INDUSTRY NOTE

USA | Technology

Semiconductors

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Semiconductors

Moore Stress = Structural Industry Shift

EQUITY RESEARCH GLOBAL

Key Takeaway

Over the next 3 to 5 years, we think exponential growth in leading edge factory costs will undermine the cost per transistor declines the industry has come to rely on. We expect this will translate to a structural shift that will benefit integrators on mature process nodes (MXIM, NXPI, BRCM, TXN), challenge fabless players on the leading edge (NVDA, ALTR, XLNX), and drive unexpected share gains for INTC and Samsung.

Signals of Moore's Law Stress: 1) NVidia published cost curves showing only nominal cost per transistor improvement on 20nm and 14nm nodes, 2) Cost models from consulting firm IBS indicating increasing cost per transistor at 28nm and 14nm nodes, 3) Broadcom CEO quoted as saying that 28nm is the first process shrink which doesn't deliver a cheaper chip. We think these data points stem from the exponential growth in the cost to build leading edge factories. We think this has a number of implications for the industry and stocks, and list three here:

Implication #1: Longer time between product refresh at the leading edge, enabling semi makers on mature nodes time to close the gap with those on the leading edge.

Implication #2: Increasing transistor costs at the leading edge means semiconductor mixed-signal / analog integrators on mature process nodes are better positioned to offer traditional Moore's Law like improvements (higher transistor count / lower cost) in their chips to OEM customers than leading edge digital players.

Implication #3: Increasing capital intensity for leading edge fabs, means near term deteriorating cash flow and quality of earnings metrics for leading edge IDMs and Foundries, but a continued shakeout and ultimately pricing power and expanding market opportunties for those leading edge IDMs/foundries that survive.

Stock Implications: We think semiconductor integrators on mature nodes are best positioned to benefit from these dynamics, and highlight MXIM, NXPI, TXN, MCHP, BRCM, CAVM, LSCC, AVGO as beneficiaries, We think fabless semiconductor companies who sell products at the leading edge will see slower product introductions, and increasing competition as peers on mature nodes have time to close the gap and view NVDA, ALTR and XLNX as seeing increased challenges. We think INTC and Samsung will be the last leading edge IDMs standing, which will translate to unexpected share gains for both. We upgrade MXIM to Buy and downgrade ALTR to Hold based in part on these trends.

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Semiconductor Watershed

The cost per transistor has declined at a 25-30% annual pace for the past 40 years

For the past 40 years, Moore's Law has accurately predicted that the number of transistors per chip doubles every two years. Equally as important as transistor density is that the cost per transistor in those chips has declined by about 30% per year. The combination of smaller, more powerful and cheaper chips every year has been the fundamental driver of the semiconductor cycle, and the foundation of innovation in electronic devices.

But some are signaling that they are no longer seeing those cost improvements – we view this as a watershed for the industry

But something happened in 2012. Parts of the fabless industry started signaling that they were no longer seeing the normal decline in transistor cost typically associated with migrating to the most advanced manufacturing process node. Our view is that this is a critical watershed that signals a structural shift in the industry, and has many far reaching implications – we highlight three:

We expect longer time between product refreshes at the leading edge – and expect BRCM and CAVM to benefit

1) **Implication #1: Longer time between product refreshes at the leading edge.** If the cost per transistor doesn't decline at the leading edge, or even if it declines at a decelerating pace, there is less of a motivation for semis to migrate products to the next leading edge node. The process node migration has been a natural time for a product refresh that introduces a step function improvement over the previous products. We think this means that companies at mature process nodes have a chance to "close the gap" to those on the leading edge. We think companies like Broadcom, Cavium and Lattice benefit from this trend.

We think Mixed-Signal / Analog Integrators will drive the next leg of value creation for OEMs. MXIM, TXN, MCHP and ADI should benefit

2) **Implication #2: Mixed Signal / Analog Integrators to Drive Next Leg of Value Creation for OEMs.** The obvious beneficiaries of Moore's Law to date have been those companies that have created value for OEM customers by delivering increased integration of digital functionality at the leading edge. This group includes Intel, NVidia, Qualcomm, Altera and Xilinx. However, if the digital players are starting to hit a wall climbing down the price curve, we expect OEMs to look to analog companies to deliver value in the form of increased integration and cost reduction in the analog domain. We think companies with mixed-signal / analog integration capabilities like Maxim, Texas Instruments, Microchip, BRCM, NXP, M/A COM, Avago, Dialog and Analog Devices benefit from this trend.

Long term – we think INTC and Samsung are left standing on the leading edge, which should translate to a technology edge and share gains

3) **Implication #3: Increasing Capital Intensity for Leading Edge Fab Builders = Near Term Pain But Long Term Gain for Survivors.** The exponential growth in the cost of building a leading edge factory is already having a negative impact to the cash flows of IDMs and Foundries. Chart 12 shows that over the past several years Cap Ex intensity has increased and free cash flow margin has declined for Intel, TSMC and UMC. We expect this to be the case for several years, but ultimately expect Intel and Samsung to be the two left standing at the leading edge. We think they will be best positioned to tune their processes for their specific products to realize cost declines which should translate to share gains in non-traditional markets.

Not a Call Against Moore's Law. We expect the industry to continue to deliver improved manufacturing processes at the leading edge, but don't expect fabless semiconductor players at the leading edge to derive cost benefits like they used to. We think there is a risk that leading edge fabless players see a shift in business models and/or front end manufacturing suppliers.

Where We Could Be Wrong: The introduction of EUV and 450mm wafers could put the industry back on the traditional cost reduction curve, however, we don't expect either before 2017.

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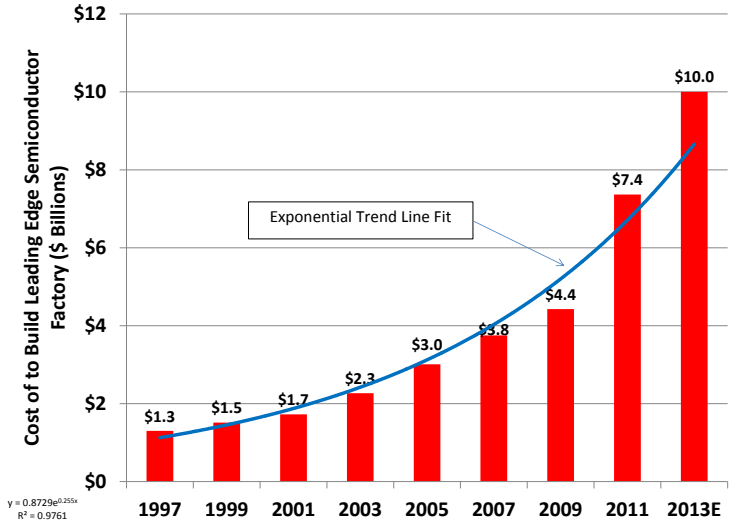
The Price of Moore's Law

Costs Growing Exponentially. In Chart 1, we used data from Intel, Global Foundries and TSMC to estimate the cost of building a leading edge semiconductor manufacturing fab over time. The data shows that this cost has been growing exponentially.

The cost of building a leading edge semiconductor manufacturing facility has been increasing exponentially over time

Chart 1: Cost of Building a Leading Edge Semiconductor Factory

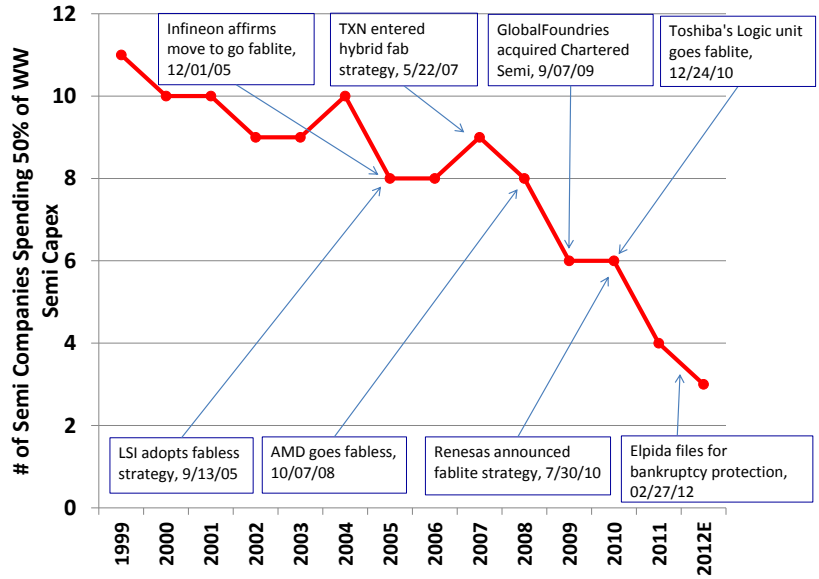


Source: Reports and press releases from Intel, TSMC and Global Foundries

Fewer Companies Driving CapEx Spend. The higher costs have resulted in fewer companies able to afford to build a leading edge factory. According to data we collected from Gartner, only 3 semiconductor companies account for 50% of global semiconductor CapEx, down from 10 at the beginning of the decade.

Fewer companies can afford to build leading edge factories. Only 3 semiconductor companies account for 50% of industry capex, down from 10 at the beginning of the decade

Chart 2: Number of Semiconductor Companies Accounting for 50% of CapEx



Source: Gartner, CapIQ, Jefferies Research

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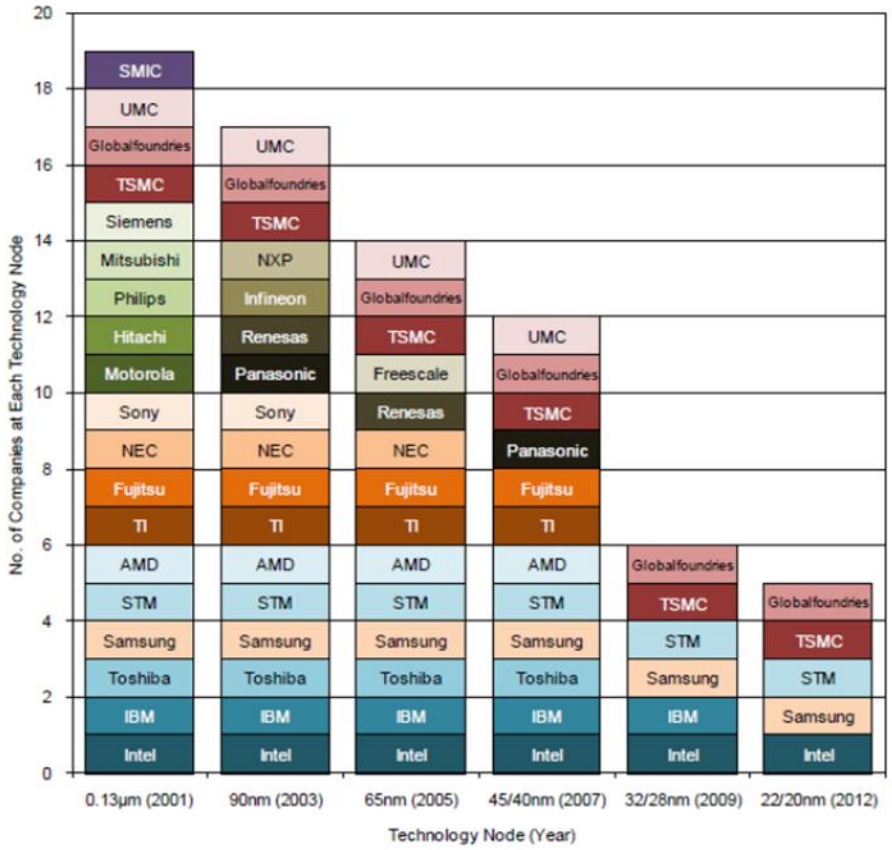
Semiconductor Manufacturing Shake-Out. The higher costs have caused Integrated Semiconductor Device Makers (IDMs) to fall off the leading edge. According to Handel Jones from International Business Strategies, only 5 companies are supporting leading edge manufacturing capabilities today, down from nearly 20 a decade ago.

The number of semiconductor companies with factories at the leading edge has declined to 5, from nearly 20 at the beginning of the decade

Chart 3: Semiconductor Manufacturers on Leading Edge Manufacturing Process Over Time



Source: Handel Jones, IBS Consulting. http://www.ibs-inc.net/

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Semiconductor "Drop-Out Zone"

Revenues = 0.8x-to-2.0x Cost of Leading Edge Factory. For each semiconductor manufacturer that dropped off the leading edge (as shown in Chart 3), we divided revenues during the last year they were on the leading edge by our estimated cost to build a leading edge factory during that year.

Chart 4 shows that semiconductor manufacturers typically drop off the leading edge when their revenues equal 0.8x-to-2.0x the cost to build a leading edge semiconductor manufacturing facility.

Chart 4: Semis Typically Stop Building Leading Edge Factories when Revenues are 0.8x-to-2.0x cost of Leading Edge Fab

Company	Last Year on Leading Edge	Semi Revs/Cost of Leading Edge Fab. (Ratio of When They Stopped Building Leading Edge Fabs)
SONY	2003	1.4
Infineon*	2003	3.2
Freescale	2005	1.8
Renesas	2005	1.8
NEC	2005	1.9
AMD	2007	1.6
TI-Baseband	2006	1.6
UMC	2007	0.9
Fujitsu	2007	0.7
Panasonic	2007	1.1
Toshiba*	2007	3.2
IBM	2009	0.5
Average		1.7
Average ex-memory		1.3
Range of "Drop-out Zone"		0.8 - 1.9

Source: IBS, Gartner, CapIQ, Jefferies Research

In Chart 5 below, we show a temporal representation of the data in Chart 4. We plotted semiconductor manufacturer revenues over time, and how they compared to the cost of building a leading edge semiconductor manufacturing facility (blue line with diamond markers). Our estimated future costs for building a leading edge factory (represented by the dashed, blue line with diamond markers), was calculated by fitting an exponential curve to the data in Chart 1.

We also put on the graph what we label as the "Drop-Out Zone," highlighted by the two upwardly sloping red lines. We define the "Drop-Out Zone" as 0.8x-to-2.0x the cost to build a leading edge factory, and is typically the revenue range at which semiconductor manufacturers can no longer support building a leading edge factory (see Chart 4).

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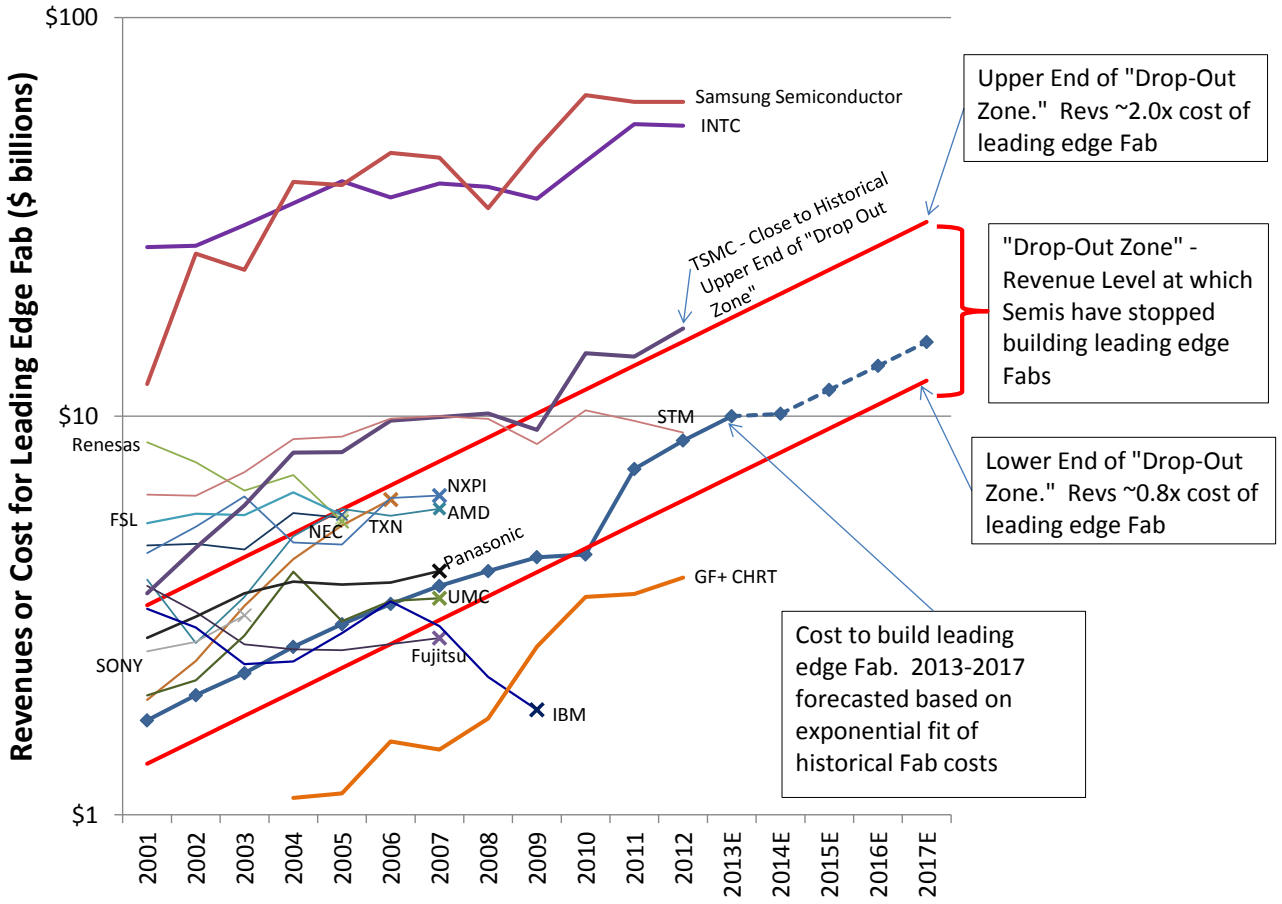
Chart 5: Semiconductor Manufacturer Revenues vs. Leading Edge "Drop-Out Zone" Represented by 0.8x-to-2.0x the Cost to Build a Leading Edge Manufacturing Capability



"X" denotes last year companies were on leading edge manufacturing

Source: Gartner, CapIQ, Jefferies Research . *Matsushita's name was changed to Panasonic in 2003. *Renesas combined Mitsubishi and Hitachi in 2003 and merged with NEC in 2009. *Globalfoundries combined revenue of Chartered Semiconductor in 2009. TXN revenues assumes DSP, ASICs, and RISC CPUs. Samsung Semiconductor includes internal and external semiconductor revenues.

Chart 5 leads us to the following observations:

1) Samsung Semiconductor and Intel are the only two companies well above the "Drop-Out Zone." We expect these two companies to have the critical mass of revenues required to support the building of leading edge factories for at least the next several manufacturing process nodes.

2) TSMC is close to the upper end of the "Drop-Out Zone." We think it is imperative for TSMC to win a big customer like Apple for it to retain scale required to justify building leading edge factories.

3) Global Foundries is operating below the "Drop-Out Zone," and in investment / customer acquisition mode. We expect it to be aggressive with spending and pricing.

4) STM is in the middle of the "Drop-Out Zone" we don't expect it to maintain a critical mass of revenues to support leading edge factory capabilities for much longer.

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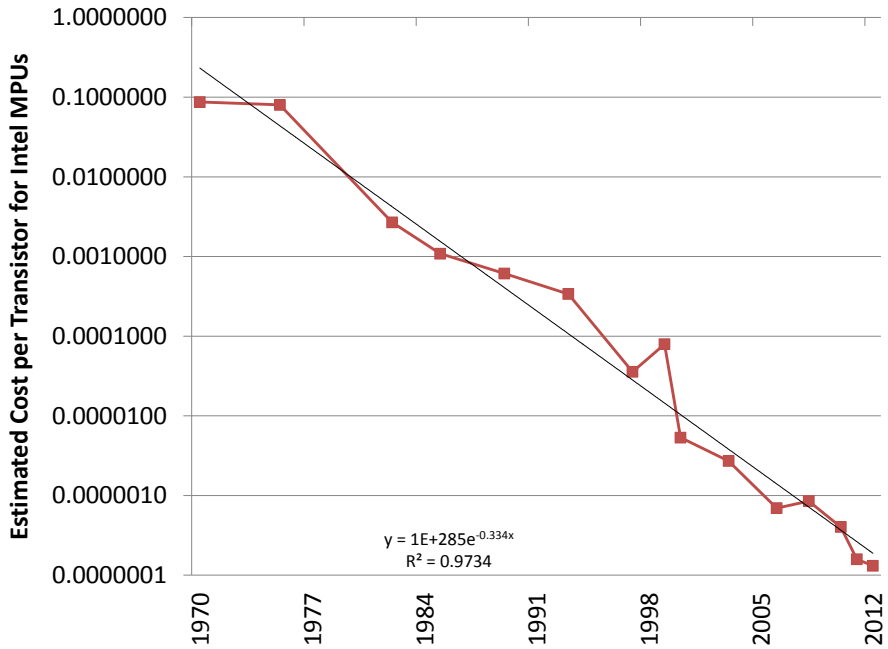
Moore Stress

Moore's Law Benefits. In addition to doubling the number of transistors per chip every 18-24 months, Moore's Law has also delivered a consistent reduction in cost per transistor to the tune of 25-30% annually. We think companies and stocks have come to expect these phenomena.

Chart 6: Cost per Transistor over Time for Intel MPUs



Source: Wikipedia.org, anandtech.com, Intel, CNET.com, processortimeline.info, thocp.net

Is Cost Per Transistor Going Up? However, commentary from NVidia and Broadcom, as well as an interesting analysis by Handel Jones from IBS lead us to believe that the cost per transistor improvements historically seen at manufacturing process node transitions, are changing for fabless players. At best, we think that the cost per transistor improvements are decelerating from node-to-node. At worst, they start increasing. At a minimum, cost per transistor improvements appear to be taking longer to realize.

Chart 7 shows of NVidia's calculation of relative cost per transistor for different manufacturing process node (extremetech.com). Chart 8 is Handel Jones' calculation for cost per transistor for each manufacturing process node, which we found at embedded.com.

NVidia's chart shows that the cost per transistor curve for the 28nm process node takes 6 quarters before crossing over the 40nm process node, but the 20nm process node takes a full 11 quarters before crossing over the 28nm node. What is worse, it appears that the cost improvement is nearly negligible once the cost cross over happens. Assuming that NVidia has to spend 10s of millions of dollars if not $100m to transition between nodes, the economics for migrating products to the new node do not appear compelling.

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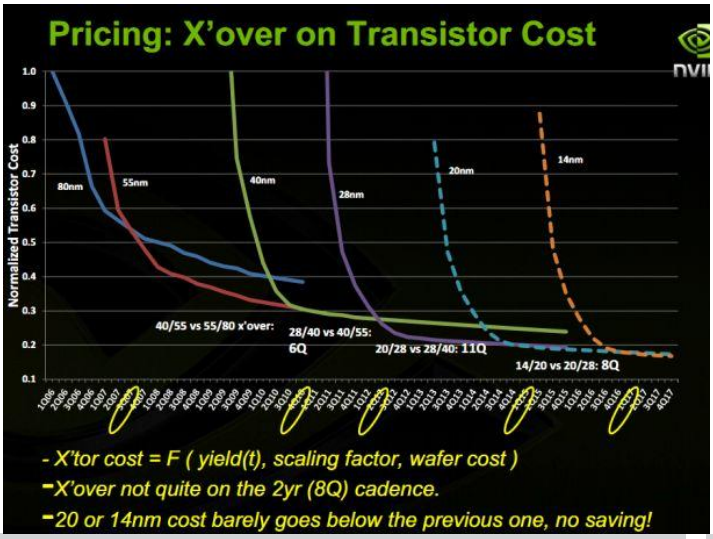
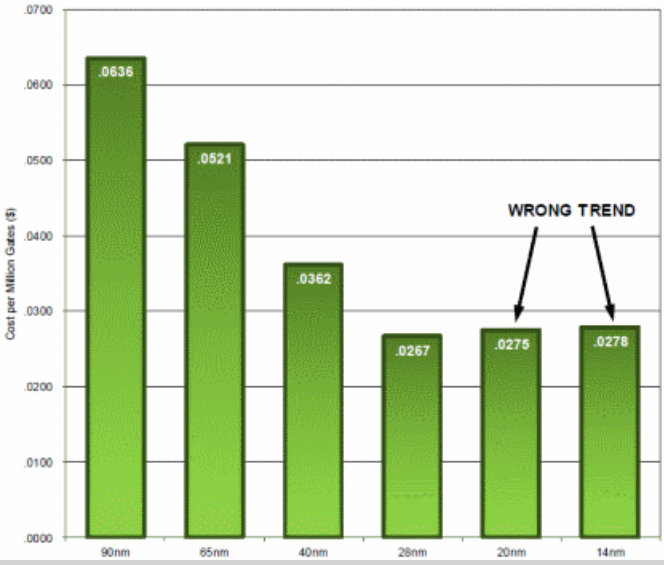
Chart 7: NVidia's Calculation of Cost per Transistor Crossover Curves



Source: NVIDIA .
http://www.extremetech.com/computing/123529-nvidia-deeply-unhappy-with-tsmc-claims-22nm-essentially-worthless

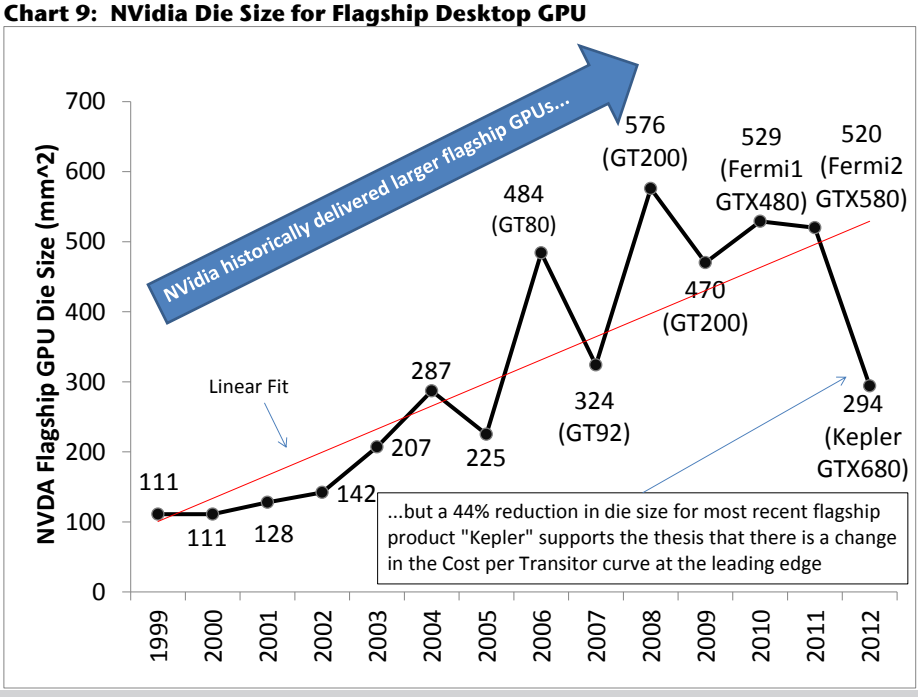
Chart 8: IBS Calculation of Cost per Transistor by Node



Source: IBS.
http://embedded.com/discussion/other/4238315/Feature-dimension-reduction-slowdown

The chart below illustrates a shift in NVidia's practice of introducing flagship desktop GPUs at increasing die size. We think this reflects a shift in the cost per transistor improvements the industry has seen over the past 40 years.

Chart 9: NVidia Die Size for Flagship Desktop GPU



Source: Wikipedia.org, techpowerup.com

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Consistent with NVidia's analysis, Broadcom's CEO, Scott McGregor, was quoted in Electronics Weekly (http://www.electronicsweekly.com/blogs/david-manners-semiconductor-blog/2012/05/the-end-of-the-learning-curve.html) as saying that not only is 28nm more expensive than 40nm now, but that based on Broadcom's calculations, it will never be cheaper than 40nm across the entire lifetime of the node.

Impacts and Implications

We think the exponential growth in the cost of building leading edge factories impacts the industry along three dimensions:

1) Longer time between product refreshes at the leading edge

2) Mixed Signal / Analog Integrators to Drive Next Leg of Integration and Value Creation for OEMs

3) Increasing Capital Intensity for Leading Edge Fab Builders = Near Term Pain But Long Term Gain for Survivors

We summarize the implications for the industry and individual stocks in the chart below, but drill down into further detail in the following section.

Chart 10: Impact and Implications of Exponential Growth of Leading Edge Manufacturing Facilities

Impact of Exponential Growth of Leading Edge Fab Costs	Semiconductor Industry Implications	Beneficiaries	Challenged
1. Longer time between process node ramps at the leading edge	Opportunity for semiconductor companies on mature nodes to close the gap leading edge chip designers	BRCM, CAVM, LSCC	NVDA(dGPU), AMD(dGPU), ALTR, XLNX. ASML
2. Decelerating improvement in Cost per Transistor at leading edge (if not increasing Cost/Transistor)	Mixed Signal / Analog Integrators drive the next leg of integration and value creation for OEMs. Digital content largely integrated and analog more easily integrated on mature process nodes.	MXIM, TXN, NXPI, MCHP, TXN, MTSI, BRCM, AVGO, ADI, DLG GR	NVDA (dGPU), AMD (dGPU), ALTR and XLNX (high-end), ASML, IMG(GPU), ARM(GPU,CPU)
3. Increasing Capital Intensity for leading edge IDMs/Foundries	Near term: Deteriorating cash flow and quality of earnings metrics for IDMs/Foundries. Longer term: Technology advantage and share gains for Survivors	Near Term: ASML Longer Term: INTC, Samsung	Near term: TSMC, INTC, Samsung, Global Foundries Longer Term: TSMC, Global Foudries

Source: Jefferies Research

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1) Longer Time Between Process Node Ramps

We think comments by NVidia and Broadcom citing no cost benefit for migrating to a new process starting with the 28nm and 20nm nodes means that semiconductor companies that don't need to shrink or lower power consumption of their chips won't migrate to the new node. We think this means a slower pace of introduction of chips on the leading edge that deliver a step function lower cost than the previous ones.

A) Beneficiaries: We think companies that operate at mature process nodes will have a chance to close the gap with their leading edge competitors. We think BRCM, LSCC and CAVM benefit.

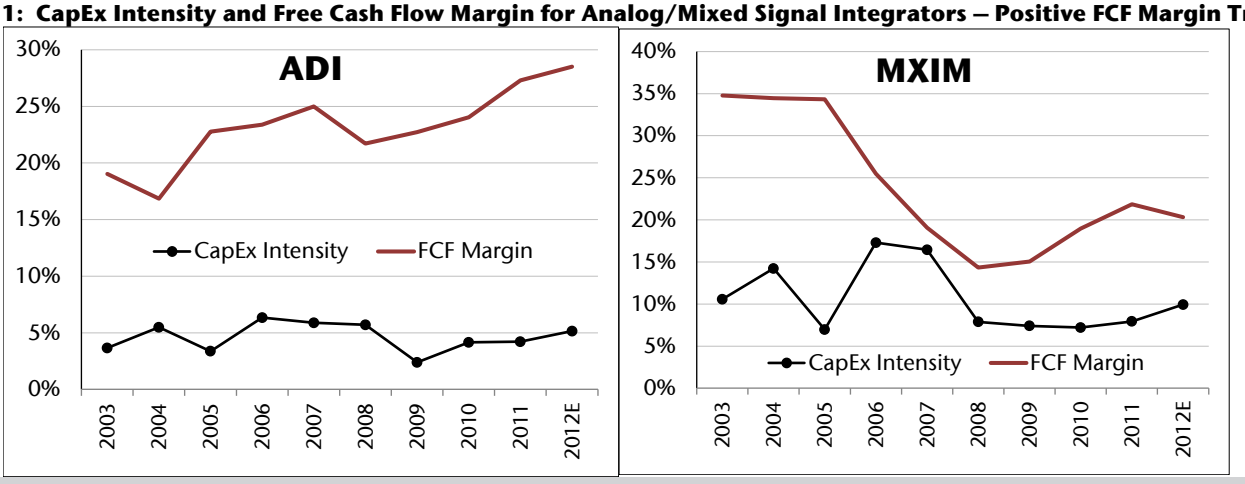
B) Challenged: We think companies that are currently delivering chips at the leading edge of the manufacturing process node will be most challenged on two dimensions. Firstly, this dynamic likely means a slower pace of new products that deliver a step function improvement in features (typically associated with a new node ramp), which means higher risk of price erosion. Secondly, competition at lagging edge nodes will have an opportunity to catch up to the leader's technology. We think ALTR, XLNX, NVDA (dGPU), and AMD (dGPU) are most challenged by this trend.

2) Transistor Cost Curve Shift at the Leading Edge

We view the primary beneficiaries of Moore's Law to date as those companies that have created value for OEM customers by delivering increased integration of digital functionality at the leading edge. This group includes Intel, NVidia, Qualcomm, Altera and Xilinx.

However, if the digital players are starting to hit a wall climbing down the price curve, we expect OEMs to look to analog companies to deliver value in the form of increased integration and cost reduction in the analog domain. We think analog companies at mature nodes are well positioned to benefit from this trend because it is easier to integrate analog technologies on mature nodes. Already, we think some of these companies are benefiting from this trend. The chart below shows the cash flow and capex intensity metrics for MXIM and ADI.

Chart 11: CapEx Intensity and Free Cash Flow Margin for Analog/Mixed Signal Integrators – Positive FCF Margin Trends



Source: Gartner, CapIQ, Jefferies Research

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A) Beneficiaries: We think companies that offer mixed-signal / analog integration capabilities will be the ones that will be able to extend Moore's Law-like cost improvements to OEMs, and gain share and post outsized top line growth compared to the rest of the industry. Companies like BRCM, MXIM, ADI, NXPI, MCHP, TXN, MTSI, AVGO, MRVL, LSCC, BCDS, DLG GR fall into this category and should benefit from this trend.

B) Challenged: We think that companies that have grown by adding more transistors for the sake of increasing processing horsepower will be challenged by this trend. We think the discrete GPU businesses of NVDA and AMD, and the FPGA businesses of ALTR and XLNX will be challenged by this trend.

3) Increasing Capital Intensity for Leading Edge Fab Builders = Near Term Pain But Long Term Gain for Survivors

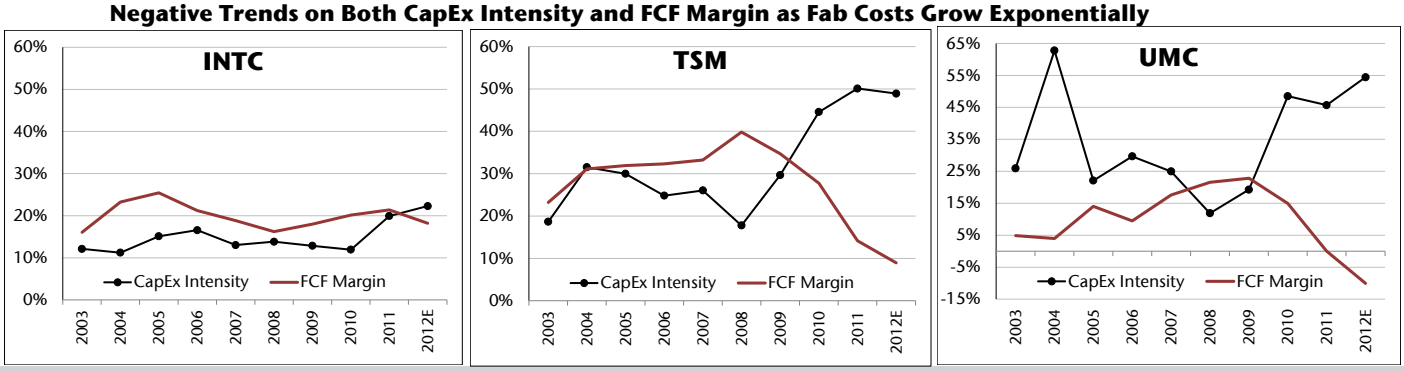
With exponential growth in the cost of building a leading edge factory, we would expect the IDMs and foundries at the leading edge to see free cash flow and quality of earnings metrics deteriorate in the near term. In the chart below, we show CapEx intensity (CapEx as a % of sales) and FCF margin for three IDM/Foundry pure plays, INTC, TSM and UMC.

The chart shows increasing CapEx intensity and downward sloping FCF margin for each company, although less pronounced for INTC. Because INTC manufactures for a limited set of products (i.e., MPUs), we would expect it to be able to better tune its processes to be more efficient, and therefore show lower CapEx intensity than the Foundries, which have had to design factories for a much broader set of customers.

a) Near Term Beneficiaries: Given the higher costs associated with the semiconductor equipment, we think semiconductor capital equipment companies with leading technology like ASML are poised to benefit from this trend.

b) Near Term Challenged: We think the higher capex intensity ultimately manifests itself in a gross margin headwind for IDMs and foundries building manufacturing facilities at the leading edge. Aside from TSM, UMC and INTC, we would also expect Samsung, Global Foundries and STMicro to be challenged by this trend.

Chart 12: CapEx Intensity and Free Cash Flow Margin for IDMs and Foundries – Negative Trends on Both CapEx Intensity and FCF Margin as Fab Costs Grow Exponentially



Source: Gartner, CapIQ, Jefferies Research. CapEx Intensity is defined as CapEx divided by sales. FCF Margin is Free Cash Flow divided by sales.

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Please see important disclosure information on pages 16 - 19 of this report.

Longer term, we expect the number of companies that can support a leading edge factory will continue to decline. Ultimately, we think Intel and Samsung will be the two survivors at the leading edge.

We think that this has a number of implications, namely, that these companies will have a manufacturing technology edge, that manifests in both cost and product functionality. Ultimately, we think it means that fabless players will seek Intel and Samsung out for foundry services as well.

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Company Specific Implications

Intel (INTC): Near term we expect high factory costs to translate to declining free cash flow and capital intensity metrics. But we also believe Intel will be one of the few companies with enough critical mass to continue building leading edge factories 3-to-5 years down the road. Because of its homogenous product mix (at least compared to foundries) we believe Intel will maintain an advantage on costs, as it will continue to be able to finely tune its manufacturing infrastructure for MPUs. Ultimately, we expect existing foundries to struggle to keep up with Intel's manufacturing leadership, and Intel to gain share in non-traditional mobile markets like handsets and tablets.

Mixed-Signal / Analog companies – MXIM, TXN, NXPI, ADI, AVGO, MTSI, MCHP, BCDS: With cost per transistor dynamics likely creating a headwind for leading edge digital players, we think OEMs will look toward other companies to realize continued integration and cost reduction in their products. We think companies that offer mixed-signal / analog integration capabilities will be the ones that will be able to extend Moore's Law-like cost improvements to OEMs, and gain share and post outsized top line growth compared to the rest of the industry.

Broadcom (BRCM): One of BRCM's key capabilities is integrating a lot of functionality onto a single chip. Its Bluetooth-Combo chip which is found in most handsets is an example, with multiple RF and digital functionality integrated into a single chip. BRCM has historically been two generations behind the leading edge manufacturing node, and we estimate that ~70% of its revenues are still on 65nm. We think companies on the leading manufacturing node will see slower product introductions, we would expect BRCM to close the gap from a cost standpoint as yields improve on manufacturing technology nodes 2-to-3 generations behind the leading edge.

PLD Companies Altera (ALTR) and Xilinx (XLNX): We think there is risk that ALTR and XLNX face challenges from two dynamics. First, as users of leading edge manufacturing processes, a deceleration or increase in transistor costs at the leading edge would likely slow down product introductions, and provide ASSP/ASIC competitors time to close the process node gap. Secondly, chart 5 shows their main foundry, TSMC, at the upper end of the revenue zone where other semiconductor companies have slipped off the leading edge. We think there is a risk that ALTR and XLNX may have to pay for front end manufacturing equipment directly – which would likely lower their ROIC metrics, or find another foundry to manufacture their products.

NVidia (NVDA): Similar to ALTR and XLNX we think NVDA faces two risks, which are illustrated in their costs curves (Chart 7) and in the shift in trend of increasing die size for subsequent introductions of its flag ship desktop GPU (Chart 9). A slowdown in introduction of leading edge manufacturing processes could lead to increased competition from Intel. Secondly, there is a risk that they either have to fund TSMC for equipment directly, potentially lowering their ROIC, or shift foundries, which would introduce execution risk.

Cavium (CAVM): We believe Cavium generates the majority of its revenues at the 65nm and 90nm nodes, and a negligible amount of revenues from the 28nm node. We believe Cavium skipped the 40nm node. As competitors Altera and Xilinx face exponentially rising design costs at the leading edge, we expect investors to gravitate toward Cavium, for both its low-cost manufacturing strategy and disruptive growth potential.

Lattice Semiconductor (LSCC): We believe Lattice generates the majority of its revenues at the 65nm and older nodes, and a small portion (primarily ICE40) of its revenues at the 40nm node. We believe Lattice does not generate any revenues at the 28nm node. Our analysis shows Lattice has been taking share in mid-range at low-end

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FPGA, and we expect the share gains to continue, as competitors Altera and Xilinx face exponentially rising design costs at the leading edge nodes.

Dialog Semi (DLG GR): Designs mixed signal PMICs at lagging edge (130, 180nm) designs on both CMOS and BCD manufacturing processes at TSMC. The transition to BCD has hurt margins of late as the firm has near "pioneered" TSMC's manufacturing in this technology with PMIC rival Maxim swiftly following suit. However, this now leaves the firm (i) fully qualified on a technique that affords greater integration of functionalities on its mixed signal IC roadmap (e.g. charging couples, crystal oscillators, parts of the audio chain and even some forms RF such as NFC) helping to support ASPs and thus GM% recovery in the near to medium term, and (ii) perhaps the chance of negotiating more favourable wafer pricing with TSMC at these lagging edge designs.

ASML (ASML NA): ASML dominates the lithography space with its Twinscan systems. But should customer numbers dwindle and cost of node progression escalate, we believe that price negotiating power could weaken. Perhaps with key customers TSMC, Intel (~15%) and Samsung all now shareholders a recognition of this direction has already been made. Secondly, ASML has relied greatly on a super-cycle story for 20/22nm whereby foundries scramble to make up the capacity needs for high end design for super-smartphone processors - with costs increasing at 22nm onwards, many may choose to look at alternative, litho-light techniques such 3D ICs (stacking) slowing tech shrink spend and pushing ASML to be reliant on memory capacity spend at a time of PC memory slowdown.

ARM holdings (ARM LN): ARM's low power CPU architecture is used in all but a few mobile handsets and tablets globally. Nearly all major SoC chip designers license their technology which relies on ramping complexity (and an increase in transistors per sqmm) as a driver. ARM's tech will continue to be widespread regardless of the speed of Moore's Law but perhaps its product cycles (the shift from one family of cores to the next) slows unless other innovations (analogous to the firms big.LITTLE concept) can entice ongoing licensing as designers forage for cleverer system designs in order to create better performance in the absence of scaling.

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Chart 13: Semi Valuation Table

Ticker	Price 26-Sep-12	Market Cap	Rating	PT	JEF EPS 2012E	JEF EPS 2013E	Street EPS 2012E	Street EPS 2013E	JEF Revenues 2012E	JEF Revenues 2013E	Street Revenues 2012E	Street Revenues 2013E	P/E 2012E	P/E 2013E	EV/S	FCF Yield 2012E	FCF Yield 2013E	EV/FCF 2012
Large Cap*																		
ADI	38.76	$11,836	Hold	$44.0	$2.19	$2.56	$2.23	$2.60	$2,737	$2,972	$2,754	$3,001	18	15	3.2	6%	7%	14
ALTR	34.77	$11,309	Hold	$40.0	$1.77	$2.06	$1.78	$2.09	$1,816	$2,173	$1,828	$2,133	20	17	4.8	5%	15%	14
AMD	3.33	$2,514	Buy	$8.0	$0.29	$0.52	$0.25	$0.34	$5,950	$6,538	$5,831	$5,935	12	6	0.4	15%	6%	8
AVGO	33.48	$8,370	Buy	$43.0	$2.79	$3.08	$2.82	$3.14	$1,665	$1,572	$2,413	$2,701	12	11	3.0	6%	9%	16
BRCM	34.08	$19,596	Buy	$42.0	$2.89	$2.93	$2.93	$3.13	$7,992	$8,861	$7,991	$8,881	12	12	2.5	9%	10%	11
INTC	22.65	$117,731	Hold	$29.0	$2.21	$2.46	$2.24	$2.30	$53,599	$57,346	$53,389	$55,636	10	9	1.9	5%	8%	19
LLTC	31.64	$7,445	Hold	$35.0	$1.86	$2.12	$1.82	$2.15	$1,306	$1,423	$1,318	$1,477	17	15	5.6	7%	7%	14
MCHP	32.70	$6,661	Buy	$39.0	$1.94	$2.40	$1.99	$2.37	$1,544	$1,860	$1,562	$1,892	17	14	3.7	8%	8%	10
MRVL	9.21	$5,253	Buy	$15.0	$0.98	$1.36	$0.96	$1.12	$3,267	$3,597	$3,267	$3,505	9	7	0.9	12%	14%	5
MTSI	12.61	$596	Buy	$21.0	$0.93	$1.18	$0.96	$1.16	$302	$322	$304	$326	14	11	1.6	8%	7%	11
MXIM	26.09	$7,822	Buy	$29.0	$1.67	$1.96	$1.65	$1.93	$2,420	$2,591	$2,422	$2,637	16	13	2.9	6%	8%	14
NVDA	13.18	$8,213	Hold	$16.0	$1.15	$1.28	$1.13	$1.28	$4,415	$4,594	$4,390	$4,792	11	10	1.3	6%	9%	11
NXPI	23.79	$5,906	Buy	$28.0	$1.67	$2.79	$1.80	$2.71	$4,405	$4,892	$4,418	$4,842	14	9	2.2	9%	14%	16
ONNN	6.13	$2,804	Buy	$9.0	$0.57	$0.87	$0.56	$0.77	$2,979	$3,186	$2,984	$3,125	11	7	1.0	10%	15%	11
TXN	27.58	$31,827	Buy	$33.0	$1.69	$2.12	$1.65	$2.06	$12,969	$14,094	$13,056	$13,844	16	13	2.6	8%	9%	14
XLNX	33.47	$9,163	Hold	$36.0	$1.82	$2.14	$1.80	$2.07	$2,265	$2,470	$2,254	$2,422	18	16	3.6	7%	7%	13
Small-Mid Cap & Memory **																		
BCDS	3.64	$67	Buy	$8.0	$0.32	$0.42	$0.45	$0.62	$144	$168	$143	$157	11	9	0.2	0%	23%	NM
CAVM	32.54	$1,616	Buy	$37.0	$0.34	$1.00	$0.35	$0.99	$233	$314	$234	$309	95	32	7.1	2%	2%	NM
EZCH	32.45	$935	Hold	$33.0	$0.77	$0.86	$0.80	$1.27	$51	$61	$52	$75	42	38	12.3	1%	2%	NM
IPHI	10.35	$293	Buy	$16.0	$0.24	$0.59	$0.23	$0.53	$96	$131	$96	$123	43	18	2.0	2%	6%	33
LSCC	3.82	$450	Buy	$7.0	$0.03	$0.36	$0.00	$0.33	$288	$331	$287	$318	124	11	0.9	-6%	8%	NM
MU	5.94	$5,865	Buy	$11.0	-$0.90	$0.13	-$0.99	$0.15	$8,432	$10,010	$8,647	$9,786	NM	47	0.9	13%	2%	9
PMCS	5.66	$1,271	Hold	$6.5	$0.37	$0.50	$0.35	$0.48	$553	$602	$547	$598	15	11	1.9	0%	0%	NM
SNDK	42.66	$10,433	Buy	$46.0	$2.00	$3.24	$1.78	$3.12	$4,934	$6,007	$4,933	$5,873	21	13	1.9	0%	7%	NM
Median													16	12	2.1	6%	8%	13
Average													25	15	2.9	6%	9%	13
Total									$124,361	$136,116	$125,118	$134,388						

** Mark Lipacis*

*** Sundeep Bajikar*

Source: Jefferies, company data, Capital IQ

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9. Transaction fees are not included.
10. All corporate actions are taken into account.

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- Altera Corp (ALTR: $34.77, HOLD)
- Analog Devices, Inc. (ADI: $38.76, HOLD)
- Avago Technologies (AVGO: $33.46, BUY)
- BCD Semiconductor Manufacturing Ltd. (BCDS: $3.62, BUY)
- Broadcom Corporation (BRCM: $34.10, BUY)
- Cavium Inc. (CAVM: $32.51, BUY)
- EZchip Semiconductor Ltd. (EZCH: $32.45, HOLD)
- Inphi Corporation (IPHI: $10.36, BUY)
- Intel Corporation (INTC: $22.65, HOLD)
- International Business Machines (IBM: $204.00, HOLD)
- Lattice Semiconductor Corporation (LSCC: $3.82, BUY)
- Linear Technology (LLTC: $31.64, HOLD)
- Marvell Technology Group Ltd. (MRVL: $9.21, BUY)
- Maxim Integrated Products, Inc. (MXIM: $26.09, BUY)
- Microchip Technology Inc. (MCHP: $32.72, BUY)
- Micron Technology, Inc. (MU: $5.94, BUY)
- NVIDIA Corporation (NVDA: $13.18, HOLD)
- NXP Semiconductors NV (NXPI: $23.76, BUY)
- PMC-Sierra, Inc. (PMCS: $5.67, HOLD)
- SanDisk Corporation (SNDK: $42.66, BUY)
- Texas Instruments Incorporated (TXN: $27.57, BUY)
- UMC (UMC: $2.06, Suspended)
- Xilinx Corp (XLNX: $33.47, HOLD)

Distribution of Ratings

			IB Serv./Past 12 Mos.	
Rating	Count	Percent	Count	Percent
BUY	748	47.34%	118	15.78%
HOLD	712	45.06%	76	10.67%
UNDERPERFORM	120	7.59%	0	0.00%

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