November Growth Well Above-Average

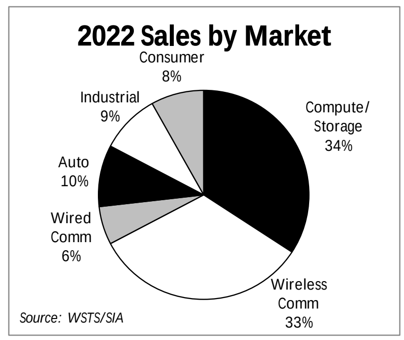
Recovery Persists, Broad-based Rally at Year-end

The semiconductor industry continued its recovery that began earlier in 2023 with well above-average November month-to-month growth of +2.9%, according to statistics released earlier this week. In addition, the outlook for 4Q sequential growth of over +4% based on company guidance across my Universe is unusually robust for this seasonally anemic period. And, overall sector share prices reflected in the SOX index significantly outperformed broader equity markets last year.

Unfortunately, most companies are *NOT* participating in this overall strength. Specifically: over half of the companies in my Universe missed at least some portion of 3Q expectations; 15 out of the 53 stocks in my Universe finished *negative* last year; and the average gain across my Universe was about half that of the SOX—despite a huge rally in December that included almost all of my stocks and whose average *exceeded* that of the SOX.

And while the relative strength of the SOX compared to the S&P500 is frighteningly similar to 2000, let me finish on a positive note: semiconductor industry growth this year is expected in the mid-double digit percentage range led by memories at around 50%, after last year's expected contraction of almost -10%. Happy New Year!

Robust 2024 Forecast: The WSTS (World Semiconductor Trade Statistics) updated its bi-annual industry forecast at the end of November and raised its expectation for industry growth this year to +13.1% with memories at +44.8%. Gartner in early December was even more bullish, expecting industry growth of +16.8% with memories at +66.3%. Recall that memories approximate 20% of the whole.



Artificial Intelligence is driving growth that is off the charts with its requirement for gobs of processors and memory, automotive is expanding in the solid double digits, and industrial markets appear to be growing nicely. And while PCs and smartphones struggled last year, market participants (Micron, recently) noted normalization of PC inventories and signs of life in smartphones. Nevertheless, consumer markets remain lackluster.

Supply Chain Gyrations: US attempts to limit advanced technology transfers to China is scrambling chip industry supply chains and markets with pretty much every semiconductor company doing what it can to preserve supply and sales in a variety of ad hoc fashions within the confines of regularly changing regulations and restrictions. Meanwhile, China is furiously attempting to advance its own technology with, arguably, some (limited) success.

Last month I opined that this chaos is a 'new normal' rather than a transition to a bifurcated market between China and The West, meaning each company's product, supply chain, and geographic and application market exposure will need to be addressed individually from a 'bottoms up' perspective—along with potential new competitors backed by the Chinese government.

After learning that China hoarded leading-edge chips and accounted for a disproportionate share of all kinds of equipment tool sets last year ahead of anticipated embargoes, I am now taking a more pessimistic view that China will eventually flood world-wide markets with devices that don't require advanced technology, while we will limit market access to China of our high-end, pricey, leading-edge products and technology. Kind of a lose-lose proposition. (Okay, so I haven't had a good week . . . sorry.)

Structural Differences: Recall that my US-equity-based Tokeneke Universe does *not* include some three-quarters of industry DRAM and NAND business from Samsung, SK Hynix and Kioxia. While my Universe does include Micron and Western Digital, it will probably under-perform expected industry growth in 2024 of +13% due to under-representation of the +40% to +60% expected memory growth. My Tokeneke Universe also does *not* include very large international players (Samsung, SK Hynix, Kioxia, MediaTek, Infineon, Renesas, Rohm, Winbond, Macronix, Nanya, Novatek, Realtek) although it does include wafer foundries (TSMC, UMC, GlobalFoundries, Skywater Tech, Tower Semi) and IP companies (Rambus, Xperi, Ceva, InterDigital, Arm, Adeia) that count as costs associated with manufacturing rather than industry sales. I also normalize fiscal quarters to the best fitting two out of three months. Unreported acquisition stub-periods and mergers exiting the sector can also be a difference.

While these differences are significant, most US-based investors experience the sector from the Tokeneke Universe perspective. The Philadelphia Semiconductor Index Option (SOX) is similarly under-represented in memories, although this is mitigated by the inclusion of equipment firms supplying to memory firms.

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November Well Above-Average Growth: Worldwide chip industry revenues for November grew by an impressive +2.9% sequentially on a three-month rolling average basis, according to statistics released by the Semiconductor Industry Association (SIA) earlier this week. November continues the trend of sequential monthly growth that began last March after nine consecutive months of declines throughout most of 2022. November has averaged a gain of +1.4% with a high of +6.3%, a low of -7.2%, and 8 declines in the last 37 years—including three in the last eight. China led with a gain of +4.4% followed by The Americas with +3.9% and Asia-Pacific at +3.5%. The rest of the world lagged with declines from Japan of -0.7% and Europe of -2.0%.

Next month's release of December statistics should continue to reflect above-average gains despite seasonal weakness given robust 4Q guidance during the 3Q earnings season. December has averaged a decline of -2.3% with a high of +3.3%, a low of -16.6%, and 31 declines in the last 37 years.

Impressive 4Q Outlook: The 4Q revenue outlook based on management guidance across my Tokeneke Universe is well above average for this typically anemic period, although many companies expect a sequential decline. The specific weighted average guidance for revenue after the 3Q earnings season called for impressive sequential growth of +4.0% this quarter, ranging from +1.1% to +7.0%. The 4Q is seasonally the second weakest quarter of the year with average sequential revenue growth of only +1.5%, a high of +16.0%, a low of -24.2%, and 14 declines in the last 37 years—including 10 of the last 16, according to industry statistics.

Preannoucements after 3Q earnings season so far include expected 4Q upside from Micron Technology, Silicon Motion, TSMC and UMC but downside from Microchip, thereby raising my weighted average growth to +4.6% ranging from +2.2% to +6.9%.

Acquisitions and Deals: The only pending acquisition at this time is the Renesas purchase of Sequans Communications for $3.03 per ADS in cash (that keeps getting extended). The other deal is Western Digital's plan to split its hard-drive and flash operations into two separate companies sometime during 2H24, as announced last October. Silicon Motion is also still suing MaxLinear for backing out of its takeover last year. And finally, Infinera was rumored to be shopping itself last March, but then tumbled into a revenue recognition review triggered by EY late-3Q23.

Broad Year-end Rally: The chip sector share price rally in December continued to outperform broader equity markets, but was unique in that nearly all the stocks in my Universe participated and the average of my Universe outperformed the SOX. During December the Philadelphia Semiconductor Index Option (SOX) gained +12.1% with 51 out of 53 stocks in my Universe advancing by an average of +13.8% compared to lesser gains from the NASDAQ, S&P500 and DOW at +5.5%, +4.4%, and +4.8%, respectively. For all of 2003, the SOX maintained its significant outperformance although 15 of the equities in my Universe declined and the average stock underperformed to the SOX by half, per the tables below.

December			
Winners *(51/53)*		Losers	
NLST	46.9%	GSIT	-4.7%
SKYT	36.5%	SQNS	-1.7%
ADEA	34.8%	RMBS	0.9%
SMTC	33.8%	MRAM	1.5%
MXL	26.9%	SIMO	4.2%
average stock +13.8%		*SOX +12.1%*	

4Q			
Winners *(43/53)*		Losers	
PI	63.6%	LSCC	-19.7%
QUIK	61.2%	SMTC	-14.9%
SKYT	59.8%	NLST	-13.8%
AMD	43.4%	AOSL	-12.7%
INTC	41.4%	ON	-10.1%
average stock +15.6%		*SOX +21.6%*	

2023			
Winners *(38/53)*		Losers	
NVDA	238.9%	WOLF	-37.0%
QUIK	169.6%	MXL	-30.0%
AMD	127.6%	INFN	-29.5%
IDCC	119.4%	TSEM	-29.4%
AVGO	99.6%	PXLW	-26.0%
average stock +32.5%		*SOX +64.9%*	

Indices	*Dec*	*4Q*	*2023*
SOX	12.1%	21.6%	64.9%
SMH	9.0%	21.3%	73.4%
NASDAQ	5.5%	13.6%	43.4%
S&P500	4.4%	11.2%	24.2%
DOW	4.8%	12.5%	13.7%

Big Chip Sector Premium: While I have not yet updated my Semiconductor Investment Ideas publication, I am still pretty terrified of the overall chip sector based on the chart on Page 4. The S&P500 is 'normalized' to the SOX so that both indices can use the same vertical axis. Basically, I just divide the S&P by 3.80508 so that both were set at 100 when the SOX initiated in 1994. Notice that the relative premium of the SOX, based largely on the enthusiasm for AI, is currently very similar to what is was in the year 2000 before the internet bubble burst. While history doesn't necessarily repeat itself, sometimes it rhymes.

—Dan K. Scovel
Semiconductor Analyst

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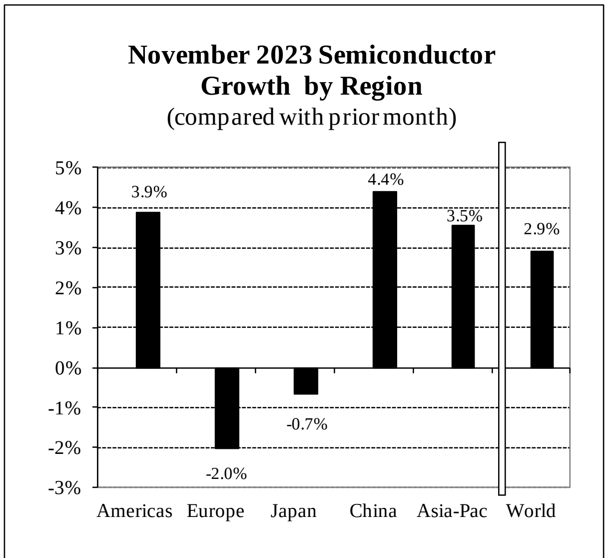
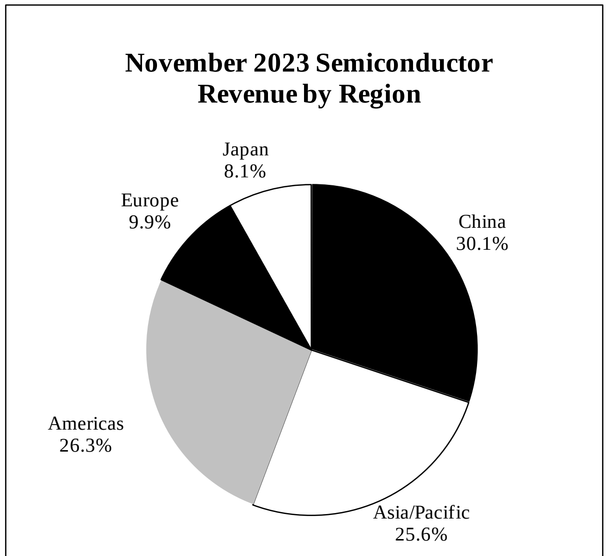


Source: WSTS and Tokeneke Research LLC



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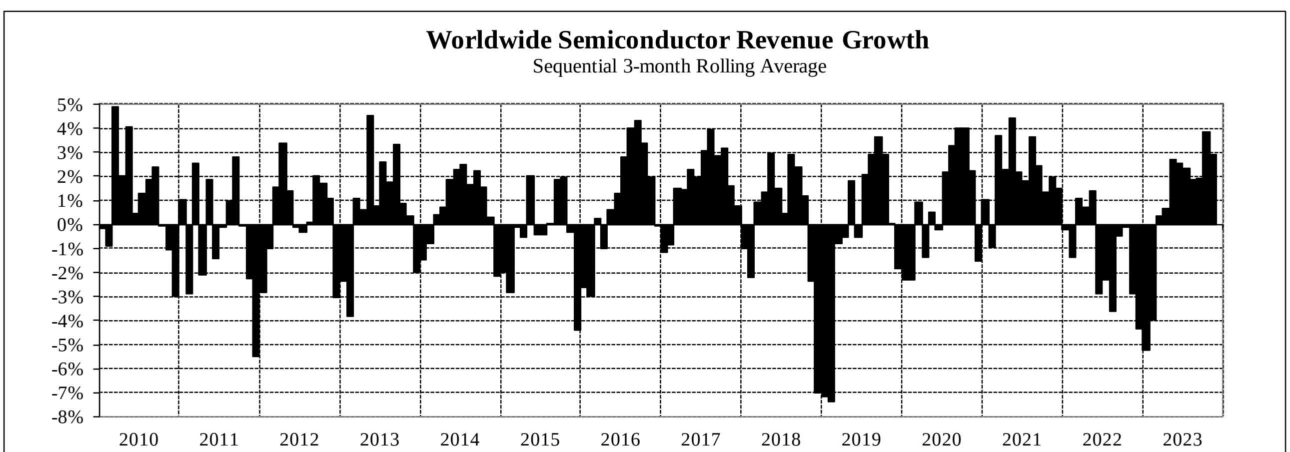

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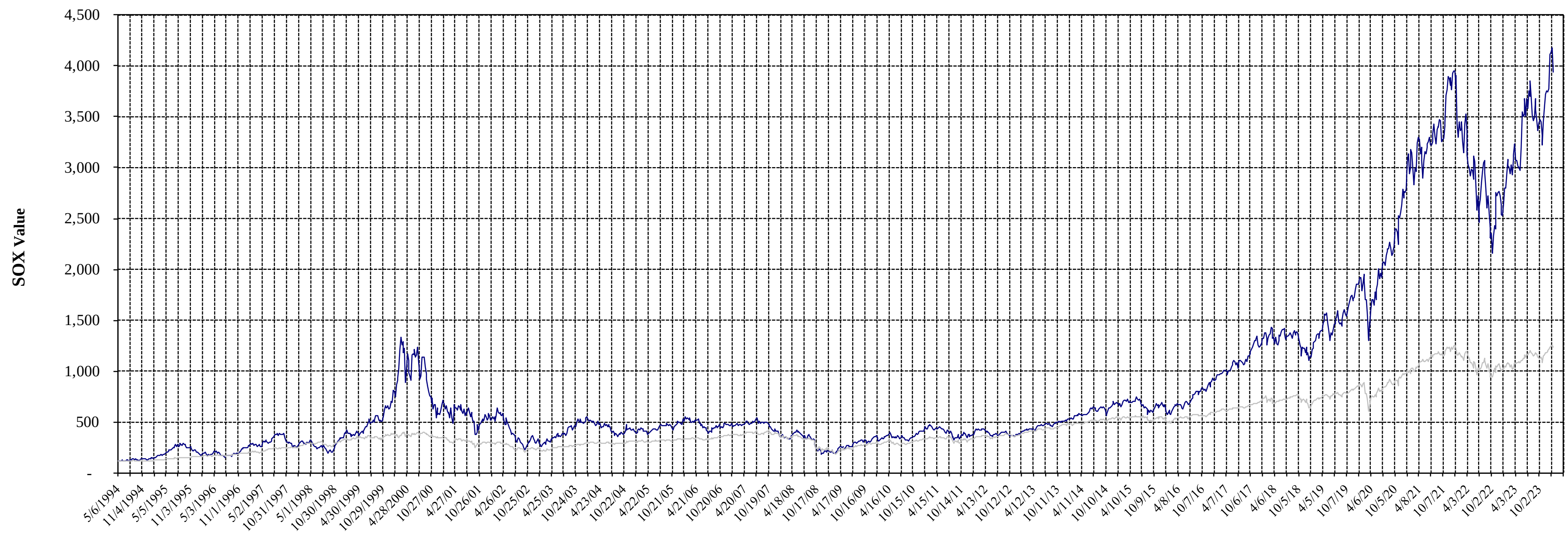
Weekly Philadelphia Semiconductor Index Option (SOX) vs. S&P 500



Source: Tokeneke Research LLC

**S&P 500 normalized to the SOX (divided by 3.80508)*

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The Company

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My Background

I have an electrical engineering background, nearly 12 years of semiconductor industry experience, and was on Wall Street for nearly eight years where I was selected as the Best On The Street semiconductor analyst for 2002 by The Wall Street Journal, and third-rated Best of the Best across all sectors.

I obtained my undergraduate BS degree in electrical engineering from the University of Washington, and my MBA from Santa Clara University. My industry experience consists of nearly 12 years in various technical sales and marketing roles at four different semiconductor firms located in Silicon Valley beginning with Advanced Micro Devices in 1984, followed by two small start-up companies, and ending at Cirrus Logic where I supported the firm's Japanese market development. I joined Fahnestock & Co. as a senior semiconductor analyst in 1996 and was recruited by Needham & Co. in April 2000.

My formal coverage list as a sell-side analyst included the following equities: AMD, ALSC, ALTR, ARTI, ATML, CUBE, CY, ESST, GNSS, INTC, ISSI, LSI, MOSY, MU, OIIM, OVTI, RMTR, SIII, SMSC, STEC, SVTG, TDFX, TSRA, TXN, and ZRAN.

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