

# SMALLER CAP MARKETS' PERSPECTIVES

## UPDATE ON THE SEMI-CONDUCTOR END MARKET

JANUARY 2019

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The semi-conductor end market, which had a cyclical bottom in the first quarter of 2016, in concert with the low point of the US economy, continued to see two years of strong, unabated cyclical growth which finally succumbed to cyclical pressures in the second quarter of 2018. In the first half of 2018, the group started exhibiting many tell-tale signs of late cycle phenomenon – lead times well above prior cycle peaks, commodity sub-segment operators (like discretets) seeing lead times extend to a quarter or more instead of a few weeks historically, industry surveys pointing to increased double ordering. The semi-conductor stock index (SOX) broadly reflected these trends as the index peaked coincidentally in the first half of 2018 along with peak fundamentals.

Semi-conductor sector fundamentals broadly deteriorated in the second half of 2018 as a combination of global economic slowdown, tariff headlines that resulted in volatile ordering patterns, and excess channel inventory which resulted in marked deceleration in overall semi-conductor growth rates in the second half of 2018. As we sit in the first quarter of 2019, some of the overhang from the cyclical excess of the prior cycle continue to linger and, combined with a slower US economic growth outlook (as reflected by recent Institute of Supply Management numbers) and malaise in some end markets like China auto and global smartphones will result in the overall semi-conductor industry seeing revenue decline in 2019. Morgan Stanley and Semi-conductor Industry Association (SIA) model for 2019 shows overall semi-conductor revenues down 4.7% year over year, all of the revenue decline coming from memory segment.

Exhibit 1: Morgan Stanley and the Semi-conductor Industry Association's 2019 model

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	A	A	A	A	A	A	A	A	E	E
<b>Revenues (\$ Millions)</b>										
Discretets /	48,406	52,449	53,322	53,808	58,541	60,684	62,233	69,087	75,252	76,757
Analog	42,285	42,338	39,303	40,117	44,365	45,228	47,848	53,069	57,449	58,023
MCU	14,799	15,155	14,633	14,659	15,310	15,479	14,573	16,430	16,907	17,076
MPU	39,927	44,725	41,882	41,120	44,033	43,268	43,142	44,370	46,170	46,170
Other	5,908	5,324	3,723	2,909	2,728	2,551	2,869	3,286	3,170	3,012
<b>Total Micrc</b>	<b>60,633</b>	<b>65,204</b>	<b>60,238</b>	<b>58,688</b>	<b>62,072</b>	<b>61,298</b>	<b>60,585</b>	<b>64,086</b>	<b>66,248</b>	<b>66,258</b>
Logic (ex M	77,377	78,782	81,703	85,927	91,633	90,753	91,498	102,196	109,900	114,296
<b>Total Logic</b>	<b>138,010</b>	<b>143,986</b>	<b>141,941</b>	<b>144,615</b>	<b>153,705</b>	<b>152,051</b>	<b>152,083</b>	<b>166,281</b>	<b>176,148</b>	<b>180,554</b>
DRAM	39,210	29,368	26,097	34,788	46,858	44,970	41,179	72,802	99,713	78,713
NAND	21,735	24,418	25,417	27,465	28,234	28,845	32,023	47,227	54,969	47,430
Other	8,669	6,963	5,481	4,790	4,140	3,390	3,565	3,946	4,433	4,521
<b>Total Mem</b>	<b>69,614</b>	<b>60,749</b>	<b>56,995</b>	<b>67,043</b>	<b>79,232</b>	<b>77,205</b>	<b>76,767</b>	<b>123,976</b>	<b>159,114</b>	<b>130,665</b>
<b>Total ICs</b>	<b>249,909</b>	<b>247,073</b>	<b>238,240</b>	<b>251,776</b>	<b>277,302</b>	<b>274,484</b>	<b>276,698</b>	<b>343,326</b>	<b>392,711</b>	<b>369,242</b>
<b>Total Semi</b>	<b>298,315</b>	<b>299,521</b>	<b>291,562</b>	<b>305,584</b>	<b>335,843</b>	<b>335,168</b>	<b>338,931</b>	<b>412,414</b>	<b>467,963</b>	<b>445,999</b>
Y/Y %	31.8%	0.4%	-2.7%	4.8%	9.9%	-0.2%	1.1%	21.7%	13.5%	-4.7%

Source: SIA, Morgan Stanley



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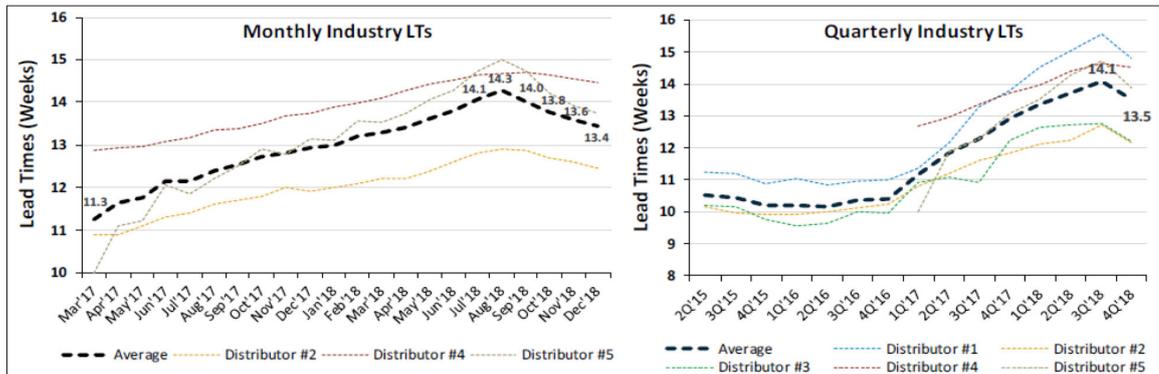
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While industry forecasts for all other segments outside of memory do show modest growth, risks remain to the downside for these estimates for two reasons:

Lead times (LT), which is an indication of visibility for future orders, are contracting after an extended period of expansion. Overall, industry lead times have extended well above the median level and are likely to contract further.

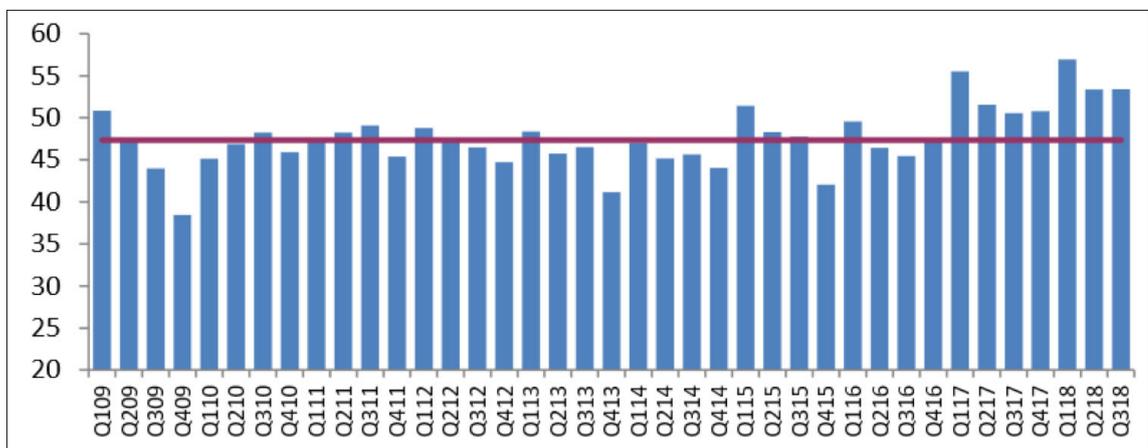
**Exhibit 2: Overall semi-conductor industry lead-times (monthly – left and quarterly – right)**



Source: Susquehanna Financial Group

Contraction in Lead Times are happening at a time when distributors are carrying inventories over long-term median levels (Red Line in Exhibit 3 below). This suggests that distributors have room to digest inventories before placing new orders to suppliers (which will cause Lead Times to stop going down).

**Exhibit 3: Distributors DOI**



Source: Morgan Stanley, Thomson Reuters

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On a positive note, investors and analysts covering the industry have marked down growth expectations and valuations of all companies in the industry; valuations are quite attractive in certain sub-segments within semi-conductors, in line with non-recessionary cyclical bottoms. However, it is premature to call the bottom in the industry based purely on valuation alone as we are just one to two quarters into a down cycle after 10 quarters of continued expansion. The Manager continues to monitor data points within this industry seeking signs of stability, looking for a cyclical bottom in the months ahead.

Source: Prakash Vijayan, CFA. Driehaus Capital Management LLC

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