Well Above-Average October Chip Growth

Recovery Persists, but Most Equities Are Underperforming

The semiconductor industry continued its recovery that began earlier this year with well above-average October month-to-month growth of +3.9% according to statistics released earlier this month. In addition, the 3Q earnings season is complete and 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 are significantly outperforming broader equity markets so far this year through the end of November.

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, and some 21 out of the 53 stocks in my Universe are *negative* year-to-date with the average gain across my Universe less than half that of the SOX.

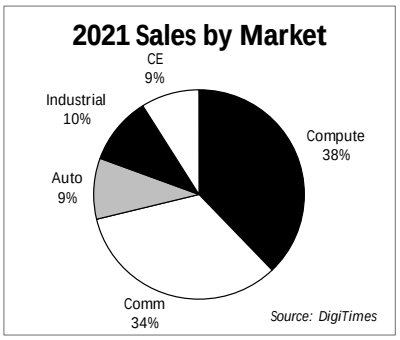
The outlook for the sector is also conflicted with business conditions exhibiting signs of a continuing recovery, but the relative strength of the SOX compared to the S&P500 is frighteningly similar to that of 2000.

Forecast Update Boost: The WSTS (World Semiconductor Trade Statistics) updated its bi-annual industry forecast at the end of November and bumped its numbers up from its previous forecast in June, as noted in the adjacent table. On an annual basis, this year will decline a little less and next year is expected to grow a little more. Notice that the size and volatility of memory products, which predominantly consists of DRAM and NAND flash, accounts for much of the overall industry dynamics. Also notice the monthly sales chart on Page 3 which clearly shows the current business cycle having bottomed in early-2023 and has consistently marched upward since.

WSTS Semiconductor Industry Revenue Growth Forecast

	2022 act	2023 fcst		2024 fcst	
		Jun '23	*Nov '23*	*Jun '23*	*Nov '23*
Total Semi	3.3%	-10.3%	-9.4%	11.8%	13.1%
$ bil	574.1		520.1		588.4
Memory Only	-15.6%	-35.2%	-31.0%	43.2%	44.8%
$ bil	129.8		89.6		129.8
% of industry	22.6%		17.2%		22.1%

AI and Automotive Drive Growth: By end-market application, Artificial Intelligence is driving growth that is off the charts with its requirement for gobs of processors and memory, and automotive is expanding in the solid double digits. Unfortunately, AI is a smaller subset of servers in the computing market that is dominated by moribund PCs and struggling non-AI servers, and automotive only accounts for some 10% of overall industry revenue. In addition, the communication sector is dominated by smartphones that have their own set of problems which renders some three-quarters of overall chip industry consumption lacking growth. Nevertheless, market participants are indicating recent potential signs of a cyclical bottoming in memory, PC and smartphone markets with an optimistic outlook for 2024.



Chinese Checkers: US attempts to limit advanced technology transfers to China is seriously 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. Nvidia is an excellent example: while its supply chain appears managed, sales to China account for some 20-25% of its total and it keeps leap-frogging de-featured AI processors to comply with evolving US restrictions to preserve revenues. In general, most of China's robust automotive chip consumption does not (yet?) appear affected and a number of major western chip suppliers are enhancing supply chains in China with joint-ventures to insure market access. Smartphones are unique given significant Chinese customer market share amid overall market weakness rendering the impact of restrictions especially opaque. In the meantime, China is furiously attempting to grow its own advanced technology with, arguably, some success.

Originally, I assumed all this chaos reflected the transition from an integrated world-wide semiconductor industry supply chain and TAM to a bifurcated structure with separate SAMs for China and 'The West.' However, I am now thinking this is the 'new normal,' as narrowly targeted limitations of strategic technology transfers attempt to preserve as much global market access as possible. What this means is that each company's product, supply chain, and geographic and application market exposure will need to be addressed individually from a 'bottoms up' perspective. And, oh yeah—new competitors with Chinese government backing may well materialize.

Structural Differences: Recall that my US-equity Tokeneke Universe does *not* include very large international players (Samsung, SK Hynix, Kioxia, MediaTek, Infineon) 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. Without Samsung, SK Hynix and Kioxia I am significantly underexposed to memory products with only Micron and Western Digital. I also normalize fiscal quarters to the best fitting two out of three months. While these differences are significant, most US-based investors experience the sector from the Tokeneke Universe perspective.

October Well Above-Average Growth: Worldwide chip industry revenues for October grew by an impressive +3.9% sequentially on a three-month rolling average basis, according to statistics released by the Semiconductor Industry Association (SIA) earlier this month. October continues the trend of sequential monthly growth that began in March after nine consecutive months of declines throughout most of 2022. October has averaged a gain of +2.3% with a high of +6.8%, a low of -2.0%, and only four declines in the last 37 years—including only one (last year) since 2001. Asia-Pacific led with a gain of +3.4% followed by Europe with +3.0% and The Americas at +2.4%. The rest of the world lagged with a gain from China of +0.5% and a decline in Japan of -0.3%.

Next month's release of November statistics should continue to reflect above-average gains given robust 4Q guidance after the 3Q earnings season. November has averaged a gain of +1.5% with a high of +16.0%, a low of -24.2%, and eight declines in the last 37 years—including three in the last 11.

3Q Slightly Above-Average: Chip industry sales for 3Q was slightly above-average at +6.3%, despite lackluster gains in September. The 3Q is a seasonally peak period that has averaged sequential revenue growth of +5.9% with a high of +19.9%, a low of -11.7%, and only four declines in the last 37 years—including only one (last year) since 2001, according to industry statistics. My Universe posted an even better weighted average gain of +9.2%.

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 calls 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. In fact, Micron Technology has already preannounced expected upside nudging up my weighted average growth to +4.3% ranging from +1.3% to +7.1%.

Acquisitions and Deals Temper: The only pending deal at this time is the Renesas acquisition of Sequans Communications for $3.03 per ADS in cash (that keeps getting extended). Broadcom recently closed its VMWare deal (finally) and ARM returned to the NASDAQ on September 14 at $51 per share for after spinning out from SoftBank. In addition, O2Micro took itself private in March for $5 per share.

A few potential deals this year were not consummated. Intel abandoned its deal for Tower Semiconductor at $53 per share in cash after failing to get regulatory approval in China; Silicon Motion is suing MaxLinear for backing out of its takeover; and MagnaChip flirted with two take-private suitors, neither which came to fruition.

Chip Sector Bounces Back: The chip sector share price rally in November more than made up for the decline during October with the vast majority of the stocks in my Universe participating. During November the Philadelphia Semiconductor Index Option (SOX) gained +15.8% with 48 out of 53 stocks in my Universe advancing by an average of +15.3% compared to lesser gains from the NASDAQ, S&P500 and DOW at +10.7%, +8.9%, and +8.8%, respectively. Year-to-date the SOX maintains its outperformance although some 40% of the equities in my Universe have declined and the average stock has significantly underperformed, per the tables below.

November

Winners *(48/53)*		Losers	
SKYT	43.0%	MX	-10.8%
GSIT	40.6%	AOSL	-9.8%
IDCC	32.8%	MRAM	-7.9%
INFN	32.8%	PXLW	-3.4%
AMBA	30.5%	VSH	0.0%
average stock +15.3%		*SOX +15.8%*	

QTD *(4Q)*

Winners *(34/53)*		Losers	
PI	51.9%	NLST	-41.3%
QUIK	27.8%	SMTC	-36.4%
INTC	25.7%	LSCC	-31.9%
IDCC	24.5%	AOSL	-28.3%
RMBS	21.3%	ON	-23.3%
average stock +2.2%		*SOX +8.5%*	

YTD

Winners *(32/53)*		Losers	
NVDA	220.0%	WOLF	-46.6%
QUIK	113.8%	MXL	-44.8%
IDCC	101.9%	SMTC	-42.9%
RMBS	88.9%	INFN	-42.3%
AMD	87.1%	TSEM	-36.6%
average stock +17.3%		*SOX +47.1%*	

Indices

	Nov	*QTD*	*YTD*
SOX	15.8%	8.5%	47.1%
SMH	15.5%	10.7%	58.2%
NASDAQ	10.7%	7.6%	35.9%
S&P500	8.9%	6.5%	19.0%
DOW	8.8%	7.3%	8.5%

Big Chip Sector Premium: While I have not yet updated my Semiconductor Investment Ideas publication, I am downright terrified of the overall sector based on the chart on Page 4. 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 broke. While history doesn't necessarily repeat itself, sometimes it rhymes.

—Dan K. Scovel
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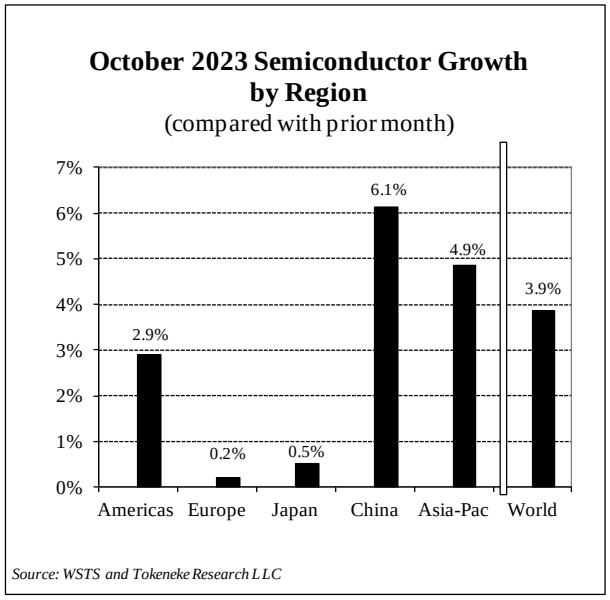
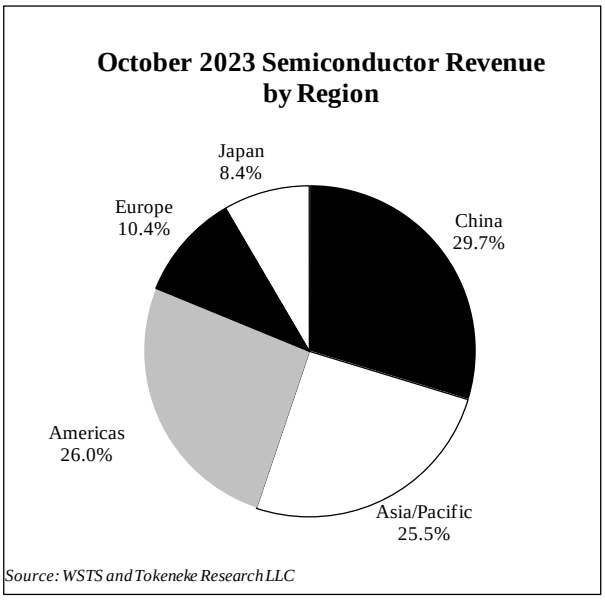
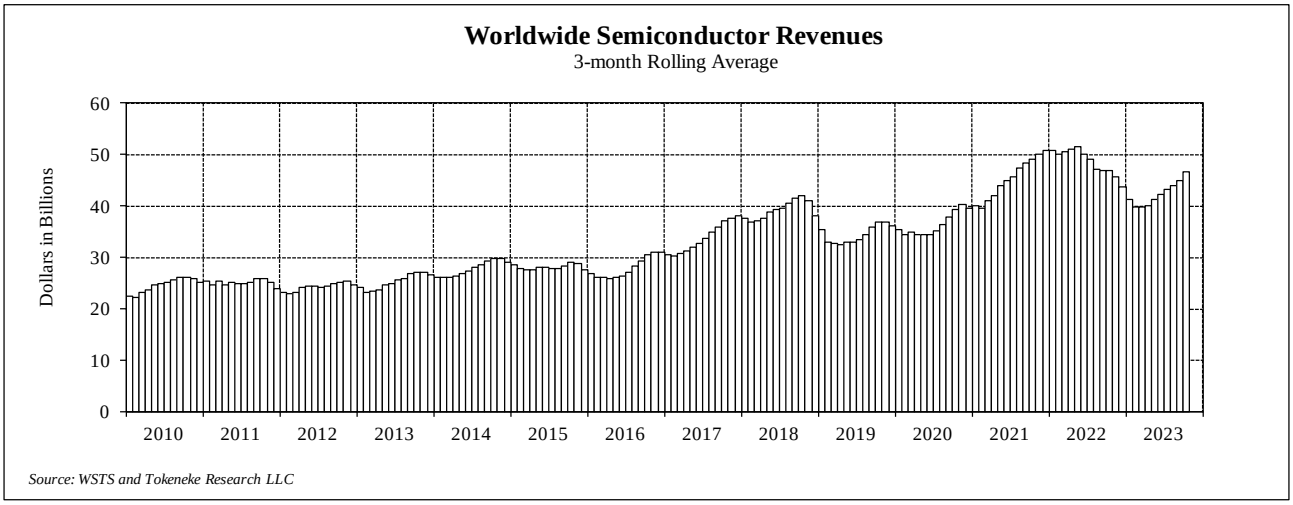
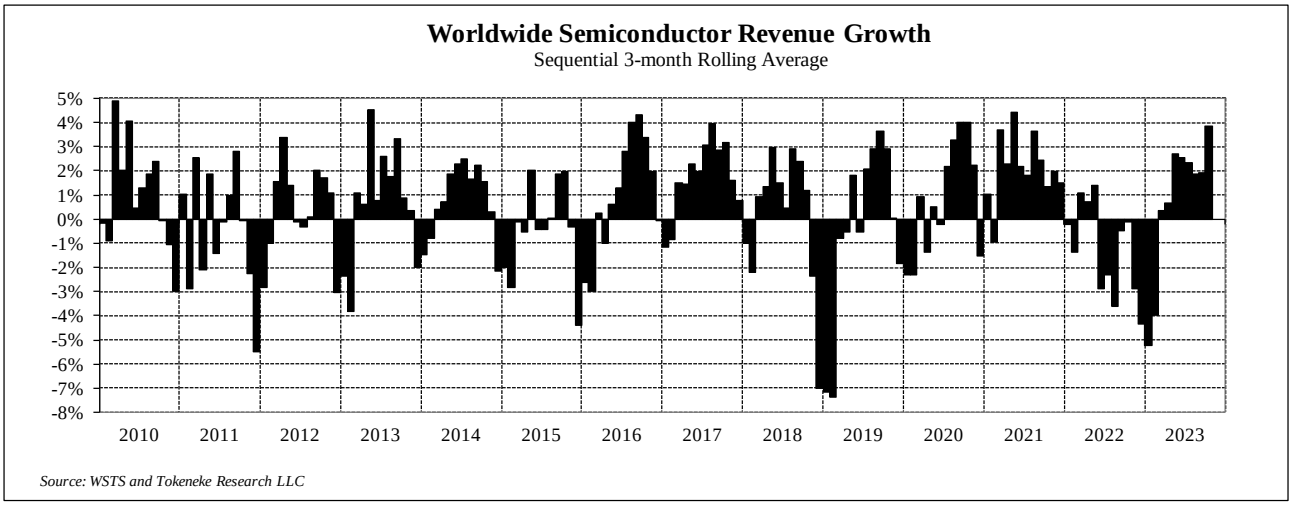
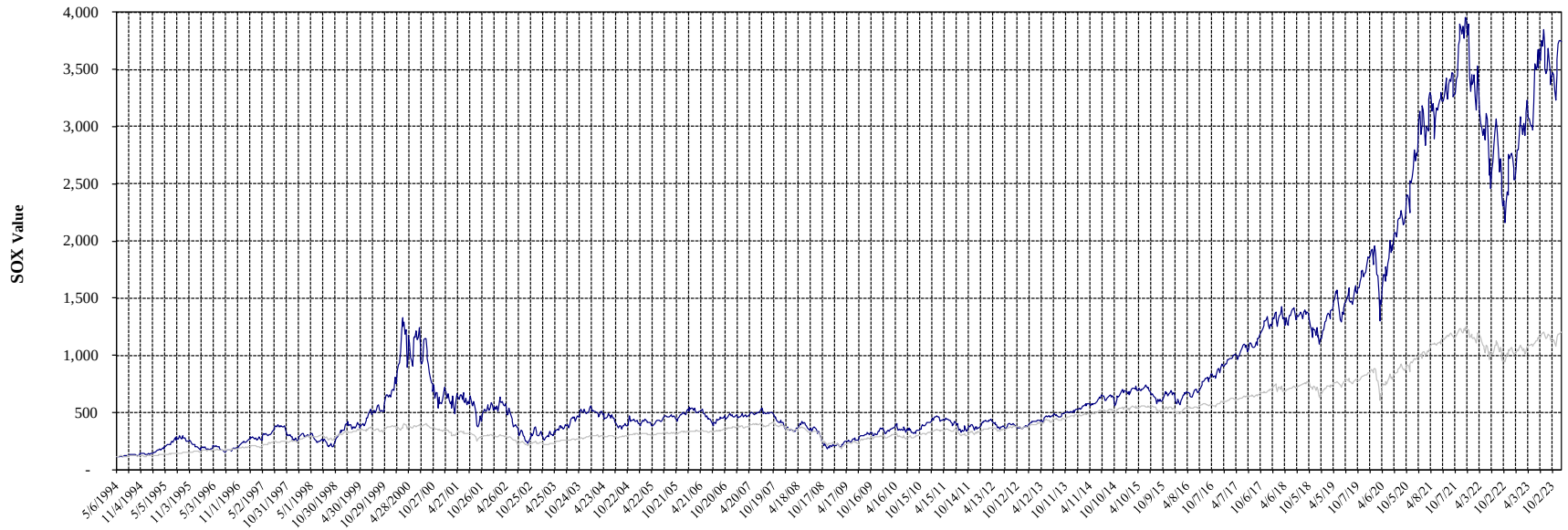








Weekly Philadelphia Semiconductor Index Option (SOX) vs. S&P 500



Source: Tokeneke Research LLC

**S&P 500 normalized to the SOX*

Tokeneke Research LLC — *Company Overview*

Semiconductor Industry Analysis and Insight

The Company

Tokeneke Research is an independent research firm specializing in semiconductor industry business issues, providing fundamental research focused on US equities across all market capitalizations within the sector to investors. The company was founded in 2005 and is based in Connecticut.

The Offering

- *Monthly Newsletter:* A summarized review of noteworthy industry business developments, sales statistics, and sector equity market performance, as well as a near-term and annual outlook for sector business fundamentals and share prices. This report typically includes two pages of text and a handful of recurring charts and tables. It is intended for relatively broad-based distribution.
- *Industry Reports:* Publications offering insight and perspective to industry-wide, multi-year forecast updates; periodic sub-sector product type and end-market reviews; fundamental and valuation perspectives on sector equity relationships; and industry introductory overview. These are more detailed reports with varying shelf-lives, and are intended for narrow distribution to interested clients.
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- *Consulting:* Special projects of limited or extended duration, as well as periodic access of varying frequency.

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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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