

US Semiconductors

What do your semis neighbors own?

Nov'23 update

Industry Overview

Semis rel. weighting falling from Aug-23 highs

We use BofA Equity Strategy data to examine breadth (what % of US active managers own) and depth (how much owned in portfolio relative to stock's weight in S&P 500 index) of semiconductor + EDA stocks in the S&P 500 index, as of the end of Nov'23 (data retrieved end of Dec'23). Key takeaways: 1) Semis relative weighting of 1.11x (-4% QoQ) has consistently fallen MoM from Jul-23 1.18x levels (-2% MoM in Nov-23), and remains well below peak (1.36x in Mar-17); 2) NVDA maintains broadest ownership, owned by 65% of fund managers, a historical peak and up 200bps QoQ (+20bps MoM in Nov-23), though relative weighting of 1.03x below top 15 owned infotech/comm services peers (1.20x average) despite 11x+ faster sales growth prospects, per cons. (57% CAGR vs. 5% peers); 3) Greatest expansion in ownership at NVDA, AVGO, SNPS, CDNS, greatest decline QoQ at AMD, TXN, QCOM, and MCHP; 4) Greatest increase in depth/overweighting at INTC, ON, NXPI, SNPS while greatest decrease in weighting at SWKS, AMD, TER, and AVGO; and 5) Long-only (LO) investors most overweight KLAC, AVGO, SNPS while hedge funds (HF) highest ownership in AMBA, SYNA, and NVMI.

Highest owned semis are relatively underweight

Top 6 most widely owned semis in the SPX index include: 1) NVDA (65% of fund managers, +200bps QoQ, +730bps YoY), 2) AVGO (37.9%, +181bps QoQ, +1350bps YoY), 3) AMD (34.1%, down 490bps QoQ, -211bps YoY), 4) AMAT (33.5%, +116bps QoQ, +570bps YoY), 5) LRCX (31.8%, +113bps QoQ, +452bps YoY), and 6) TXN (27.6%, down 299bps QoQ, -829bps YoY). On the other hand, SPX chip stocks that were the most overweighted include: 1) KLAC (1.89x overweighted vs weight in SPX index), 2) AVGO (1.65x), 3) SNPS (1.54x), 4) NXPI (1.45x), and 5) MU (1.45x). Least overweighting vs SPX at QRVO, SWKS, QCOM and TER. Interestingly, despite widespread confidence in NVDA's increased growth prospects I-t, the stock's weighting is relatively contained at only 1.03x vs SPX, not that far from its ~1.0x overweight position a year ago and has fallen 5% from 1.08x weighting in Jun-23. AMD (3rd most owned) has also become more underweight, at 0.68x in Nov-23, the lowest weighting of years analyzed.

Ownership trends in semicap, EDA, industrial/auto stocks

AMAT and LRCX owned by similar % of managers (34/32%, respectively) +116/+113bps QoQ in Nov-23. LRCX weightage dropped 7% QoQ to 0.94x (vs 1.06x in Jun-23), while AMAT higher weighted at 1.33x (although fell 4% QoQ). KLAC most overweighted among semicaps at 1.89x. Within EDA, SNPS slightly more owned than CDNS (23% vs 21%), though SNPS more overweight at 1.54x vs CDNS at 1.28x. /MCHP/ADI ownership down 490-160bps QoQ, yet rel. weighting for ADI/TXN +1.4%/2.2% QoQ. ON/NXPI ownership weak (-96bps/2bps QoQ) yet weightage +18%/+14% QoQ.

LOs prefer ON, TXN, AVGO, MCHP relative to HFs

Rel. net weighting of semis in LO vs HF portfolios. ON, MCHP, TXN, AVGO more overweighted across LO investors. QRVO, CDNS, and TER overweighted at HFs. Stocks overweight across both LOs and HFs: AMAT, QCOM, NVDA, AMD, KLAC, ADI, LRCX.

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Exhibit 1: Summary of positioning

Ownership/weighting of semis stocks

Ticker	% funds holding	Relative Weight
NVDA	65.0%	1.03x
AVGO	37.9%	1.65x
AMD	34.1%	0.68x
INTC	12.4%	0.89x
QCOM	27.1%	0.63x
TXN	27.6%	1.22x
AMAT	33.5%	1.33x
LRCX	31.8%	0.94x
ADI	24.1%	1.20x
MU	10.6%	1.45x
KLAC	21.8%	1.89x
SNPS	22.6%	1.54x
CDNS	21.2%	1.28x
NXPI	17.9%	1.45x
MCHP	12.6%	0.83x
ON	11.5%	1.02x
SWKS	4.1%	0.08x
TER	6.2%	0.39x
QRVO	3.2%	0.08x

Source: BofA US Equity & US Quant Strategy
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*See page 10 for glossary

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Semiconductor ownership analysis

Within semis, NVDA is the most-owned stock among active fund managers, with ownership of 65% in November '23 (up from 60% in last report – June '23), followed by Broadcom, AMD, and Applied Materials (34% - 38% ownership). Qorvo remains the least-owned semi stock with ownership of 3% (down from 4% in June '23) across all active manager funds in survey.

Exhibit 2: Semiconductors & Semicap equipment - % holdings by active fund managers

NVDA is the most owned amongst semis by active fund managers while QRVO is least owned

Ticker	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
NVDA	57.7%	57.9%	57.8%	59.9%	60.2%	60.8%	61.3%	60.1%	60.5%	63.0%	64.3%	64.8%	65.0%
AVGO	24.3%	24.9%	26.1%	25.3%	25.3%	26.3%	27.0%	28.7%	33.1%	36.1%	37.1%	36.7%	37.9%
AMD	36.2%	35.1%	34.0%	36.3%	36.9%	39.2%	40.1%	39.6%	39.0%	39.0%	38.6%	36.7%	34.1%
INTC	15.7%	15.8%	15.0%	16.0%	16.0%	15.5%	14.5%	14.3%	12.7%	13.3%	12.9%	12.9%	12.4%
QCOM	35.4%	34.5%	33.1%	35.2%	35.2%	34.5%	33.7%	31.2%	29.7%	29.5%	28.7%	27.9%	27.1%
TXN	35.9%	36.5%	36.1%	34.3%	34.0%	33.9%	33.1%	32.3%	31.1%	30.6%	28.9%	28.4%	27.6%
AMAT	27.8%	29.2%	29.0%	28.2%	29.1%	29.2%	30.2%	30.6%	30.5%	32.4%	32.7%	33.1%	33.5%
LRCX	27.2%	29.2%	29.9%	30.8%	31.1%	31.6%	30.8%	30.3%	29.7%	30.6%	31.0%	31.4%	31.8%
ADI	24.3%	24.0%	23.8%	23.3%	24.4%	24.6%	25.6%	25.6%	26.3%	25.7%	25.7%	24.6%	24.1%
MU	12.5%	13.2%	12.6%	11.9%	12.8%	13.5%	13.1%	13.2%	14.1%	11.8%	11.7%	11.1%	10.6%
KLAC	21.2%	20.8%	21.1%	21.5%	22.4%	22.5%	23.3%	22.8%	22.6%	21.7%	21.9%	22.0%	21.8%
SNPS	19.1%	17.8%	17.9%	17.7%	19.2%	19.6%	20.1%	19.9%	19.5%	21.1%	22.2%	22.9%	22.6%
CDNS	18.3%	17.5%	17.9%	18.0%	18.3%	18.4%	19.8%	19.7%	19.8%	19.9%	20.5%	21.1%	21.2%
NXPI	16.8%	17.3%	17.3%	17.7%	18.6%	19.3%	18.6%	17.1%	16.7%	17.9%	18.4%	18.5%	17.9%
MCHP	11.3%	12.6%	12.6%	13.4%	12.2%	13.2%	12.5%	14.3%	13.8%	15.0%	14.6%	13.5%	12.6%
ON	11.3%	11.7%	11.4%	12.8%	14.5%	15.2%	13.7%	13.8%	13.0%	12.4%	12.6%	12.0%	11.5%
SWKS	6.4%	6.4%	5.0%	4.4%	5.2%	7.3%	7.3%	6.5%	6.2%	5.5%	5.3%	4.1%	4.1%
TER	8.4%	8.5%	8.5%	7.6%	7.6%	8.2%	8.1%	7.6%	7.1%	6.6%	6.7%	6.2%	6.2%
QRVO	2.3%	2.6%	2.6%	2.9%	2.9%	3.5%	4.4%	3.9%	3.4%	3.2%	3.2%	3.2%	3.2%
Median	20.1%	19.3%	19.5%	19.8%	20.8%	21.1%	21.7%	21.3%	21.2%	21.4%	22.1%	22.4%	21.8%

Source: BofA US Equity & US Quant Strategy

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KLAC is still the most overweight stock in semis (1.89x), followed by AVGO (1.65x).

QRVO and SWKS (0.08x each) are the most underweight stocks across semis.

Exhibit 3: Semiconductors, Semicap – relative weighting (to index) by active fund managers

KLAC and AVGO are the most overweight semis stocks by active fund managers, while SWKS and QRVO are most underweight

Ticker	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
NVDA	0.91x	0.86x	0.87x	1.00x	1.07x	1.07x	1.07x	1.08x	1.07x	1.07x	1.05x	1.03x	1.03x
AVGO	1.92x	2.06x	2.04x	2.02x	1.85x	1.85x	1.83x	1.76x	1.80x	1.80x	1.81x	1.81x	1.65x
AMD	1.02x	0.90x	0.86x	0.96x	1.01x	0.99x	1.06x	1.00x	1.03x	0.95x	0.86x	0.74x	0.68x
INTC	0.49x	0.48x	0.45x	0.45x	0.62x	0.65x	0.65x	0.75x	0.75x	0.75x	0.85x	0.82x	0.89x
QCOM	0.92x	0.79x	0.80x	0.77x	0.83x	0.83x	0.78x	0.75x	0.71x	0.69x	0.71x	0.70x	0.63x
TXN	1.25x	1.28x	1.29x	1.21x	1.21x	1.22x	1.16x	1.24x	1.21x	1.20x	1.28x	1.22x	1.22x
AMAT	1.23x	1.36x	1.38x	1.38x	1.45x	1.40x	1.45x	1.41x	1.41x	1.39x	1.43x	1.35x	1.33x
LRCX	0.80x	0.96x	1.00x	1.10x	1.11x	1.07x	1.09x	1.07x	1.06x	1.01x	1.01x	0.94x	0.94x
ADI	1.09x	1.09x	1.06x	1.07x	1.20x	1.21x	1.23x	1.24x	1.23x	1.18x	1.24x	1.25x	1.20x
MU	1.20x	1.48x	1.48x	1.42x	1.58x	1.57x	1.59x	1.56x	1.57x	1.55x	1.46x	1.45x	1.45x
KLAC	2.05x	1.99x	2.01x	1.87x	1.88x	1.91x	1.98x	2.01x	1.98x	1.91x	1.96x	1.90x	1.89x
SNPS	1.23x	1.18x	1.18x	1.29x	1.35x	1.39x	1.40x	1.48x	1.44x	1.48x	1.55x	1.53x	1.54x
CDNS	0.93x	0.86x	0.86x	1.06x	1.07x	1.14x	1.17x	1.27x	1.27x	1.27x	1.30x	1.30x	1.28x
NXPI	1.24x	1.24x	1.26x	1.33x	1.31x	1.38x	1.39x	1.43x	1.40x	1.27x	1.49x	1.44x	1.45x
MCHP	1.11x	1.08x	0.89x	0.91x	0.88x	0.38x	0.84x	0.88x	0.89x	0.89x	0.96x	0.83x	0.83x
ON	0.71x	0.62x	0.56x	0.72x	0.92x	0.97x	0.92x	0.91x	0.90x	0.86x	0.89x	0.88x	1.02x
SWKS	0.11x	0.08x	0.07x	0.07x	0.09x	0.23x	0.23x	0.22x	0.21x	0.20x	0.09x	0.08x	0.08x
TER	0.66x	0.64x	0.67x	0.68x	0.67x	0.70x	0.60x	0.59x	0.48x	0.48x	0.46x	0.42x	0.39x
QRVO	0.13x	0.13x	0.14x	0.14x	0.10x	0.11x	0.20x	0.19x	0.16x	0.08x	0.08x	0.08x	0.08x
Median	1.06x	1.02x	0.94x	1.07x	1.09x	1.10x	1.12x	1.08x	1.14x	1.12x	1.15x	1.13x	1.03x

Source: BofA US Equity & US Quant Strategy

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On a rolling forward basis (3-month average), we highlight positive sentiment (expanding ownership and rising weightage on rolling QoQ basis) across select names: SNPS, CDNS, and NXPI. Conversely more cautious sentiment (both declining ownership and weightage QoQ) exists at AMD, QCOM, MU, KLAC, MCHP, SWKS, TER, and QRVO.

Exhibit 4: QoQ ownership and weightage changes on rolling 3 month basis

Several names in semis saw falling ownership and weightage QoQ

Rolling QoQ ownership/weightage changes		
Ticker	Ownership	Weightage
NVDA	352bps	-0.04x
AVGO	463bps	-0.03x
TXN	(299bps)	0.02x
QCOM	(225bps)	-0.03x
INTC	(74bps)	0.10x
AMD	(275bps)	-0.24x
AMAT	197bps	-0.03x
ADI	(102bps)	0.02x
MU	(192bps)	-0.11x
LRCX	117bps	-0.08x
KLAC	(45bps)	-0.05x
SNPS	240bps	0.08x
CDNS	113bps	0.03x
NXPI	104bps	0.09x
MCHP	(81bps)	-0.01x
ON	(104bps)	0.04x
SWKS	(156bps)	-0.13x
TER	(74bps)	-0.09x
QRVO	(27bps)	-0.06x

Source: BofA US Equity & US Quant Strategy, Bloomberg

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Notably, Intel at 12% ownership is held below \$100bn+ market cap peers ranging 27% - 65% ownership. Furthermore, we also note stocks with >1% dividend yield have a 1.08x relative weighting versus the 0.98x average for stocks with no dividend (or have yield <1%).

Exhibit 5: Summary of ownership and weighting

INTC holds ownership levels below peers of similar size

Ticker	Bloomberg Ticker	Mkt Cap (\$bn)	Div Yield (%)	Ownership and Weighting	
				Ownership (%)	Weighting
NVDA	NVDA US EQUITY	\$1,174.9	0.0%	65.0%	1.03x
AVGO	AVGO US EQUITY	\$495.8	2.0%	37.9%	1.65x
TXN	TXN US EQUITY	\$151.3	3.1%	27.6%	1.22x
AMD	AMD US EQUITY	\$218.5		34.1%	0.68x
QCOM	QCOM US EQUITY	\$153.1	2.3%	27.1%	0.63x
INTC	INTC US EQUITY	\$198.4	1.1%	12.4%	0.89x
AMAT	AMAT US EQUITY	\$126.1	0.8%	33.5%	1.33x
LRCX	LRCX US EQUITY	\$97.0	1.1%	31.8%	0.94x
MU	MU US EQUITY	\$90.6	0.6%	10.6%	1.45x
ADI	ADI US EQUITY	\$93.8	1.8%	24.1%	1.20x
SNPS	SNPS US EQUITY	\$74.4		22.6%	1.54x
KLAC	KLAC US EQUITY	\$75.0	1.1%	21.8%	1.89x
CDNS	CDNS US EQUITY	\$69.9		21.2%	1.28x
NXPI	NXPI US EQUITY	\$55.6	1.9%	17.9%	1.45x
MCHP	MCHP US EQUITY	\$45.8	2.1%	12.6%	0.83x
ON	ON US EQUITY	\$34.0		11.5%	1.02x
SWKS	SWKS US EQUITY	\$16.9	2.6%	4.1%	0.08x
TER	TER US EQUITY	\$15.6	0.4%	6.2%	0.39x
QRVO	QRVO US EQUITY	\$10.3		3.2%	0.08x

Source: BofA US Equity & US Quant Strategy, Bloomberg

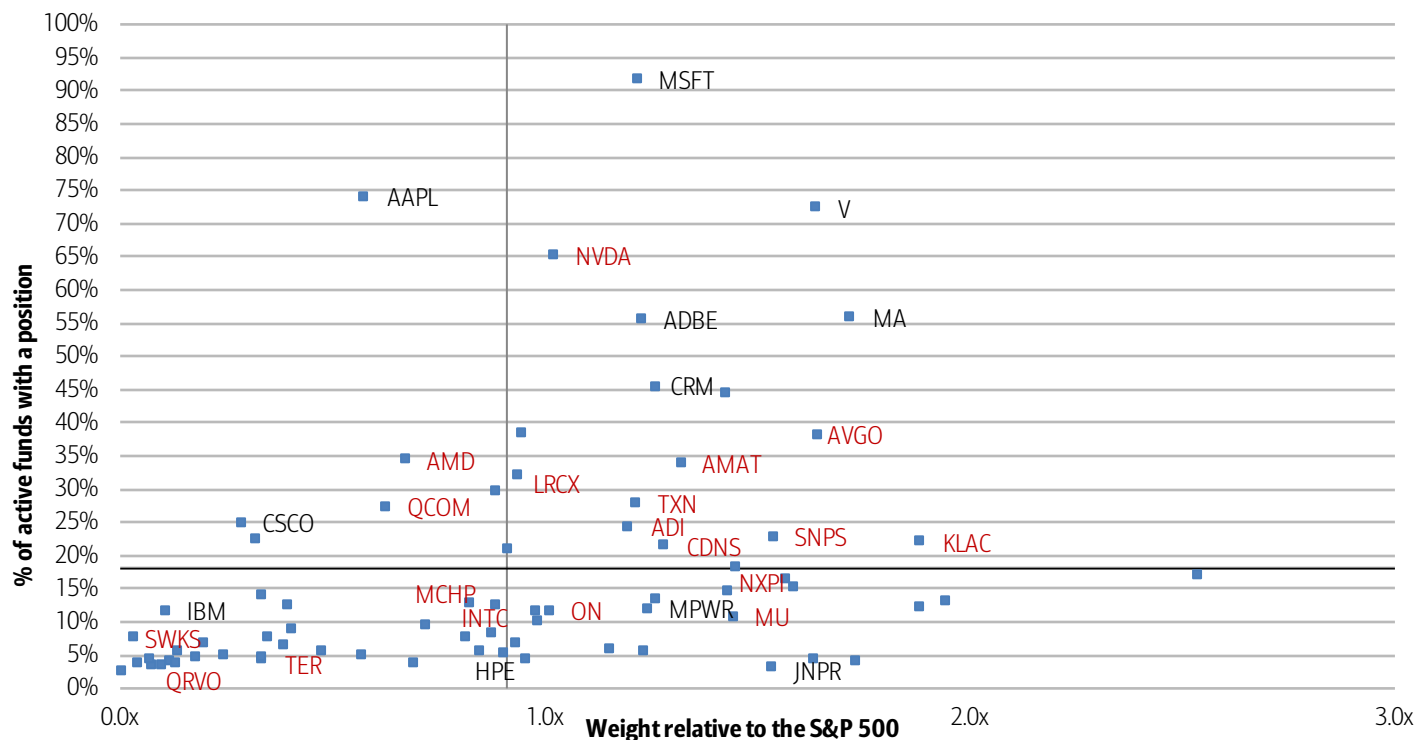
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Furthermore, assessing semis ownership/weighting relative to all infotech peers: (1) NVDA, LRCX, TXN, ADI, AMAT, SNPS, CDNS, AVGO, and KLAC are relatively well-owned and overweight; (2) QRVO, SWKS, MCHP, INTC, TER are both under-owned and underweight; (3) QCOM and AMD are well-owned but underweight; (4) NXPI, ON, and MU are relatively overweight but under-owned.

Exhibit 6: Tech stocks in S&P 500 – rel. weight vs. % ownership (axis intersects relative weight and % ownership for overall sector)

KLAC has the highest relative weighting to the S&P 500 while NVDA has the highest ownership within semis



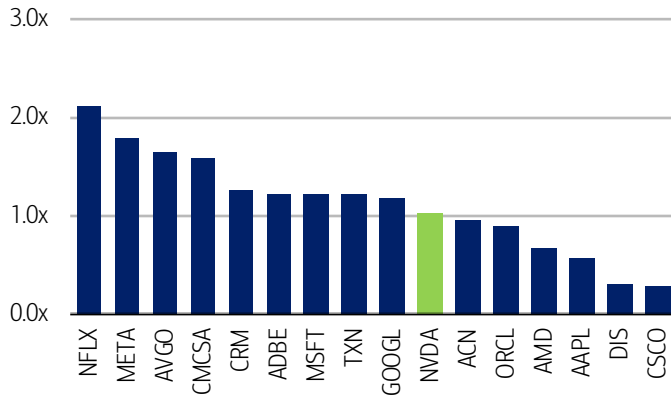
Source: BofA US Equity & US Quant Strategy

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We also put NVDA's ownership in context. Despite being held by ~65% of funds in the survey (>2500bp higher than the next semis company), breadth of ownership remains modest compared to high market cap infotech/comms peers. Indeed, NVDA's 1.03x relative weighting trails tech customers/peers at a 1.13x (avg of top 15), suggesting room for expansion.

Exhibit 7: Rel. Weightage of Top Market Cap Infotech/Comms Stocks

NVDA relative weightage in the back half of high mkt cap tech peers

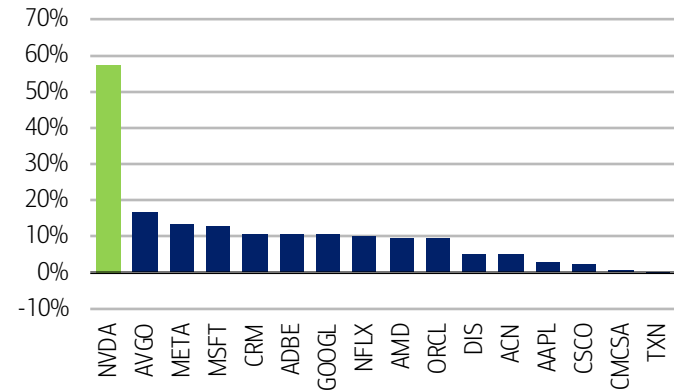


Source: BofA US Equity & US Quant Strategy

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Exhibit 8: Cons. CY22-25 sales CAGR of top infotech/comms stocks

NVDA is growing 3x-4x the peer group



Source: BofA Global Research, Bloomberg

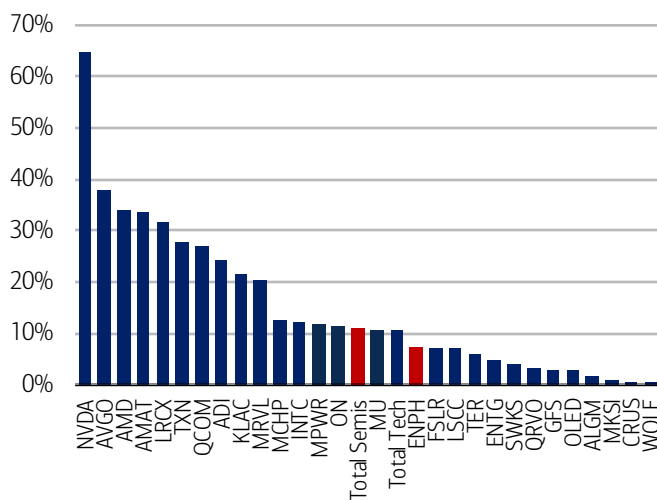
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Russell 1000 analysis

NVDA, AVGO, and AMD have the largest percentage of holdings by active fund managers for Russell 1000 stocks; CRUS, MKSI, WOLF, ALGM have the lowest. At the median, Russell 1000 semis are held by 11% of active fund managers, about 50bps above overall tech. Overall, semis are slightly underweight relative to the Russell 1000 index (0.90x), although better relative to all of tech (0.68x). WOLF, GFS, MRVL have the highest weighting while ENPH, CRUS, and SWKS have the lowest weighting.

Exhibit 9: % holdings of Russell 1000 stocks by active fund managers

NVDA has largest % of holdings by Russell 1000 managers

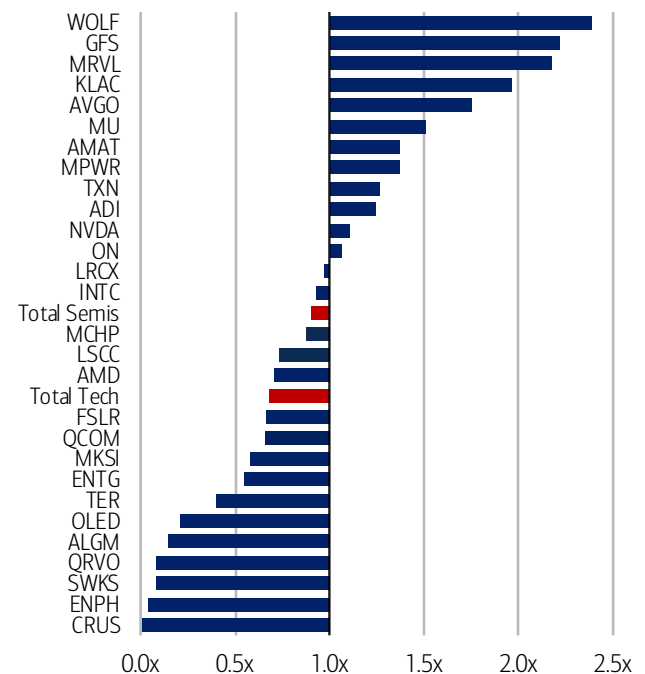


Source: BofA US Equity & US Quant Strategy

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Exhibit 10: Semis are underweight relative to Russell 1000 index

WOLF most overweight vs. Russell 1000 Index



Source: BofA US Equity & US Quant Strategy

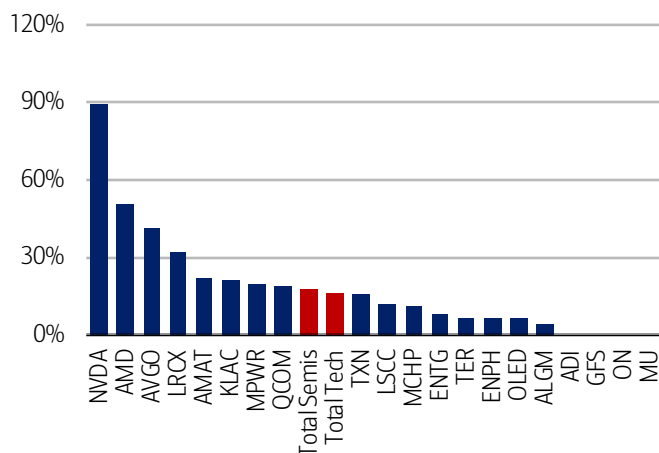
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NVDA, AMD, AVGO have the largest percentage of active manager holdings for Russell 1000 growth stocks while ADI, GFS, ON, MU, are least held. ADI, TXN, and INTC have the largest percentage of active manager for Russell 1000 value stocks; FLSR, MKSI, and WOLF have the lowest holding.

Exhibit 11: % holdings of Russell 1000 growth by active funds

NVDA has largest % of holdings by Russell 1000 growth managers



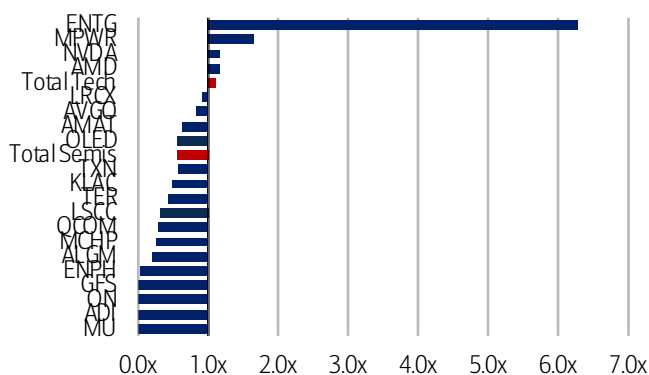
Source: BoFA US Equity & US Quant Strategy

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Semis are underweight (0.56x) relative to the Russell 1000 Growth index, while overall tech is slightly overweight (1.10x). ENTG, NVDA, and MPWR have the highest weighting while ALGM, ENPH, and MCHP have the lowest. For the Russell 1000 Value index, semis are well underweight at the median (0.12x) while overall tech is just also underweight (0.84x). MCHP is by far the most overweight in this index.

Exhibit 13: Semis are underweight relative to Russell 1000 growth

ENTG is most overweight relative to Russell 1000 growth Index

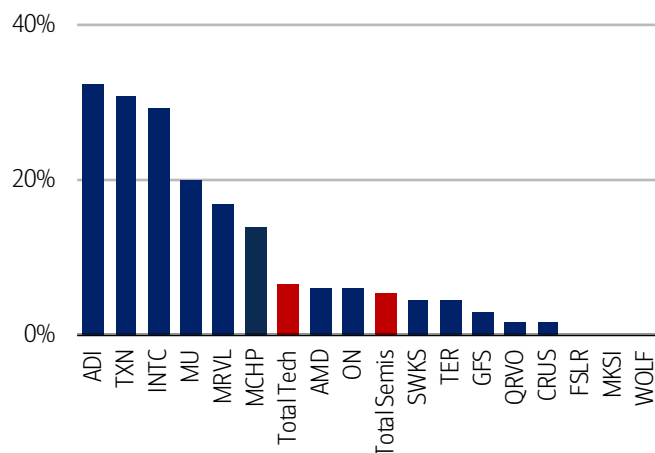


Source: BoFA US Equity & US Quant Strategy

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Exhibit 12: % holdings of Russell 1000 value by active funds

ADI has largest % of holdings by Russell 1000 value managers

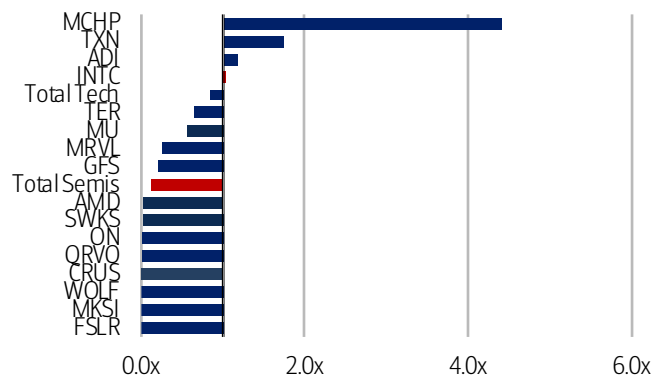


Source: BoFA US Equity & US Quant Strategy

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Exhibit 14: Semis are underweight relative to Russell 1000 value

MCHP is the overweight relative to the Russell 1000 value index



Source: BoFA US Equity & US Quant Strategy

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Sell-side sentiment

In terms of sell-side ratings, MRVL and NVDA have the highest % of buy ratings; while INTC, TXN, and QROV have the lowest.

Exhibit 15: Semiconductors & Semicap equipment - Street (sell-side) buy ratings as a % of total (as of end of Feb)

NVDA holds the most Buy ratings as a percentage of total ratings

Ticker	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
INTC	25.0%	22.9%	21.7%	18.2%	19.1%	19.6%	22.2%	20.5%	19.6%	20.8%	20.8%	20.8%	22.9%
NVDA	71.2%	71.2%	70.6%	72.5%	75.0%	76.8%	84.5%	87.7%	88.1%	93.5%	95.3%	95.3%	92.3%
TXN	28.6%	28.6%	25.7%	26.5%	25.7%	25.7%	25.7%	25.7%	23.5%	29.7%	31.6%	33.3%	33.3%
AVGO	80.8%	76.0%	76.0%	76.0%	75.9%	76.7%	76.7%	77.4%	75.0%	75.8%	76.5%	73.5%	73.5%
AMAT	72.7%	72.7%	72.7%	72.7%	72.2%	68.6%	68.6%	61.1%	62.2%	63.2%	64.1%	67.5%	67.5%
ADI	71.4%	72.4%	72.4%	70.0%	65.6%	65.6%	65.6%	65.6%	63.6%	61.8%	61.8%	64.7%	64.7%
LRCX	61.5%	65.4%	65.4%	63.0%	63.0%	64.3%	59.3%	59.3%	59.3%	60.7%	62.1%	70.0%	70.0%
MCHP	69.2%	65.4%	65.4%	64.0%	61.5%	64.0%	68.0%	68.0%	65.4%	61.5%	61.5%	65.4%	73.1%
SWKS	58.1%	60.0%	62.1%	63.3%	64.5%	59.4%	56.3%	56.3%	54.5%	51.5%	48.5%	48.5%	45.5%
NXPI	50.0%	48.4%	48.4%	51.6%	51.6%	54.8%	54.8%	56.3%	51.5%	51.5%	54.5%	54.5%	54.5%
KLAC	75.0%	70.0%	66.7%	63.6%	59.1%	56.5%	56.5%	52.2%	47.8%	50.0%	52.0%	53.8%	51.9%
AMD	69.4%	72.9%	72.3%	65.2%	66.7%	67.4%	65.9%	66.7%	66.7%	73.1%	75.0%	75.0%	70.9%
WOLF	70.0%	65.0%	63.6%	63.6%	65.2%	52.2%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	47.8%
AMBA	78.9%	76.2%	76.2%	75.0%	68.2%	66.7%	63.6%	63.6%	63.6%	61.9%	59.1%	63.6%	63.6%
CRUS	81.8%	81.8%	75.0%	75.0%	69.2%	69.2%	61.5%	61.5%	58.3%	63.6%	63.6%	72.7%	81.8%
NVMI	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	85.7%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%
COHR	75.0%	82.4%	83.3%	83.3%	83.3%	83.3%	83.3%	66.7%	61.1%	66.7%	66.7%	72.2%	73.7%
MRVL	88.2%	90.9%	90.6%	90.6%	87.5%	87.5%	90.6%	87.9%	88.2%	88.6%	89.2%	91.9%	89.5%
ON	74.2%	74.2%	68.8%	68.8%	65.6%	68.8%	68.8%	68.8%	63.6%	68.8%	68.8%	56.3%	60.6%
TER	61.1%	61.1%	52.6%	52.6%	52.6%	52.6%	52.6%	52.6%	52.6%	57.1%	61.9%	61.9%	66.7%
MTSI	69.2%	69.2%	61.5%	53.8%	50.0%	50.0%	50.0%	50.0%	42.9%	50.0%	57.1%	57.1%	57.1%
QROV	31.0%	29.6%	26.9%	25.0%	24.1%	20.0%	30.0%	30.0%	32.3%	37.5%	37.5%	37.5%	37.5%
CDNS	66.7%	73.3%	80.0%	75.0%	76.5%	76.5%	76.5%	75.0%	80.0%	81.3%	81.3%	81.3%	81.3%
SNPS	80.0%	81.3%	81.3%	86.7%	86.7%	87.5%	87.5%	81.3%	80.0%	81.3%	82.4%	82.4%	82.4%
GFS	76.5%	76.5%	77.8%	77.8%	77.8%	75.0%	80.0%	80.0%	76.5%	72.2%	72.2%	82.4%	82.4%
LITE	76.9%	66.7%	62.5%	56.3%	58.8%	52.9%	47.1%	47.1%	47.1%	52.9%	52.9%	58.8%	55.6%
CRDO	100.0%	100.0%	100.0%	75.0%	77.8%	77.8%	77.8%	80.0%	80.0%	81.8%	81.8%	83.3%	83.3%
CAMT	57.1%	57.1%	57.1%	57.1%	57.1%	62.5%	62.5%	62.5%	75.0%	75.0%	75.0%	75.0%	75.0%
MU	77.5%	71.8%	68.4%	71.1%	74.4%	73.7%	71.1%	71.1%	71.8%	69.2%	74.4%	74.4%	73.7%
Median	71.4%	71.8%	68.8%	68.8%	65.6%	66.7%	65.6%	63.6%	63.6%	63.2%	63.6%	67.5%	70.0%

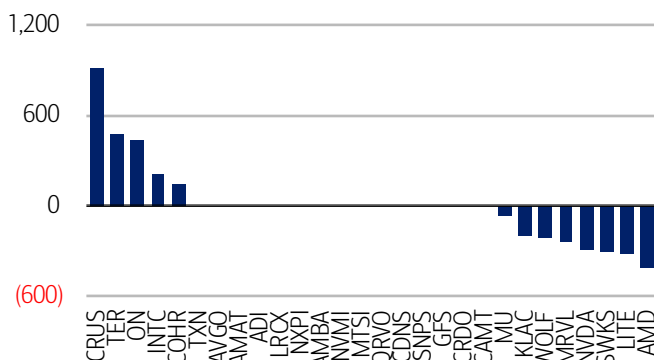
Source: BofA Global Research, Bloomberg

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Below, we examine the MoM and YoY changes in Buy ratings as a % of total sell-side ratings. On a MoM basis, CRUS and TER saw the largest increases, while AMD and LITE experienced the largest declines. On a YoY basis, NVDA, CAMT, CDNS increased the most while NVMI, KLAC decreased the most.

Exhibit 16: MoM change in Buy ratings as a % of total (bps)

CRUS had largest increase in Buy ratings MoM, AMD largest decrease

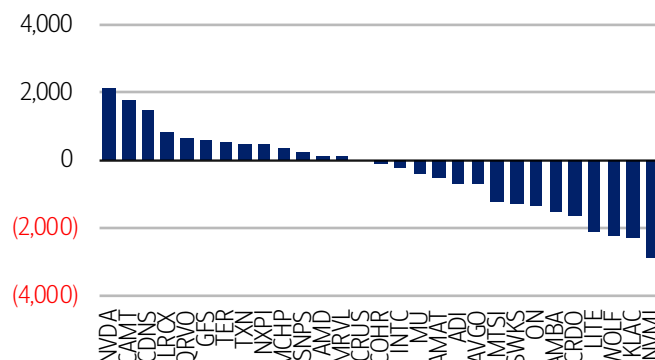


Source: Bloomberg

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Exhibit 17: YoY change in Buy ratings as a % of total (bps)

NVDA has largest increase in Buy ratings YoY, NVMI has largest decrease



Source: Bloomberg

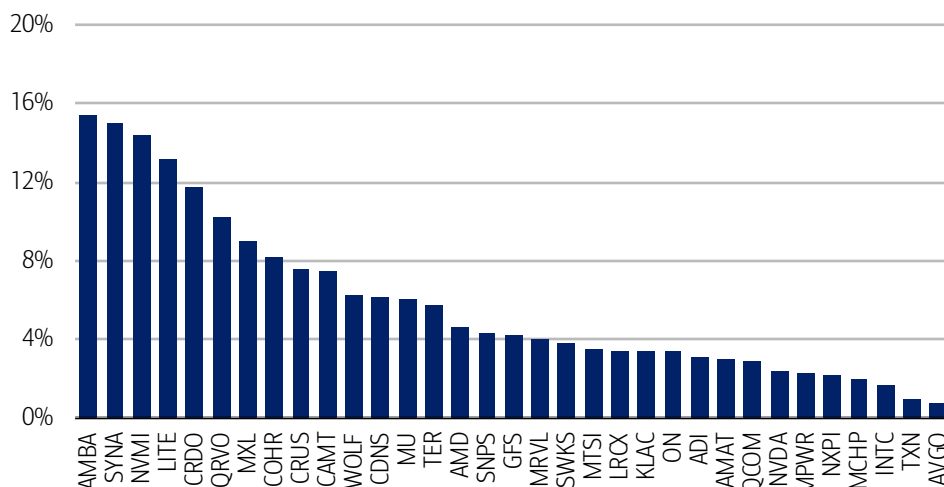
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Hedge fund ownership

AMBA, SYNA, and NVMI have the highest proportion of hedge fund ownership; AVGO, TXN, and INTC have the lowest. Note this analysis also includes semi companies that are excluded from the S&P 500 index.

Exhibit 18: Percentage of shares outstanding held by hedge fund managers – as of 6/31/2023

AMBA, SYNA, NVMI most owned amongst hedge funds, while AVGO, TXN, INTC are least owned



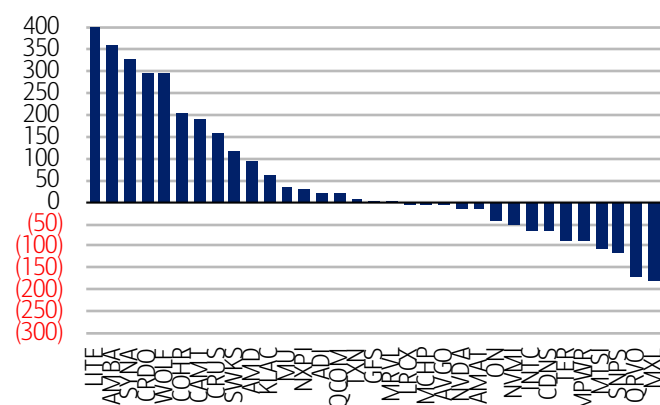
Source: FactSet

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Below, we examine the QoQ and YoY changes in relative hedge fund ownership (as % of shares outstanding). On a QoQ basis, LITE and AMBA saw the largest increases in hedge fund ownership, while MXL and QRVO experienced the most significant decreases. On a YoY basis, SYNA and CRDO hedge fund ownership increased the most while SWKS and MPWR saw the greatest declines.

Exhibit 19: QoQ change in % of shares outstanding held by hedge fund managers (bps)

LITE had the highest change in HF ownership on a quarterly basis

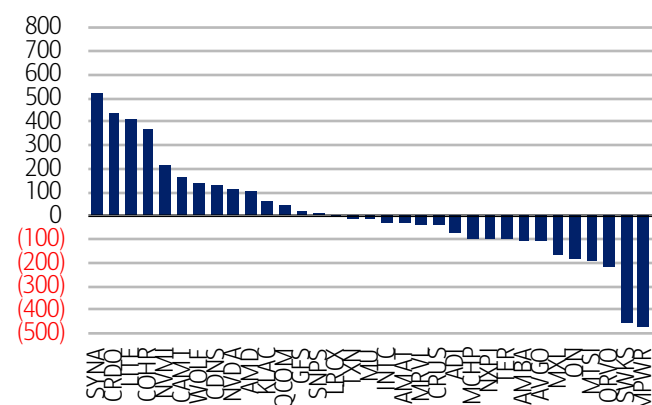


Source: Factset

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Exhibit 20: YoY change in % of shares outstanding held by hedge fund managers (bps)

SYNA also had the highest change in HF ownership on a YoY basis



Source: Factset

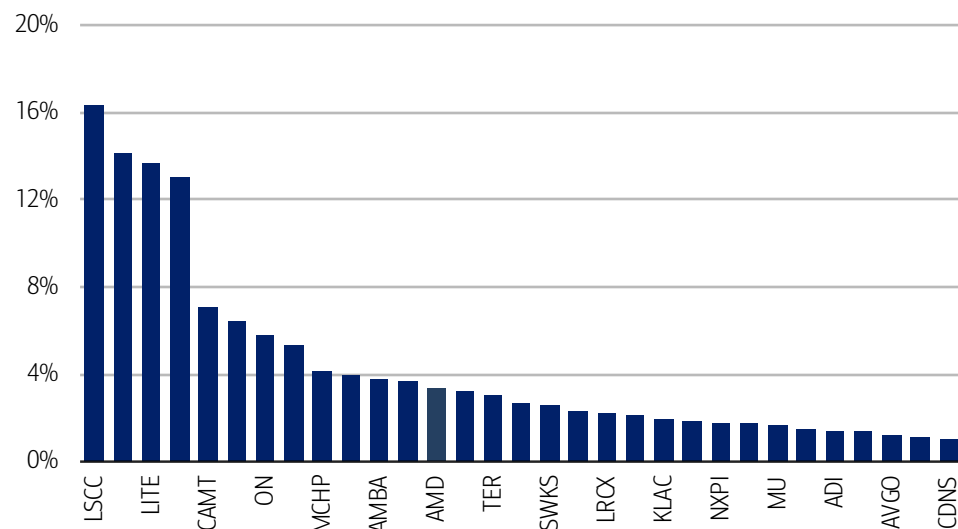
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Short interest update

LSCC and WOLF has the highest short interest as a percentage of total float while NVDA and CDNS have the lowest.

Exhibit 21: Short interest as a percentage of total float (%)

LSCC has the highest short interest as % of total float



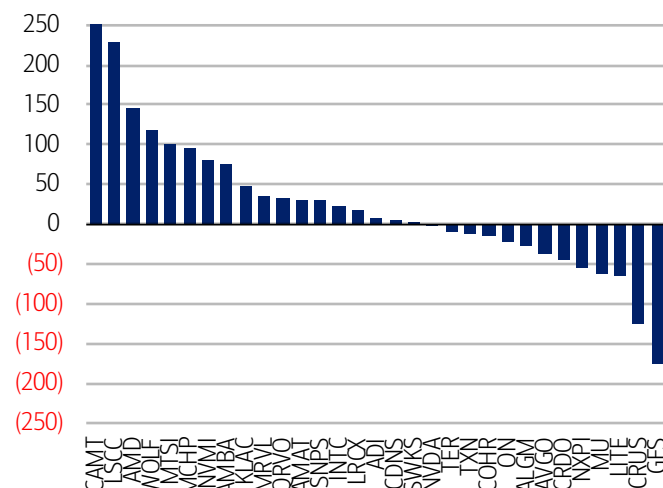
Source: Bloomberg

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As compared to three months ago, CAMT, LSCC, and AMD had the greatest increases in short interest as a percentage of total float while GFS and CRUS had the greatest decrease. On a YoY basis, LSCC had the largest increase in short interest as a percentage of total float while CRDO had the largest decrease.

Exhibit 22: QoQ change in Short Int/Float % (bps)

CAMT saw the largest increase in short int/float on a quarterly basis

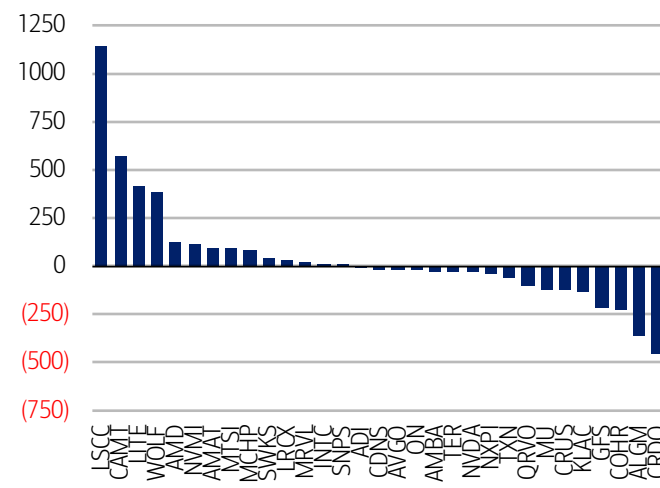


Source: Bloomberg

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Exhibit 23: YoY Change in Short Int/Float (bps)

LSCC also saw the largest increase in short int/float on a YoY basis



Source: Bloomberg

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Relative weighting: HF vs. LO

We compare relative weighting (fund ownership vs. SPX ownership of semi stocks) in Long Only (LOs) and Hedge Funds (HFs) and compare the difference in ownership by fund type. On a relative basis, ON, MCHP, TXN, AVGO, INTC, and NXPI are more overweighted across LOs versus HFs. Conversely, SNPS, SWKS, MU, TER, CDNS, and QRVO are more overweight by HFs. We note AMAT, NVDA, AMD, KLAC, ADI, and LRCX are overweight at both LOs and HFs.

Exhibit 24: Summary of positioning at HFs and LOs

ON, TXN, AVGO, MCHP are significantly overweight at LOs

Ticker	LO Rel Wt to SP500	HF Rel Wt to SP500	LO vs HF Net
High LO Weighting			
ON	1.02	-2.71	3.72
MCHP	0.83	-2.54	3.37
TXN	1.22	-1.01	2.23
AVGO	1.65	-0.45	2.09
INTC	0.89	-0.63	1.52
NXPI	1.45	-0.06	1.52
Balanced LO/HF Weighting			
AMAT	1.33	0.42	0.90
QCOM	0.63	0.72	-0.09
NVDA	1.03	1.16	-0.14
AMD	0.68	0.90	-0.23
KLAC	1.89	1.62	0.26
ADI	1.20	2.02	-0.82
LRCX	0.94	1.86	-0.92
High HF Weighting			
SNPS	1.54	2.80	-1.26
SWKS	0.08	1.43	-1.35
MU	1.45	3.19	-1.75
TER	0.39	3.39	-3.01
CDNS	1.28	4.62	-3.34
QRVO	0.08	9.76	-9.68

Source: BofA US Equity & US Quant Strategy

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Exhibit 25: Stocks mentioned in report

Summary of stocks mentioned in this report

BofA Ticker	Bloomberg Ticker	Company Name	Price	Rating
ACLS	ACLS US Equity	Axcelis	US\$ 120.92	C-2-9
AEIS	AEIS US Equity	Advanced Energy	US\$ 102.05	B-2-8
ALGM	ALGM US Equity	Allegro Microsystems	US\$ 29.01	C-2-9
AMBA	AMBA US Equity	Ambarella	US\$ 56.71	C-3-9
AMD	AMD US Equity	Advanced Micro	US\$ 135.32	C-1-9
ADI	ADI US Equity	Analog Devices	US\$ 188.96	B-1-7
AMAT	AMAT US Equity	Applied Materials	US\$ 151.45	B-1-7
AVGO	AVGO US Equity	Broadcom	US\$ 1058.58	B-1-7
CAMT	CAMT US Equity	Camtek	US\$ 67.02	C-1-9
CDNS	CDNS US Equity	Cadence	US\$ 257.28	B-1-9
COHR	COHR US Equity	Coherent	US\$ 40.86	C-2-9
CRDO	CRDO US Equity	Credo	US\$ 18.09	C-3-9
CRUS	CRUS US Equity	Cirrus Logic	US\$ 79.93	
GFS	GFS US Equity	GlobalFoundries	US\$ 57.02	C-2-9
INTC	INTC US Equity	Intel	US\$ 47.05	B-2-8
KLAC	KLAC US Equity	KLA-Tencor	US\$ 552.59	B-1-7
LITE	LITE US Equity	Lumentum	US\$ 49.95	B-3-9
LRCX	LRCX US Equity	Lam Research	US\$ 736.93	C-1-7
LSCC	LSCC US Equity	Lattice	US\$ 65.78	C-2-9
MCHP	MCHP US Equity	Microchip	US\$ 84.57	B-1-7
MRVL	MRVL US Equity	Marvell	US\$ 56.76	C-1-7
MTSI	MTSI US Equity	M/A-Com	US\$ 85.72	C-1-9
NVDA	NVDA US Equity	Nvidia	US\$ 475.69	C-1-7
NVMI	NVMI US Equity	Nova Instruments	US\$ 132.1	B-1-9
NXPI	NXPI US Equity	NXP Semiconductor	US\$ 216.08	B-1-7
ON	ON US Equity	ON Semiconductor	US\$ 79.31	C-1-9
QRVO	QRVO US Equity	Qorvo Inc.	US\$ 105.69	B-3-9
SWKS	SWKS US Equity	Skyworks	US\$ 105.21	B-3-7
SNPS	SNPS US Equity	Synopsys	US\$ 492.4	B-1-9
TER	TER US Equity	Teradyne	US\$ 101.75	B-3-7
TXN	TXN US Equity	Texas Instruments	US\$ 166.74	B-2-7
WOLF	WOLF US Equity	Wolfspeed, Inc.	US\$ 40.56	C-3-9

Source: Bloomberg, BofA Global Research

BofA GLOBAL RESEARCH

Glossary

Companies:

ADBE: Adobe
 ADI: Analog Devices
 ADSK: Autodesk
 ALGM: Allegro MicroSystems
 AMAT: Applied Materials
 AMBA: Ambarella
 AMD: Advanced Micro Devices
 ANSS: ANSYS
 AVGO: Broadcom
 CDNS: Cadence
 CRM: Salesforce
 CRUS: Cirrus Logic
 CTXS: Citrix
 EDA: Electronic design automation
 ENPH: Enphase Energy
 ENTG: Entegris
 FTNT: Fortinet
 FSLR: First Solar
 HF : hedge fund
 INTC: Intel
 INTU: Intuit
 KLAC: KLA
 LSCC: Lattice Semiconductor
 LO: long only
 MCHP: Microchip
 MKSI: MKS Instruments
 MPWR: Monolithic Power
 MRVL: Marvell
 MTSI: M/A-com
 MSFT: Microsoft
 NLOK: NortonLifeLock
 NOW: ServiceNow
 NVDA: Nvidia
 NXPI: NXP Semiconductor
 ORCL: Oracle
 PAYC: Paycom
 QCOM: Qualcomm
 QRVO: Qorvo
 SEDG: SolarEdge
 SWKS: Skyworks
 SYNA: Synaptics
 TXN: Texas Instruments
 WOLF: Wolfspeed
 HF: Hedge Fund
 LO: Long-Only
 RF: Radio Frequency
 TAM: Total Addressable Market

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BofA Securities is currently acting as financial advisor to Intel Corp in connection with its sale of a minority stake in IMS Nanofabrication GmbH to Taiwan Semiconductor Manufacturing Co Ltd, which was announced on September 12, 2023.



Disclosures

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster ^{R1}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

^{R1} Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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