IHS Markit™

Dynamic Semiconductor Years

PSMC Meeting April 25-27

Director | IHS Markit Technology
15 Inverness Way East | Englewood, CO 80112
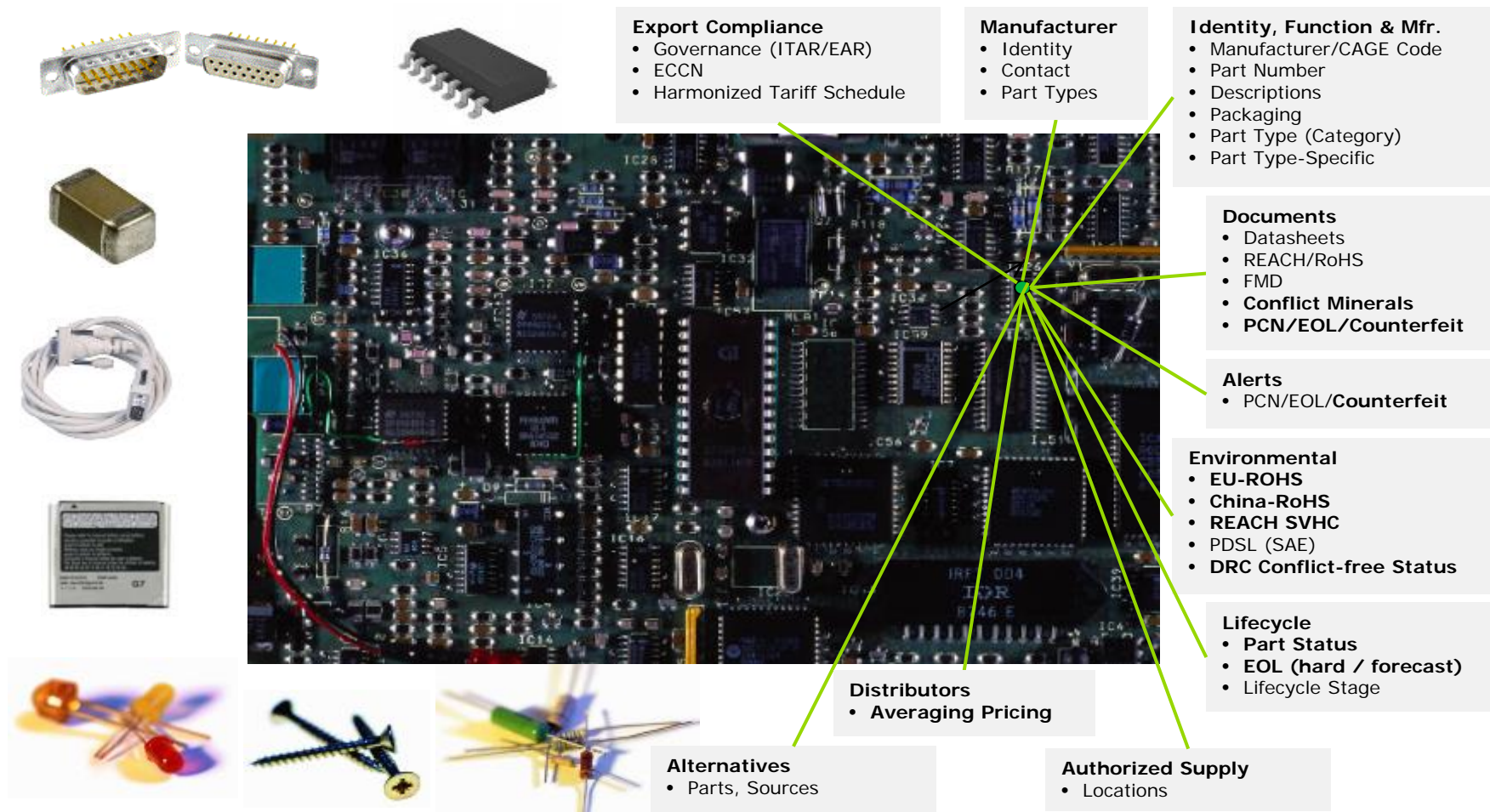**P:** +1 303 988 2206

IHS Markit

Addressing strategic challenges with interconnected capabilities

We deliver on the promise of The New Intelligence

IHS Markit provides leaders from multiple industries with the perspective and insights they need to make the best choices and stay ahead of their competition.

CHEMICAL

FINANCIAL MARKETS DATA & SERVICES

ECONOMICS & COUNTRY RISK

ENERGY

ENGINEERING & PRODUCT DESIGN

AUTOMOTIVE

OPERATIONAL RISK & REGULATORY COMPLIANCE

AEROSPACE, DEFENSE & SECURITY

TECHNOLOGY, MEDIA & TELECOM

MARITIME & TRADE

DIGITAL & WEB SOLUTIONS

Parts Management Solutions provide access to:

Export Compliance
- Governance (ITAR/EAR)
- ECCN
- Harmonized Tariff Schedule

Manufacturer
- Identity
- Contact
- Part Types

Identity, Function & Mfr.
- Manufacturer/CAGE Code
- Part Number
- Descriptions
- Packaging
- Part Type (Category)
- Part Type-Specific

Documents
- Datasheets
- REACH/RoHS
- FMD
- **Conflict Minerals**
- **PCN/EOL/Counterfeit**

Alerts
- PCN/EOL/**Counterfeit**

Environmental
- **EU-ROHS**
- **China-RoHS**
- **REACH SVHC**
- PDSL (SAE)
- **DRC Conflict-free Status**

Lifecycle
- **Part Status**
- **EOL (hard / forecast)**
- Lifecycle Stage

Distributors
- **Averaging Pricing**

Alternatives
- Parts, Sources

Authorized Supply
- Locations

Dynamic Semiconductor Industry
Agenda

- Events leading up to 2014-2016

- Why the consolidation

- Acquisition trends

- What lies ahead

- Component challenges & best practices

Consolidation of Semiconductor Industry

Record Financial Acquisitions and Mergers

- **2014-2016: Financially, historic level of consolidation**

  > 2014: over $37B in announcements (M&A)

  > 2015: over $100B in announcements (M&A)

  > 2016: over $90B in announcements (M&A)

- **Some notable consolidations announcements:**

  > 2014: Analog Devices' acquisition of Hittite Microwave for $2.45B

  > 2014: TE Connectivity's acquisition of Measurement Specialties, Inc. for $1.7B

  > 2014: Infineon Technologies' acquisition of International Rectifier for $3B

  > 2015: Avago Technologies' acquisition of Broadcom for $37B

  > 2015: NXP and Freescale merge in a $11.8B deal to form a $30B company

  > 2015: Intel's acquisition of Altera for $16.7B

  > 2016: Western Digital's acquisition of Sandisk for $19B

  > 2016: Analog Devices' acquisition of Linear Technology for $14.8B

  > 2016: Qualcomm's acquisition NXP for $47B

  > 2016: Broadcom Limited's acquisition of Brocade Communications Systems for $5.9B

Qualcomm to acquire NXP

Largest financial acquisition in the history of the semiconductor industry

- **Announced on Oct 27, 2016, the acquisition**

  > Creates semiconductor engine for the connected world

  > Enhances global leadership in integrated semiconductor solutions

  > Expands footprint across key growth opportunities:
  Automotive, Internet of Things, security and networking

  > Grows serviceable addressable markets by ~40% to $138 billion in 2020

  > Significantly accretive to non-GAAP earnings immediately upon close

- "By joining Qualcomm's leading SoC capabilities and technology roadmap with NXP's leading industry sales channels and positions in automotive, security and IoT, we will be even better positioned to empower customers and consumers to realize all the benefits of the intelligently connected world."

  > CEO of Qualcomm Incorporated

Factors leading up to consolidations

Reasons numerous for an extended period of acquisitions

- **Financial considerations**

  > Solid financial performance for three years leading into 2014

  > Semiconductor companies cash rich

  > Low interest rates, low cost of borrowing

 > Executives looking at acquisitive vs. organic to maintain growth due to low growth forecasts in 2015

- **Semiconductor strategic actions**

  > Competitive positioning, buy competitors, gain market share

  > Improve market share by selling off less profitable product lines

  > Capitalize on the Internet of Things (IoT) and the electronic / autonomous automobile

    – Offer more complete solutions

    – Technology advances, system on Chip (SOC)

    – More fully integrated devices and embedded systems

SOXX: The Semiconductor Index

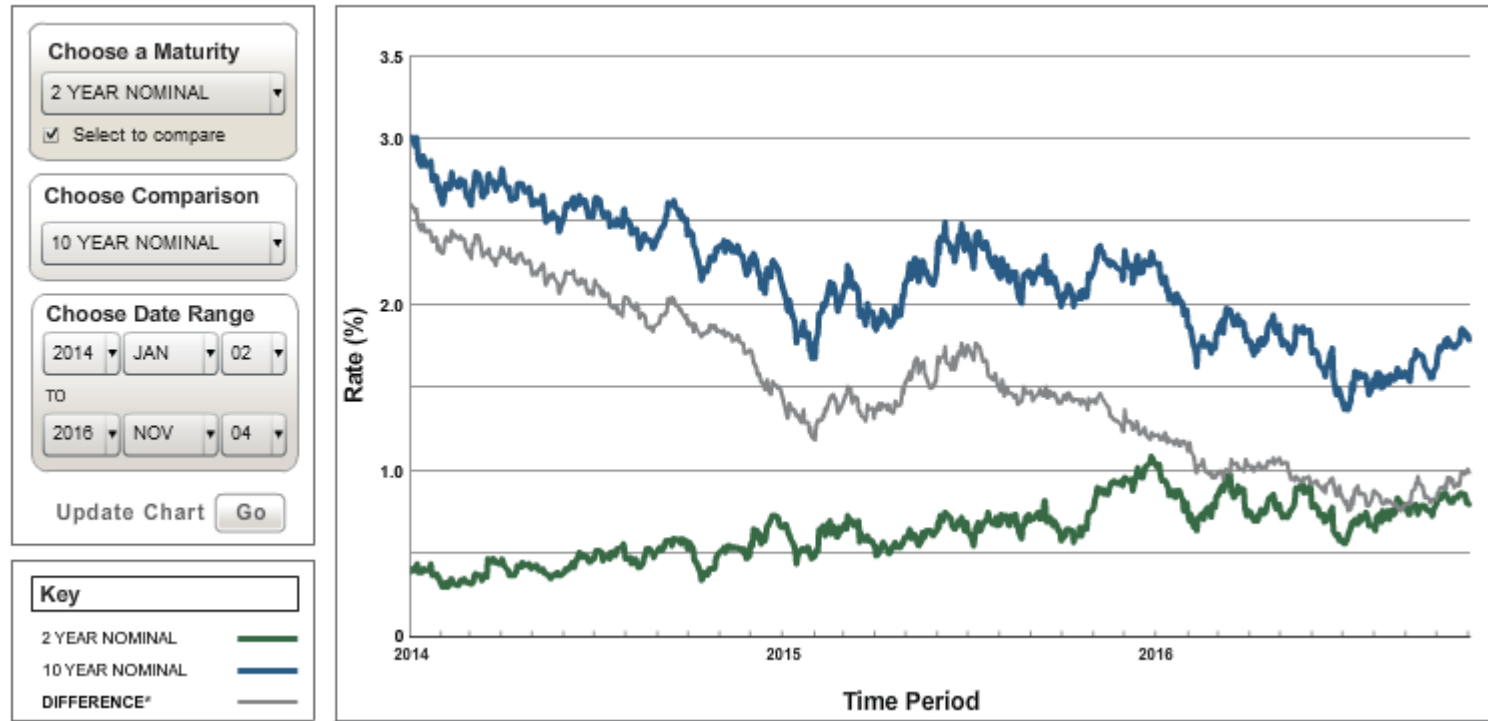19 Months of Unprecedented Growth

- PHLX Semiconductor Index: SOX
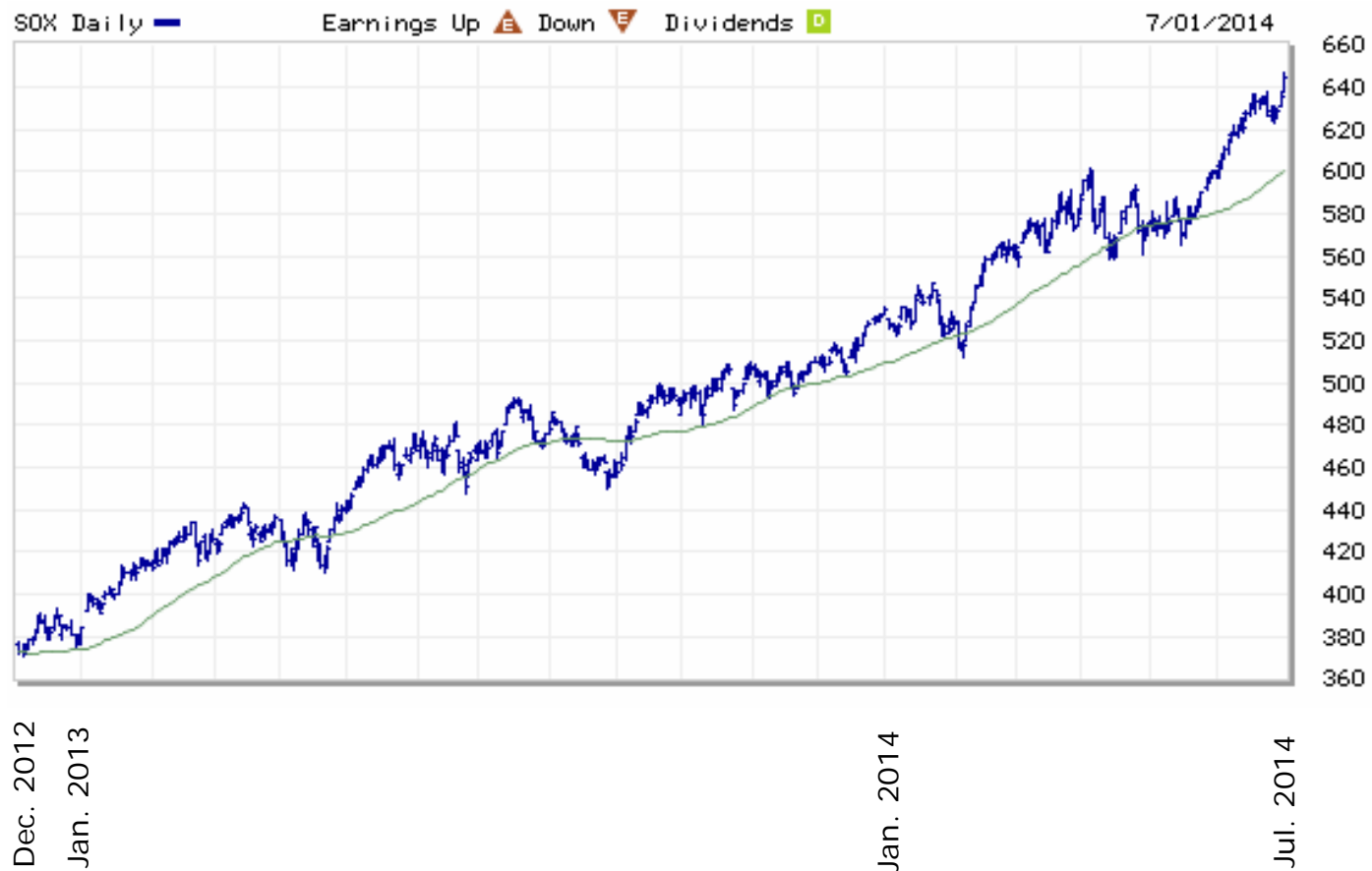
Interest Rates

Jan. 2014 to Nov. 4, 2016

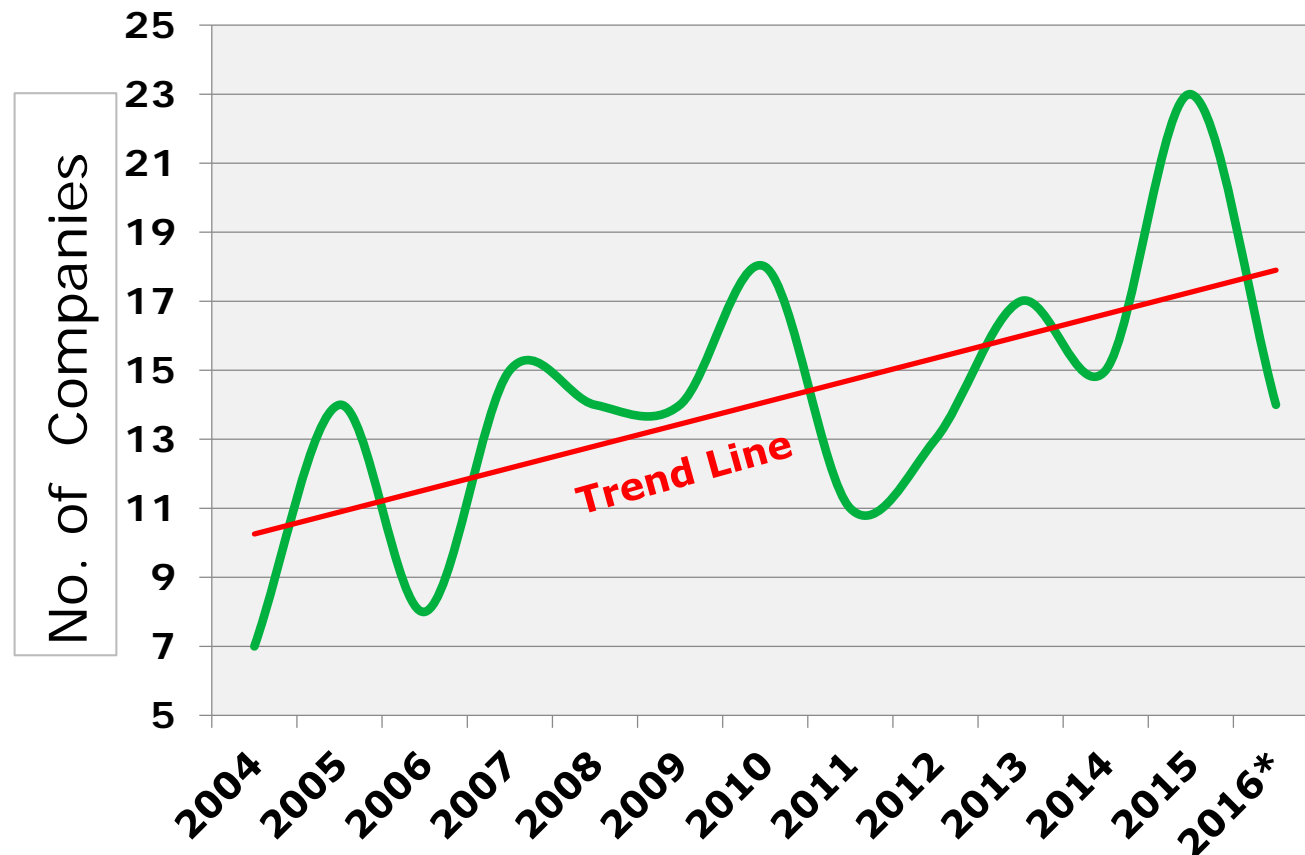- Low interest rates translate to cheap borrowing costs

Historical Treasury Rates

Acquisition & Merger Timeline Trends

12 year trend is increasing

Acquisitions & Mergers

Acquisitions Driving Revenue Growth

Staying in the Top 10 requires revenue growth

Company Name	2010 Revenue($)		Company Name	2016 Revenue($)	
Intel	$	40,394	Intel	$	54,981
Samsung Electronics	$	27,418	Samsung Electronics	$	40,323
Texas Instruments	$	12,994	Qualcomm	$	15,405
Renesas Electronics Corporation	$	11,893	Broadcom Limited	$	14,979
Toshiba	$	10,988	SK Hynix	$	14,699
SK Hynix	$	10,380	Micron Technology	$	12,963
STMicroelectronics	$	10,346	Texas Instruments	$	12,686
Micron Technology	$	8,876	Toshiba	$	10,258
Qualcomm	$	7,204	NXP	$	9,306
Broadcom	$	6,682	MediaTek	$	8,733
Elpida Memory	$	6,446	Infineon Technologies	$	7,197
Advanced Micro Devices (AMD)	$	6,345	STMicroelectronics	$	6,973
Infineon Technologies	$	6,319	nVidia	$	6,030
Sony Semiconductor Solutions Corporatio	$	5,224	Western Digital Corporation	$	5,761
Panasonic Corporation	$	4,946	Renesas Electronics Corporat	$	5,661
Top 15 Companies	$	176,455	Top 15 Companies	$	225,955
All Others	$	135,025	All Others	$	126,494
Total Semiconductor	$	311,480	Total Semiconductor	$	352,449

Source – IHS *Competitive Landscaping Tool Q1, 2017*

- Qualcomm
  - > Growth in Wireless
  - > Acquires NXP

- Broadcom LTD
  - > Wired Infrastructure
  - > Acquires Avago

- Micron
  - > NAND and DRAM Mfr
  - > Acquires Elpida

- NXP
  - > Automotive & Security
  - > Merges with Freescale

- Infineon
  - > Acquires IR

- ST Micro
  - > Broad based portfolio

Consolidations Driving Market Share

Companies Gaining Dominance in Specific Markets

Source – IHS *Competitive Landscaping Tool Q1, 2017*
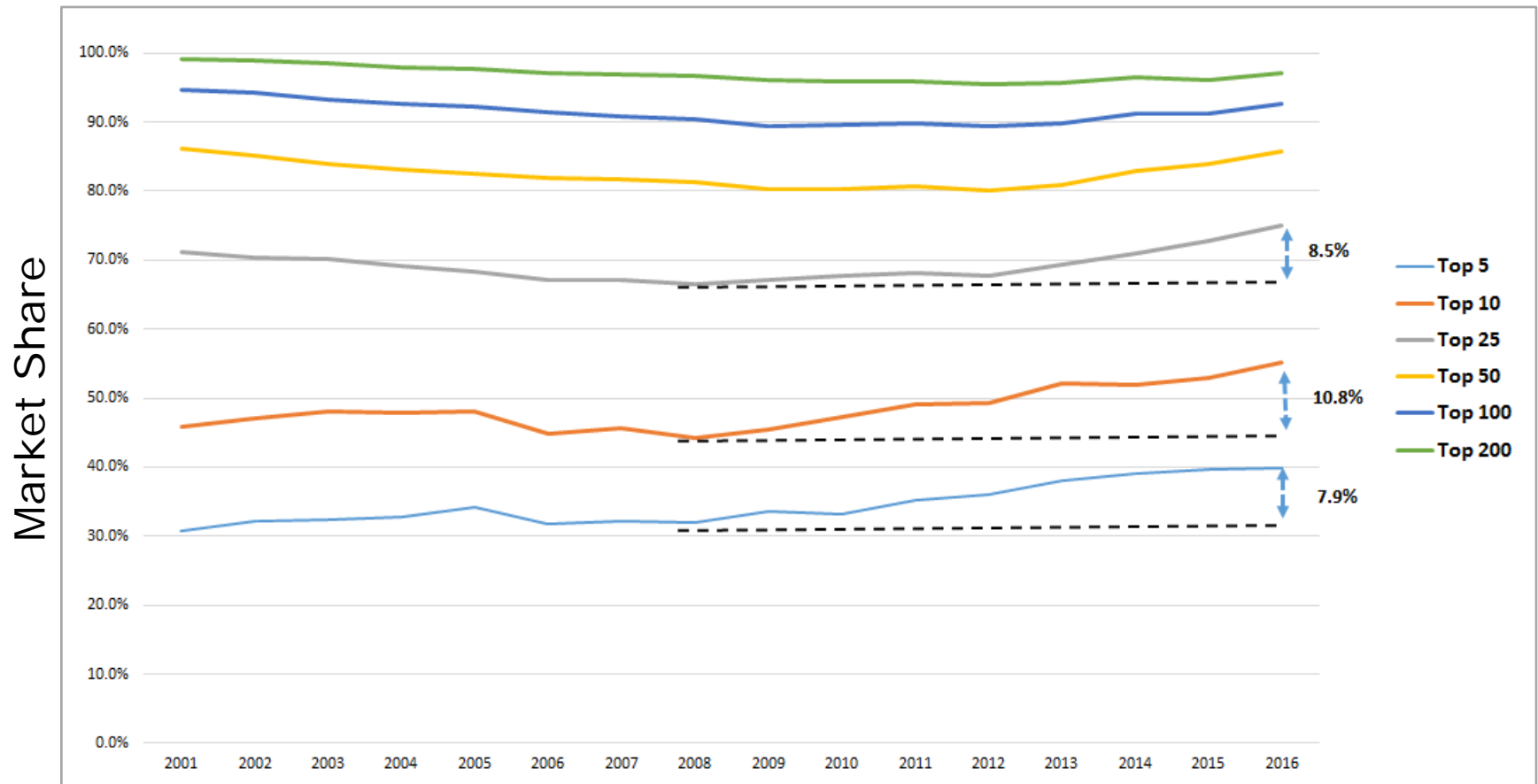
Regional & Geopolitical Semiconductor changes

China expected to become a global semiconductor player

- **China to spend up to $100B to grow semiconductor industry 20% annually**
  - > XMC, will break ground in the city of Wuhan for the first Chinese-owned plant dedicated to producing the most widely used memory chips
  - > Memory Technology acquired in Nov 2016

- **Acquisitions of Note:**
  - > Lattice Semiconductor acquired by Canyon Bridge Capital partners in Nov 2016 for $1.3B
  - > NXP sells standard products unit (Nexperia) to Jianguang Asset Management and Wise Road Capital in June 2016 for $2.75B
  - > Hua Capital Management Co Ltd, a Chinese private equity firm acquired chipmaker OmniVision Technologies Inc (OVTI.O) for $1.9 billion in 2015

- **Blocked acquisitions:**
  - > State owned, China Resources challenges ON Semiconductor with Fairchild acquisition
  - > Fujian Grand Chip Investment Fund dropped its proposed €670-million takeover of semiconductor equipment supplier Aixtron

http://www.reuters.com/article/us-fairchild-semico-m-a-idUSKBN0TR1GV20151208#gsQPgDSJYKD4FJu9.97
http://www.wsj.com/articles/china-moves-to-contend-in-chip-making-1458851538
http://www.mercurynews.com/2015/04/05/more-deals-ahead-china-fund-buys-silicon-valley-chip-maker/
http://www.scmp.com/tech/china-tech/article/2068514/chinese-firms-quest-more-strategic-semiconductor-deals
http://www.eetimes.com/document.asp?doc_id=1330775

What Lies ahead for the Semiconductor Industry

Consolidation likely to continue

- **Indications the trend may continue**
  - > Low cost of borrowing
  - > China determined to get more involved in the global Semiconductor Market
  - > IoT represents a whole new evolution of products and markets

- **Some Semiconductor Companies could remain targets**
  - > Cypress Semiconductor
  - > Integrated Device Technology
  - > InvenSense
  - > Maxlinear
  - > Power Integrations
  - > Xilinx
  - > Maxim Integrated
  - > M/A Com Technology Solutions Holdings, Inc
  - > Cavium Inc

Component Challenges

Brought on by Semiconductor Consolidations

- **Acquisition and Merger awareness**
  - > Tracking current manufacture of components in your supply chain
  - > Increased counterfeit risk due to perceived supply chain constraints
- **Procurement**
  - > Securing second source or domestic sources of critical components
  - > 2017 seeing long lead times for component orders
  - > Understanding authorized distribution channels at new company
- **Component branding and inspection challenges**

Component Information Source Critical

https://www.ihs.com/products/electronic-parts-management-solution.html

Dynamic Semiconductor Years

Thank you