

A Tale of Two Annum's

Weak Year Ends Strong, Strong Year Starts Weak

The semiconductor industry finished the down year of 2023 on unusual strength in December, but company guidance for 1Q during the 4Q earnings season so far is extremely weak. In the meantime, the SOX index started off the year by outperforming broader equity markets during January, while some three-quarters of the stocks in my Tokeneke Universe declined by an average of -5.2%. So, what does it all mean? It means expectations are going down, that's what it means.

The business is what it is. AI is 'hot as a pistol' and uses metric butt-loads of memory, while smartphones and PCs—the bulk staples of the chip industry—are struggling, but hopefully have bottomed. And that hot double-digit growth market for automobiles has corrected its product shortages just in time for EV demand to temper. The good news is the chip industry has successfully diversified its portfolio of end markets. The bad news is those end markets are just as volatile as technology has always been.

When it comes to picking stocks it's even worse. Investor expectations are based on forecasts, and those forecasts increasingly suck. To be fair (since I am tasked as being a forecaster), market transitions have always been difficult to time and profile while longer-term magnitudes of opportunities are much easier and more reliably predictable. Unfortunately, almost all semiconductor industry markets are in some kind of transition at this point. And, oh yeah—supply chains are 'indigenizing.'

As the old Asian insult says, 'May you live in interesting times.' Well, yes we are.

Weak 2023 Finishes Strong: The SIA released its semiconductor industry statistics for December earlier this week that were unusually strong for a seasonally weak month—which resulted in quarterly and annual results much better than expected. Their forecast update for 2023 that was just updated in November called for a decline of -9.4%, which turned out to be -8.2%. While ostensibly good news, it muddies the forecast for 2024 by raising the base.

Strong 2024 Starts Weak: At the end of last week 16 out of 53 companies in my Tokeneke Universe had announced 4Q results and provided pretty abysmal 1Q guidance of a weighted average quarterly sequential decline of -8.8%—that's even worse at -11.1% when memory strength is excluded. This is causing analysts to lower 2024 expectations, which inherently questions industry forecast expectations for the year.

Last year's strong finish begs another question: if we freeze the absolute sales number forecast for 2024 of \$588.4B, then what had been growth of +13.1% automatically downgrades to +11.7% if that business had been 'pulled-in' to last year. Or, is +13.1% still good? Unfortunately, the next SIA/WSTS biannual forecast update isn't until June. A variety of prognosticators will weigh-in before then, but it appears that numbers will be going down.

Supply Chain Indigenization: I love that word. Credit goes to DigiTimes from a recent headline about China's attempts to grow its own motherboard business. As I noted previously, 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—while China develops its own supply chains and technologies. And this chaos is a 'new normal' rather than a transition to something else.

Also, China hoarded leading-edge chips and accounted for a disproportionate share of equipment sales last year ahead of anticipated embargoes, which I think will cause them to eventually flood world-wide markets with devices manufactured in mature technologies. But before then, the lack of Chinese market access to our high-end, pricey, leading-edge products and technology will stymie sales of such offerings. Yep, numbers are going down.

Structural Differences: 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 will probably under-perform expected industry growth in 2024 due to under-representation of more robust expected memory growth. 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.

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 (*or maybe not*).

December Growth: Worldwide chip industry revenues for December grew by +1.4% sequentially on a three-month rolling average basis, according to statistics released by the Semiconductor Industry Association (SIA) earlier this week. December is typically a seasonally down month, but this report continues the trend of sequential monthly growth that began last March after nine consecutive months of declines throughout most of 2022. 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. China led with a gain of +4.7% followed by The Americas with +1.8% and Asia-Pacific at +0.3%. The rest of the world lagged with declines from Japan of -2.4% and Europe of -3.8%. See the Charts on Page 3 of this report.

Next month's release of January statistics is likely to be much weaker than normal based on 1Q guidance so far this earnings season. January has averaged a decline of -2.2% with a high of +1.7%, a low of -12.2%, and 32 declines in the last 37 years.

2023 Review: Worldwide semiconductor industry revenue declined by -8.2% last year after a record high in 2022, which was better than the latest SIA/WSTS forecast of -9.4% from November. Europe was the only region to gain with growth of +4.0%, while decliners were led by China at -14.0% and followed by Asia-Pacific at -10.1%, the Americas at -5.2% and Japan at -3.1%. See the Charts on Page 4 of this report. Automotive sales grew by +23.7% and MCUs grew by +11.4%, while memories declined the most by -28.9% and accounted for 17.5% of the total.

Really Bad 1Q Outlook: The 1Q revenue outlook based on management guidance is well below average after 16 out of 53 companies in my Tokeneke Universe reported by the end of last week, including both memory companies MU and WDC (which also happen to be the only companies expecting growth). The specific weighted average revenue guidance calls for a sequential decline of -8.8% this quarter, ranging from -12.0% to -5.5%, and is even worse when the memory companies are excluded at -11.1% ranging from -14.2% to -7.9%. The 1Q is seasonally the weakest quarter of the year with an average sequential revenue decline of -2.1%, a high of +9.2%, a low of -19.4%, and 25 declines in the last 37 years—including 11 of the last 12, according to industry statistics.

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). Western Digital has plans to split its hard-drive and flash operations into two separate companies 2H24, as announced last October. Also, Silicon Motion is suing MaxLinear for backing out of its takeover last year, and Infinera was rumored to be shopping itself last March before it stumbled into a revenue recognition review triggered by EY late-3Q23.

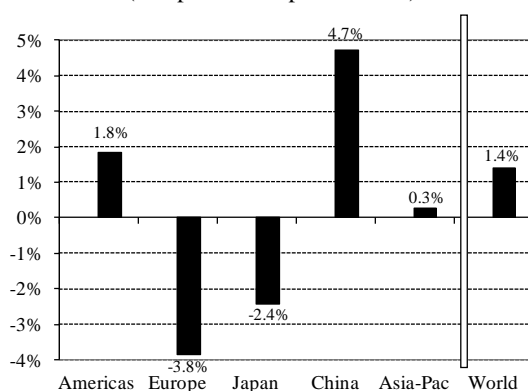
Strong SOX, Weak Sector: Semiconductor sector share prices started off the year quite weak despite outperformance of the SOX. During January the Philadelphia Semiconductor Index Option (SOX) gained +2.0% and outperformed broader market indices, while 40 out of 54 stocks in my Universe *declined* by an average of -5.2%. Note the Winners last month include two AI plays (NVDA, AMD) and a memory supplier (WDC). Broader markets advanced with the NASDAQ, S&P500 and DOW up by +1.0%, +1.6%, and +1.2%, respectively.

January				Indices	
Winners (14/54)		Losers		Jan	
PXLW	35.1%	MBLY	-40.3%	SOX	2.0%
NVDA	24.2%	WOLF	-25.2%	SMH	6.3%
AMD	13.8%	GSIT	-25.0%	NASDAQ	1.0%
MRVL	12.3%	QUIK	-18.0%	S&P500	1.6%
WDC	9.3%	DIOD	-16.4%	DOW	1.2%
average stock -5.2%		SOX +2.0%			

Scary Stocks: Kind of a scary time across the chip sector in equity markets right now, with valuations stretched after last year's rally and deteriorating expectations for this year. While AI and memory and automotive offer growth opportunities, much of that optimism is already reflected in share price valuations. Note the relative premium of the SOX in the chart on Page 5 of this report that is similar to what it was in the year 2000 before the internet bubble burst. History doesn't necessarily repeat itself, but we sure are living in interesting times.

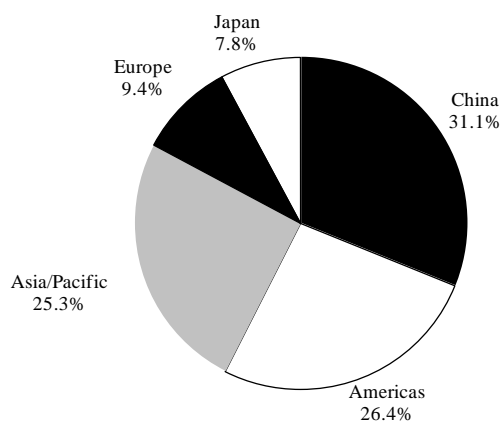
—Dan K. Scovel
Semiconductor Analyst

December 2023 Semiconductor Growth by Region
(compared with prior month)



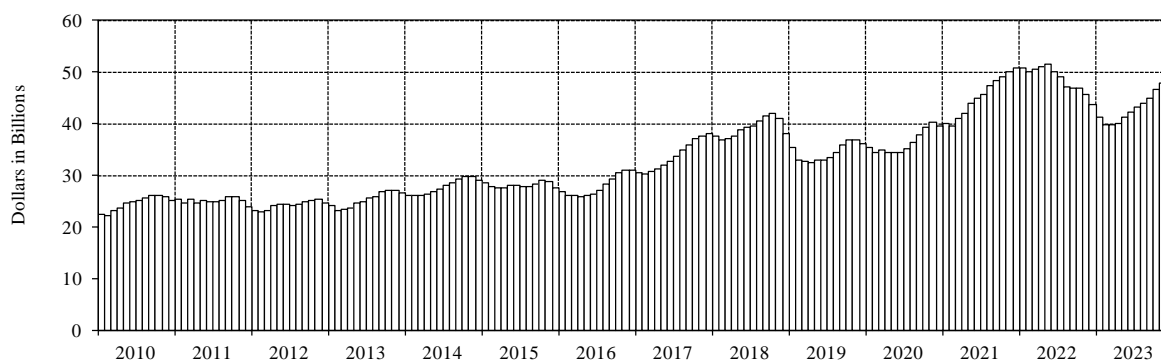
Source: WSTS and Tokeneke Research LLC

December 2023 Semiconductor Revenue by Region



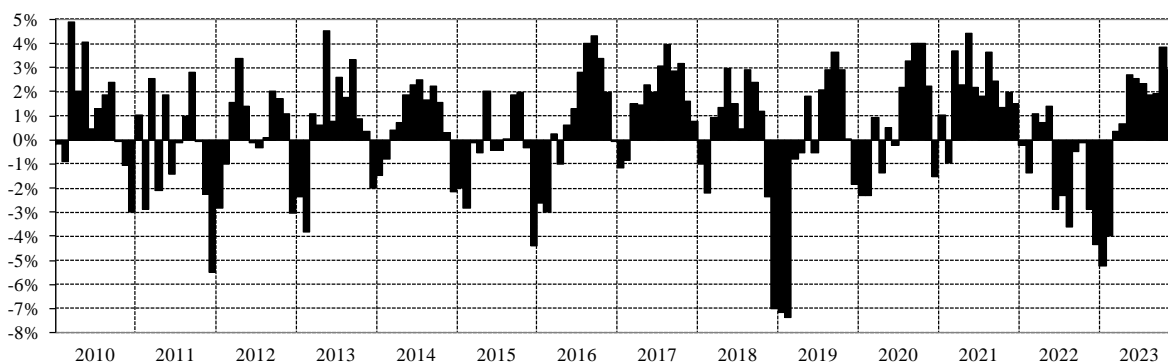
Source: WSTS and Tokeneke Research LLC

Worldwide Semiconductor Revenues
3-month Rolling Average

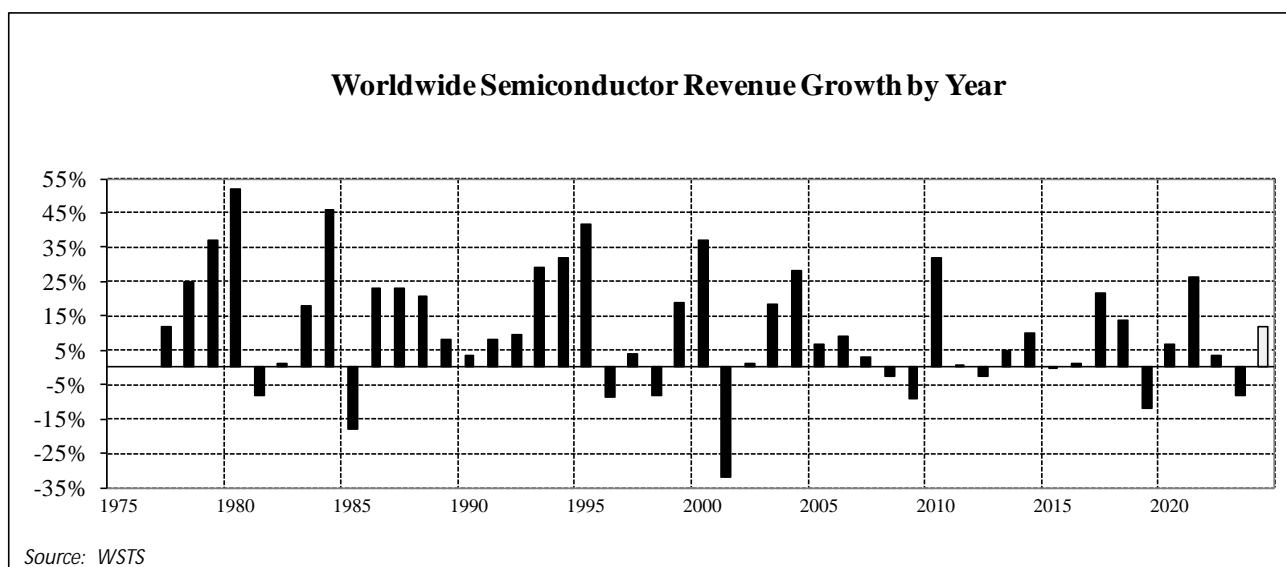
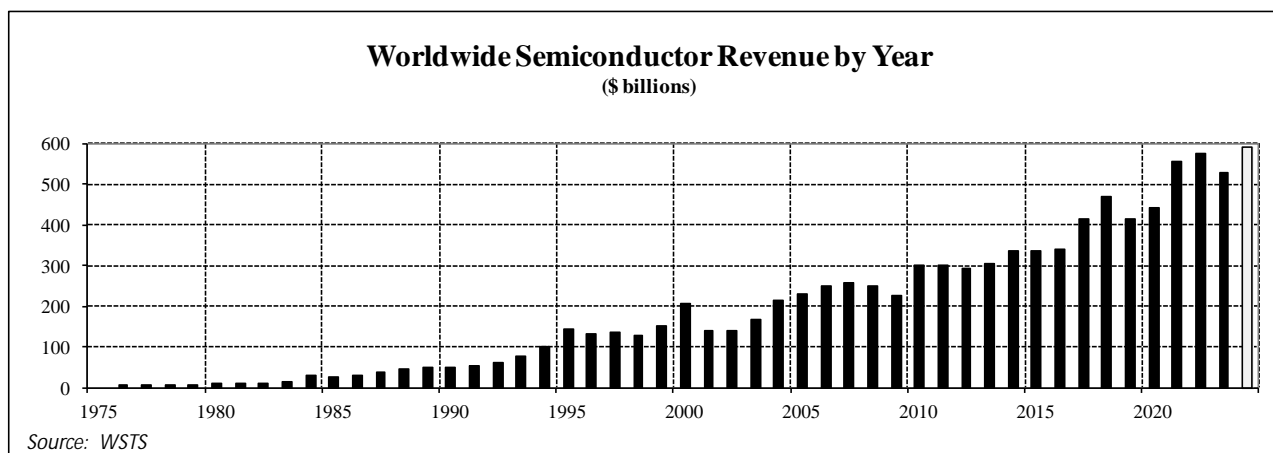
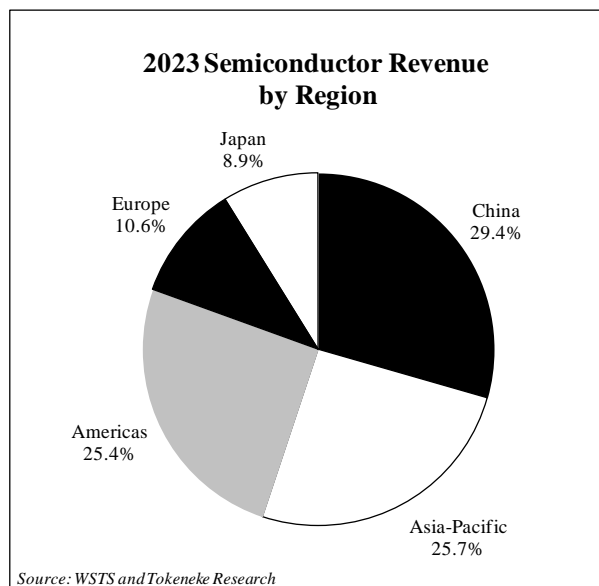
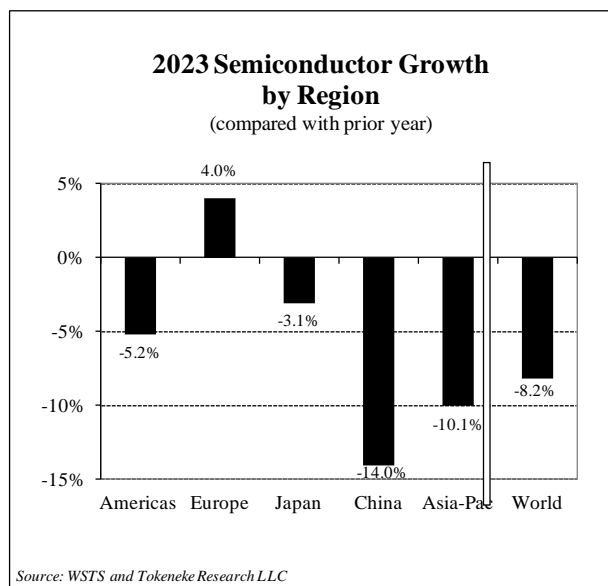


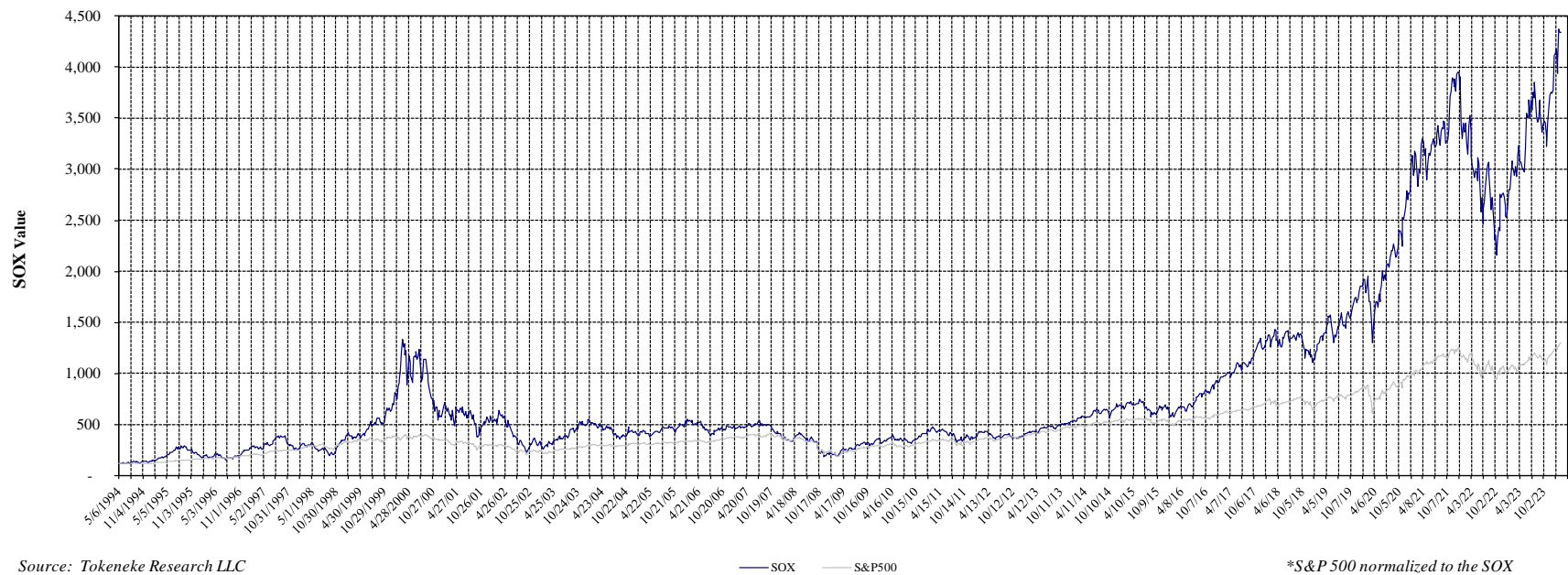
Source: WSTS and Tokeneke Research LLC

Worldwide Semiconductor Revenue Growth
Sequential 3-month Rolling Average



Source: WSTS and Tokeneke Research LLC



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

Source: Tokeneke Research LLC

— SOX — S&P500

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

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.
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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 Fahnstock & 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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