

April 11, 2022 04:01 AM GMT

Semiconductors | North America

Weekly: Further thoughts on potential macro weakness; auto sales

We add to our thoughts from a couple of weeks ago about the challenges of covering semis - where, outside of regional smartphone and PC data points, conditions remain very robust - during a period where macroeconomic weakness almost certainly will dampen that enthusiasm.

Thoughts on the ongoing semiconductor selloff: Two weeks ago, we wrote that we would anticipate that macroeconomic variables are the ones that matter, as investors will likely continue to look through strong near term outlooks given significant sustainability risk around the corner. That's what we are hearing from generalists as well as semiconductor specialists, for the most part, and it makes sense to us.

In this environment there are two separate important elements: reporting on current channel checks, and then viewing those channel checks through the lens of a likely macroeconomic deceleration.

Current channel checks for the most part continue to point to very strong conditions. To be sure, there are a couple of regional pockets of weakness that we talked about a few weeks ago (mostly related to China handsets, and some portions of the PC market, with the PC weakness mostly being attributed to Eastern Europe). We haven't seen those markets get better, but they haven't gotten worse either, as far as we can tell. We are hearing of sell side reports seeing those shifts as a major inflection, and of course it's possible that they are - but they aren't new or recent.

But for the broad based markets, including enterprise compute, networking, industrial, and autos, the driving factor is customer fears of ongoing supply chain risks, and there haven't been many changes. We still see very long lead times, we still see expedite fees and frequent escalation calls from customers, we see sequential price increases in the more transactional parts of the market. Importantly, we still see shortages impacting customers in many areas; indeed, we see it in our own coverage, where there continues to be material supply chain risk in semiconductor capital equipment.

Our view remains that even with some deceleration in end demand, that these strong conditions in broad markets should persist through the year. The reason is tied to the magnitude of these shortages; this has not been a normal supply chain environment, and customers who have been struggling for the better part of two years are going to build inventory when the dust settles. This effect is greater in the markets where semiconductors are a relatively small percentage of

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the bill of materials, given the multipliers at work - and the fact that analog or trailing edge parts are not subject to the price fluctuations that we see in the larger semiconductor verticals.

So will stocks react positively to earnings? Our view is that they probably won't, but again the macroeconomic view is likely to dominate, and any "better than feared" economic outcome could have material effect. Stocks shrugged off positive commentary after 4q earnings, again at our conference, and more recently the market has reacted unenthusiastically to positive quantitative commentary from stocks such as Micron and Analog Devices.

The reason, of course, is the risk that economic deceleration presents a material risk to intermediate term outcomes. Our economics and strategy team are clear that the federal reserve's actions, along with other factors such as increasing energy prices, are all going to exert some negative pressure on economic growth. So we are in a phase where the normal data collection and insight generation process (mostly, talking to semiconductor company managements, semiconductor customers, and semiconductor channel partners, and analyzing inventory and supply chain trends) is less useful than other phases.

Further, as we have highlighted for several quarters, customer inventory levels in most areas are already somewhat inflated, reflecting to some degree the "incomplete kit" phenomena, where inventory of most parts builds up awaiting the bottleneck parts. That does leave us vulnerable.

Having said that, the material selloff that we have already seen does derisk the situation somewhat - and we do see some opportunities around earnings. Stocks are down enough that we expect a positive response to any macro reversal, whether a change in geopolitical events, change in energy prices, or change in the overall economic outlook; but they are not down enough to be in a place where "bad news is good news", in our view. The industry has not experienced an economic recession since 2008/9, given the strong economic performance in 2020, and we are certainly not discounting a globally synchronized recession by any means.

Because we see ongoing strength in the broader markets, we do see some tactical opportunities around earnings for analog names. We would highlight Microchip here, but we could also see strong moves from other names that have seen some recent negative sentiment - NXP and ON, for example. It's less that we expect a strong reaction from earnings, but more that we see very low possibility of any fundamental erosion around earnings, and given low valuation and a cynical tactical bias around these "PMI exposed" names we just see limited near term downside. Further, we would see these stocks as offering the most upside near term in the event of any "better than feared" macroeconomic outcomes should those occur. ADI and TXN should also have very strong results, but those names have held up much better as well.

As for the analog names being "PMI exposed", that's undoubtedly true, but we actually think that a macroeconomic deceleration presents a much more significant risk to vertical markets, such as PCs, phones, and even servers, which generally remain popular with investors.

We also like a group that could have some shorter term risk, the semiconductor capital equipment names. The reason for the shorter term risk is the supply chain issues that have tripped up all of the companies in recent quarters. There is no line of sight to that being resolved, and there does continue to be some nearer

term risk - that has held back the stocks materially. Ultimately, we think this creates an opportunity. The tools are installed at customers already, in many cases the revenues are collected, our checks show that the installations continue to ramp sharply, and any lost revenue for the June quarter will be collected in the second half. LRCX is our top pick, but we would generally look through supply chain issues for AMAT and KLAC as well.

While we do see tactical opportunities in these oversold conditions, the backdrop is likely to remain cautious. There are many factors pulling down economic growth, and semiconductors are not immune from that. We aren't calling for re-acceleration from here, and would expect that for stocks to do more than rebound from recent weakness they are going to have to demonstrate material product cycle strength above and beyond what the economy can deliver.

US auto sales in March were in-line with expectations, declining 5.6% m/m and 25.6% y/y. Inventory levels remain depleted near record low levels. SAAR was 13.4mn units in March, down 5.6% m/m and 25.6% y/y ([Exhibit 1](#)), in-line with consensus. Days of supply remained near record low levels, coming in at 25 days, which is up slightly from 22 days last month and down meaningfully from 39 days last year. Incentives were down 10.9% m/m and 57.2% y/y at \$1,474 per car. Lastly, the vehicle mix remained strong, favoring light trucks (78.9%) vs. cars (21.1%), which compares to last year when trucks represented 76.8% of the mix and cars made up 23.2%. Our Autos team (led by Adam Jonas) forecasts SAAR of 16mn for 2022 which is up ~9% y/y from ~15mn in 2021. Their bear case is 15mn and their bull case is 17mn.

BEV penetration was 5.3%, up from 2.4% last year and BEV sales were up 67% y/y. While Tesla grew 108% y/y and captured 72.9% of US BEV share, Non-Tesla BEV sales were up 20% y/y. This compares to last year when Tesla accounted for 60.8% of BEV share. For context, Tesla is outselling other US OEMs by ~2.7x.

Within our coverage, we highlight some companies that have meaningful exposure to autos: Sensata (60%), NXP (50%), TE Connectivity (40%), ON Semiconductor (35%), ADI (20%), TXN (20%), and MCHP (15%).

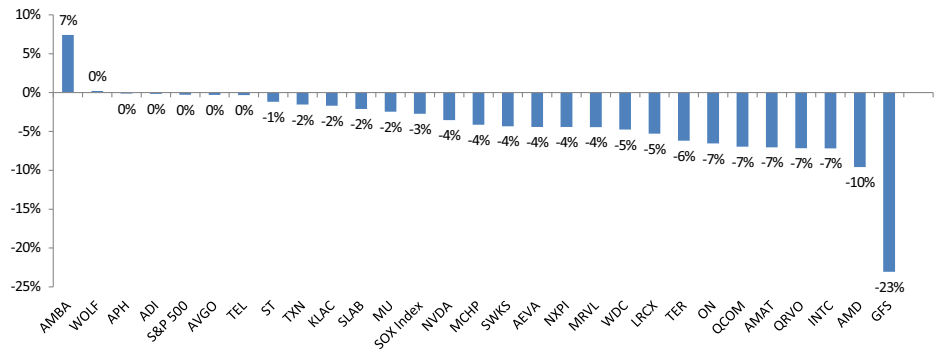
Exhibit 1: US SAAR Components

SAAR (MM Units)	Mar-22	Mar-21	Feb-22
Domestic Car	1.9	2.7	0.6
Import Car	0.8	1.4	2.5
Domestic Truck	8.4	11.0	5.7
Import Truck	2.2	3.0	5.5
Total Industry	13.4	18.0	14.2

Source: Autodata, Morgan Stanley Research

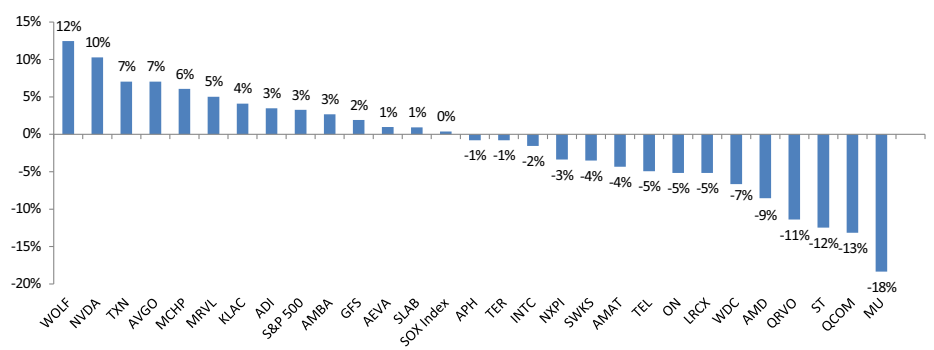
Semiconductor Coverage - Valuation / Stock Performance

Exhibit 2: Weekly stock performance



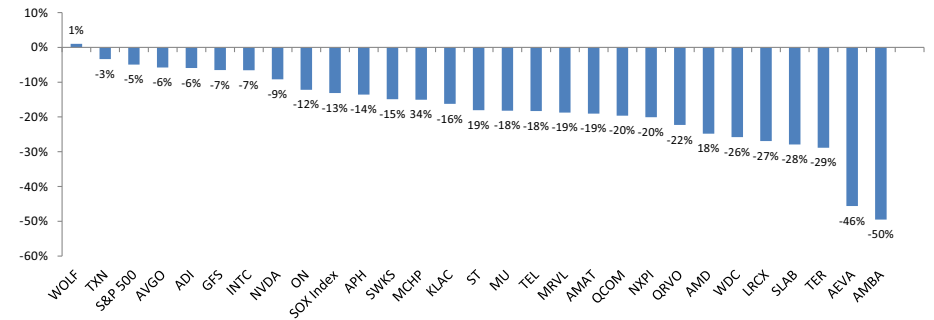
Source: Refinitiv, Morgan Stanley Research

Exhibit 3: Monthly stock performance



Source: Refinitiv, Morgan Stanley Research

Exhibit 4: YTD stock performance



Source: Refinitiv, Morgan Stanley Research

Semis Week Ahead

Exhibit 5: April 11 - April 15, 2022

Monday, April 11

Tuesday, April 12

Wednesday, April 13

Thursday, April 14

Friday, April 15

LOOKING AHEAD:

Tuesday, April 19

AVGO Teach In: Custom Silicon

12:00pm ET - <https://investors.broadcom.com/events/event-details/custom-silicon-teach>

Wednesday, April 20

LRCX Earnings

5:00pm ET - details to follow

Source: Bloomberg, Refinitiv, Morgan Stanley Research

Semiconductor Coverage

Exhibit 6: Semiconductors - Risk Reward

							% Upside / Downside
Ticker	Ticker	Rating	Price	Risk-Reward			Base
				Bear	Base	Bull	
<u>Computing</u>							
INTC	INTC.O	UW	\$48.1	\$28	\$47	\$70	-2%
<u>Memory</u>							
MU	MU.O	EW	\$76.2	\$41	\$83	\$120	9%
WDC	WDC.O	OW	\$48.4	\$41	\$71	\$90	47%
<u>Capital Equipment</u>							
AMAT	AMAT.O	EW	\$127.4	\$114	\$160	\$207	26%
LRCX	LRCX.O	OW	\$525.5	\$550	\$730	\$904	39%
TER	TER.O	EW	\$116.4	\$110	\$132	\$155	13%
KLAC	KLAC.O	EW	\$360.3	\$307	\$400	\$574	11%
<u>Comm-IC / Multi-Market</u>							
MRVL	MRVL.O	EW	\$71.1	\$64	\$80	\$100	13%
AMBA	AMBA.O	OW	\$102.5	\$97	\$164	\$222	60%
AVGO	AVGO.O	OW	\$627.0	\$624	\$703	\$1,003	12%
SWKS	SWKS.O	EW	\$132.0	\$120	\$173	\$235	31%
QRVO	QRVO.O	EW	\$121.5	\$93	\$150	\$208	23%
WOLF	WOLF.N	EW	\$112.9	\$48	\$102	\$162	-10%
QCOM	QCOM.O	OW	\$147.0	\$151	\$223	\$281	52%
<u>Analog / MCUs</u>							
TXN	TXN.O	UW	\$182.1	\$154	\$198	\$258	9%
NXPI	NXPI.O	EW	\$182.0	\$187	\$262	\$311	44%
ON	ON.O	EW	\$59.6	\$45	\$68	\$85	14%
MCHP	MCHP.O	OW	\$74.0	\$57	\$100	\$124	35%
SLAB	SLAB.O	EW	\$148.8	\$124	\$208	\$264	40%
<u>Components</u>							
TEL	TEL.N	EW	\$131.8	\$125	\$167	\$218	27%
ST	ST.N	OW	\$50.6	\$43	\$71	\$89	40%
APH	APH.N	EW	\$75.6	\$61	\$76	\$115	1%
AEVA	AEVA.N	EW	\$4.1	\$3	\$5	\$9	22%
<u>Foundry</u>							
GFS	GFS.O	OW	\$60.7	\$48	\$73	\$96	19%

Source: Refinitiv, Morgan Stanley Research estimates

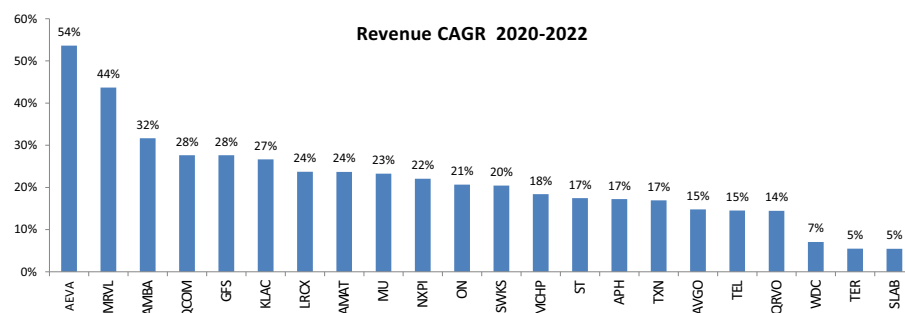
Exhibit 7: MS vs. Street

		CY2022e EPS				CY2022e Revenue		
		MS	Consensus	% Diff		MS	Consensus	% Diff
OW	AMBA	\$1.81	\$1.74	4%	AMBA	\$387	\$383	1%
	AVGO	\$36.49	\$35.95	1%	AVGO	\$32,533	\$32,173	1%
	LRCX	\$34.58	\$35.64	(3%)	LRCX	\$18,258	\$18,368	(1%)
	MCHP	\$5.11	\$5.01	2%	MCHP	\$7,427	\$7,330	1%
	QCOM	\$12.04	\$12.03	0%	QCOM	\$43,491	\$43,162	1%
	ST	\$3.92	\$3.98	(2%)	ST	\$4,203	\$4,230	(1%)
	GFS	\$1.64	\$1.81	(9%)	GFS	\$6,000	\$7,809	(23%)
	WDC	\$7.34	\$8.76	(16%)	WDC	\$18,718	\$19,786	(5%)
EW	AMAT	\$8.10	\$8.33	(3%)	AMAT	\$26,460	\$26,992	(2%)
	WOLF	-\$0.24	-\$0.22	7%	WOLF	\$872	\$883	(1%)
	APH	\$2.79	\$2.76	1%	APH	\$11,818	\$11,857	(0%)
	MU	\$9.24	\$10.55	(12%)	MU	\$33,516	\$35,844	(6%)
	KLAC	\$22.66	\$22.12	2%	KLAC	\$9,739	\$9,614	1%
	MRVL	\$2.27	\$2.23	2%	MRVL	\$6,129	\$5,964	3%
	NXPI	\$13.26	\$12.95	2%	NXPI	\$12,831	\$12,731	1%
	SLAB	\$2.61	\$2.62	(0%)	SLAB	\$986	\$991	(0%)
	SWKS	\$11.71	\$11.88	(1%)	SWKS	\$5,757	\$5,784	(0%)
	TEL	\$7.65	\$7.41	3%	TEL	\$16,425	\$16,105	2%
	AEVA	-\$0.65	-\$0.72	(10%)	AEVA	\$11	\$10	10%
	TER	\$4.69	\$4.83	(3%)	TER	\$3,474	\$3,480	(0%)
UW	QRVO	\$12.85	\$12.87	(0%)	QRVO	\$4,886	\$4,917	(1%)
	ON	\$4.15	\$4.19	(1%)	ON	\$7,651	\$7,664	(0%)
	INTC	\$3.44	\$3.54	(3%)	INTC	\$73,554	\$75,988	(3%)
	TXN	\$9.12	\$9.09	0%	TXN	\$19,772	\$19,887	(1%)

Source: Refinitiv, Morgan Stanley Research estimates

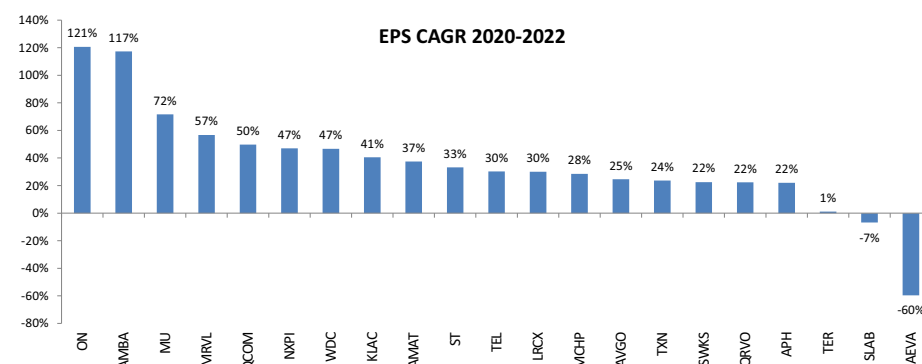
Revenue and EPS Growth

Exhibit 8: 2020-22e Revenue CAGR



Source: Refinitiv, Morgan Stanley estimates

Exhibit 9: 2020-22e EPS CAGR



Source: Refinitiv, Morgan Stanley estimates

Inventory

Exhibit 10: DOI for Semi Companies increased 2 days and is now 17 days above the historical median

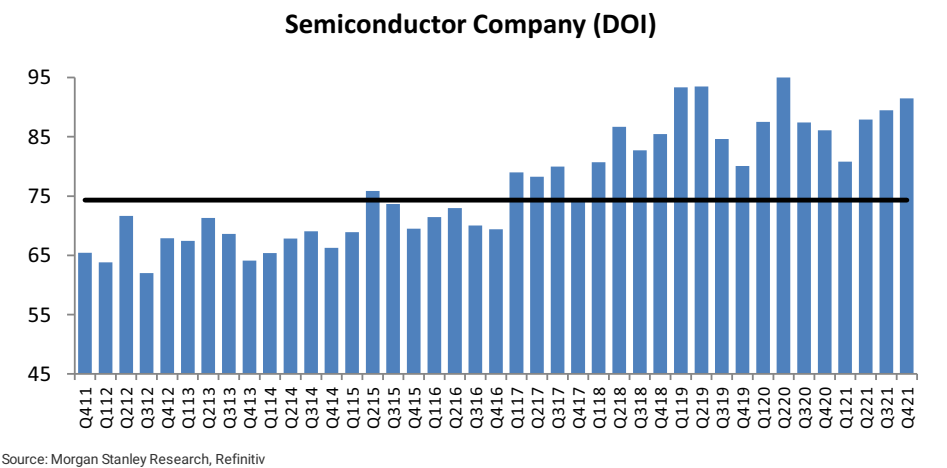


Exhibit 11: Semi Customer DOI was down 5 days to 50 days and is now 4 days above the historical median

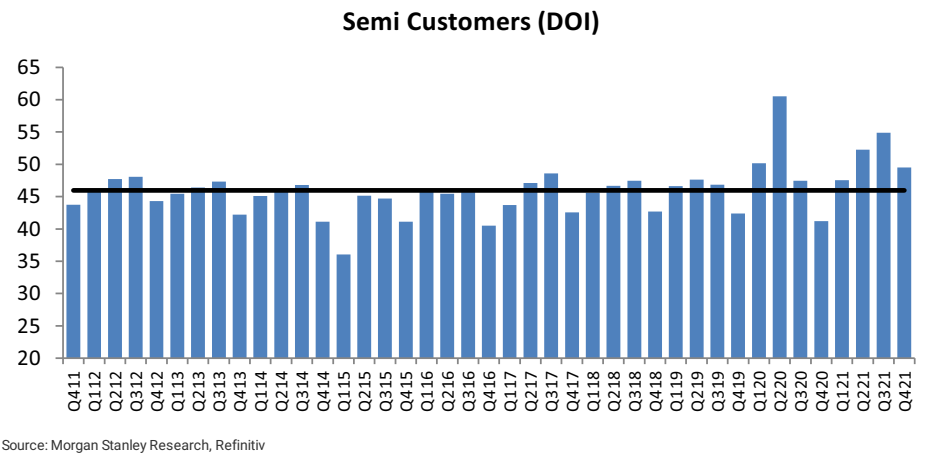
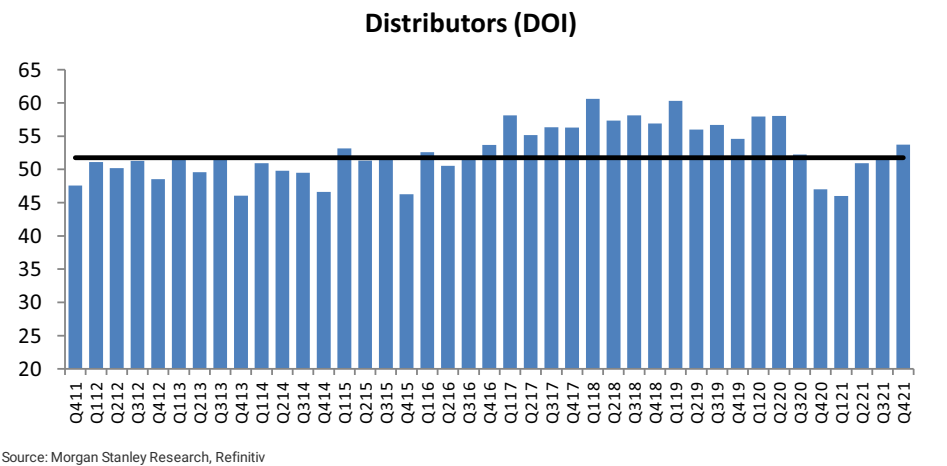


Exhibit 12: Distributor inventory is at 54 days, up 2 days q/q and is 2 days above the historical median



Short Interest

Exhibit 13: Short Interest as % of Float

	1/Apr/21	31/Dec/21	30/Jan/22	2/Mar/22	1/Apr/22
ADI	7.0%	1.3%	1.3%	1.5%	1.4%
AEVA	1.1%	4.3%	4.2%	4.0%	3.8%
AMAT	1.3%	1.3%	1.2%	1.2%	1.1%
AMBA	5.0%	3.3%	3.0%	2.3%	3.4%
AMD	6.8%	5.2%	5.3%	3.8%	2.3%
APH	0.8%	0.9%	0.8%	0.9%	0.8%
AVGO	1.6%	1.3%	1.1%	1.3%	1.2%
GFS	-	0.5%	0.5%	2.3%	2.3%
INTC	1.4%	1.7%	1.5%	1.5%	1.4%
KLAC	1.7%	1.3%	1.3%	1.1%	1.0%
LRCX	1.5%	1.3%	1.2%	1.4%	1.2%
MCHP	2.6%	2.2%	2.4%	2.0%	2.0%
MRVL	4.9%	1.8%	2.1%	2.0%	1.9%
MU	2.0%	2.2%	1.9%	2.1%	2.1%
NVDA	1.0%	0.9%	1.0%	1.1%	1.0%
NXPI	2.3%	2.0%	2.0%	2.2%	2.2%
ON	4.2%	4.3%	4.7%	3.0%	3.2%
QCOM	2.0%	1.3%	1.4%	1.2%	1.5%
QRVO	2.4%	1.8%	2.0%	3.1%	2.8%
SLAB	2.8%	5.7%	4.8%	5.0%	5.1%
ST	1.4%	1.6%	1.7%	3.1%	5.8%
SWKS	2.3%	1.5%	1.8%	2.0%	1.7%
TEL	0.8%	1.1%	1.2%	1.3%	1.1%
TER	3.3%	3.4%	3.2%	3.4%	2.3%
TXN	1.5%	2.0%	2.0%	1.7%	1.6%
WDC	1.7%	2.5%	2.3%	1.9%	2.2%
WOLF	9.4%	7.0%	7.5%	7.3%	7.5%
AVERAGE	2.8%	2.4%	2.3%	2.4%	2.4%
MEDIAN	2.0%	1.8%	1.9%	2.0%	2.0%

Source: Refinitiv, Morgan Stanley Research

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(as of March 31, 2022)

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	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MSC
Overweight/Buy	1438	41%	366	45%	25%	630	41%
Equal-weight/Hold	1539	44%	365	45%	24%	712	46%
Not-Rated/Hold	0	0%	0	0%	0%	0	0%
Underweight/Sell	552	16%	87	11%	16%	207	13%
TOTAL	3,529		818			1549	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

Analyst Stock Ratings

Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Not-Rated (NR). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

Analyst Industry Views

Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

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INDUSTRY COVERAGE: Semiconductors

COMPANY (TICKER)	RATING (AS OF)	PRICE* (04/08/2022)
Ethan Puritz		
Amphenol Corp. (APH.N)	E (08/23/2020)	\$73.28
Sensata Technologies Holding N.V. (ST.N)	O (12/13/2020)	\$47.77
Te Connectivity Ltd (TEL.N)	E (09/23/2019)	\$124.76
Joseph Moore		
Advanced Micro Devices (AMD.O)		\$101.00
Aeva Technologies Inc (AEVAN)	E (07/19/2021)	\$3.79
Ambarella Inc (AMBA.O)	O (03/29/2016)	\$90.69
Analog Devices Inc. (ADI.O)	E (09/13/2021)	\$158.74
Broadcom Inc. (AVGO.O)	O (11/19/2019)	\$587.00
GlobalFoundries Inc (GFS.O)	O (03/03/2022)	\$54.75
Intel Corporation (INTC.O)	U (03/03/2022)	\$47.02
Marvell Technology Group Ltd (MRVL.O)	E (09/14/2015)	\$63.15
Microchip Technology Inc. (MCHP.O)	O (10/19/2020)	\$66.32
Micron Technology Inc. (MU.O)	E (08/12/2021)	\$72.14
NVIDIA Corp. (NVDA.O)		\$231.19
NXP Semiconductor NV (NXPI.O)	E (04/08/2021)	\$167.50
ON Semiconductor Corp. (ON.O)	E (08/03/2021)	\$52.73
Qorvo Inc (QRO.O)	E (03/03/2022)	\$114.43
Qualcomm Inc. (QCOM.O)	O (06/16/2020)	\$136.69
Silicon Laboratories Inc. (SLAB.O)	E (01/19/2021)	\$136.94
Skyworks Solutions Inc (SWKS.O)	E (11/28/2018)	\$122.28
Teradyne Inc (TER.O)	E (03/03/2022)	\$108.66
Texas Instruments (TXN.O)	U (04/13/2020)	\$174.11
Western Digital (WDC.O)	O (01/23/2020)	\$47.20
Wolfspeed, INC (WOLF.N)	E (12/07/2020)	\$103.78

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* Historical prices are not split adjusted.

INDUSTRY COVERAGE: Semiconductor Capital Equipment

COMPANY (TICKER)	RATING (AS OF)	PRICE* (04/08/2022)
Joseph Moore		
Applied Materials Inc. (AMAT.O)	E (08/09/2018)	\$119.96
KLAC Corp (KLAC.O)	E (02/28/2020)	\$341.21
Lam Research Corp (LRCX.O)	O (06/16/2020)	\$491.64

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