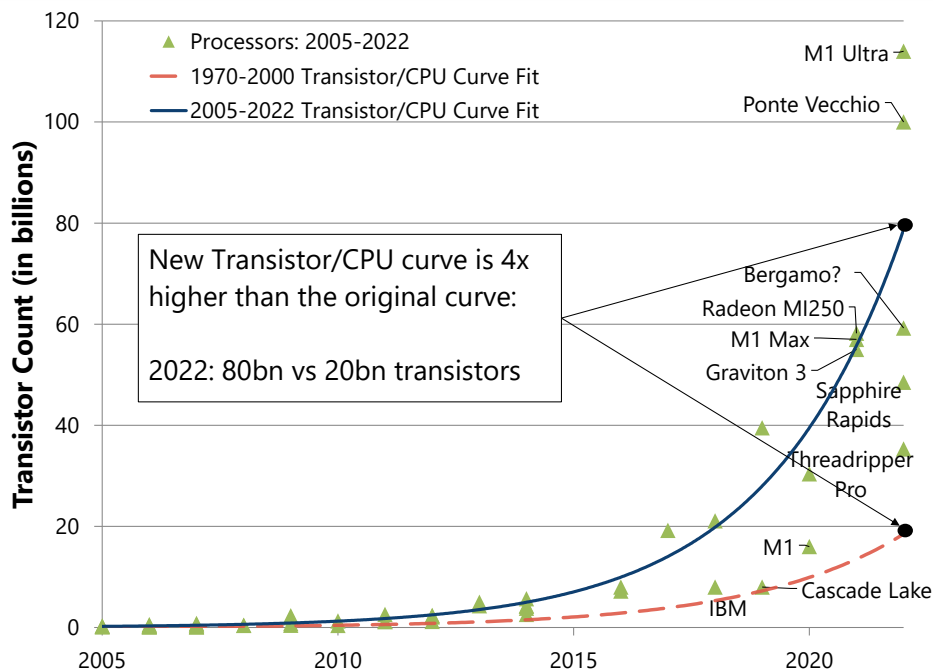
Transistors/CPU (green scatter) also inflected with increased CPU core count in 2015 to a steeper curve that is 4x higher than the original - we call this inflection "Moore's Bend"

The solid red line is a curve fit of transistors per CPU between 1970 and 2000 - "pre-multi-core processors"

The solid blue line is a curve fit of transistors per CPU starting in 2005 - "post multi-core processors"

Since log scale plots obscure the magnitude of inflections, we plot this chart on a normal y-axis scale below

**Chart 5 - Moore's Bend: Transistors per Processor Increasing 4x Faster Than Pre-Parallel Processing Era (2005)**



Source: Jefferies. Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten. New plot and data collected for 2010-2020 by K. Rupp.

This chart shows the same chart above just on a normal y-axis scale, with the transistor curve fit for 1970-2000 shown in red, and 2005-2022 in blue

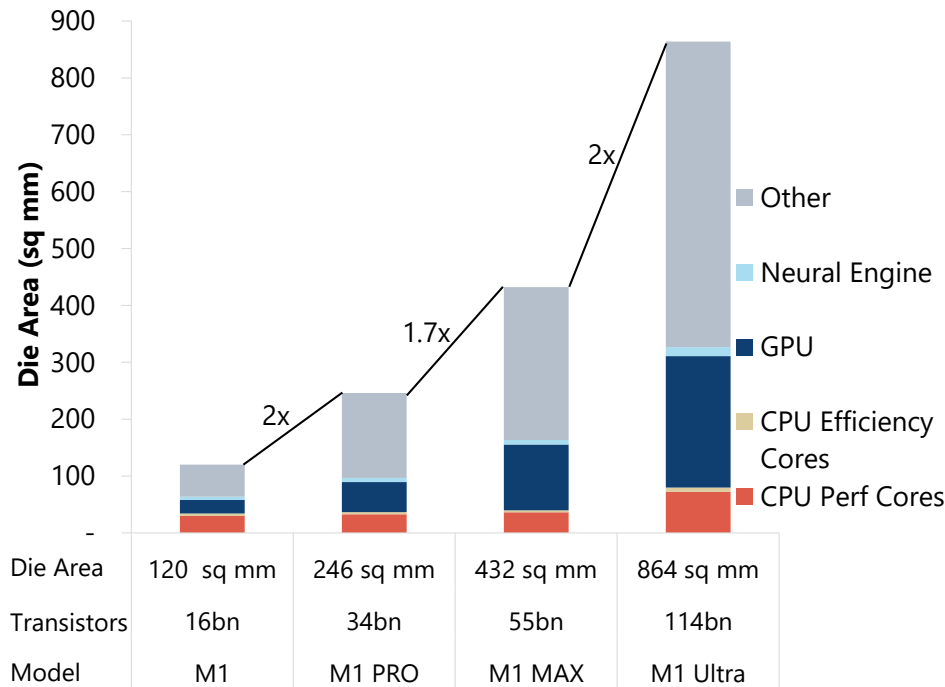
The historical transistor curve-fit (red, 1970-2000) indicates that at the historical transistor growth curve, the industry would be producing 20bn transistor CPUs today...

...however, the new transistor curve fit (blue, 2005-2022) shows 80bn transistor CPUs in 2022

Said another way, transistors/CPU are 4x higher in 2022 than the single-core CPU growth rate established between 1970 and 2000 would have predicted

We believe that accelerated transistor/CPU growth supports our view that WFE has become a secular growth industry

**Chart 6 - Apple M1 ARM CPUs Have Seen 7x Increase in Die Size in just 3 Years**



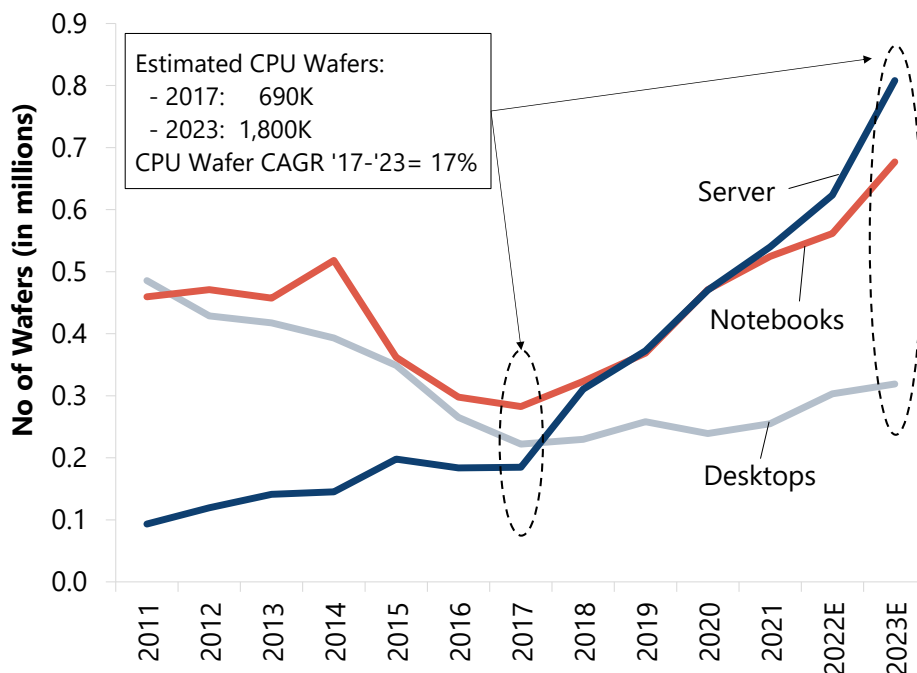
Increasing die size is not just a data center phenomenon, it also can be seen in client PCs - the most obvious example is the evolution of Apple's M1 ARM CPU

Over just the past 3 years, the die size of Apple M1 family of ARM CPUs has increased 2x and 3.5x with M1 PRO and M1 MAX vs. the original M1. The recently launched M1 Ultra is 7x bigger than M1

The transistor count has scaled with the same magnitude increasing 7x with M1 Ultra and 3x M1 MAX vs. the original M1 at 16bn, with no change in process node

The increased die size translates to 2.3x; 4.6x and 9x more wafers required to make the same number of M1 Max; M1 PROs and M1 Ultras vs. the original M1 CPU

**Chart 7 - We Estimate Demand for CPU Wafers Increases at a 17% CAGR between 2017-2023, Well in Excess of 2% CPU Unit Growth**



We use data from the previous charts, coupled with unit shipment data to calculate the increased demand for wafers for the Server and Client CPU markets

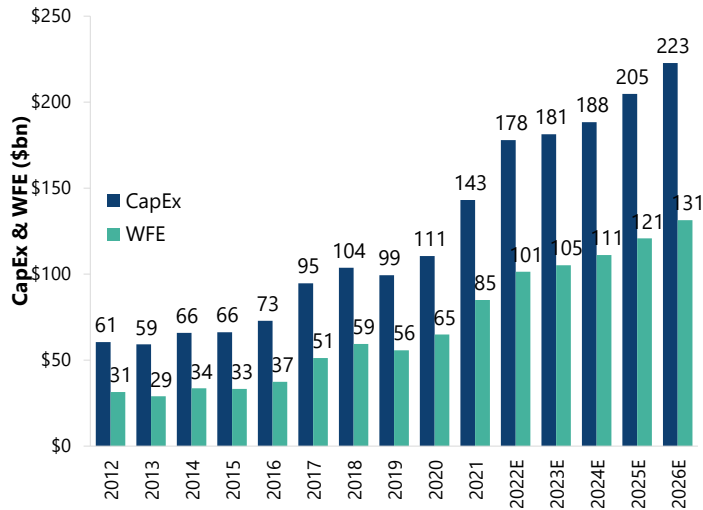
We estimate that increased CPU chip sizes will have driven an increase in the number of wafers necessary to make Client and Server CPUs to 1.8m wafers in 2023 from 690K wafers in 2017, or a 17% CAGR, well in excess of the 2% CPU unit CAGR forecasted for the same time period

We estimate that demand for server CPU wafers alone will have increased at a 28% CAGR between 2017 and 2023, while demand for notebook CPU wafers will have increased at a 16% CAGR

We think this dynamic explains at least in part why the industry is experiencing tight capacity and why WFE has transformed into a secular growth market

Source: Jefferies, Mercury, Anandtech, techpowerup.com, wccfttech.com, Company data

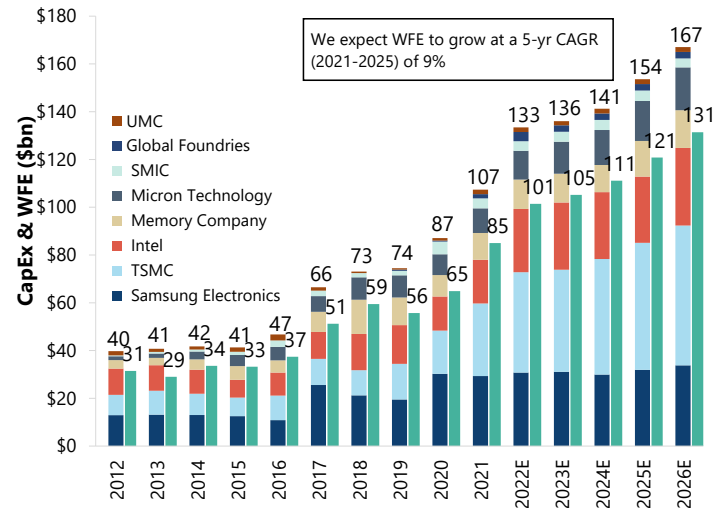
Chart 8 - Semi CapEx vs WFE Spend



Source: Jefferies, Gartner, FactSet

WFE as a % of total CapEx ranges from 58-63% with remainder spend on facilities, backend and other. We forecast WFE at ~60% of total CapEx going forward

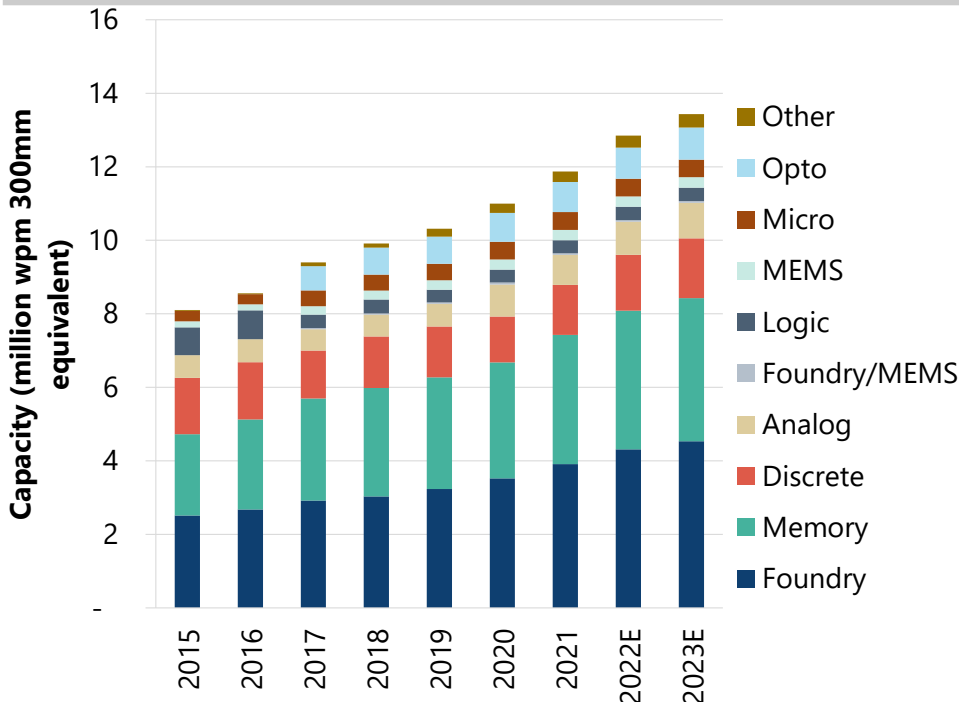
Chart 9 - We expect WFE revenues to grow through 2025



Source: Jefferies, Gartner, FactSet

We expect the CapEx spend of the top 8 semiconductor companies to grow at a CAGR of 9% over the next 5 years. We expect WFE revenues to grow in-line at a 5yr CAGR of 9%

Chart 10 - Global Semiconductor Manufacturing Capacity Forecasted to Increase by 9% and 4% in 2022 and 2023

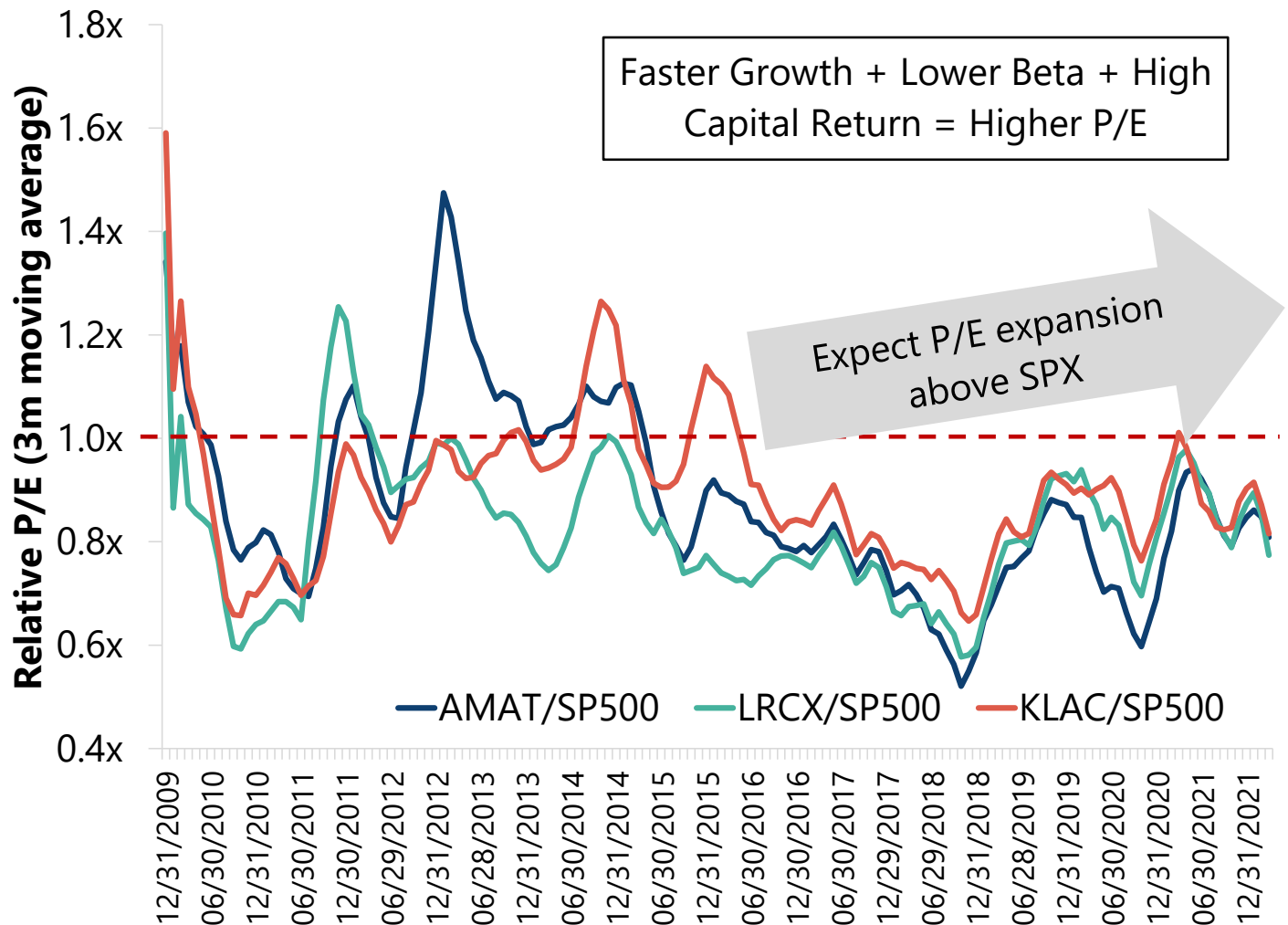


Source: Jefferies, SEMI

SEMI forecasts global semiconductor wafer capacity to increase by 9% in 2022 and by 4% in 2023

Our sense is consensus expects a much larger increase in capacity

Chart 11 - Expect SPE P/E Ratios to Expand Beyond Parity to SPX



Source: Jefferies, FactSet

## Expect Continued SCE P/E Expansion

P/E ratios of North American SCE companies have historically traded at a 0%-to-50% discount to the SPX. However, we believe P/E ratios of SCE companies will ultimately expand to trade at a 10%-to-20% premium to the SPX, due to:

- 1) **Faster Growth.** As we demonstrate in part one of our thesis above, we expect the P/E multiple for this group to expand as the market appreciates that it has shifted from pure cyclical to a growth cyclical industry
- 2) **Lower Beta, Associated w/ Lower Earnings Volatility.** We show earnings volatility of SCE stocks has declined over time, as FCF has increased. We expect this to translate to lower beta and higher P/E over time.
- 3) **Higher Profitability Leading to Higher Capital Returns and Levered EPS Growth.** We show consolidation has driven higher profitability levels. We expect profitability levels will continue to climb higher, driving levered EPS growth and increased levels of capital return, which we expect will also translate to higher P/E ratios over time



## Semiconductor Capital Equipment Stocks - 5-Year EPS Power Calculations

Our 5-yr EPS Bull Case scenarios for ASML, AMAT, KLAC and LRCX assume EPS doubles, while our Base Case assumes EPS increases by 60%-80%. We expect the P/E ratios of AMAT, KLAC and LRCX to expand to a 20% premium to the market over the next 3-to-5 years, vs the current 20%-30% discount - if correct, this would imply multiple years of 20% + stock appreciation potential.

**Chart 12 - ASML 5-yr EPS**

5 yr EPS Power (2025E)	2021	Base	Bull	Bear
Revenues (EURm)	18,611	30,505	33,556	27,732
3 yr CAGR		11%	14%	7%
GM %	52.7%	55.8%	59.8%	51.4%
OM %	36.3%	39.7%	45.2%	33.6%
Operating Income	6,750	12,102	15,153	9,329
<b>EPS</b>	<b>14.36</b>	<b>27.66</b>	<b>35.72</b>	<b>20.33</b>

Source: Jefferies

**Chart 13 - AMAT 5-yr EPS Power**

5 yr EPS Power (2026E)	2021	Base	Bull	Bear
Revenues (\$, M)	24,172	36,619	42,599	30,850
3 yr CAGR		9%	12%	5%
Gross Margin % - Non-GAAP	47.8%	49.0%	50.0%	48.0%
Operating Margin % - Non-GAAP	32.3%	34.0%	35.0%	33.0%
Operating Income - Non-GAAP	7,811	12,451	14,910	10,181
<b>EPS - Non-GAAP</b>	<b>7.35</b>	<b>13.19</b>	<b>15.84</b>	<b>10.74</b>

Source: Jefferies

**Chart 14 - LRCX 5-yr EPS Power**

5 yr EPS Power (2026E)	2021	Base	Bull	Bear
Revenues (\$, M)	16,524	24,849	29,121	21,089
3 yr CAGR		9%	12%	5%
Gross Margin % - Non-GAAP	46.4%	49.0%	50.0%	47.0%
Operating Margin % - Non-GAAP	32.2%	34.0%	35.0%	33.0%
Operating Income - Non-GAAP	5,314	8,449	10,192	6,959
<b>EPS - Non-GAAP</b>	<b>32.46</b>	<b>52.85</b>	<b>63.81</b>	<b>43.49</b>

Source: Jefferies

**Chart 15 - KLAC 5-yr EPS**

5 yr EPS Power (2026E)	2021	Base	Bull	Bear
Revenues (\$, M)	8,166	13,078	14,980	10,848
3 yr CAGR		10%	13%	6%
Gross Margin % - Non-GAAP	63%	64.0%	65.0%	63.0%
Operating Margin % - Non-GAAP	42%	43.0%	44.0%	42.0%
Operating Income - Non-GAAP	3,401	5,624	6,591	4,556
<b>EPS - Non-GAAP</b>	<b>18.50</b>	<b>31.50</b>	<b>37.06</b>	<b>25.37</b>

Source: Jefferies

Our 2025 EPS power base case is \$27.66, which assumes a 5-yr revenue CAGR of 11%

Our 2025 EPS bull case is \$35.72, and bear case is \$20.33

Our 2026 EPS power base case is \$13.19, which assumes a 5-yr revenue CAGR of 9%

Our 2026 EPS bull case is \$15.84, and bear case is \$10.74

Our 2026 EPS power base case is \$52.85, which assumes a 5-yr revenue CAGR of 9%

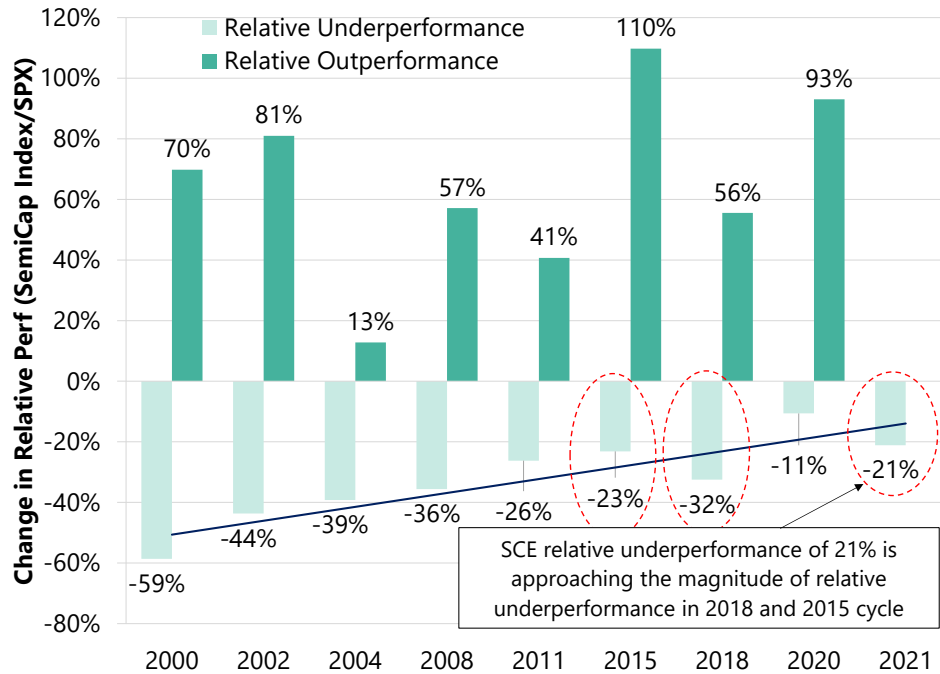
Our 2026 EPS bull case is \$63.81, and bear case is \$43.49

Our 2026 EPS power base case is \$31.50, which assumes a 5-yr revenue CAGR of 10%

Our 2026 EPS bull case is \$37.06, and bear case is \$25.37

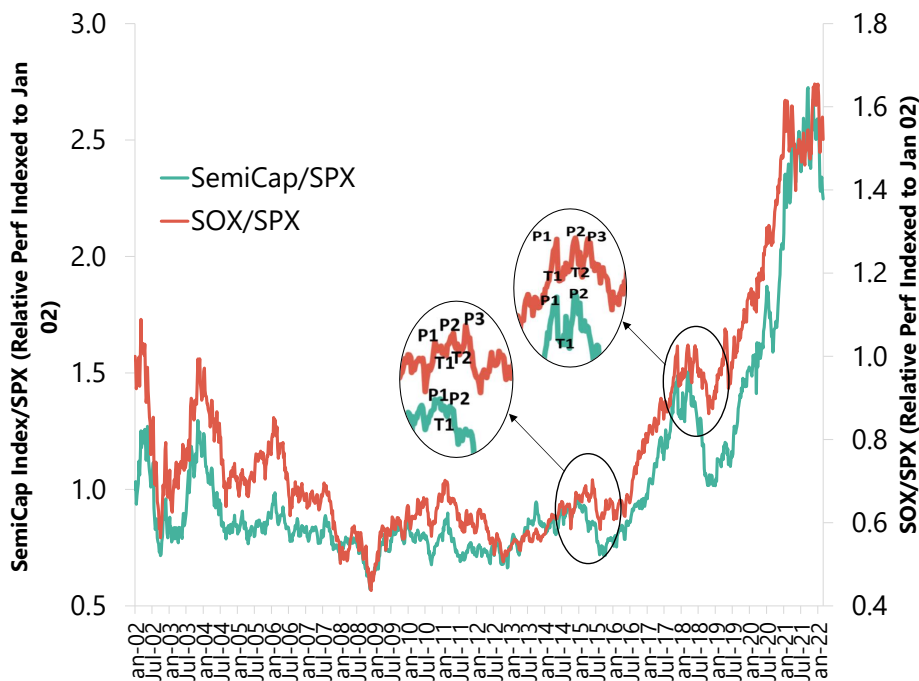
## Cycle Thoughts

Chart 16 - Relative SemiCap Declines Attenuating vs SPX



Source: Jefferies, FactSet. Semicap Index is cap-weighted (AMAT, ASML, LRCX, Tokyo Electron and KLAC)

Chart 17 - Relative to the SPX, in 2018, Our SCE Index Bottomed 6% Below the Mid-Cycle Correction - That is Where it is Today



Source: Jefferies, FactSet. SemiCap Index is cap-weighted (AMAT, ASML, LRCX, TEL and KLAC)

Over the last 8 cycles, the magnitude of relative underperformance during downcycles has decreased over time while the magnitude of relative outperformance during upcycles has increased

Since the peak in Sep-21, our SCE index has underperformed the SPX by 21%; nearing the average underperformance of 27.5% seen in 2017-18 (32%) and 2014-15 (23%) cycles

We believe that Semiconductor stocks have entered the peaking process for this cycle. Because of high order backlog and tight capacity, we expect the peaking process to last at least 6 months.

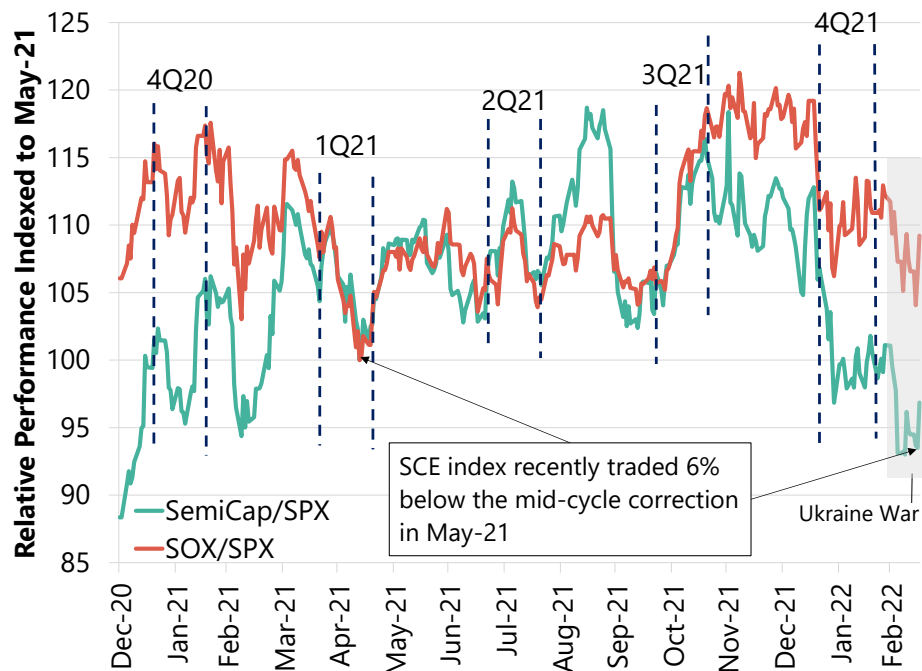
The Peaking Process of the SCE stocks slightly varied from SOX during the 2014-15 and 2017-18 cycles

- Relative to SPX, SCE stocks experienced 2 Peaks and 1 Trough each cycle as compared to 3 Peaks and 2 Troughs pattern of SOX
- SCE stocks rolled before SOX
- Relative to the SPX, the SCE End-of-Cycle bottom was 6% and 20% lower than the Mid-Cycle-Correction Bottom in 2017-18 and 2014-15 cycle respectively

We observe that our SCE Index is 6% below the mid-cycle correction in May, consistent with where it bottomed during the 2018 cycle



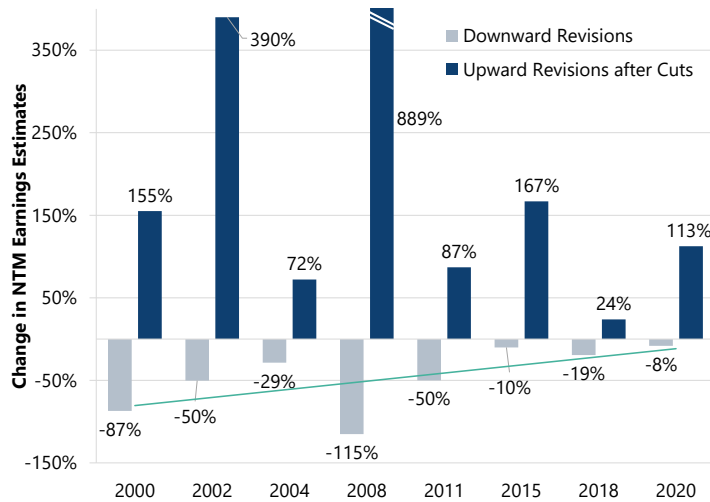
**Chart 18 - Relative to the SPX, Our SCE Index has Traded 6% Below the Mid-Cycle Correction in May-21**



Relative to the SPX, our SCE stock index recently traded 6% below the mid-cycle correction in May-2021, which is the same level it bottomed at during the 2018 correction

Source: Jefferies, FactSet. SemiCap Index is cap-weighted (AMAT, ASML, LRCX, TEL and KLAC)

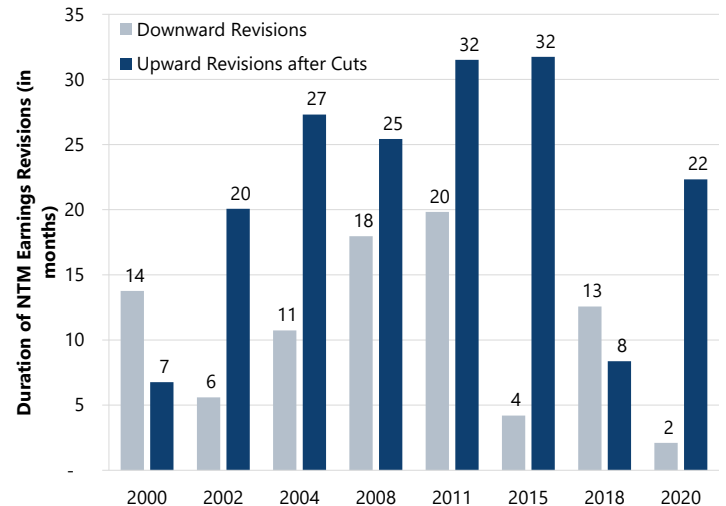
**Chart 19 - Magnitude of Downward Revision Cycles Attenuating**



Source: Jefferies, FactSet. Aggregate earnings of AMAT, ASML, LRCX, Tokyo Electron, KLAC and their respective acquisitions

We quantify the magnitude of downward revision in NTM EPS estimates during cuts and upward revision post-cuts. As the industry has consolidated, downward revisions appear to be attenuating

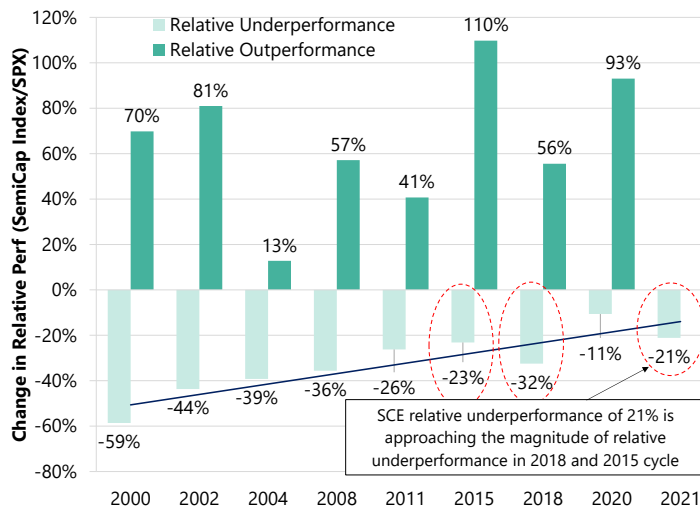
**Chart 20 - Five of the last Six Upward Revision Cycles lasted 20-32 Months (ex-current cycle)**



Source: Jefferies, FactSet. Aggregate earnings of AMAT, ASML, LRCX, Tokyo Electron, KLAC and their respective acquisitions

Over the past 8 cycles, on average the NTM earnings estimates for our sample of semiconductor capital equipment companies increased for a period of 21 months, after earnings estimates bottomed

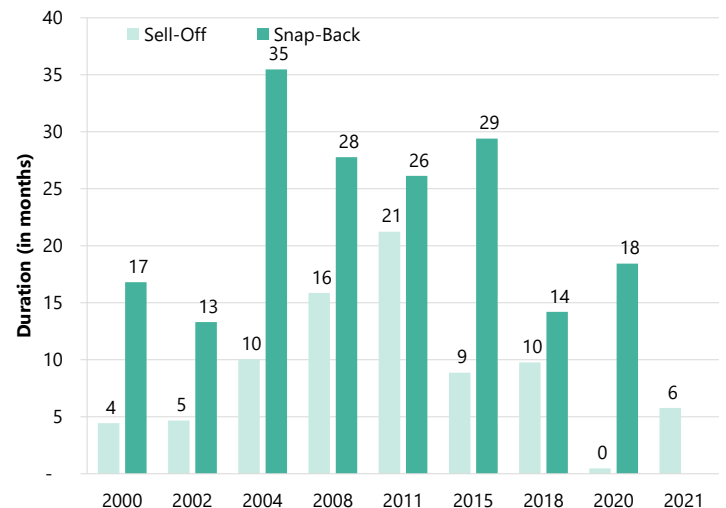
**Chart 21 - Relative SemiCap Declines Attenuating vs SPX**



Source: Jefferies, FactSet. Semicap Index is cap-weighted (AMAT, ASML, LRCX, Tokyo Electron and KLAC)

Over the last 8 cycles, the relative magnitude of sell-offs has decreased over time and the relative magnitude of snap-backs has increased

**Chart 22 - Relative Perf vs SPX Since 2015: Downturns <10 months, Upcycles 14-29 months**



Source: Jefferies, FactSet. Semicap Index is cap-weighted (AMAT, ASML, LRCX, Tokyo Electron and KLAC)

In the recent 2015 and 2018 cycles the duration and magnitude of sell-offs were much lower than seen in the prior cycles

## Jefferies Global Semiconductor Capital Equipment Valuation Table

Chart 23 - Jefferies Global Semiconductor Capital Equipment Valuation Table

Company	Rating	Jefferies Analyst	Market Cap (bn)	Price Target	3/16/22 Price	P/E 2022 2023	EV/FCF 2022 2023	EV/S 2022 2023	P/TanBk	Gross Margin [1]	Operating Margin [1]
<b>Semi Cap Equipment:</b>											
<i>Front-End</i>											
ACMR	Buy	Lee	\$ 1	\$ 133	\$ 59	31x 21x	n.m. 59x	1x 1x	1x	44%	15%
Adv Micro - 688012	Buy	Lee	CNY 76	CNY 219	CNY 123	87x 73x	192x 88x	14x 11x	5x	42%	25%
Aixtron	Hold	Menon	EUR 2	EUR 18	EUR 20	26x 22x	21x 17x	4x 4x	4x	42%	22%
AMAT	Buy	Lipacis	\$ 113	\$ 197	\$ 128	15x 14x	19x 14x	4x 4x	13x	48%	32%
ASM International	Buy	Menon	EUR 15	EUR 350	EUR 314	27x 24x	34x 27x	7x 6x	7x	48%	28%
ASML Holding	Buy	Menon	EUR 235	EUR 700	EUR 579	34x 29x	46x 34x	10x 9x	47x	53%	35%
Canon - 7751	Hold	Nakanomyo	JPY 3,768	JPY 2,800	JPY 2,825	13x 13x	15x 14x	1x 1x	2x	51%	8%
KLAC	Buy	Shrotre	\$ 51	\$ 515	\$ 341	15x 14x	20x 12x	5x 5x	56x	60%	39%
Lasertech - 6920	Hold	Nakanomyo	JPY 1,641	JPY 26,000	JPY 17,400	42x 27x	75x 55x	12x 9x	29x	53%	36%
LRCX	Buy	Lipacis	\$ 70	\$ 869	\$ 501	14x 13x	19x 13x	4x 4x	14x	46%	32%
NAURA - 002371	Hold	Lee	CNY 167	CNY 219	CNY 320	118x 91x	4638x 860x	12x 10x	68x	40%	7%
Nikon - 7731	Buy	Nakanomyo	JPY 454	JPY 1,600	JPY 1,200	13x 12x	12x 6x	0x 0x	1x	42%	7%
TEL - 8035	Buy	Nakanomyo	JPY 8,676	JPY 80,000	JPY 55,190	17x 16x	22x 16x	4x 4x	7x	44%	29%
<i>Back-End</i>											
Advantest - 6857	Buy	Nakanomyo	JPY 1,698	JPY 14,000	JPY 8,510	16x 15x	18x 15x	4x 4x	8x	56%	26%
Disco - 6146	Buy	Nakanomyo	JPY 1,083	JPY 43,000	JPY 30,000	17x 17x	18x 14x	4x 4x	4x	60%	34%
<b>Average:</b>						32x 27x		6x 5x			

[1] Please note that Gross Margin and Operating Margin are in GAAP terms.

[2] Given footnote 1 and ASC 606, please note that RMBS's gross margin and operating margin presented in the table are not reflective of its cash flow from fixed-fee licensing agreements.

Company	Consensus Sales (m)				Cash (m)	Debt (m)	Net Debt		Net Debt		JEF EPS				Cons. EPS				ROIC		
	2022		2023				/EBITDA		/Shr		2022		2023		2022		2023				
Semi Cap Equipment:																					
Front-End																					
ACMR	\$	388	\$	496	\$	593	\$	39	\$	(13.58)	\$	(30.95)	\$	1.86	\$	2.23	\$	1.92	\$	2.78	10%
Adv Micro - 688012	CNY	4,435	CNY	6,061	CNY	11,459	CNY	16	CNY	(26.05)	CNY	(18.57)	CNY	1.29	CNY	1.51	CNY	1.41	CNY	1.69	9%
Aixtron	EUR	467	EUR	521	EUR	352	EUR	4	EUR	(3.40)	EUR	(3.08)	EUR	0.86	EUR	1.13	EUR	0.74	EUR	0.89	13%
AMAT	\$	27,915	\$	29,389	\$	5,737	\$	5,757	\$	(0.00)	\$	0.02	\$	8.55	\$	9.22	\$	8.70	\$	9.39	39%
ASM International	EUR	2,178	EUR	2,379	EUR	492	EUR	16	EUR	(0.84)	EUR	(9.65)	EUR	13.18	EUR	14.36	EUR	11.70	EUR	12.86	24%
ASML Holding	EUR	22,285	EUR	24,833	EUR	7,590	EUR	4,193	EUR	(0.43)	EUR	(8.36)	EUR	17.00	EUR	20.20	EUR	16.99	EUR	19.63	36%
Canon - 7751	JPY	3,735,721	JPY	3,850,000	JPY	404,772	JPY	320,971	JPY	(0.36)	JPY	(63)	JPY	230	JPY	239	JPY	214	JPY	214	8%
KLAC	\$	9,794	\$	10,318	\$	2,810	\$	3,539	\$	0.33	\$	4.83	\$	22.50	\$	24.97	\$	22.55	\$	23.79	43%
Lasertech - 6920	JPY	130,056	JPY	188,320	JPY	18,970	JPY	38	JPY	(1.01)	JPY	(201)	JPY	396	JPY	596	JPY	414	JPY	640	41%
LRCX	\$	18,694	\$	19,670	\$	5,329	\$	4,994	\$	(0.15)	\$	(2.40)	\$	34.55	\$	39.90	\$	35.77	\$	39.16	44%
NAURA - 002371	CNY	13,976	CNY	17,472	CNY	1,514	CNY	1,654	CNY	(1.10)	CNY	0.27	CNY	1.97	CNY	2.92	CNY	2.72	CNY	3.53	14%
Nikon - 7731	JPY	538,679	JPY	546,815	JPY	367,364	JPY	138,558	JPY	(78.74)	JPY	(605)	JPY	106	JPY	111	JPY	95	JPY	100	4%
TEL - 8035	JPY	2,224,587	JPY	2,177,522	JPY	423,947	JPY	-	JPY	(0.73)	JPY	(2,697)	JPY	3,015	JPY	3,243	JPY	3,204	JPY	3,438	41%
Back-End																					
Advantest - 6857	JPY	461,344	JPY	384,625	JPY	121,713	JPY	39,866	JPY	(1.85)	JPY	(410)	JPY	514	JPY	566	JPY	522	JPY	562	36%
Disco - 6146	JPY	263,089	JPY	221,555	JPY	130,217	JPY	-	JPY	(1.49)	JPY	(3,608)	JPY	1,816	JPY	1,818	JPY	1,744	JPY	1,817	24%

Source: Jefferies, FactSet

## Company Valuation/Risks

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(Article 3(1)e and Article 7 of MAR)

Recommendation Completion March 16, 2022 , 19:11 ET.

Recommendation Distributed March 17, 2022 , 00:00 ET.

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- ACM Research Inc (ACMR: \$59.70, BUY)
- Advanced Micro-Fabrication Eqp Inc China (688012 CH: CNY125.79, BUY)
- Advantest (6857 JP: ¥9,010, BUY)
- Aixtron SE (AIXA GR: €19.60, HOLD)
- Applied Materials Inc. (AMAT: \$130.48, BUY)
- ASM International N.V. (ASM NA: €313.70, BUY)
- ASML Holding NV (ASML NA: €578.90, BUY)
- Canon Inc. (7751 JP: ¥2,819, HOLD)
- Disco (6146 JP: ¥31,300, BUY)
- KLA Corporation (KLAC: \$350.92, BUY)
- LAM Research Corporation (LRCX: \$514.49, BUY)
- Lasertec Corp (6920 JP: ¥19,410, HOLD)
- NAURA Technology Group (002371 CH: CNY325.27, HOLD)
- Nikon (7731 JP: ¥1,236, BUY)



• Tokyo Electron (8035 JP: ¥57,820, BUY)

## Distribution of Ratings

Distribution of Ratings						
			IB Serv./Past12 Mos.		JIL Mkt Serv./Past12 Mos.	
	Count	Percent	Count	Percent	Count	Percent
BUY	1999	63.72%	140	7.00%	27	1.35%
HOLD	1006	32.07%	22	2.19%	3	0.30%
UNDERPERFORM	132	4.21%	0	0.00%	0	0.00%

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