

■ ■ ■ ■ **Moving Towards Profitability**  
**Semiconductor Market Update**

**Sokudo Lithography Breakfast Forum**

**July 15, 2008**

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Manufacturing**

# Forecast Growth Scorecard

Revenue Growth (%)	2009			2010		
	-6 Mos	-3 Mos	Now	-6 Mos	-3 Mos	Now
Global Real GDP	+0.7	-1.4	<u>-2.8</u> ↓	+2.5	+2.1	<u>+1.6</u> ↓
U.S. Real GDP	-1.0	-2.7	<u>-2.8</u> ↓	+1.7	+2.0	<u>+1.4</u> ↓
Elec. Equipment <sup>1</sup>	-3.2	-12.8	<u>-15.5</u> ↓	+4.2	+2.6	<u>+3.8</u> ↑
Semiconductor <sup>2</sup>	-16.3	-24.1	<u>-22.4</u> ↑	+14.6	+7.5	<u>+10.6</u> ↑
Foundry	-24.1	-41.1	<u>-24.7</u> ↑	+25.1	+33.8	<u>+18.4</u> ↓
SATS	-18.6	-35.8	<u>-18.6</u> ↑	+11.8	+17.5	<u>+17.3</u> ↓
Capital Spending	-34.1	-46.5	<u>-44.8</u> ↑	+13.9	+16.6	<u>+20.9</u> ↑
Equip. Spending	-31.7	-45.2	<u>-45.8</u> ↓	+17.7	+20.1	<u>+29.0</u> ↑
WFE Equipment	-33.1	-46.1	<u>-47.1</u> ↓	+16.3	+17.1	<u>+26.4</u> ↑
P&A Equipment	-30.7	-46.5	<u>-46.6</u> ↓	+26.0	+30.2	<u>+42.1</u> ↑
AT Equipment	-19.8	-34.2	<u>-32.0</u> ↑	+18.9	+32.7	<u>+32.2</u> ↓

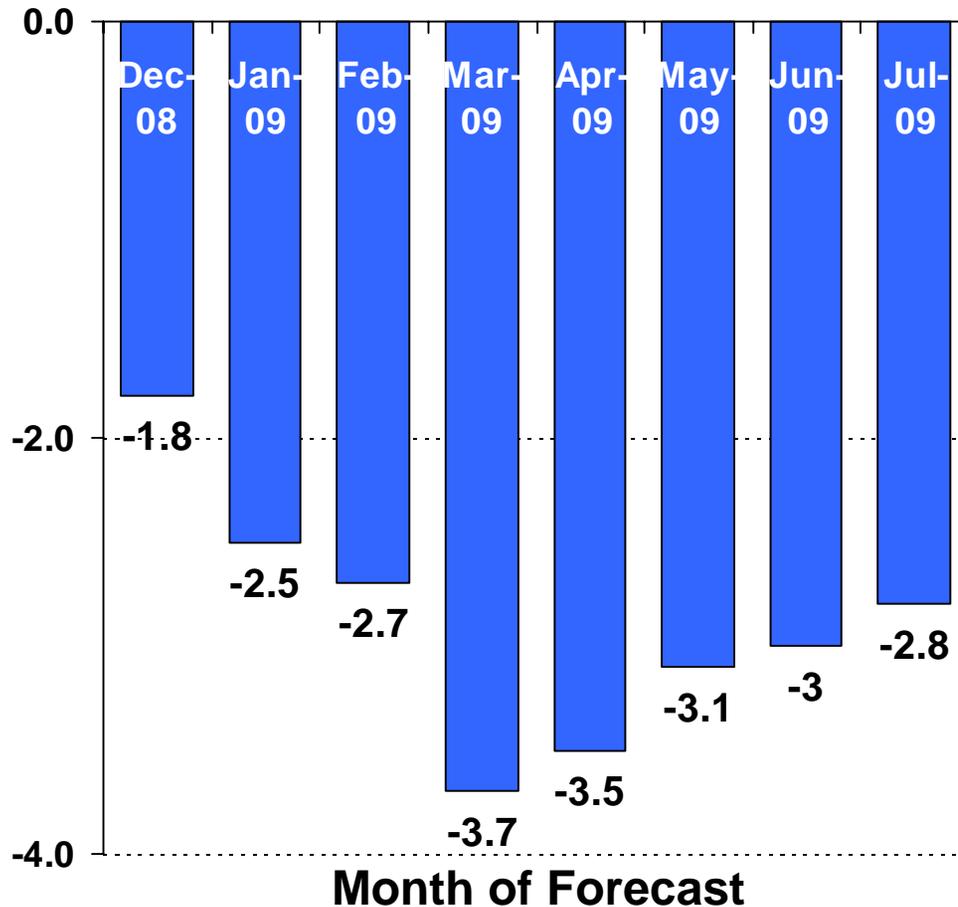
<sup>1</sup> Production revenue

<sup>2</sup> Excluding solar

Source for GDP data: IHS Global Insight

# US GDP Growth Forecast for 2009 over Time: Pushing Off Bottom But Issues Persist

Real GDP Growth (Percent)

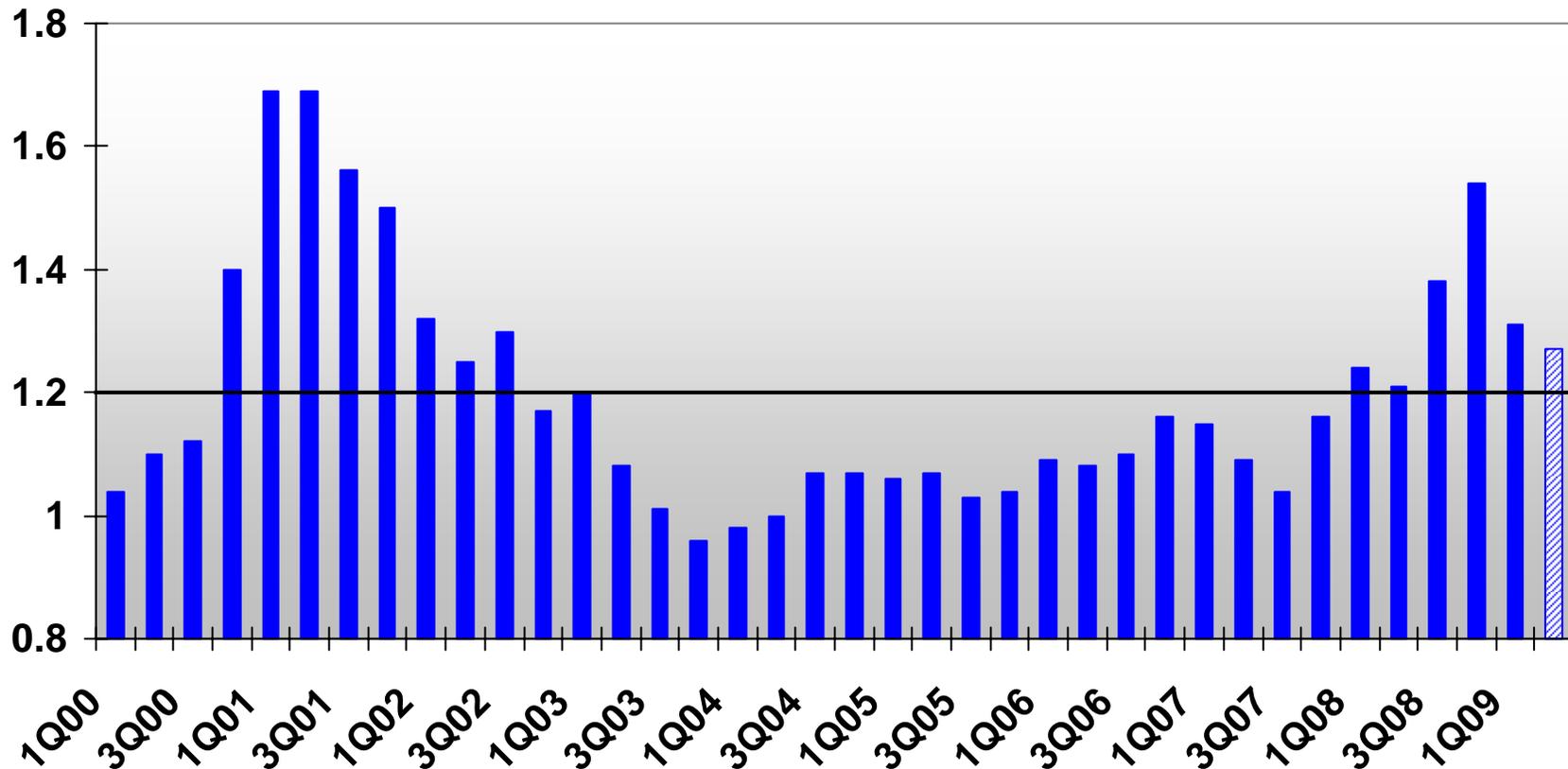


Quarter of First US GDP Growth in 2009

Forecast	3Q	4Q
Dec-08	X	
Jan-09	X	
Feb-09		X
Mar-09		X
Apr-09		X
May-09	X	
Jun-09	X	
Jul-09	X	

# Inventory Index: Significant Drop in 1Q 09

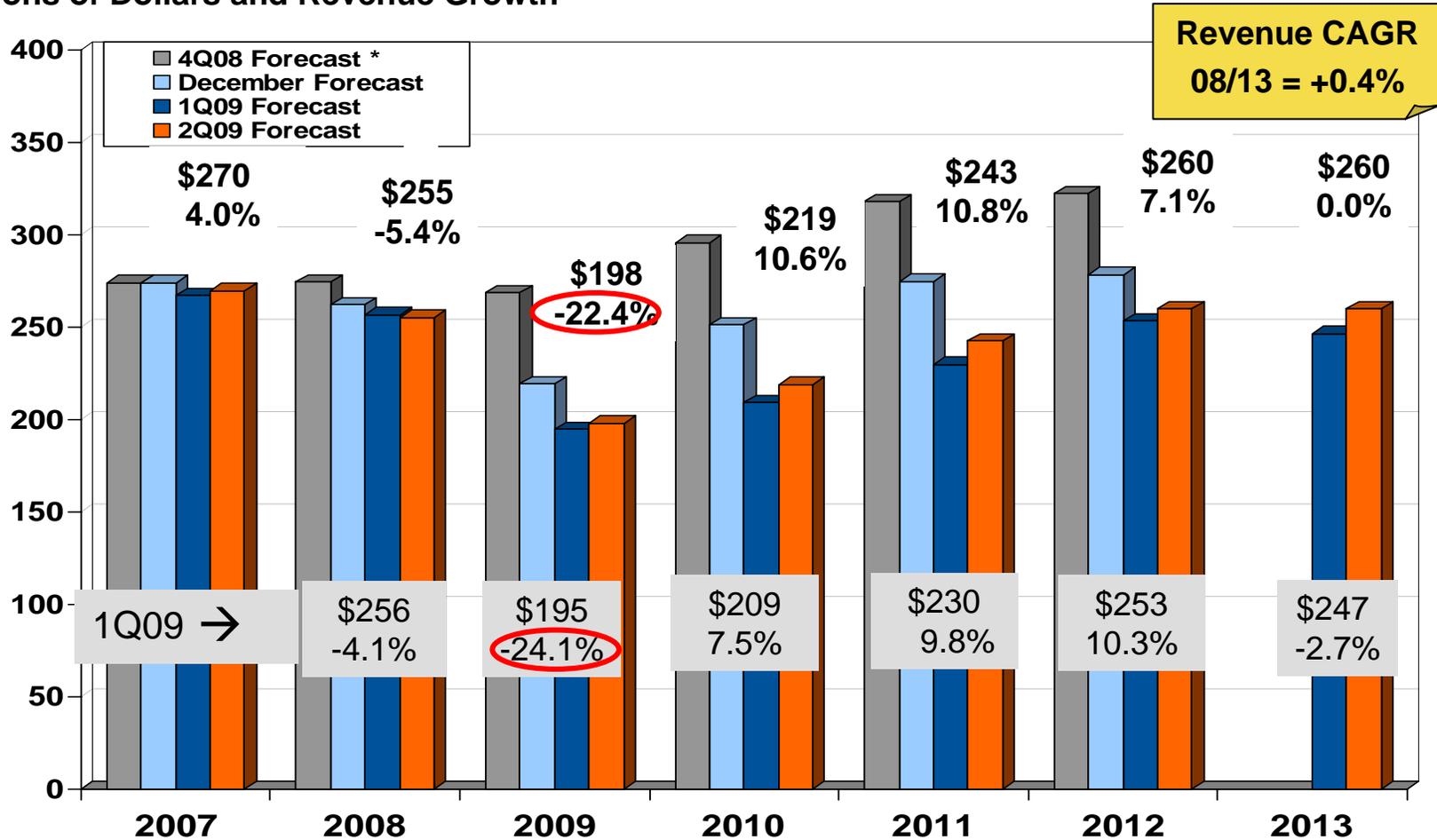
## Inventory Index



**Legend:** Less than 0.95 — Moderate to severe shortages  
 0.95 to 1.10 — Normal inventory levels  
 1.10 to less than 1.20 — Moderately inflated  
 Greater than 1.20 — Severe excess inventory

# Financial Crisis Impact: Unprecedented Decline Followed by Bumpy Recovery

Billions of Dollars and Revenue Growth



\* Note: 4Q08 forecast Included Solar (\$10B of Crystalline Silicon Cell PV included in 2008)

# Semiconductor 2Q09 Forecast Update: Device Revenue and Annual Growth

Revenue (\$B)	2008	2009	2010	2011	2012	2013	CAGR
<b>Memory</b>	<b>47.4</b>	<b>39.4</b>	<b>46.7</b>	<b>52.6</b>	<b>55.2</b>	<b>48.6</b>	<b>0.5%</b>
Micro	48.8	37.3	40.4	44.4	46.7	48.2	-0.2%
Logic	11.8	9.3	10.3	11.6	12.9	13.3	2.4%
Analog	17.8	13.4	14.1	15.1	16.3	16.7	-1.3%
Discrete	17.3	12.9	13.5	14.4	15.1	15.5	-2.1%
Opto	16.7	13.6	15.2	16.6	17.8	18.6	2.3%
ASIC	23.7	17.8	18.9	20.9	22.6	23.4	-0.2%
ASSP	68.5	51.9	57.2	64.0	69.8	71.9	0.9%
Non-optical Sensors	3.0	2.4	2.6	3.0	3.4	3.6	4.0%

## Annual Growth Rates

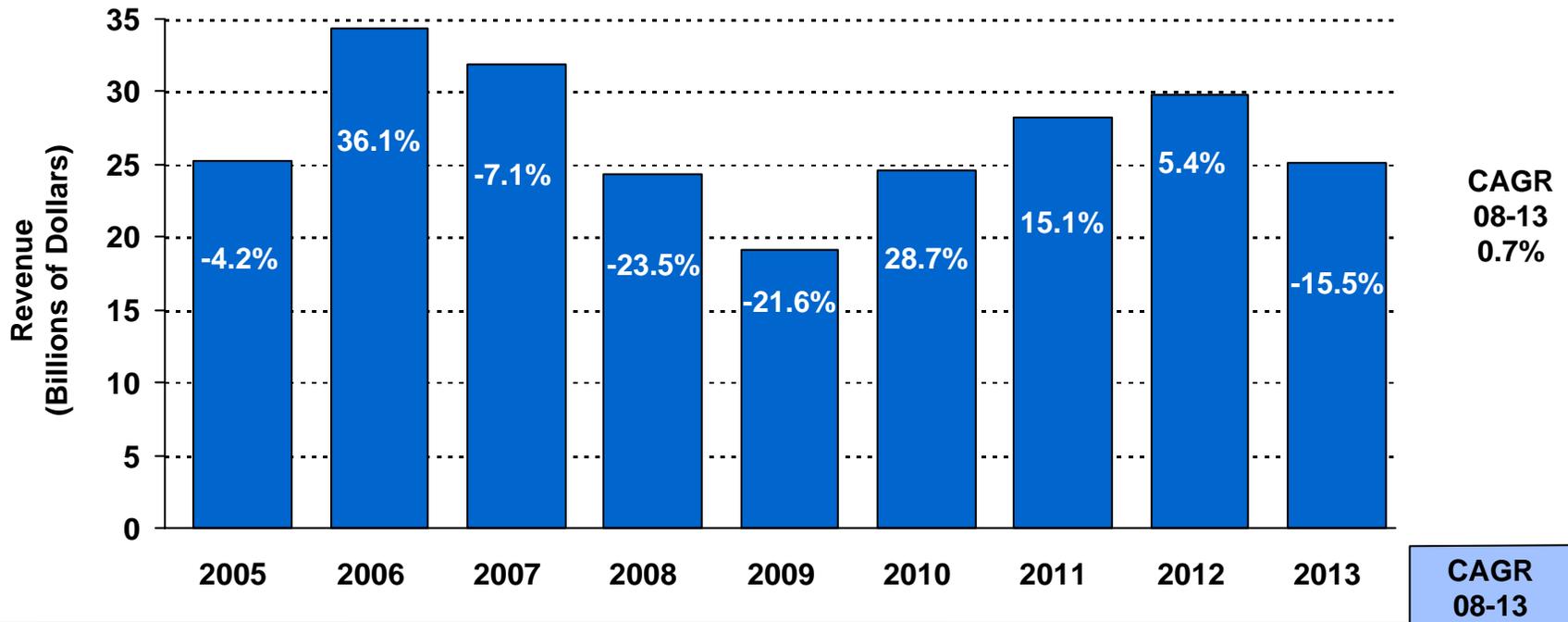
<b>Memory</b>	<b>-20.0%</b>	<b>-16.8%</b>	<b>18.7%</b>	<b>12.5%</b>	<b>5.0%</b>	<b>-11.9%</b>
Micro	0.1%	-23.6%	8.3%	9.9%	5.1%	3.4%
Logic	-7.3%	-21.5%	10.4%	13.1%	11.4%	3.0%
Analog	0.0%	-25.0%	5.6%	6.9%	7.9%	2.3%
Discrete	-1.6%	-25.4%	4.6%	6.8%	4.9%	2.8%
Opto	1.2%	-18.4%	11.8%	9.5%	7.1%	4.6%
ASIC	-4.3%	-25.0%	6.4%	10.3%	8.3%	3.7%
ASSP	-1.0%	-24.2%	10.1%	11.9%	9.1%	2.9%
Non-optical Sensors	4.0%	-18.2%	9.6%	14.6%	11.5%	6.1%

Note: Excludes Solar

Source: Gartner Dataquest Estimates (May 2009)

# DRAM Forecast, 2Q09: Annual DRAM Market Metrics

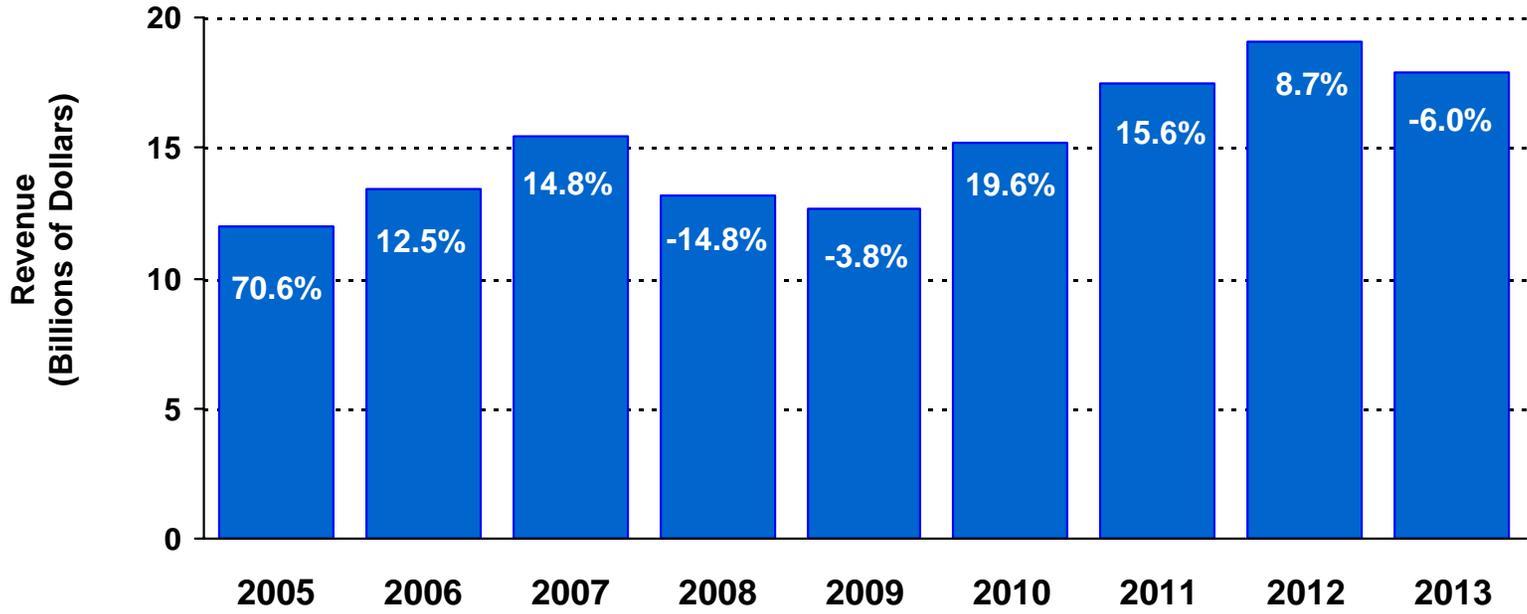
										<b>CAGR 08-13</b>
<b>Megabytes Bn</b>	237.7	366.0	683.8	1,111	1,255	1,774	2,649	3,808	5,780	39.1%
<b>Bit Growth</b>	55.7%	54.0%	86.9%	62.4%	13.0%	41.3%	49.4%	43.7%	51.8%	



										<b>CAGR 08-13</b>
<b>ASP 1Gb eqv.</b>	13.57	11.99	5.96	2.81	1.95	1.77	1.37	1.00	0.56	-27.6%
<b>ASP Change</b>	-38.5%	-11.6%	-50.3%	-52.9%	-30.6%	-8.9%	-23.0%	-26.7%	-44.4%	

# NAND Flash Market Forecast: 2008 Collapse, 2010+ Recovery

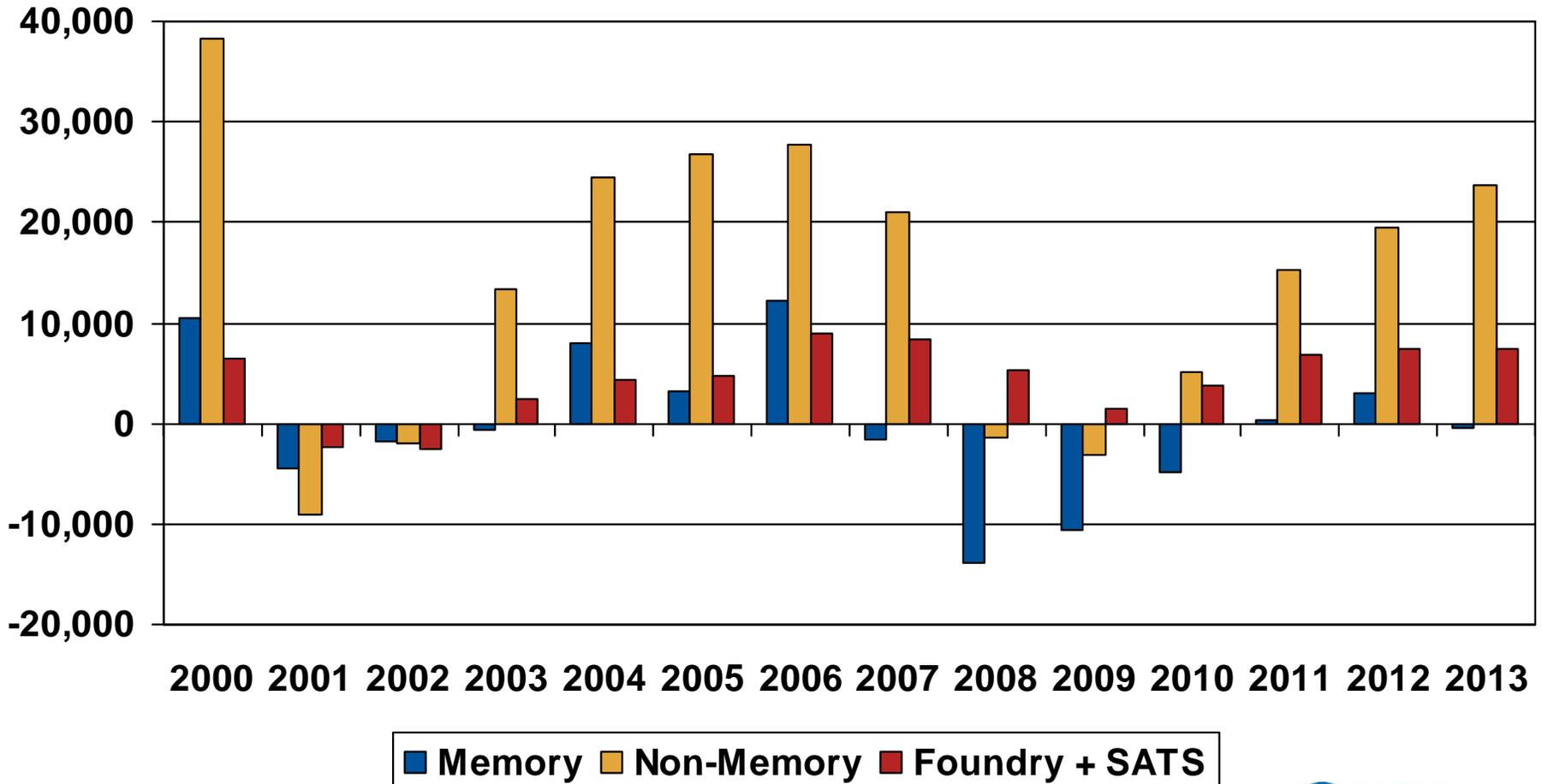
										<b>CAGR 08-13</b>
<b>Petabytes</b>	<b>234.8</b>	<b>719.9</b>	<b>1,992</b>	<b>4,513</b>	<b>6,437</b>	<b>13,806</b>	<b>30,448</b>	<b>61,471</b>	<b>113,005</b>	<b>90.4%</b>
<b>Bit Growth</b>	<b>258%</b>	<b>207%</b>	<b>177%</b>	<b>127%</b>	<b>43%</b>	<b>115%</b>	<b>121%</b>	<b>102%</b>	<b>84%</b>	



										<b>CAGR 08-13</b>
<b>ASP 1GB eqv.</b>	<b>52.1</b>	<b>19.1</b>	<b>7.94</b>	<b>2.99</b>	<b>2.01</b>	<b>1.12</b>	<b>0.59</b>	<b>0.32</b>	<b>0.16</b>	<b>-44.2%</b>
<b>ASP Change</b>	<b>-52.3%</b>	<b>-63.3%</b>	<b>-58.5%</b>	<b>-62.4%</b>	<b>-32.6%</b>	<b>-44.2%</b>	<b>-47.6%</b>	<b>-46.1%</b>	<b>-48.9%</b>	

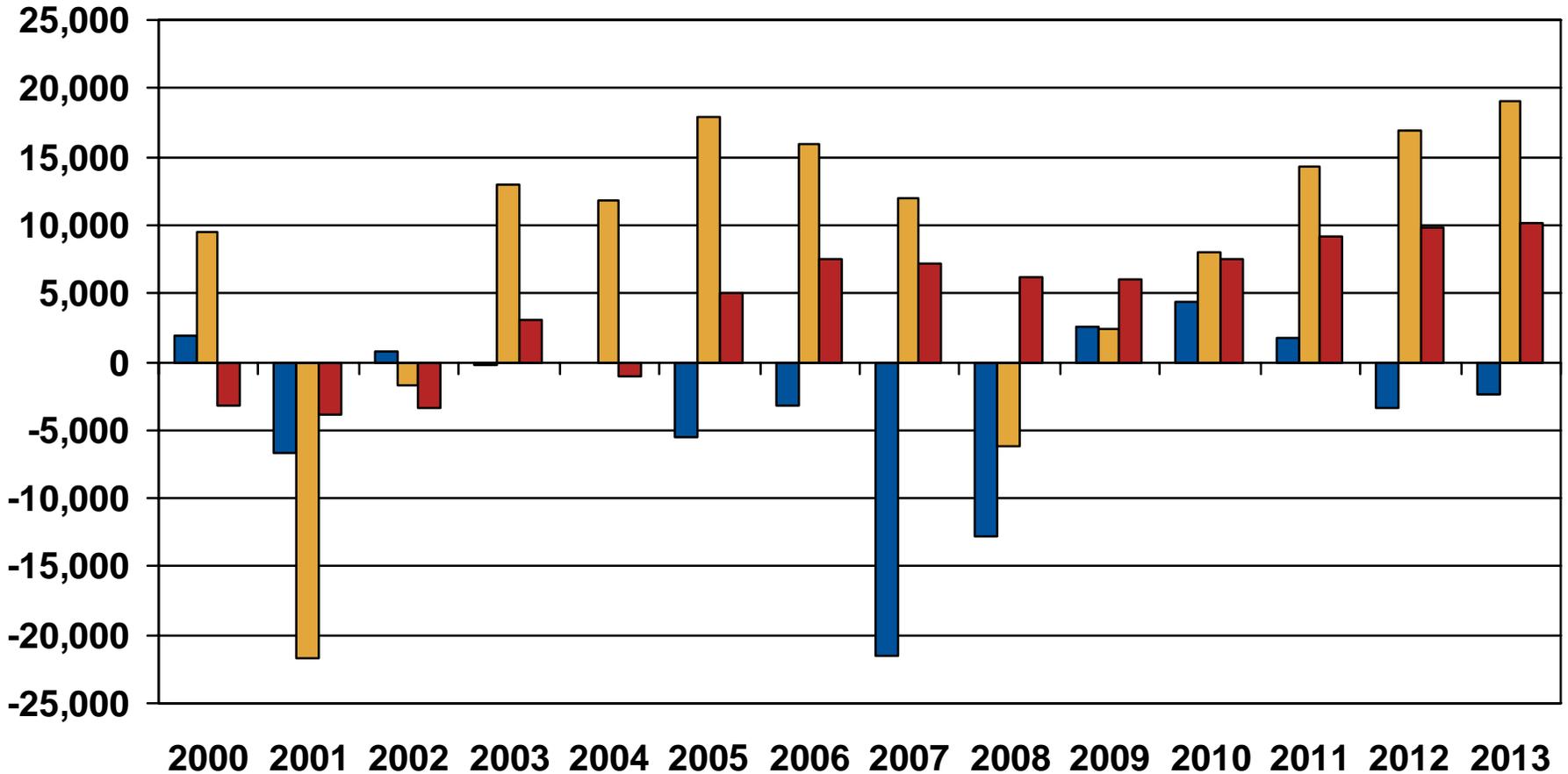
# Industry Profitability Recovers

Net Income \$M



# Net Cash Flow Recovers

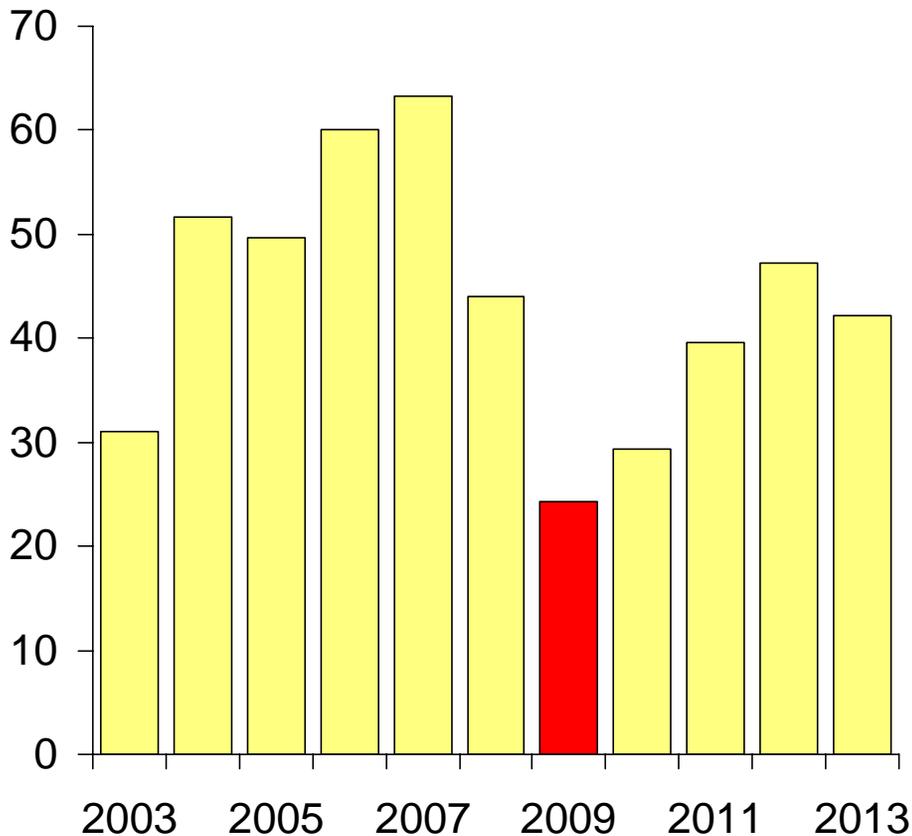
## Net Cash Flow \$M



■ Memory ■ Non Memory ■ Foundry + SATS

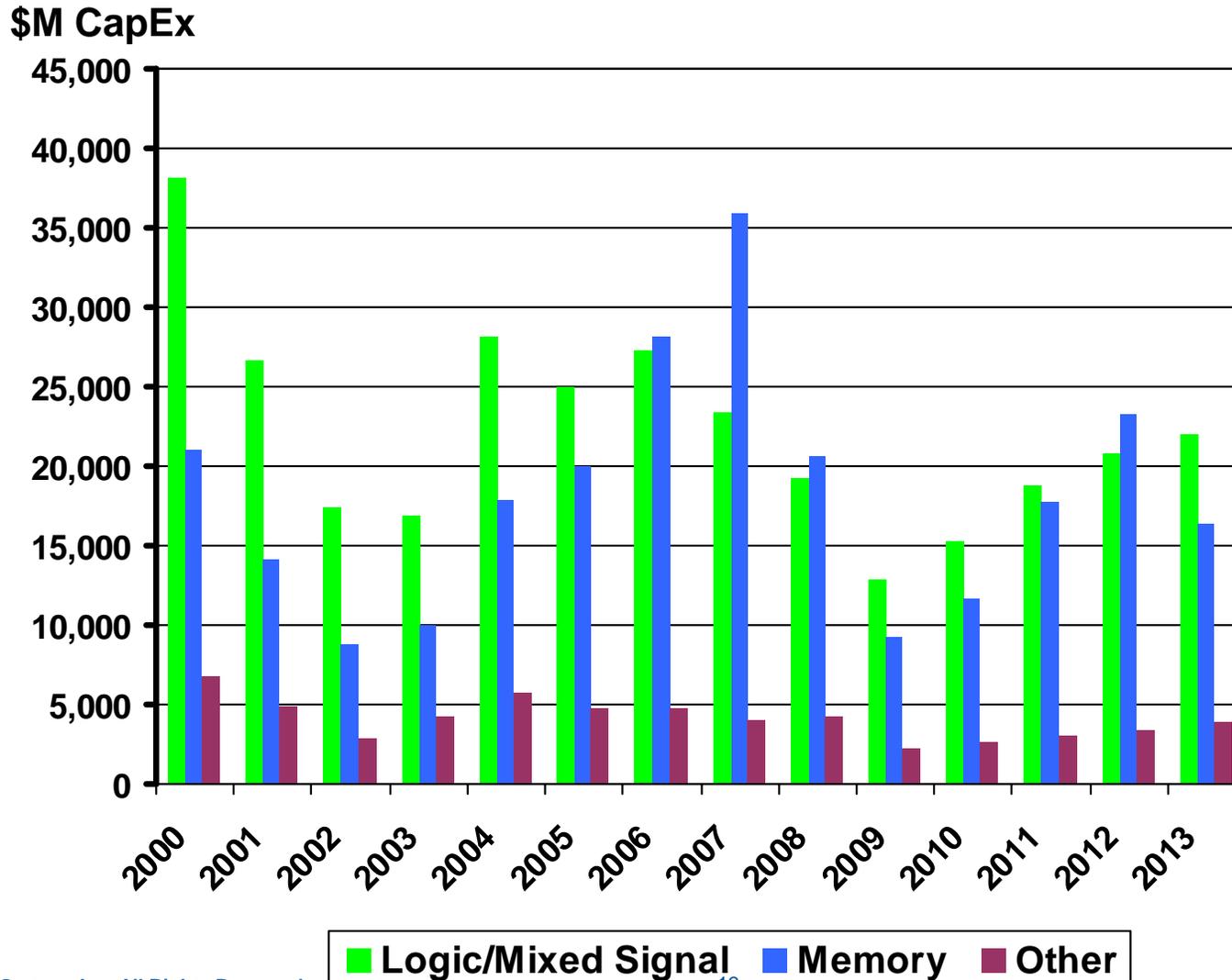
# Capital Spending: Plummeting in 2009

Billions of Dollars



- 2009 down 62% from 2007 peak
- Spending shifting from minimal investment mode to new technology investment mode in 2H 2009

# Capital Spending by Device Type



# 2009 Capex Top 20: Intel Returns to # 1 Position for 2009

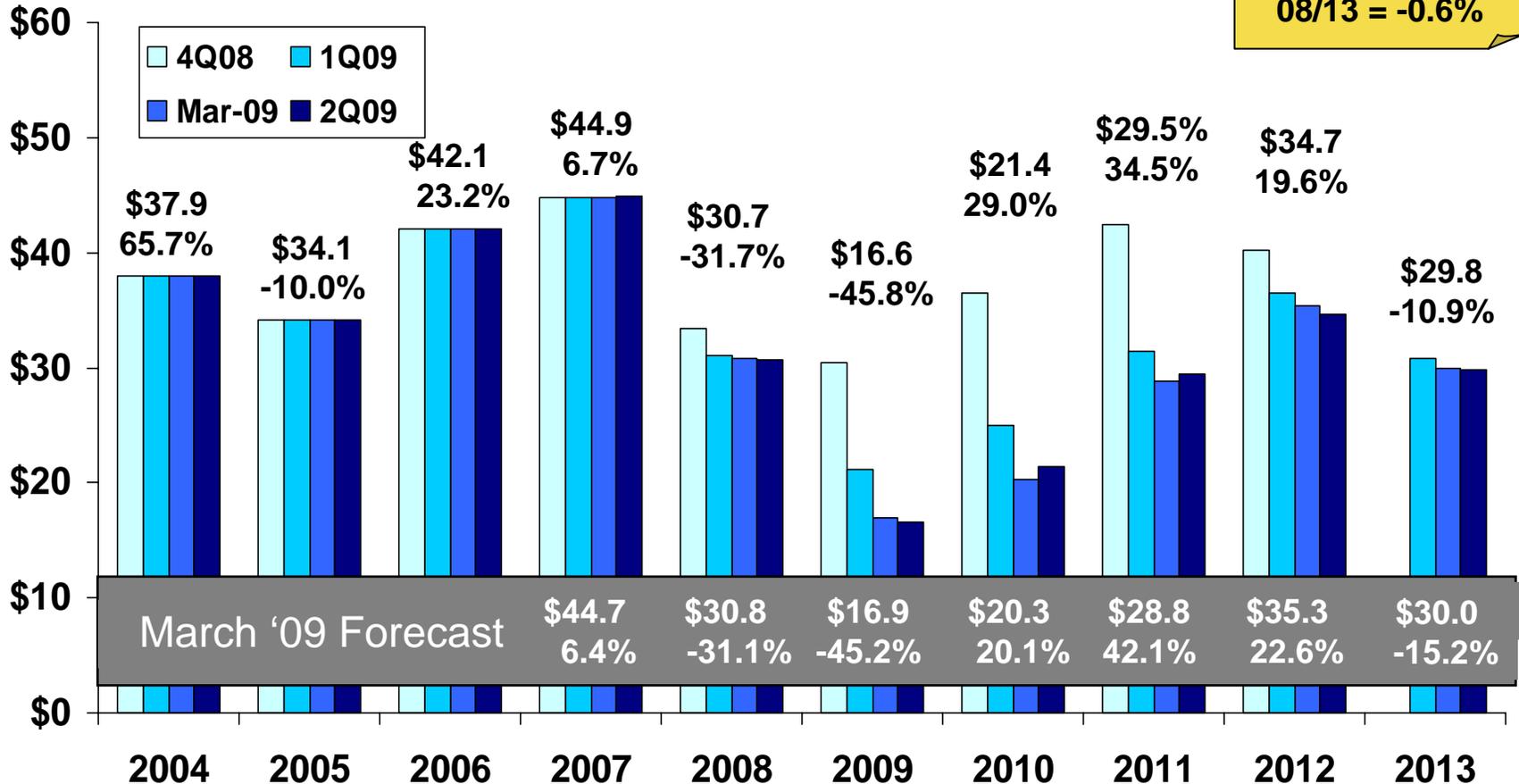
\$M

2009 Rank	Company	2008	2009	Change
1	Intel	5,232.0	4,500.0	-14.0%
2	Samsung	6,000.0	3,500.0	-41.7%
3	TSMC Group	1,886.0	1,500.0	-20.5%
4	Toshiba	2,683.7	908.9	-66.1%
5	Hynix	2,358.0	800.0	-66.1%
6	Global Foundries	-	760.0	NM
7	Rohm	646.0	508.0	-21.4%
8	Micron Technology	1,675.0	500.0	-70.1%
9	Sandisk	1,600.0	500.0	-68.8%
10	STMicroelectronics	981.0	500.0	-49.0%
11	Sony	971.5	452.4	-53.4%
12	IBM Microelectronics	500.0	425.0	-15.0%
13	Nanya Technology	380.3	405.0	6.5%
13	Elpida	1,075.9	403.9	-62.5%
15	Panasonic (was Matsushita)	740.8	403.9	-45.5%
16	NEC	699.5	403.9	-42.2%
17	Chartered Group	576.0	375.0	-34.9%
18	Inotera	606.0	354.5	-41.5%
18	Rexchip	600.0	350.0	-41.7%
20	Powerchip	600.0	313.0	-47.8%
	<b>Top 20 Companies Total</b>	<b>29,811.7</b>	<b>17,863.6</b>	<b>-40.1%</b>
	<b>Total Worldwide Capital Spending</b>	<b>44,012.3</b>	<b>24,295.9</b>	<b>-44.8%</b>
	<b>Top Companies (Percent)</b>	<b>67.7</b>	<b>73.5</b>	

# Semiconductor Capital Equipment, 2Q 09: Economic Crisis Hits Hard

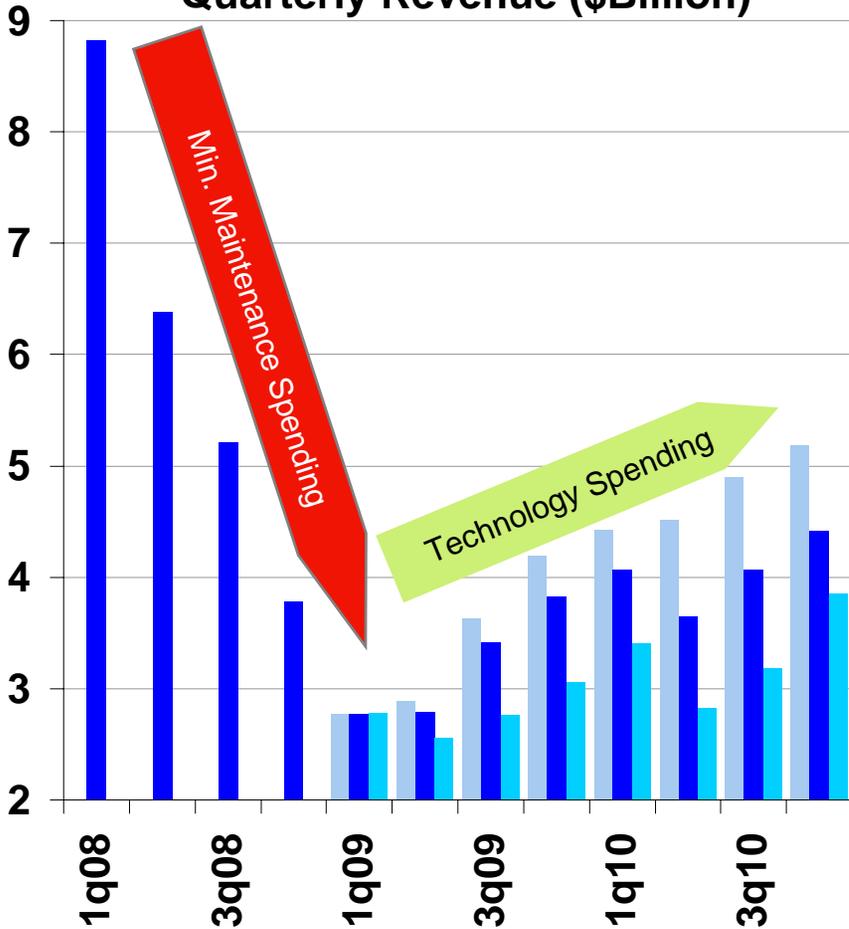
Billions of Dollars and Revenue Growth  
All Capital Equipment Including Test

Revenue CAGR  
08/13 = -0.6%

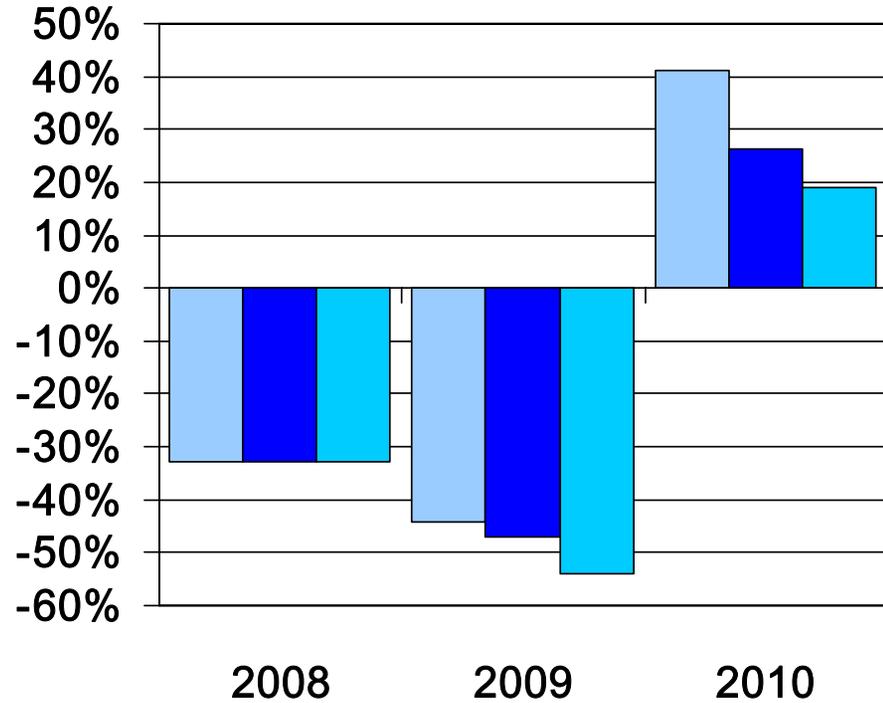


# Wafer Fab Equipment Quarterly Revenue Scenarios

Quarterly Revenue (\$Billion)



Annual Growth (%)



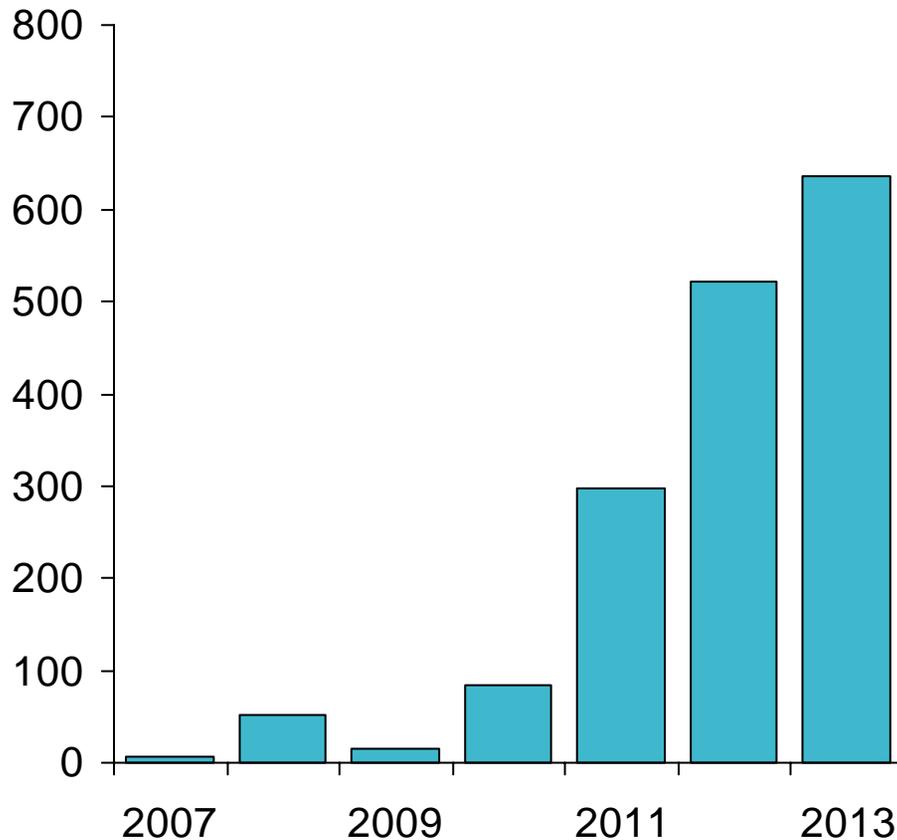
# Stepper Unit Forecast – June 2009

Unit Shipment	History		Forecast				
	2007	2008	2009	2010	2011	2012	2013
ALL g-line	1	-	*	*	*	*	*
ALL i-line & g-line <sup>1</sup>	268	146	28	40	89	105	73
ALL DUV	335	198	90	131	180	215	183
All 248 nm DUV	159	78	37	56	79	101	84
248nm Repeater	4	5	1	2	2	1	-
248nm Scanner	155	73	36	54	77	100	84
All 193 nm DUV	176	120	53	75	101	114	99
193d Scanner	130	50	7	8	13	17	11
193i Scanner	46	70	46	67	88	97	88
<b>Total</b>	<b>604</b>	<b>344</b>	<b>118</b>	<b>171</b>	<b>269</b>	<b>320</b>	<b>256</b>
<i>Growth</i>	-4.6%	-43.0%	-65.7%	44.9%	57.3%	19.0%	-20.0%

		2006	2007	2008	2009	2010	2011	2012	2013	CAGR
<b>Revenue</b>										2007-2013
<b>Total</b>	<b>[Million]</b>	\$ 6,386	\$ 7,144	\$ 5,388	\$ 2,473	\$ 3,430	\$ 4,805	\$ 5,856	\$ 4,935	-6.0%
	<i>Growth</i>	28.0%	11.9%	-24.6%	-54.1%	38.7%	40.1%	21.9%	-15.7%	

# Post-193nm Lithography: Insertion Not Before 16nm

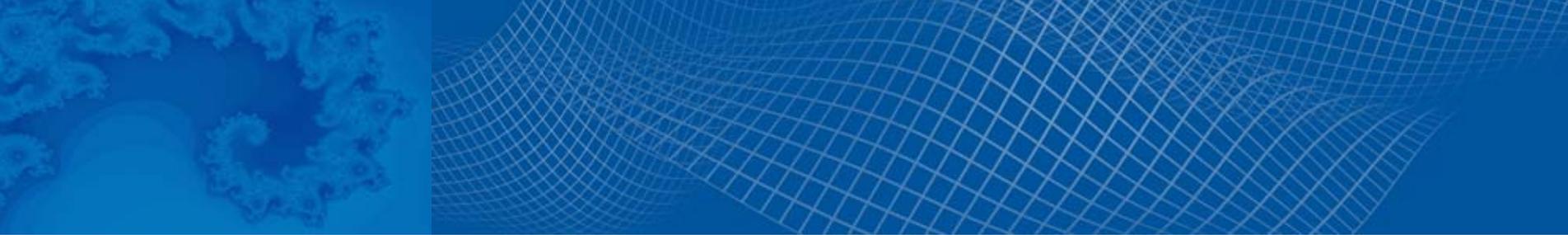
Billions of Dollars



- Post-193nm Lithography:
  - EUV, Imprint, beam technologies
- 193nm Immersion with Double Patterning schemes will carry industry to 16nm

# Conclusions

- Macro-economic forecasts continue to improve
  - Start of US recovery possible for 3Q 2009
- Overall industry profitability should return in 2010
  - Memory lags until 2011
- Capital spending remains depressed as cash reserves are sparse
  - Only companies with deep pockets have significant spending
  - 2009 spending for technology, capacity growth returns in 2010
- Equipment bottoms in Q2 2009
  - Market pick-up in 2H 2009 caused by return in technology buys
  - Sustainable recovery possible in 2H 2010



■ ■ ■ ■ Thank You