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Analysts parse industry strengths, challenges, opportunities at SEMI breakfast

by James Montgomery, News Editor, Solid State Technology

June 9, 2008 - A trio of semiconductor industry analysts presented their newest industry/macroeconomic analysis at a SEMI breakfast panel near Boston (June 4), generally agreeing that the IC industry isn't doing as badly as had been feared. Other topics addressed included capex trends and a coming "memory meltdown," concerns about long-term fab-lite models, IC makers vs. systems OEMs, and advice to suppliers about 450mm.



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Market analysis updates

Chip sales already look much better in 2Q than they did in the prior quarter, pointed out Semico Research's Jim Feldhan, noting positive growth across all product categories (including swings from low to high-single-digit losses to single-digit gains in discretetes, linear, MOS memory, and various logic segments). Look for possible 11%-12% growth in 3Q, he said -- although he admitted the firm has lowered its 2008 growth expectation to 7.7% from 11% earlier in the year.

The IC industry should managed to "muddle through" 2008 with mild growth, thanks to a lack of surplus inventories, aggressive actions by the Feds in an election year, a PC upgrade cycle and good unit volume demand (9%-10% long-term), and

chipmakers' new religion of moderating their capex/sales (now at a historic low of 17.8%) and keeping utilization rates high. IC unit volumes are so steady that he's had to put a bend in his trendline projection -- starting in mid-2004 the rate went from ~9.5%/yr to now 14%/yr. And look for a two-year high in memory ASPs by 3Q08, he added.

Unlike IC Insights' McClean, Bob Johnson from Gartner said IC inventories are breaking through a "Caution" zone and into beginnings of "severe excess," with nearly all categories >10% above their "stable" average for three quarters now (see **Figure 1**), though should start declining in 2Q and be "normal" by year's end.

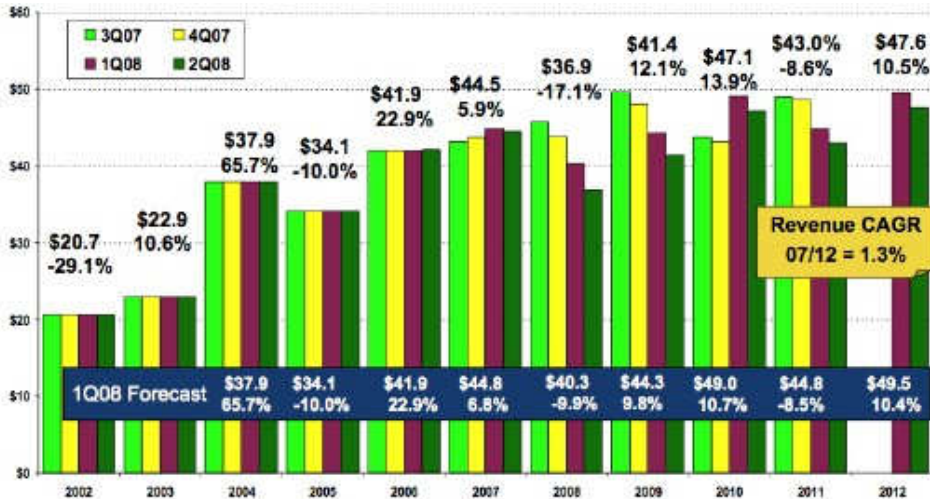


Current last three quarters versus most recent stable period in DASI history

Semiconductor Foundry Inventory Analysis	5Yr rolling Avg	Avg over			
		1Q05 & 3Q05	3Q2007	4Q2007	1Q2008
Analog	103.15	102.22	112.57	112.28	110.72
CPU & Graphics	73.76	75.21	68.87	68.45	70.02
Discrete	87.10	87.77	80.28	81.08	87.05
FPGA	91.36	97.29	77.18	75.15	71.97
MCU	100.98	98.23	110.48	108.94	109.41
Memory	63.22	65.60	63.24	75.85	73.01
Consumer	40.17	38.23	44.94	46.70	57.72
Wired	73.71	80.91	79.03	79.68	76.36
Wireless	48.60	47.29	54.87	61.00	89.21
Diversified	73.10	73.22	72.13	76.95	83.76

Orange = above stable average by 10%;  
Blue = below stable average by 10%

Turning to capital spending, Johnson noted that Gartner has pulled in a downturn scenario from 2010 into 2008 (see **Figure 2**), now expecting a -17.1% decline this year, followed by a recovery in 2009-2010 (12%-13% each), another dip in 2011 (-8.6%), and another recovery in 2012 (10.5%). Most of Gartner's expectations for industry and macroeconomic indicators have been downgraded this year and next (see **Figure 3**), though the backend segment -- a leading indicator of recovery -- is expected to swing up next year.



Source: Gartner, April 2008

What industry leaders are saying about The Decade of Change...



Revenue Growth (%)	2008			2009		
	-6 Mos	-3 Mos	Now	-6 Mos	-3 Mos	Now
Global Real GDP	+3.5	+3.3	+3.0 ↓	+3.6	+3.6	+3.2 ↓
U.S. Real GDP	+2.0	+1.9	+1.2 ↓	+2.8	+2.9	+1.4 ↓
Elec. Equipment <sup>1</sup>	+4.0	+3.1	+2.8 ↓	+2.1	+2.6	+2.5 ↓
Semiconductor <sup>2</sup>	+6.2	+3.4	+4.6 ↑	+8.5	+9.4	+7.9 ↓
Capital Spending	-4.4	-13.2	-19.8 ↓	+9.5	+8.6	+7.4 ↓
Equip. Spending	+0.3	-9.9	-17.1 ↓	+9.7	+9.8	+12.1 ↑
WFE Equipment	-1.3	-10.2	-17.4 ↓	+11.4	+9.6	+9.8 ↑
P&A Equipment	+5.5	-9.7	-18.1 ↓	+3.7	+10.6	+16.7 ↑
AT Equipment	+7.3	-7.8	-13.2 ↓	+4.1	+10.4	+27.8 ↑

<sup>1</sup> Production revenue  
<sup>2</sup> Including solar

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### Macroeconomic analysis/projection

"The economy is not as bad as some had feared," said Semico's Feldhan. A recession is typically defined as two straight quarters of negative growth, and after a barely positive 1Q08 (+0.6%) "we're going to just skirt that," thanks largely to a weak US dollar, he said. Housing is still a serious concern, with now close to 10 months of inventory, suggesting this sector will remain problematic "well into 2009," he said, and the national deficit is still a concern with inflation worries in energy and food sectors. But look for a recovery in 2H08 "or at least better than in 1Q," with a rebound in consumer confidence (interest rates are at an all-time low) keeping device demand strong. Also, watch for a push to bring manufacturing back to US shores as oil and transportation costs rise, he said.

IC Insights' Bill McClean said he's sticking with his original 9% IC growth projection from January, and expressed some optimism in this being an election year (historically accompanied by strong US/world economic growth), China's efforts to show off its economy in its Olympic year, and the coming switch from analog to digital TVs in the US. Despite negative factors such as high/volatile oil prices, a weak housing market, slowing worldwide economy, and a tough capital-funds environment, the IC industry should managed to "muddle through" 2008 with mild growth, thanks to a lack of surplus inventories, aggressive actions by the Feds in an election year, a PC upgrade cycle and good unit volume demand (9%-10% long-term), and chipmakers' new religion of moderating their capex/sales (now at a historic low of 17.8%) and keeping utilization rates high. IC unit volumes are so steady that he's had to put a bend in his trendline projection -- starting in mid-2004 the rate went from ~9.5%/yr to now 14%/yr. And look for a two-year high in memory ASPs by 3Q08, he added.

A prolonged US economic slowdown is not in the most likely forecast scenario, though US real GDP growth did slip in 1Q, Johnson noted.

Both Johnson and McClean suggested the IC industry, despite its increased reliance on consumer trends, won't suffer terribly in the current environment. Johnson suggested that with "nothing out there to drive more than mid single-digit growth," the industry is likely to be tied very closely to the consistency of worldwide GDP growth rates. Gartner has subsequently raised its short-term semiconductor market growth forecast to 4.6% from 3.4%, a move Johnson snarkily called "extremely bullish."

### Memory meltdown will "clear the playing field"

Still, despite a general mediocre-to-optimistic outlook, Johnson expressed concern that the industry could be setting up for even harder times ahead, thanks largely to continued softness in memory -- which he actually calculates as a negative CAGR (-0.5%) for the segment from 2007-2012 (see **Figure 4**). Capex in 2008 is tracking at 2005 levels, with DRAM spending cut nearly in half (-47%) -- and the only reason NAND spending is increasing at all is because of big investments by Toshiba/Sandisk, Johnson noted. "This is not the sign of a healthy industry, that half of your capex is coming from someone who's very sick," he said.

Revenue (\$B)	2007	2008	2009	2010	2011	2012	CAGR	Change in CAGR
Memory	59.0	57.0	66.0	68.7	55.4	57.7	-0.5%	-1.0%
Micro	49.0	51.3	53.1	55.1	56.8	58.6	3.7%	-1.7%
Logic	12.9	14.1	14.8	15.7	16.7	18.0	6.9%	1.3%
Analog	17.6	18.7	20.0	21.8	22.8	24.4	6.7%	0.9%
Discrete	17.4	18.3	19.4	20.6	21.2	22.5	5.2%	1.4%
Opto	22.7	26.0	28.3	31.0	34.8	38.5	11.1%	2.8%
ASIC	24.5	25.4	25.9	27.0	28.1	29.7	3.9%	-0.4%
ASSP	68.0	72.6	78.3	85.4	90.4	95.0	6.9%	-0.2%
Non-opto Sensors	2.7	3.1	3.4	3.7	4.1	4.4	10.1%	1.4%

Total Industry CAGR: 4.9%

Change in Revenue (\$B 2Q08 vs 1Q08)	2007	2008	2009	2010	2011	2012
Memory	1.0	2.1	0.5	1.2	-1.6	-1.9
Micro	0.6	0.7	-1.1	-2.3	-2.9	-4.2
Logic	-0.5	0.1	0.1	0.1	0.4	0.5
Analog	0.5	0.8	1.1	1.5	1.5	1.7
Discrete	0.6	0.9	1.3	1.6	1.7	2.1
Opto	0.5	0.8	0.5	0.6	2.2	5.1
ASIC	-0.5	-0.4	-0.7	-0.6	-1.0	-1.3
ASSP	2.0	2.5	2.2	1.9	2.8	2.1
Non-opto Sensors	0.4	0.6	0.6	0.7	0.8	0.9

**Highlighted Changes >= \$1B**

■ Up

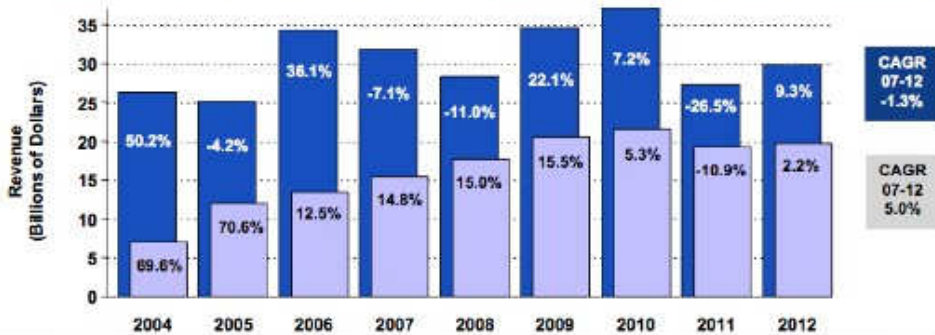
■ Down

■ Flat

Source: Gartner Dataquest Estimates (May 2008)

Overall IC units are still around 11%/year, but in memory the gulf between bit growth and ASPs is staggering -- 50% CAGR for DRAM (2007-1012) and a whopping 101.8% CAGR for NAND, vs. -34% and -48% slumps in ASP CAGR, respectively (see **Figure 5**) -- and costs are only coming down ~20%/year.

DRAM	2007	2008	2009	2010	2011	2012	CAGR 07-12			
Megabytes Bn	152.8	237.7	366.0	663.8	1,135.9	1,680.5	2,384.3	3,381.7	5,219.3	50.2%
Bit Growth	41.2%	55.7%	54.0%	66.9%	66.1%	48.0%	41.8%	41.8%	54.3%	54.3%
ASP \$12Mb eqv.	11.03	6.79	6.00	2.98	1.60	1.32	1.00	0.52	0.37	-34.3%
ASP Change	6.4%	-38.5%	-11.6%	-50.3%	-46.4%	-17.5%	-24.5%	-48.2%	-29.2%	-29.2%



NAND Flash	2007	2008	2009	2010	2011	2012	CAGR 07-12			
Megabytes Bn	65.6	235	720	1,992	4,901	10,881	20,796	38,085	66,617	101.8%
Bit Growth	222.2%	257.9%	206.6%	176.6%	146.1%	121.6%	91.5%	83.1%	74.9%	74.9%
ASP \$12Mb eqv.	6.84	3.26	1.20	0.50	0.23	0.12	0.07	0.03	0.02	-48.0%
ASP Change	-47.4%	-52.3%	-63.3%	-58.5%	-53.3%	-47.9%	-45.0%	-51.4%	-41.6%	-41.6%

Source: Gartner, May 2008

Meanwhile, companies are in terrible financial condition (Qimonda is spending >\$2 for every \$1 it makes, Johnson said), and huge capex now means firms have to seek infusions from external capital markets that are unforbearing. Hynix, for example, he said, had to shave \$1B off its projected 2008 capex because they weren't sure they could find someone to loan them the money!

Pity the pitch that memory execs are forced to make to potential investors, Johnson explained:

- Capital intensity just peaked at 58% last year and will stay at >40% through 2012 despite a sector meltdown;
- The six-year sales CAGR is actually a *downslope* (-0.6%);
- Expect huge negative cash flows and a sea of red ink;
- And we'll need billions of dollars to fund capex.

Add up lousy sales, even worse profits as surging units far outpace falling ASPs, and cutthroat competition (Toshiba and Samsung continuing to pressure everyone else, and we should "expect a memory meltdown...and a big one!" Johnson concluded. "It's like Japan in the 1980s, and there's a similar endgame coming up. It'll clear the playing field."

### Lively Q&A: Fab-lite, ICs vs. EMS "turning point," 450mm advice

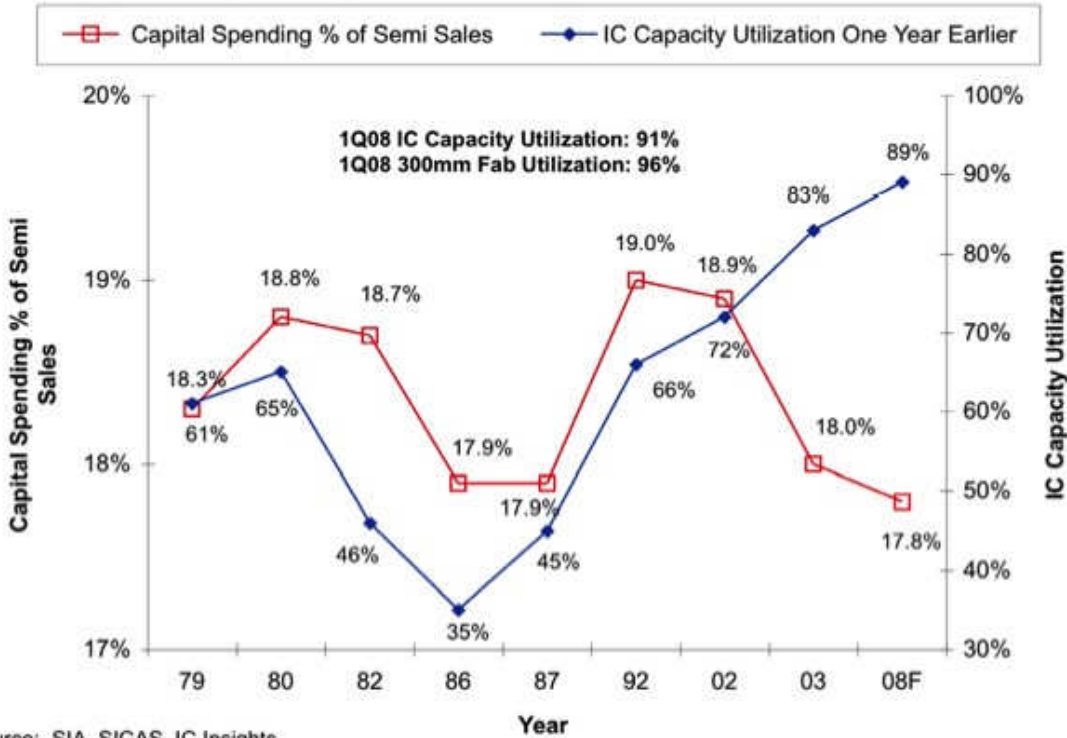
A number of questions from the audience spurred both agreement and debate among the panelists, over a shift in balance between IC makers and systems manufacturers; the long-term risks of a fab-lite strategy; and how not to approach the 450mm debate.

Industry consultant Bill Tobey posed a question to the panel: why aren't chipmakers passing along costs to EMS firms, who are now getting perhaps 10x the functionality in chip performance as they did 10 years ago for the same dollar? PC costs are going down thanks to cheap memory, Johnson agreed ("Dell loves this"), noting that memory firms may be the last in the industry to stop giving their technology away.

McClellan noted that the IC industry "has always been in a push/pull situation with EMS providers," correlating the tipping point of influence to utilization rates -- at 90% utilization the IC industry wields influence, but when rates are down (to a low of 35% in the mid-80s) EMS firms call the shots. Right now, the industry is at a tipping point where "the tide is turning in favor of the IC industry," he said. In 2006, DRAM suppliers leveraging a 30% hike in sales and 19% ASPs "got the power and they used it, and Dell, HP, etc., paid them -- and it didn't kill the computing market." Now, with IC sales essentially flat and capex/sales ratios at historic lows, it's time for chipmakers to stop the bleeding on ASPs and push for better pricing from the EMS segment. "It's not going to crash the systems industry," though unit volumes may slip down to ~10% or so, he said. Semico's Feldhan added that EMS firms have set budgets for their components, and cheap DRAM has allowed them to pile more memory into entry-level systems like notebooks (sales of which grew 35% Y-Y in 1Q08 and 43% for Dell alone, he showed). Once prices stabilize and if IC suppliers push back, these EMS firms simply won't install as much memory, he said.

Review of the new religion of moderated investments and historically low capex/sales (citing TSMC and Intel) spurred discussion about the rising popularity of the fab-lite business model, which McClellan dubbed a "bean-counter's dream" since a firm can offload its leading-edge technology (and associated heavy costs) -- but this attraction to "near-term economics" could come back to bite some firms in the future, he warned. Revenues/wafer for the top four foundries (TSMC, UMC, Chartered, SMIC) have fallen 10%-20% since 2004, with only TSMC still above \$1k/wafer, he showed in a chart. Meanwhile, he diagrammed a push/pull scenario involving IC supply, demand, and ASPs, suggesting that pricing will eventually give in. "Foundries are making a power play to get better prices," he said -- and in fact TSMC has already publicly said it wants to raise prices, [and UMC and others are reported to be following suit](#). (Other related trends McClellan showed: IC utilizations, which in years past have generally tracked in step when capex/sales have slipped below 19%, are now pushing 90% even as capex/sales sink; and capex/IC unit shipped is now at a 20-year low [see **Figures 6-7**]). As prices go up the fab-lite model loses some of its bean-counting luster, and eventually there's a risk of a "flip-flop" when revenues/wafer get back above a certain point and fab-lite firms wish they had their own in-house manufacturing capacity again. Unfortunately, "once you get off the technology train, it's tough to get back on," McClellan said. Infineon, he noted, struggled mightily internally with this decision for a long time, and eventually "the bean-counters won." TI could be an exception, McClellan and Semico's Feldhan agreed, noting that the firm still has "its fingers in process development" working with TSMC and is keeping its "black magic art form" analog processes in-house.

## IC Capacity Utilization the Year Prior to When Capital Spending as a Percent of Sales was ≤19%



Source: SIA, SICAS, IC Insights

## Semiconductor Capital Spending per IC Unit Shipped



Source: WSTS, IC Insights

McClean also had a message for suppliers still developing their strategy for offering (or not) 450mm-capable products. Those chipmakers that want (and realistically need) 450mm see it as their next major manufacturing cost reducer, so it's pretty much a fait accompli, he suggested -- "you don't tell your customers what they need, they tell you!" And since the three big chipmakers that have taken a public 450mm stand (Intel, Samsung, and TSMC) represent 30% of global capex, ignoring their desire is a huge risk for any equipment supplier. While seeming empathetic toward equip/mats suppliers' concerns about 450mm ROI and tech challenges, McClean said he's very surprised and taken aback by some suppliers' defiant tone of refusal to invest in 450mm. If a company is alone making/selling a particular

tool for a particular process (a market of one), maybe they can get away with a no-450mm hardline stance for a while, he said (at least until someone makes something brand-new). But even a dominant market leader with a no-450mm stance, he suggested, shouldn't be surprised when a smaller competitor sidles up to Intel for a conversation about 450mm -- and then watch those marketshares flip! His summary comment: "If you're not in at 450mm, you're out...forever!" -- **J.M.**

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