August Chip Growth Very Strong Thanks to AI

3Q Outlook is Also Robust, But Shares Continue to Underperform

Semiconductor industry revenue statistics for August were released late last week and the sequential growth rate was very strong at +3.5%, well above average and even a little better than I expected—thanks to AI. And 3Q guidance across my Universe is also pretty darn good while just-over half of reporting companies exceeded expectations. But share prices continued to under-perform despite retaining a marginal year-to-date advantage.

Recall that AI is single-handedly accounting for chip industry growth expected at +16% this year driven by memory products at +77% as well as the Philadelphia Semiconductor Index Option (SOX) outperforming broader equity markets thanks to NVDA, while the rest of the 'Magnificent Seven' throw tens of billions of dollars at AI infrastructure—to NVDA.

The problem is that underneath AI there isn't a whole lot going on in the rest of the semiconductor end-markets. And most companies are *not* enjoying AI enthusiasm with almost half in my Universe having missed at least part of 2Q earnings and 3Q guidance expectations and most experiencing share price declines so far this year.

Like Intel, Samsung is also having problems due to the lack of AI offerings. Recall that AI processors use High Bandwidth Memory (HBM) DRAM configurations which are tricky to package, very pricey, and the large die suck capacity away from the rest of the DRAM markets whose subsequent shortage was supposed to support market prices. However, expected incremental gains from mature smartphone and PC markets do not appear to be materializing, and the demand shortfall is pressuring DRAM spot market prices. The primary factor supporting +77% expected memory growth this year is HBM with the derivative capacity shortfall offering additional, incremental gains. TrendForce estimates 2Q DRAM market share of Samsung at 43%, SK Hynix at 35% and Micron at 20%. However, Hynix owns HBM and Micron has established a foothold, but Samsung does not yet have a qualified HBM offering (but is probably very close).

Samsung traded-off semiconductor industry revenue leadership with Intel in recent years but is now facing a number of challenges resulting in re-organizations and new fab delays. First, it is late to the AI/HBM DRAM party which leaves it with the rest of the least favorable sectors. Second, it's foundry business is losing considerable money as it struggles to compete with TSMC. And other problems include workers striking at several facilities across different countries; a former executive detained by Korean authorities for leaking DRAM process technology to China; and Chinese DRAM maker CXMT ramping production. My point is that Samsung's problems aren't primarily due to peripherally incremental DRAM market weakness.

I continue to hope that AI cap ex euphoria ahead of revenue streams and profits lasts long enough for PCs, smartphones, automotive and the rest of the end-markets to return to growth. In the meantime, the SOX index remains over-extended versus the S&P500 and most fundamental valuations across the sector are not attractive. I would still be very careful and extremely selective approaching potential chip sector opportunities at this time.

Geopolitical Gymnastics Review: No big geopolitical changes last month, although the bar for 'notable' is pretty high given all the changes over the last couple years. Recall the new normal chaos is every semiconductor company preserving its supply chain and sales in a variety of ad hoc fashions by skipping around ever-evolving US, Chinese and European technology sanctions, embargoes and tariffs. 'De-Sinicization' describes Chinese and Taiwanese companies expanding operations to more politically neutral countries like Singapore, while 'Geopolitically Dependable Capacity' describes TI's strategy to support customer supply requirements. 'Indigenization' includes government grants and loans incentivizing domestic semiconductor operations that includes multiple billions of dollars from the US, China, Japan, India, South Korea, Malaysia, Taiwan and Spain. The Chinese grow-your-own category is referred to as 'Huawei-ization' due to that company's political isolation from the US.

Memories Matter: Recall that my US-equity-based Tokeneke Universe does *not* include some three-quarters of industry memory business from Samsung, SK Hynix and Kioxia. While my Universe does include Micron and Western Digital, it *should* under-perform expected industry growth in 2024 due to under-representation of more robust expected memory growth at +77% thanks to AI.

Actually, my Universe has been outperforming industry statistics so far this year. My Universe declined sequentially by -2.2% 1Q24 and grew by +7.1% 2Q24, while the SIA numbers for 1Q declined initially by -5.7% but have since been revised to -3.5%, and 2Q came in at +6.5%. So much for that argument . . .

My Tokeneke Universe also does *not* include very large international players (aforementioned memory guys plus 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 make a difference. I also don't segregate non-semiconductor corporate revenue.

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.

August Growth Very Strong: Worldwide chip industry revenues for August grew by a well-above-average +3.5% sequentially on a three-month rolling average basis, according to statistics released by the Semiconductor Industry Association (SIA) late last week. The magnitude of the above-average growth was better than I had expected. August has averaged growth of +1.7% with a high of +5.2%, a low of -3.6%, and six declines in the last 38 years, including only one in the last 22 according to industry statistics. The Americas led once again with impressive growth of +7.5% followed by continued growth from Japan at +2.5% and a rebound from Europe at +2.4%. China and Asia-Pacific lagged with growth of +1.7% and +1.5%, respectively.

November's release of September/3Q statistics should also be above-average given my solid 3Q Universe outlook amid the AI/memory turbocharge. September has averaged growth of +2.7% with a high of +8.2%, a low of -2.5%, and four declines in the last 38 years, including only one in the last 22 according to industry statistics.

3Q Outlook Above Average: The 3Q revenue outlook based on management guidance from 2Q earnings announcements across my Universe is benefiting from the current AI turbocharge. The specific weighted average guidance for revenue calls for a sequential gain of +7.0% this quarter, ranging from +4.3% to +9.7%. The 3Q is seasonally the strongest of the year with an average sequential revenue increase of +5.9%, a high of +19.9%, a low of -11.3%, and only four declines in the last 38 years—including only one in the last 22, per industry statistics.

Banking Deals: No public banking deals last month, although Qualcomm was rumored to approach Intel on a possible takeover after Intel's crashing share price. Notable events include a new CEO at Lattice; Sequans planning a reverse stock split of 1:2.5 this week to preserve its listing; InterDigital forecasting $1B in annual revenue by 2030; and Intel getting a $3B Defense Department deal and a custom chip deal with Amazon. Pending deals include Kioxia's IPO in Tokyo, Nokia's three-pronged offer for Infinera, Western Digital's plan to split its hard-drive and flash operations into separate companies 2H24, and Silicon Motion suing MaxLinear for backing out of its takeover.

Semiconductor Equities Underperform—Again: Semiconductor sector share prices underperformed broader equity markets during September, but at least they didn't decline like they did for 3Q. Their outperformance on a year-to-date basis narrowed considerably and my Universe continues to underperform the SOX. During September the Philadelphia Semiconductor Index Option (SOX) eked-out growth of +0.3% while only 24 out of 56 stocks in my Universe advanced amid an unchanging average. Year-to-date the SOX is now barely outperforming broader equity markets with a gain of +23.9% and only 25 out of 56 stocks in my Universe have advanced by an underperforming average of +5.0%. Broader equity markets have gained with the NASDAQ, S&P500 and DOW up by +21.2%, +20.8%, and +12.3%, respectively. I added Allegro Microsystems (ALGM) to my Universe last month.

September

Winners *(24/56)*		Losers	
PI	28.8%	CRUS	-14.7%
ALAB	21.7%	GFS	-13.8%
SQNS	19.0%	AOSL	-11.2%
SITM	18.6%	QRVO	-10.9%
GSIT	15.5%	NLST	-10.9%
average stock +0.0%		*SOX +0.3%*	

3Q

Winners *(21/56)*		Losers	
SQNS	136.7%	WOLF	-57.4%
SMTC	52.8%	MBLY	-51.2%
PI	38.1%	HIMX	-30.7%
SITM	37.9%	RMBS	-28.1%
CEVA	25.2%	MXL	-28.1%
average stock -2.2%		*SOX -5.5%*	

YTD

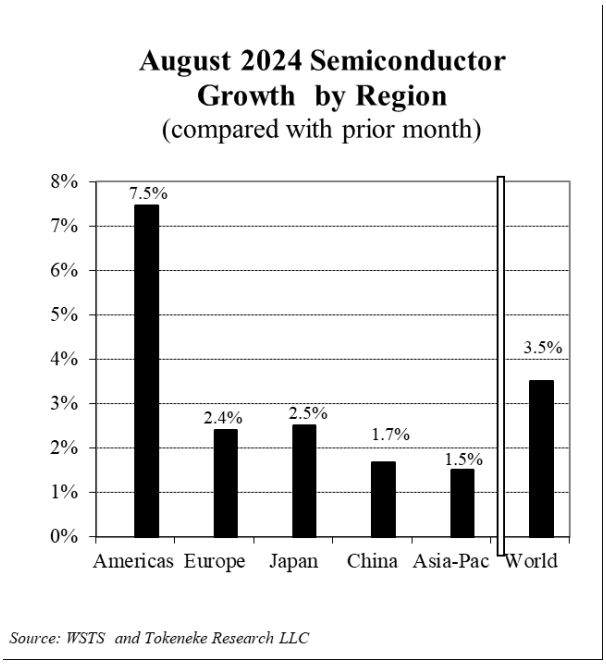
Winners *(25/56)*		Losers	
NVDA	145.2%	WOLF	-77.7%
PI	140.5%	MBLY	-68.4%
SMTC	108.4%	SQNS	-58.0%
ARM	90.3%	INTC	-53.3%
TSM	67.0%	PXLW	-45.8%
average stock +5.0%		*SOX +23.9%*	

Indices

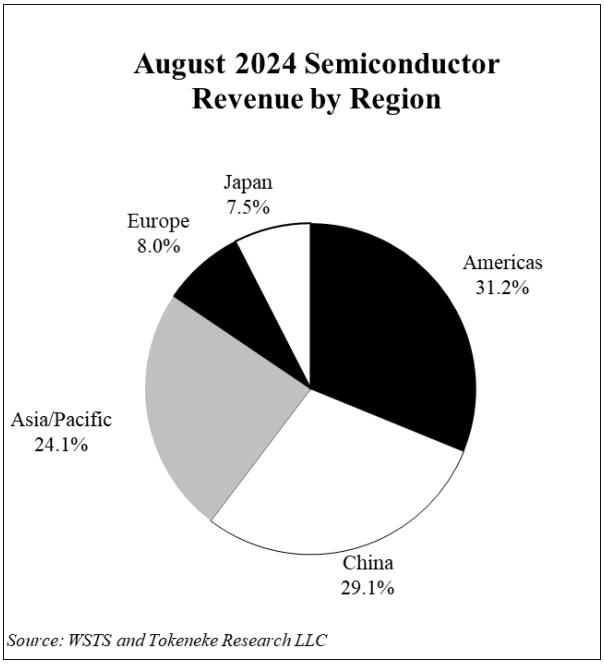
	Sept	*3Q*	*YTD*
SOX	0.3%	-5.5%	23.9%
SMH	0.8%	-5.8%	40.4%
NASDAQ	2.7%	2.6%	21.2%
S&P500	2.0%	5.5%	20.8%
DOW	1.8%	8.2%	12.3%

Chip Stocks Still Scary: While AI is a huge growth opportunity, the rest of the semiconductor industry's markets are experiencing malaise and/or transitions. In the meantime, the SOX index remains way over-extended versus the S&P500 (note the relative premium in the chart on Page 4), and most fundamental valuations across the sector are not attractive. I would remain extremely selective approaching potential chip sector opportunities at this time.

—Dan K. Scovel
Semiconductor Analyst



Source: WSTS and Tokeneke Research LLC



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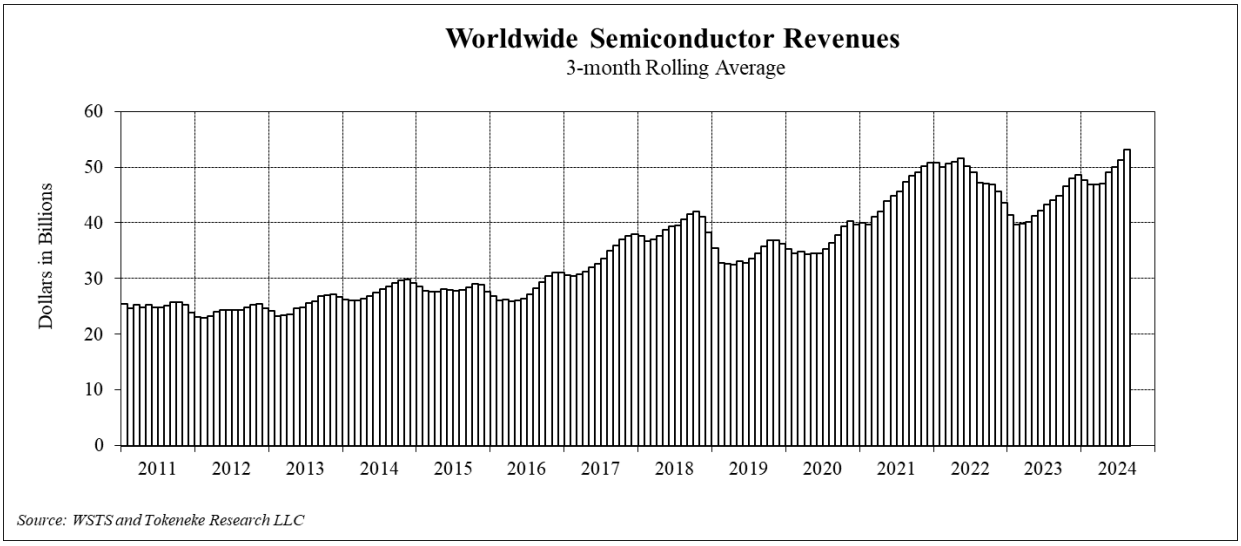

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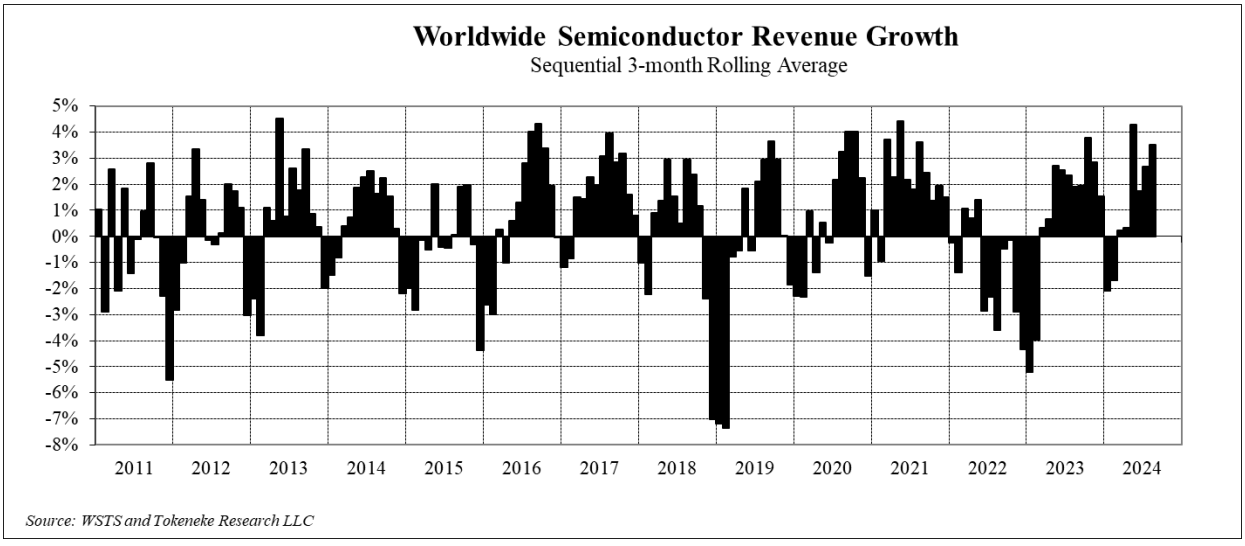
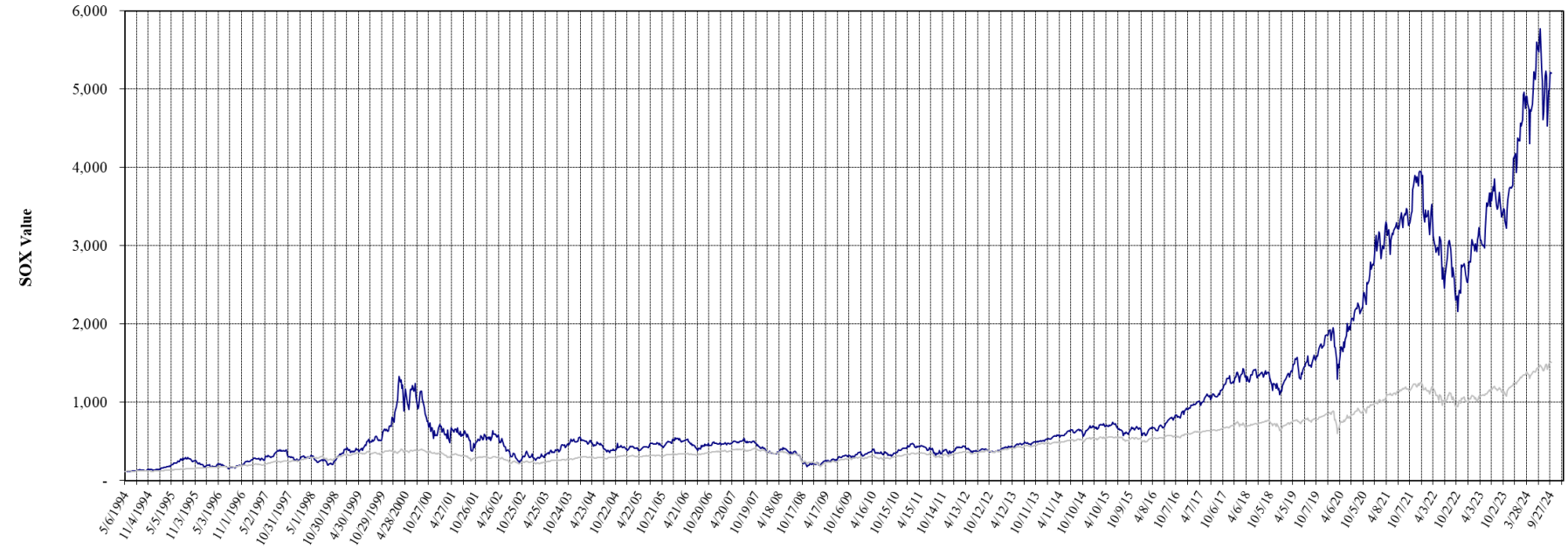


Source: WSTS and Tokeneke Research LLC

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)*

Tokeneke Research LLC — *Company Overview*

Semiconductor Industry Analysis and Insight

The Tokeneke Universe:

55 companies/tickers as of 6/12/24, but I added ALGM Allegro Microdevices for a total of 56 in September 2024.

Company	Ticker	Company	Ticker	Company	Ticker
Adeia	ADEA	Microchip Technology	MCHP	Rambus	RMBS
Analog Devices	ADI	Monolithic Power Systems (MPS)	MPWR	Silicon Motion	SIMO
Astera Labs	ALAB	Everspin Technologies	MRAM	SiTime	SITM
Ambarella	AMBA	Marvell	MRVL	SkyWater Technology	SKYT
Advanced Micro Devices (AMD)	AMD	M/A-COM Technology	MTSI	Silicon Laboratories	SLAB
Alpha Omega Semiconductor	AOSL	Micron Technology	MU	Semtech	SMTC
Arm Holdings	ARM	MagnaChip	MX	Sequans Communications	SQNS
Broadcom	AVGO	MaxLinear	MXL	STMicroelectronics	STM
CEVA	CEVA	Netlist	NLST	Skyworks Solutions	SWKS
Cirrus Logic	CRUS	NVIDIA	NVDA	Synaptics	SYNA
Diodes	DIOD	NXP Semiconductors	NXPI	Tower Semiconductor (TowerJazz)	TSEM
GlobalFoundries	GFS	ON Semiconductor	ON	Taiwan Semiconductor Mfg. Corp. (TSMC)	TSM
GSI Technology	GSIT	Impinj	PI	Texas Instruments (TI)	TXN
Himax Technologies	HIMX	Power Integrations	POWI	United Microelectronics Corp. (UMC)	UMC
InterDigital	IDCC	Pixelworks	PXLW	Vishay Intertechnology	VSH
Infinera	INFN	QUALCOMM	QCOM	Western Digital	WDC
Intel	INTC	Qorvo	QRVO	Wolfspeed	WOLF
Lattice Semiconductor	LSCC	QuickLogic	QUIK	Xperi	XPER
Mobileye Global	MBLY				

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.

My Background

I have an electrical engineering degree, nearly 12 years of semiconductor industry experience, and was on Wall Street for nearly eight years where I was selected as Best On The Street semiconductor analyst by The Wall Street Journal in 2002.

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 as a sell-side analyst included the following: 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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