

THE DRAMATIC RESTRUCTURING OF THE INTEGRATED CIRCUIT INDUSTRY

by

Bill McClean
President
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Get ready for some really good news as keynote speaker Bill McClean of IC Insights addresses "The Dramatic Restructuring of the Integrated Circuit Industry". In IC Insights' opinion, the "bottom" of the current cycle in the worldwide economy and IC industry was reached in 2012 and 2013 will mark the beginning of the next cyclical upturn—one in which the IC industry CAGR will more than triple to 7.4% in the next 5-year period.

ABSTRACT

Throughout 2012, the expectations for global economic growth consistently deteriorated and global GDP expanded by only 2.6%. It should be noted that 2.5% or less worldwide GDP growth is typically considered a global recession. However, IC Insights' forecast for 2013 worldwide GDP growth is 3.2%, with increasingly better growth expected for the global economy through 2016.

The IC industry is set to emerge from a difficult 5-year period of minimal growth. From 2007-2012, the IC market grew at an average annual rate of 2.0%. In IC Insights' opinion, the "bottom" of the current cycle in the worldwide economy and IC industry was reached in 2012 and 2013 will mark the beginning of the next cyclical upturn—one in which the IC industry CAGR will more than triple to 7.4% in the next 5-year period.

Overall, semiconductor industry cycles are becoming increasingly tied to the health of the worldwide economy. While poor semiconductor industry growth has occurred during periods of strong worldwide economic growth, primarily due to semiconductor industry overcapacity and the resulting IC price declines, it is rare to have strong semiconductor industry growth without at least a "good" worldwide economy to support it. Thus, over the next five years, annual global semiconductor market growth rates are expected to gain significant momentum and closely mirror the performance of worldwide GDP growth.

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THE DRAMATIC RESTRUCTURING OF THE INTEGRATED CIRCUIT INDUSTRY

Bill McClean, President—IC Insights

Keynote Address



2013 BiTS Workshop
March 3 - 6, 2013




Presentation Outline

- Global Economic Trends and “New” IC Cycle Model
- IC Market Trends
- Capital Spending and Capacity Trends
- Summary



Global Economic Trends

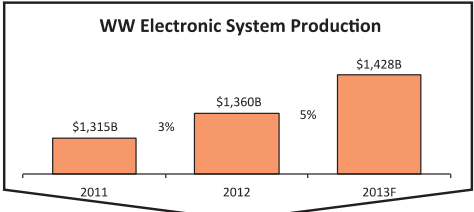
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Electronic Industry Interdependence

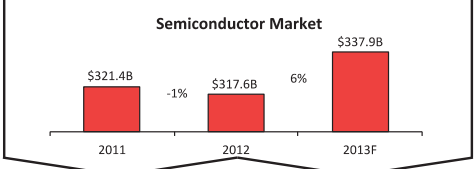
2012 Worldwide GDP = \$60.2 Trillion

WW Electronic System Production



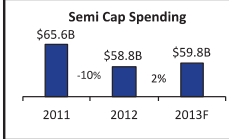
Year	Production (\$B)	% Change
2011	\$1,315B	-
2012	\$1,360B	+3%
2013F	\$1,428B	+5%

Semiconductor Market



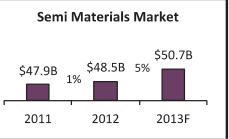
Year	Market (\$B)	% Change
2011	\$321.4B	-
2012	\$317.6B	-1%
2013F	\$337.9B	+6%

Semi Cap Spending



Year	Spending (\$B)	% Change
2011	\$65.6B	-
2012	\$58.8B	-10%
2013F	\$59.8B	+2%

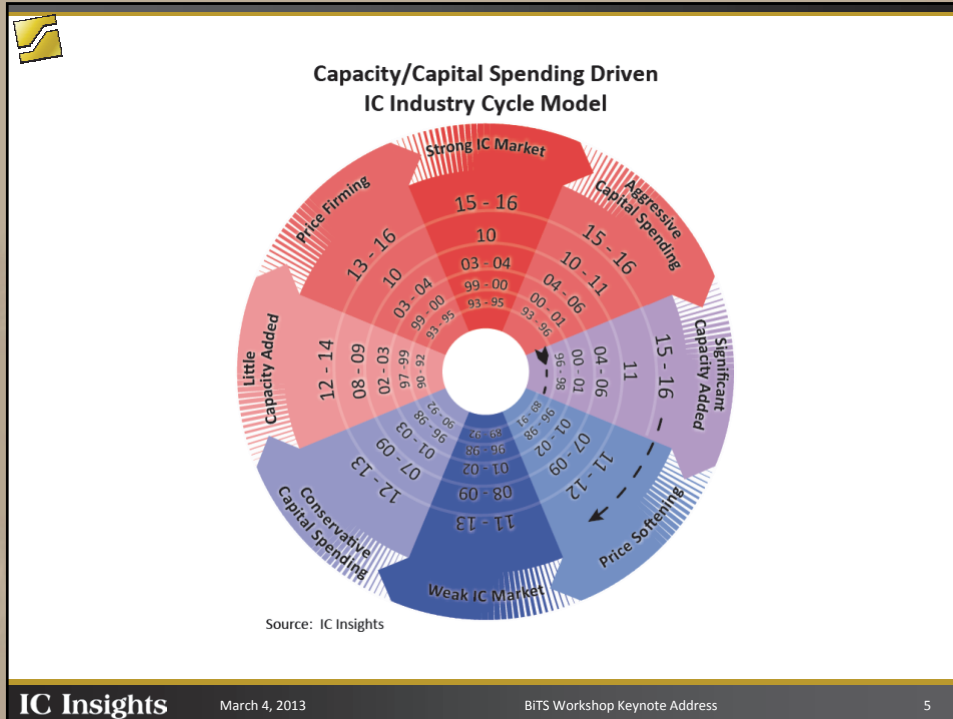
Semi Materials Market



Year	Market (\$B)	% Change
2011	\$47.9B	-
2012	\$48.5B	+1%
2013F	\$50.7B	+5%

Source: IC Insights

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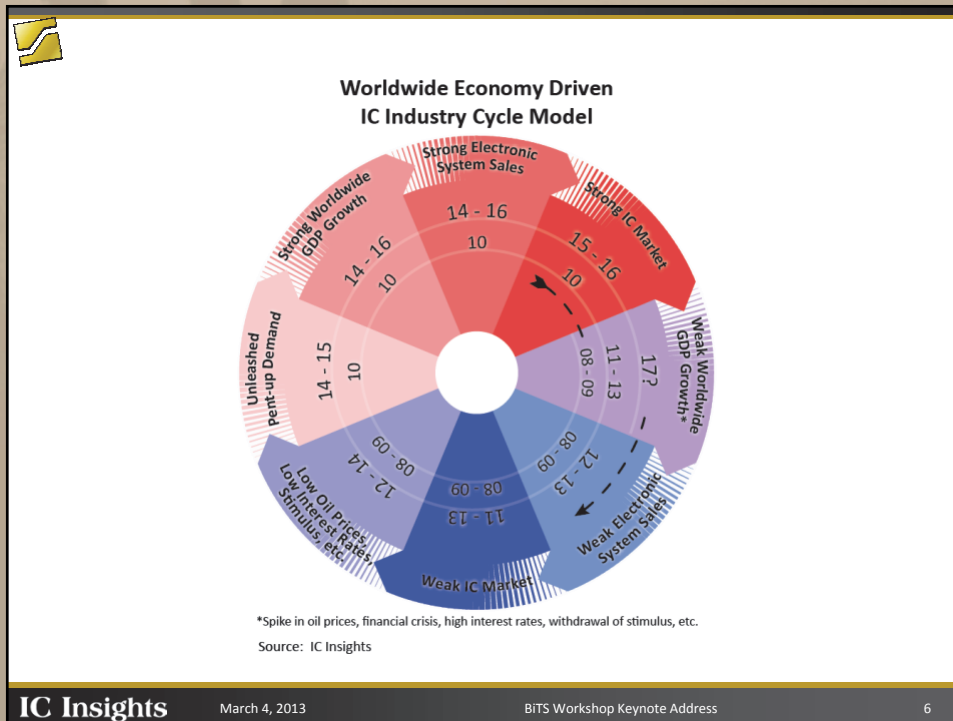


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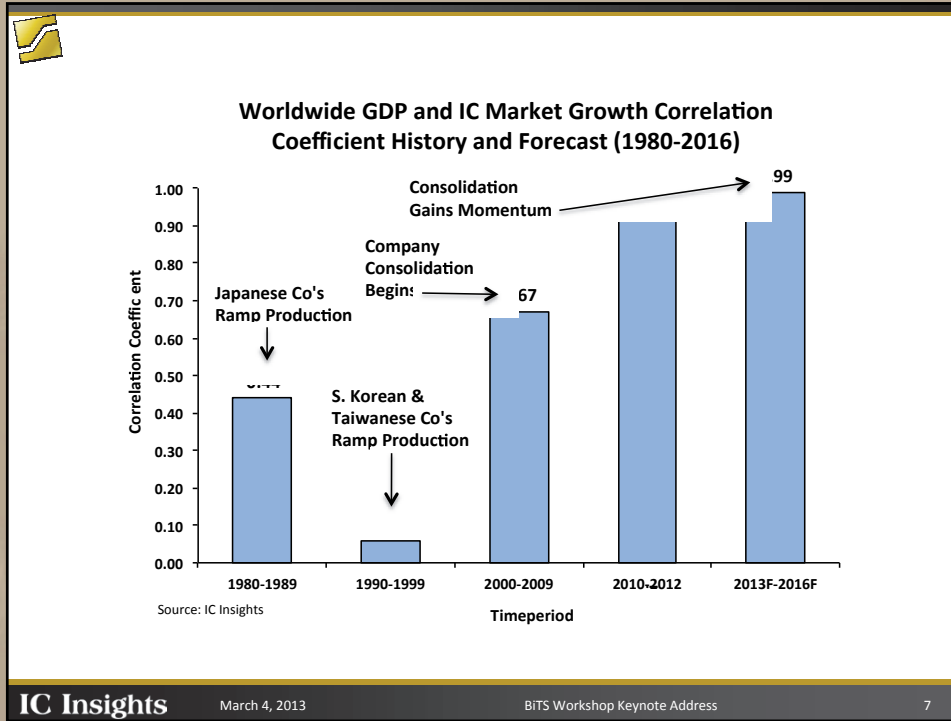


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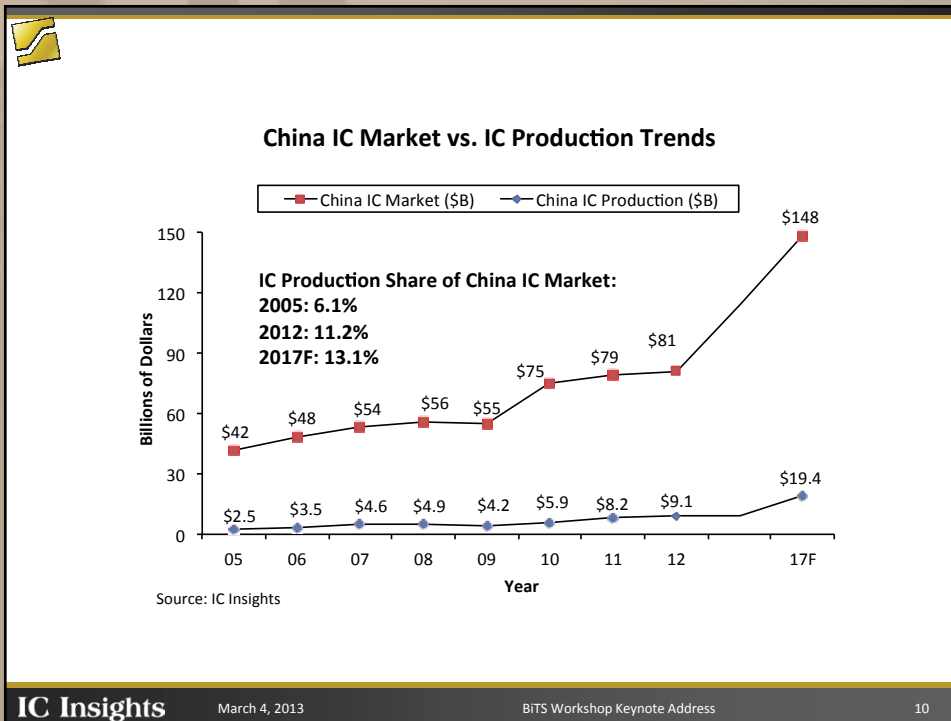
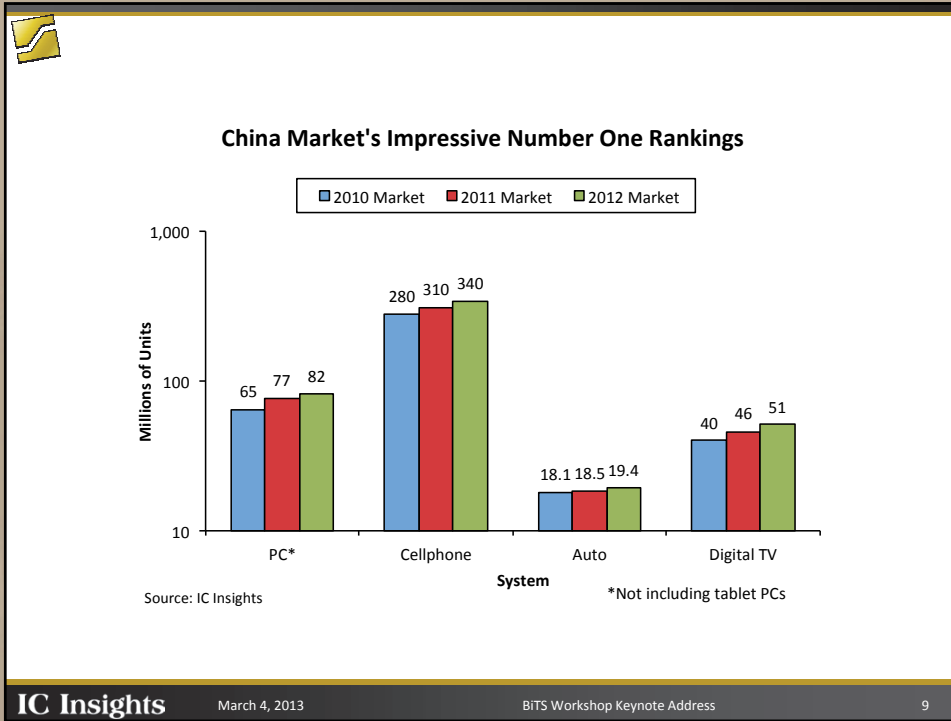


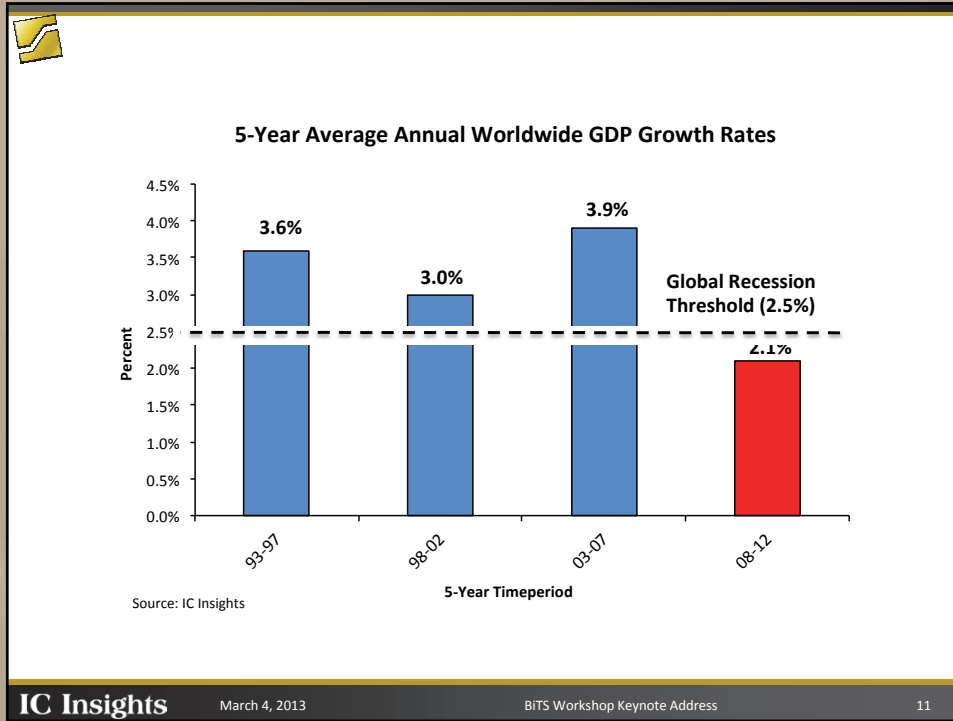
Worldwide GDP Breakdown (2011-2013F)

Country/Region	2011 GDP Growth %	2011 GDP (\$ Trillions)	2011 (% of Total)	2012 GDP Growth %	2012 GDP (\$ Trillions)	2012 (% of Total)	2013F GDP Growth %	2013F GDP (\$ Trillions)	2013F (% of Total)
Developed Countries									
U.S.	1.7%	13.92	23.7%	2.2%	14.23	23.6%	2.4%	14.57	23.5%
Eurozone	1.5%	12.17	20.8%	-0.8%	12.07	20.1%	-0.3%	12.04	19.4%
Japan	-0.7%*	4.28	7.3%	1.5%	4.34	7.2%	1.4%	4.41	7.1%
U.K.	0.7%	2.68	4.6%	-0.1%	2.68	4.4%	1.3%	2.71	4.4%
Canada	2.4%	1.38	2.4%	2.1%	1.41	2.3%	2.3%	1.44	2.3%
Australia/NZ	2.2%	1.03	1.8%	3.7%	1.07	1.8%	3.0%	1.10	1.8%
Total Developed	1.3%	35.46	60.5%	1.0%	35.80	59.5%	1.3%	36.26	58.4%
Emerging Markets	6.2%	23.19	39.5%	5.2%	24.40	40.5%	5.9%	25.84	41.6%
Worldwide Total	3.2%	58.65	100.0%	2.6%	60.19	100.0%	3.2%	62.10	100.0%
China**	9.2%	4.71	8.0%	7.8%	5.08	8.4%	8.1%	5.49	8.8%
India**	7.1%	1.52	2.6%	5.6%	1.61	2.7%	6.2%	1.70	2.7%

Source: World Bank, IMF, IC Insights

*Forecast was 1.5% before the earthquake
**Included in Emerging Market figures





2013 Worldwide GDP vs. IC Market Growth Scenarios

2013 Worldwide GDP Growth	2013 Worldwide IC Market Growth
2.5 - 2.8%*	<3%
2.9 - 3.3%	3 - 7%
3.4 - 3.7%	8 - 12%
≥3.8%	>12%

*≤2.5% = Global Recession

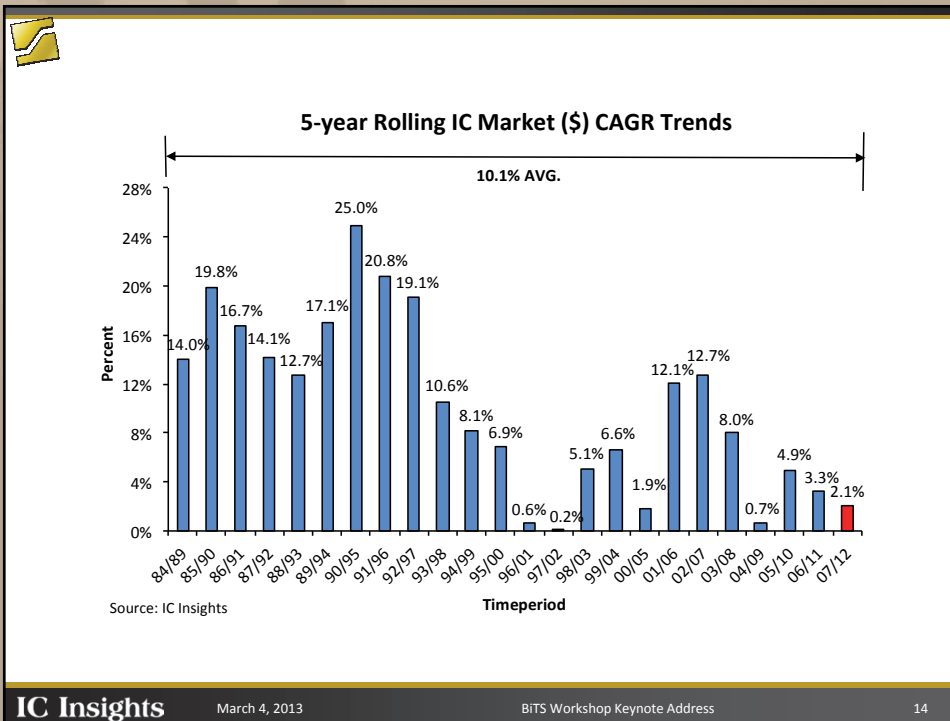
Source: IC Insights

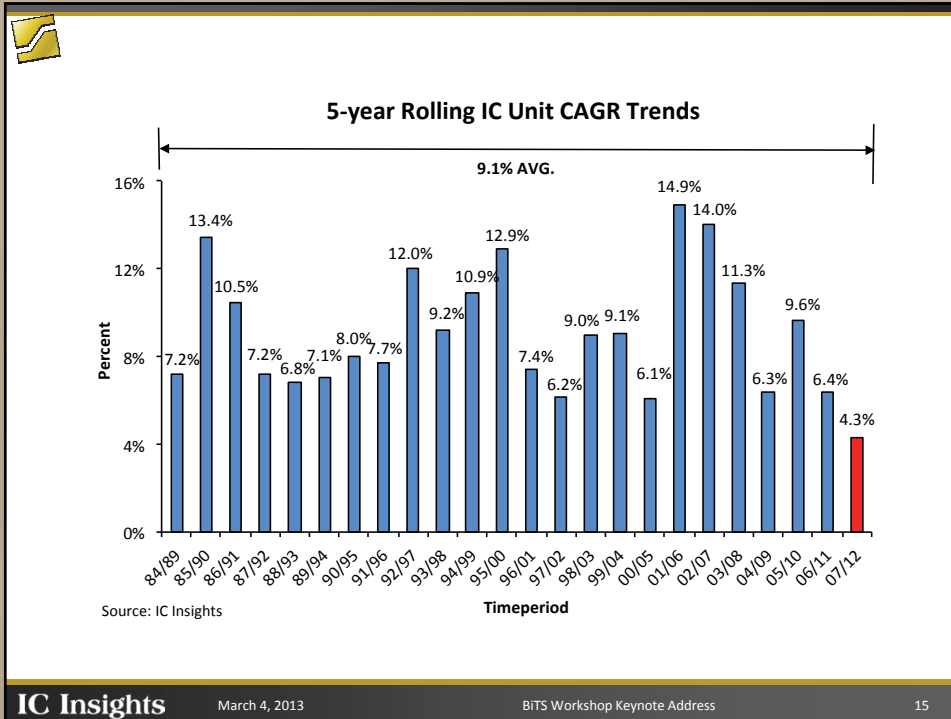
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IC Market Trends

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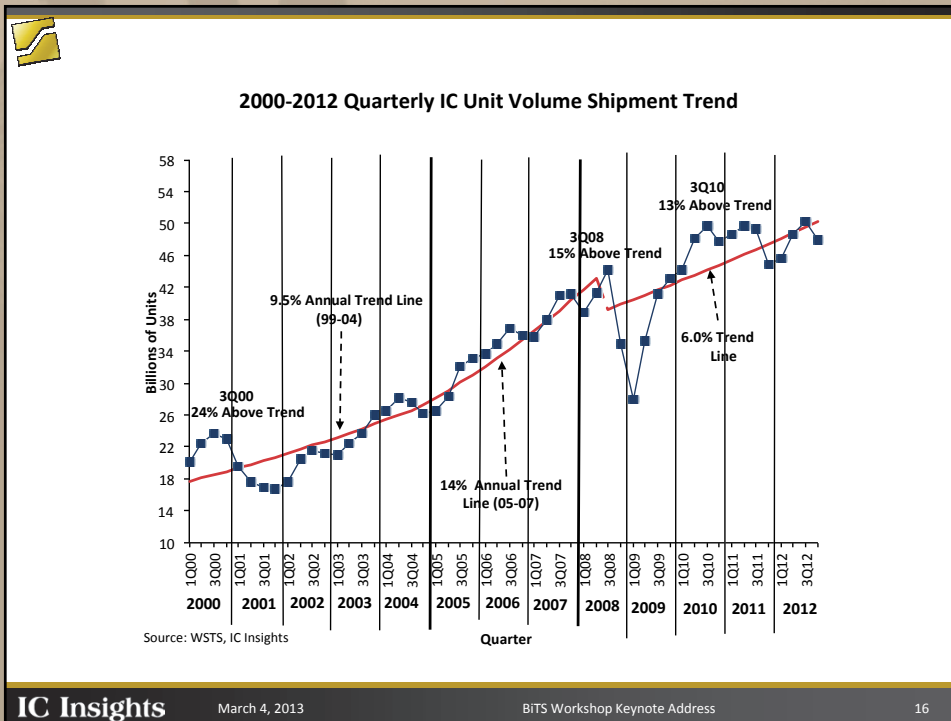


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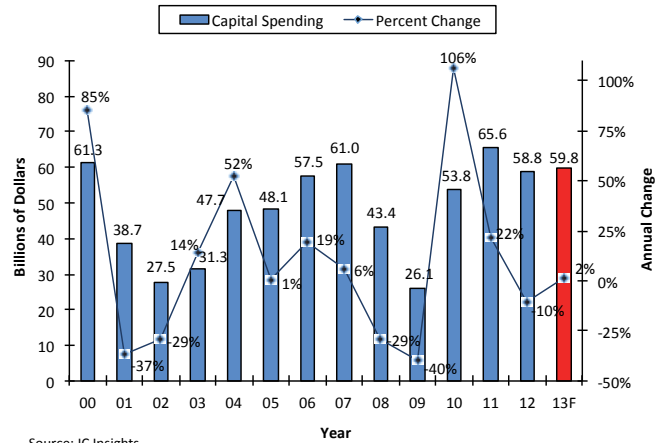
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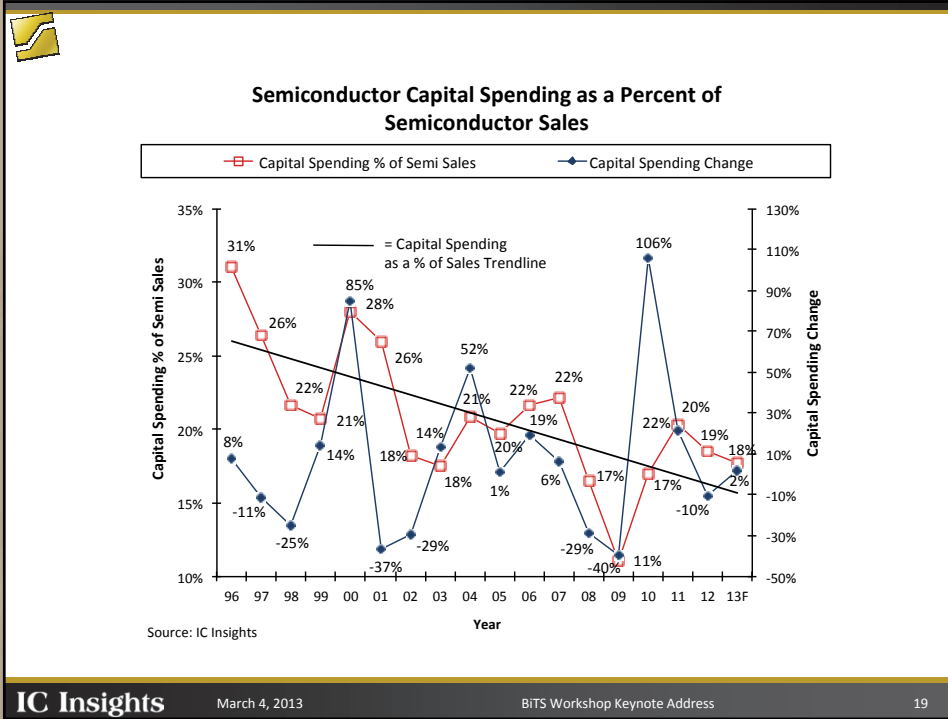
Capital Spending and Capacity Trends



Worldwide Semiconductor Capital Spending Trends (2000-2013)



Source: IC Insights

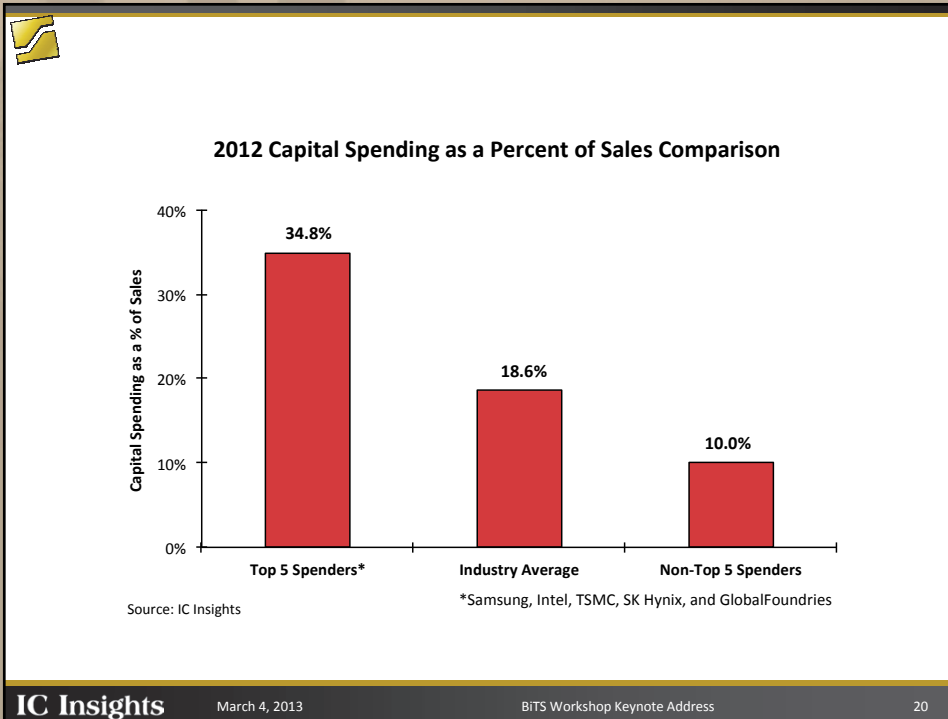


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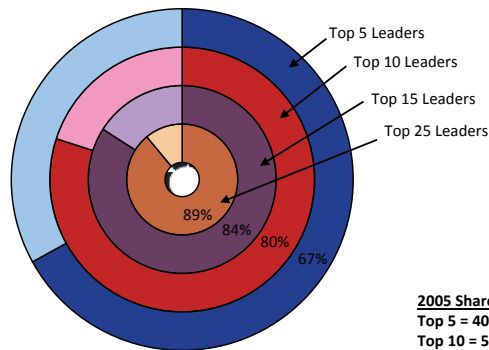
Major Semiconductor Manufacturers that Increased Spending in 2012

2012	Company	2011 (\$M)	2012 (\$M)	12/11 % Change	2012/2011 (\$M)
1	TSMC	7,333	8,322	13%	989
2	SK Hynix	3,165	3,655	15%	490
3	Samsung	11,755	12,225	4%	470
4	UMC	1,585	2,000	26%	415
5	Intel	10,764	11,000	2%	236
6	Rohm	385	535	39%	150
7	Maxim	195	250	28%	55
8	Magnachip	48	70	46%	22
— Total		35,230	38,057	8%	2,827
— Others		30,325	20,778	-31%	-9,547
— WW Total		65,555	58,835	-10%	-6,720

Source: IC Insights, Company Reports

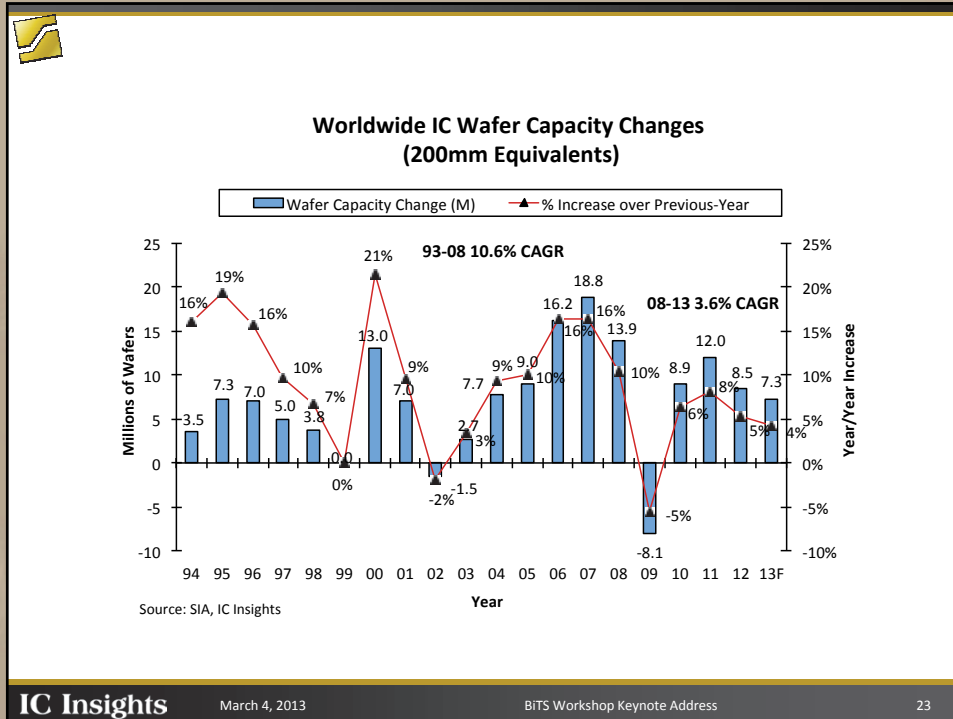


2013F Capital Spending Leaders' Shares of Total WW Semiconductor Industry Spending (\$59.8)



2005 Share
 Top 5 = 40%
 Top 10 = 55%
 Top 15 = 67%
 Top 25 = 82%

Source: IC Insights

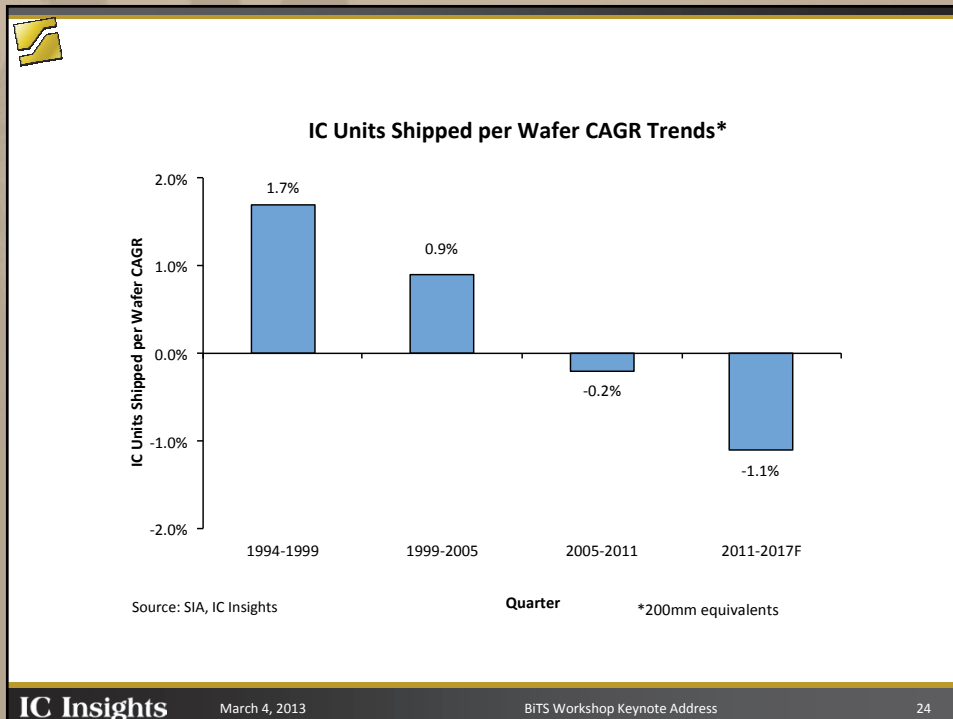


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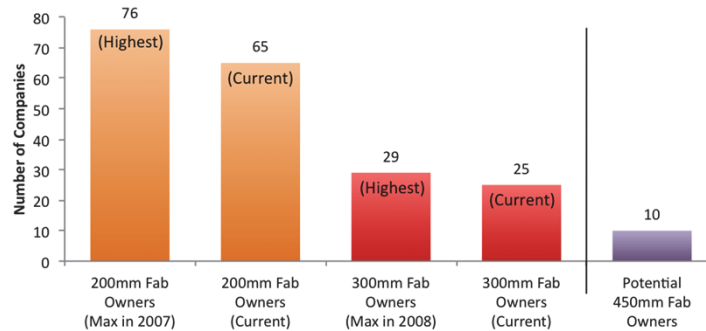
The New Normal?

"Moore's Law is going through an interesting phase. We use to have improvement in cost per transistor at every node, and at 28nm it's coming down, but at 20nm or 14nm it may even come up and that may be a shock for everyone."

—Scott McGregor, CEO Broadcom
 Dec. 2012



Number of IC Companies with 200mm vs. 300mm Fabs
 (as of December 2012)



Includes pilot- and volume-production-class, but not R&D, fab facilities (IC fabs only).
 Each member of joint-venture companies counted separately

Source: IC Insights' Strategic Reviews database



450mm Comments from Intel at SEMICON West 2012

- Intel expects a 30% manufacturing cost reduction when moving from 300mm to 450mm production.
- Standards development for 450mm production may be easier than it was for 300mm since only 5-7 companies need to agree on standards for 450mm as compared to over 30 companies for 300mm.
- Intel stated that it won't start a new wafer fab using 450mm wafers but will ramp using 300mm technology and transition to 450mm afterwards.
- Intel won't make its decision regarding the timing of high-volume 450mm production until 2015.
- Phase 2 of the Global 450 Consortium in New York will open the program to other companies besides the five founding companies (IBM, Intel, GlobalFoundries, TSMC, and Samsung).
- In addition to EUV, part of Intel's \$4.1 billion investment in ASML is targeting 450mm technology development.

Source: Intel, IC Insights



Summary



Supply Base Changes

o Changes spurring IC market maturity:

With no entry-point opportunities, the IC industry is closed to new major manufacturing startups —
 Chinese companies last group of newcomers; Will help moderate over-investment in fabs.

Fab-lite foundry movement —
 Will lead to less overspending for IC fabrication capacity.

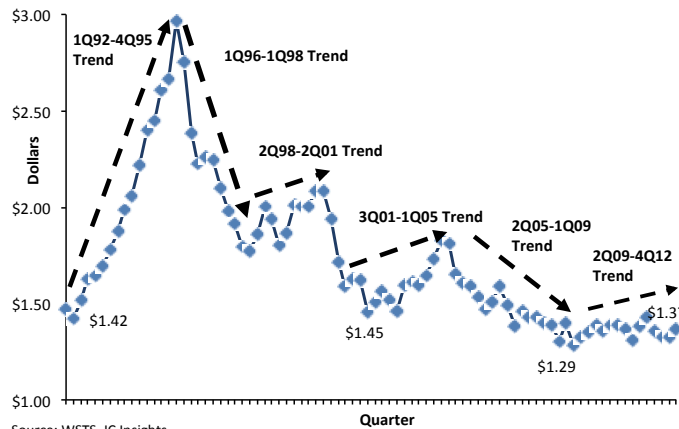
Capex as a percent of sales budgets —
 After averaging 25% in the late 1990s, the ratio is forecast to decline to 16-17% in the 2010s.

Fewer IC Manufacturers —
 The IC industry is forecast to go from over 75 suppliers using 200mm wafers to about 25 using 300mm wafers to less than 10 using 450mm wafers.

Source: IC Insights



1992-2012 Quarterly IC ASP Trends



Source: WSTS, IC Insights



IC Market to Show Better Growth

Year	IC Unit Shipments (B)	IC Average Selling Price (ASP)	IC Market (B)
1997	60.1	\$2.12	\$127.7
2012	192.6	\$1.35	\$259.4
1997-2012 CAGR	8.1%	-3.0%	4.8%
2012	192.6	\$1.35	\$259.4
2022F	346.0	\$1.62	\$560.0
2012-2022F CAGR	6.0%	1.8%	8.0%

2008-2012 IC ASP -0.5% CAGR

Source: IC Insights



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