March Semiconductor Retreat Tempers its Magnitude

1Q Weakness is Among the Worst, 2Q Recovery Anemically-Mixed

Semiconductor industry statistics for March released earlier this month continued its pattern of sequential declines, albeit at a much more tempered magnitude. Specifically, the industry was down by -1.8% compared to the average gain of +2.2%, but this decline was much improved over the -7% drops from the prior two months. The 1Q sequential decline of -15.5% was the third worst in the last 28 years.

The 1Q earnings season is nearly complete, and the outlook for the 2Q seasonal recovery is anemically-mixed. The weighted sequential revenue gain across my Universe based on guidance so far reflects a gain of +2.1% which pales in comparison to the +3.8% average, although half the reporting companies are meeting or exceeding 2Q expectations, and the growth rate accelerates to +4.8% if I exclude Intel and Micron from the calculation. In the meantime, chip sector share price volatility returned to 'steady gains mode' last month and the sector continues to significantly outperform broader equity markets year-to-date.

Clearly the semiconductor sector has risk at this juncture with share gains amid business weakness, primarily from memory products and the lack of growth from PCs and smartphones—as well as Chinese tariffs. Nevertheless, a number of specific companies and individual markets offer persistent underlying growth: automotive, data centers, IoT and emerging 5G telecom, for example. See my latest Semiconductor Investment Ideas publication offering specific potential opportunities.

Memories Whack Growth: DRAM and NAND memories drove semiconductor industry growth last year, but are expected to drag the industry into a ditch this year. According to market researcher IC Insights, 2018 total industry sales of $469B was primarily driven by memory product growth of +26%, accounting for six points of +13.7% total growth. DRAM was the largest product category that accounted for 21% of total industry sales while NAND accounted for 12.7%. For 2019, memories are expected to *drop* by -24%, thereby dragging otherwise flat non-memory revenue down to an overall industry decline of -9%.

DRAMs are Different, NAND Not-So-Much: DRAM product profitability is likely to persist for the foreseeable future due to: Suppler consolidation with three manufacturers currently accounting for some 96% of industry output; fragmented end-markets of PCs, smartphones, servers and automotive each requiring different product performance optimizations (density, low-power, high-speed and high-reliability, respectively); and technological complications impeding line-width shrinkage below 20nm significantly raising the capital intensity of investment and severely encumbering potential new entrants. This is why I am *NOT* concerned that the rich and motivated Chinese will spoil the DRAM market by crashing prices with oversupply anytime in the foreseeable future.

NAND flash has very different market characteristics: There are twice as many suppliers supporting a market almost half the size that is less fragmented by application with twice the expected bit growth compared to DRAMs. The expected growth of SSDs as they replace conventional HDDs (hard disk drives) over the next serveral years turbo-charges expected annual bit growth of +40%, twice that of DRAMs. However, the greater commoditization of NAND could easily result in significant market price erosion which tempers expected revenue growth.

The bottom line is that DRAM and NAND are very different markets. I believe DRAM will continue to grow and largely maintain its profitability for at least the next couple—if not the next few—years. NAND, on the other hand, will probably experience greater overall growth, but that growth will be highly volatile as short-term supply dynamics risk adverse market price erosion.

Structural Differences: Recall that my US-equity-based Tokeneke Universe does *not* include some three-quarters of industry DRAM and NAND business from Samsung, Hynix and Toshiba. While my Universe does include Micron, it will more closely track flat growth this year rather than -9%. Other structural differences in my Universe include the lack of very large international players (Samsung, Hynix, Toshiba, MediaTek, Infineon), although it does include wafer foundries (TSMC, UMC, SMIC, TowerJazz) and IP companies (Rambus, Xperi (formerly Tessera), Ceva, and InterDigital) that, technically anyway, don't count as semiconductor industry revenues, but rather costs associated with manufacturing. I also normalize fiscal quarters to the best fitting two out of three months. Unreported stub-periods from acquisitions can also be a difference.

The bigger problem is that most US-based investors in the chip sector experience the industry 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 makers.

Tempering March Retreat: Worldwide semiconductor industry revenues for March dropped by -1.8% sequentially on a three-month rolling average basis, according to statistics released by the Semiconductor Industry Association (SIA) earlier this month. The industry's monthly performance has been below-average since July of last year and declined since December, but this is the first month in 2019 that it *hasn't* plummeted by a magnitude of at least -7%. March has averaged a gain of +2.2% with a high of +7.0%, a low of -6.9%, and four declines in the last 29 years—including only one in the last 17 years. China led with a gain of +1.3% followed by Europe with +0.6%. The rest of the world lagged with declines of -1.9% from Asia-Pacific, -4.5% from Japan and The Americas bringing up the rear at -6.7%. This is the first month since December that not all regions have posted declines.

Next month's release of April metrics will probably be below-average—at best—as well, given weak weighted company guidance for 2Q. April has averaged a gain of +1.2% with a high of +7.6%, a low of -4.7%, and 10 declines in the last 29 years—including seven of the last 14 years.

Near-Record 1Q Decline: Chip industry 1Q revenue weakness was below expectations and pretty extreme—in fact, the third worst in the last 28 years. Industry statistics reported a drop of -15.5%, well below the average 1Q sequential revenue decline of -2.2% with a high of +8.8%, a low of -19.4%, and 19 declines in the last 28 years—including 12 of the last 14. The Americas were the weakest with a crash of –29.2%, followed by China at –14.5%, Japan at –13.8% and Asia-Pacific with –10.4%. Europe led the pack with a decline of –3.1%.

1Q seasonality is the weakest. The weighted average sales across my Tokeneke Universe reflects a sequential quarterly decline of -14.4% after 51 of 59 companies reporting, which pretty significantly underperforms compared to company guidance centered at -12.9% ranging from -14.9% to -10.9% after five mostly negative preannouncements.

Anemically-Mixed 2Q Recovery: The 2Q revenue outlook based on management guidance across my Tokeneke Universe remains weak and a mixed bag compared to expectations. Of the 51 companies reporting so far, 20 have missed expectations and 21 have met or exceeded them (with 10 n/a's). Also note that Intel and Micron are adversely affecting an otherwise above-average 2Q rebound weighted at +4.8%. The specific weighted average guidance for revenue (including Intel and Micron) calls for a gain of +2.1% ranging from -0.2% to +4.4%. The 2Q typically recovers after the 1Q trough: the chip industry has averaged 2Q sequential revenue growth of +3.8% with a high of +20.0%, a low of -19.9%, and only five declines in the last 29 years—including only one in the last 11, according to industry statistics.

Rally Returns: Chip sector share prices resumed their rally and outperformed broader market indices last month after March's correction. During April the Philadelphia Semiconductor Index Option (SOX) gained +11.5% while 49 out of 59 stocks in my Universe rallied by an average of +9.2% compared to the NASDAQ, S&P500 and DOW at +4.7%, +3.9%, and +2.6%, respectively. Year-to-date the chip sector is doing even better, per the tables below.

April			
Winners *(49/59)*		**Losers**	
PI	74.7%	NLST	-24.9%
QCOM	51.0%	MTSI	-16.9%
SLAB	33.1%	OIIM	-14.6%
MOSY	30.1%	CEVA	-6.6%
MRVL	25.8%	XLNX	-5.2%
average stock +9.2%		*SOX +11.5%*	

YTD			
Winners *(55/59)*		**Losers**	
PI	101.2%	HIMX	-5.5%
LSCC	87.1%	MTSI	-4.3%
QTNA	69.7%	OIIM	-3.3%
PXLW	59.0%	IDCC	-1.6%
GSIT	58.2%	QUIK	0.1%
average stock +31.8%		*SOX +34.7%*	

Indices	***Apr***	***YTD***
SOX	11.5%	34.7%
SMH	9.3%	33.2%
NASDAQ	4.7%	22.0%
S&P500	3.9%	17.5%
DOW	2.6%	14.0%

Sector Volatility Tempers: Volatility in the SOX tempered during April after a highly active March. It trended upward during the month cycling only four times: +6.2%, -1.1%, +0.9%, -0.1%, +1.4%, -0.8%, +7.0%, -2.8% then +0.8% to finish with a net gain of +11.5% at a value of 1,556.2.

Opportunities Exist: Clearly the semiconductor sector has risk at this juncture with share gains amid business weakness—never mind Chinese tariffs and the potential for more. Nevertheless, underlying growth persists from a number of markets, and a significant number of companies' businesses are outperforming relative to the industry average. See my latest Semiconductor Investment Ideas publication for specific potential opportunities.

—Dan K. Scovel
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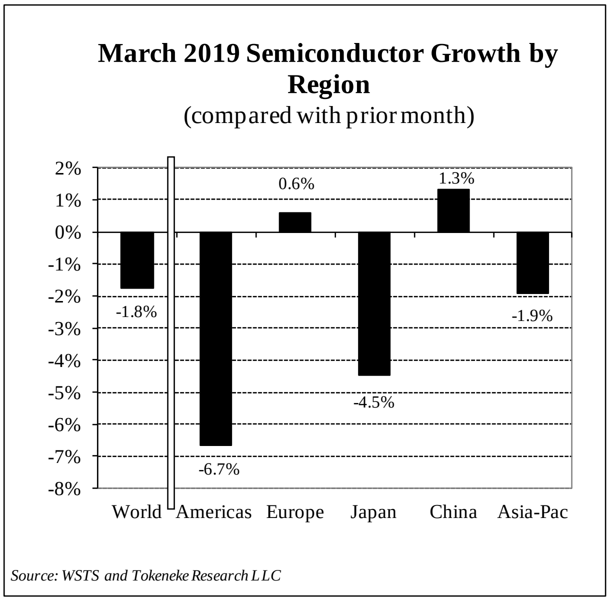
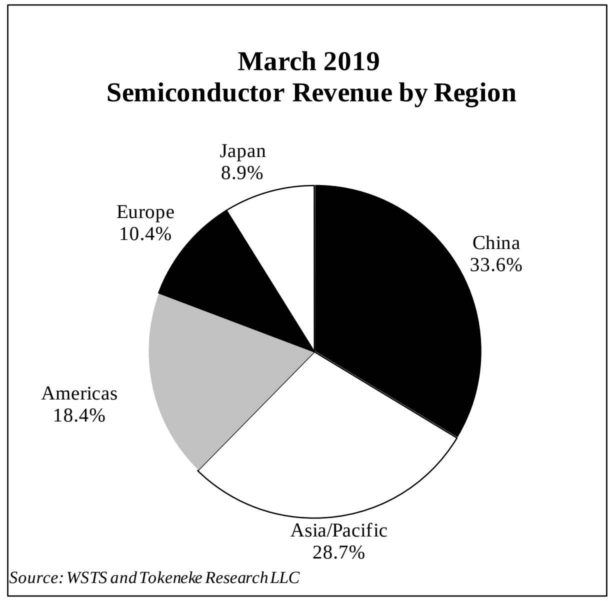
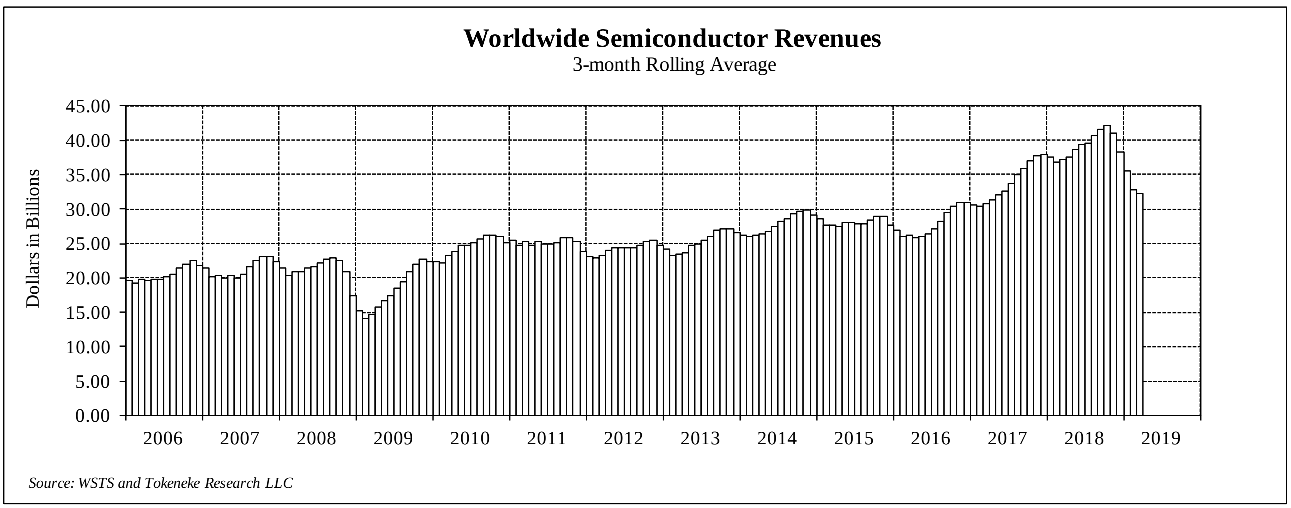
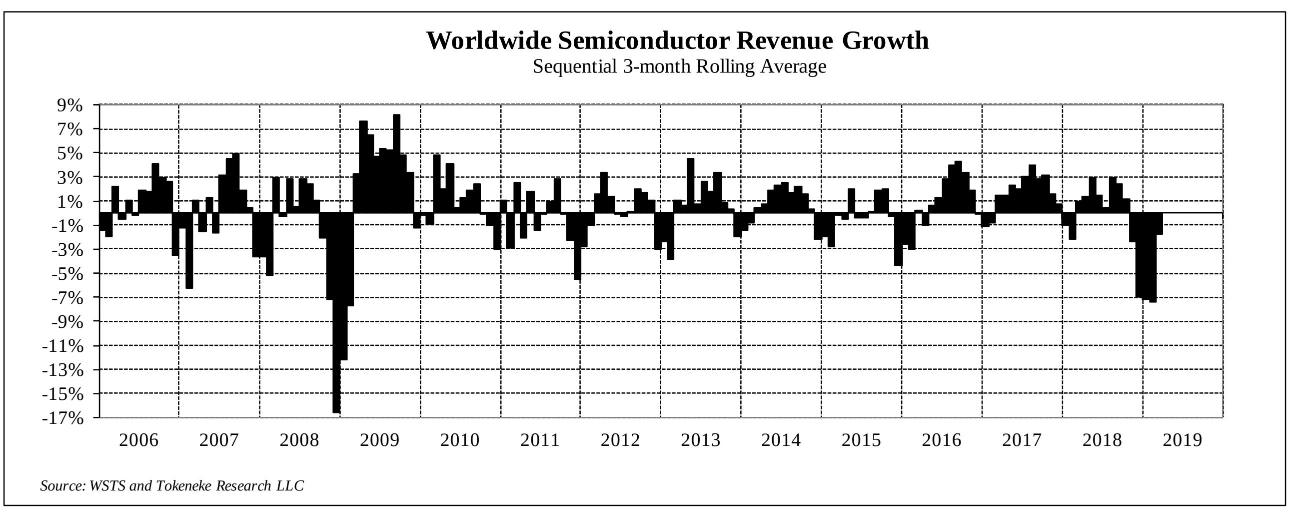

March 2019 Semiconductor Growth by Region
(compared with prior month)
2%
1%
0%
-1%
-2%
-3%
-4%
-5%
-6%
-7%
-8%
-1.8%
-6.7%
0.6%
-4.5%
1.3%
-1.9%
World
Americas
Europe
Japan
China
Asia-Pac
Source: WSTS and Tokeneke Research LLC


March 2019
Semiconductor Revenue by Region
Japan
8.9%
Europe
10.4%
China
33.6%
Americas
18.4%
Asia/Pacific
28.7%
Source: WSTS and Tokeneke Research LLC


Worldwide Semiconductor Revenues
3-month Rolling Average
Dollars in Billions
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Source: WSTS and Tokeneke Research LLC


Worldwide Semiconductor Revenue Growth
Sequential 3-month Rolling Average
9%
7%
5%
3%
1%
-1%
-3%
-5%
-7%
-9%
-11%
-13%
-15%
-17%
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
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*

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.

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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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