xerfi|Global

Global

Semiconductor Groups - World

Market Analysis – 2015-2020 Trends – Corporate Strategies

Report code:	5XEEE01
Analyst:	José Antonio BAUTISTA
Publication date:	July 2015

The 5 phases of Xerfi Global's Global Markets And Competition reports

1. **Identification of the playing field**
   At Xerfi Global, we believe that international classifications are not the only valid definition of a market. It is the companies that make the sector and not vice-versa. During our first brainstorming session, we strive to give a clear-cut definition of the scope of the report.

2. **Identification of market leaders**
   During the second phase, Xerfi Global's analysts identify the players who will be studied in the report. Our aim is not only to classify by total sales, but also to detect tomorrow's movers and shakers, especially those from emerging markets.

3. **Identification of the main market indicators**
   Using the best and most up to date international sources, Xerfi Global's experts handpick the most relevant indicators pertaining to both supply and demand.

4. **Identification of corporate strategies**
   During a further brainstorming session, the Xerfi Global team aims to decipher the main corporate strategies and key future trends.

5. **Identification of the key conclusions**
   Thanks to a final brainstorming session, drawing on the knowledge of all the members of Xerfi Global, the main conclusions are debated and ultimately summed up in no more than a dozen slides. Concision, precision and accurate forecasts are our main aims.

This is a collective report written under the supervision of:
José Antonio BAUTISTA

Other contributors include:
Pierre-Antoine WAXIN
Kathryn MCFARLAND
Alessandro SCHILIRO
Mihai FRENT
Alberto BALBONI

Table of Contents

0. Conclusions

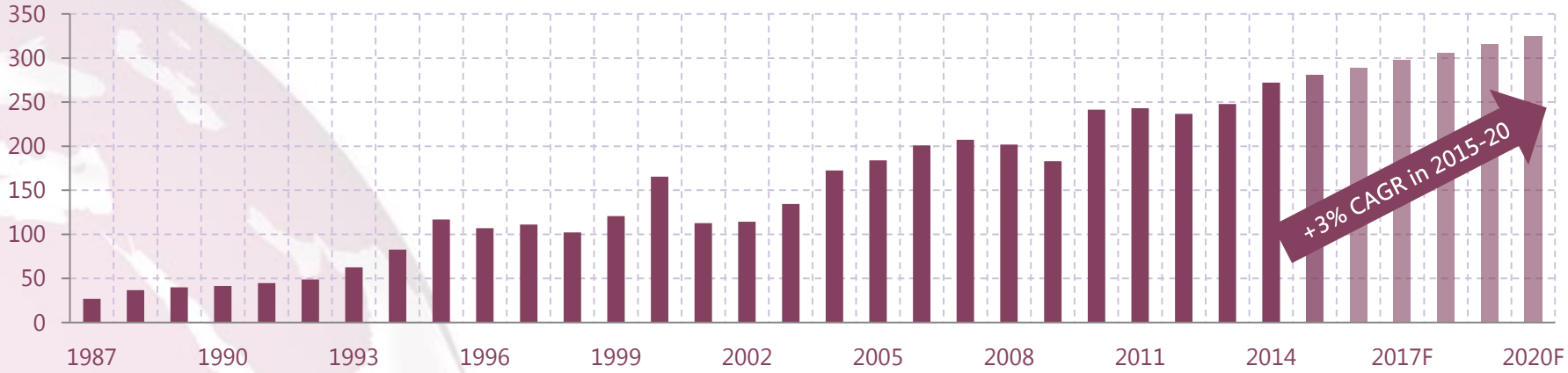
Key trends 2015-2020

- Global semiconductor sales went up by 9.8% to €272.16 billion in 2014, mainly driven by the launch of new technologies (tablets, smartphones, wearables), the rising demand for consumer electronics in Asia and a better economic context in Europe and North America. In the 2015-2020 period, the semiconductor market is expected to grow at an average 3.0% CAGR to reach €324.97 billion.
- New technologies, increasing connectivity and rising middle-classes in developing markets will be the main growth drivers of the industry in the short- and medium-term. One of the main new growth engines for the industry in coming years will be the emerging Internet of Things, which will encompass 60.2% of connected devices worldwide in 2020, followed by smartphones (12.1%) and tablets (11.0%).
- China was the largest semiconductor market in 2014, representing 38.8% of global exports and 56.5% of the global demand for semiconductors. In coming years China's weight in the industry will further increase as the Chinese government is boosting the national semiconductor industry to reduce its high reliance on imported integrated circuits.
- Intel and Samsung continued to be the industry leaders, with far higher sales than any other competitor. Nevertheless, as the chip market is ever more shaped by the emergence of new technologies (smartwatches, connected cars and appliances, cloud computing…), both leaders could see its leadership threatened in the coming years. In May 2015, fabless Avago acquired Broadcom for up to €27 billion, recording the largest deal in the industry's history and creating the new third largest semiconductor group.
- Rivalry has been intensifying in recent years mainly as a result of the changes faced by the industry as demand has shifted from mature economies to Asia and new technologies have burst onto the market. Semiconductor players will need to invest heavily to adapt their designs and processes to account for new specific requirements for smartphones, tablets, and the Internet of Things, and to improve the security, energy-efficiency and connection of devices. Leading chipmakers will continue adapting their portfolios and prices to respond to this new scenario, while new big mergers and acquisitions will take place in the industry.

The global semiconductor market is set to continue growing...

Global semiconductor sales (1987 – 2014)

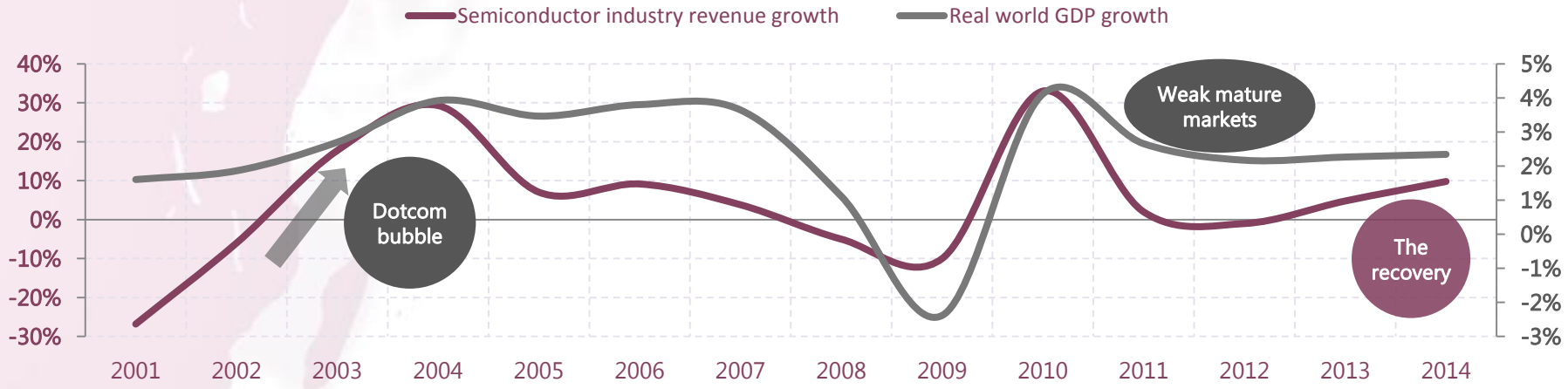
unit: billion euros



...although it will remain relatively reliant on economic cycles

World semiconductor sales and world GDP growth, 2001-2014

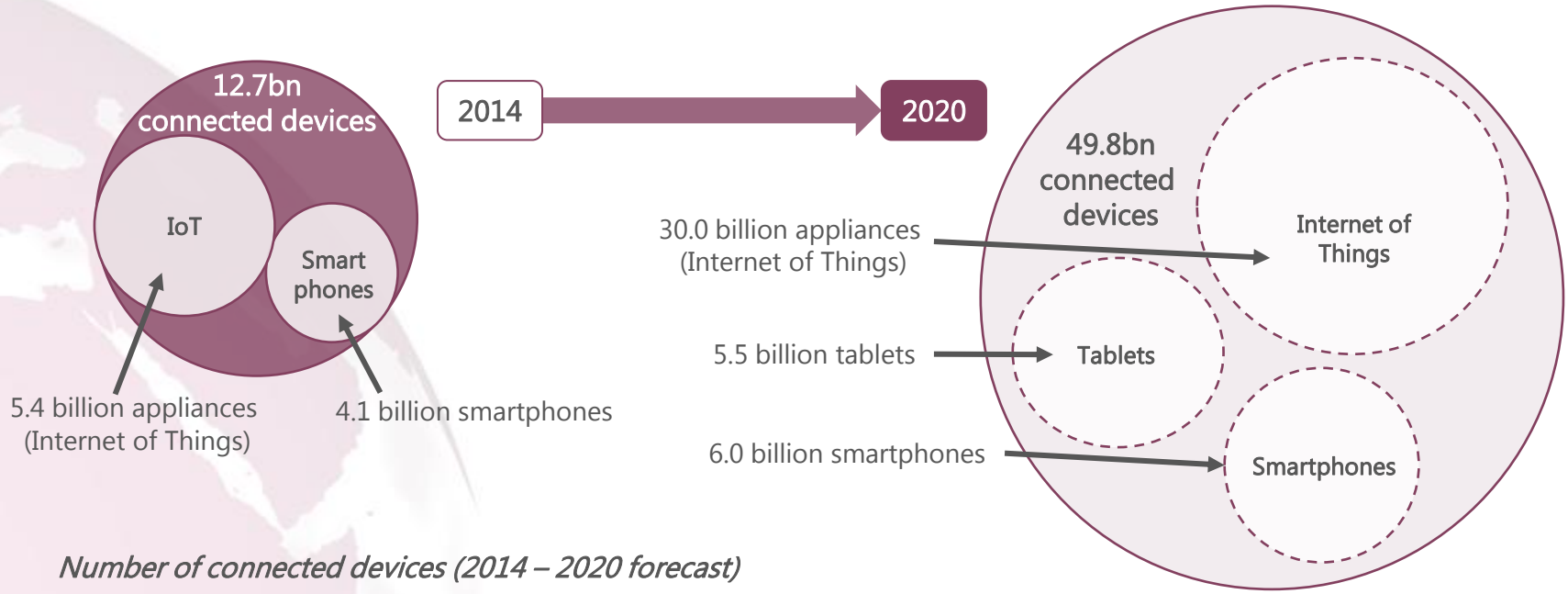
unit: annual % change in revenue (left axis); annual % change in real world GDP (right axis)



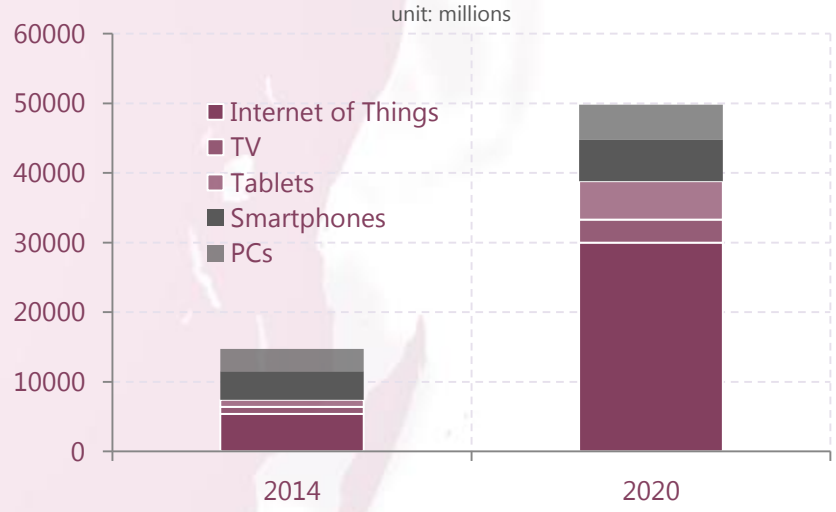
Source: Xerfi Global with WSTS, GSA and PWC

Demand will be driven by increasing connectivity and new technologies

Overview of connected devices (2014-2020)



Number of connected devices (2014 – 2020 forecast)



Source: Xerfi Global with IDC

By 2020, the number of connected devices will increase to 49,800 from around 14,700 in 2014. New product categories will be one of the main growth drivers in the semiconductor industry, together with the increasing connectivity of these new technologies. As smartphones and tablets consolidate, new technologies such as wearables are creating additional demand in the industry.
In the five coming years, the segment with the fastest-growth rate expected is that of sensors, which are a key element in the emerging Internet of Things.

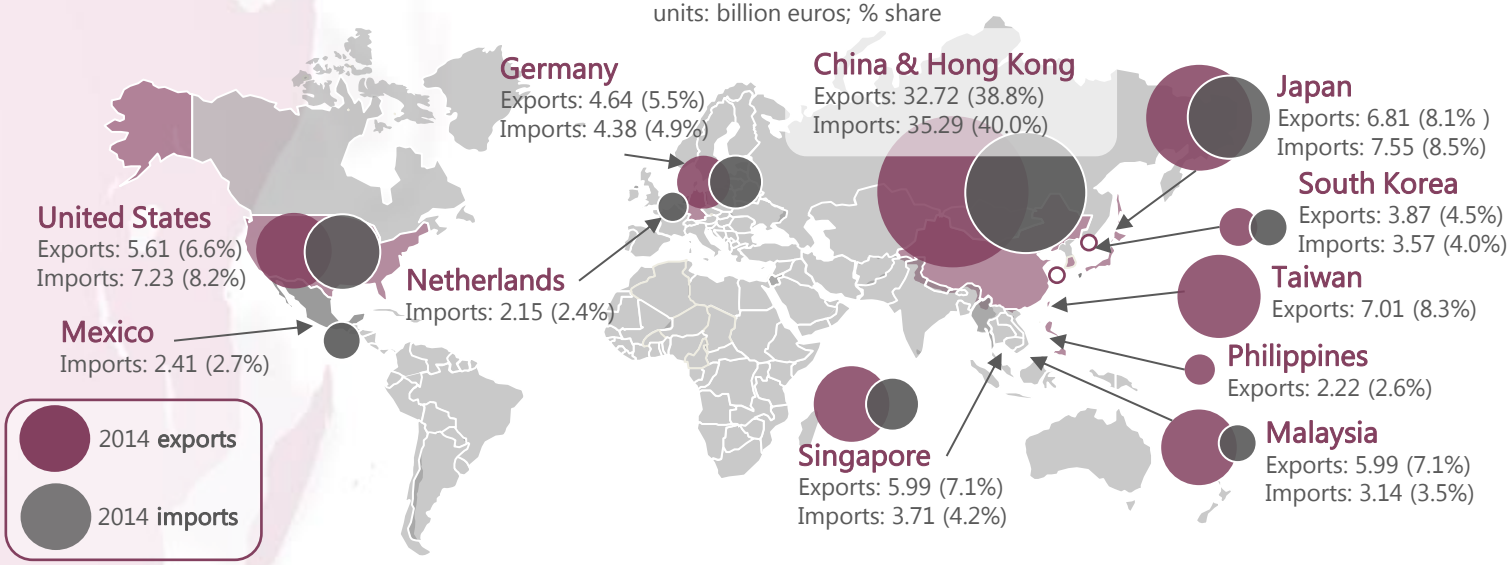
Asia will remain at the heart of the semiconductor industry...

Global semiconductor consumption by region (2014 – 2020 forecast)

unit: % share

Breakdown of world´s top 10 exporters and importers of semiconductor devices (2014)*

units: billion euros; % share

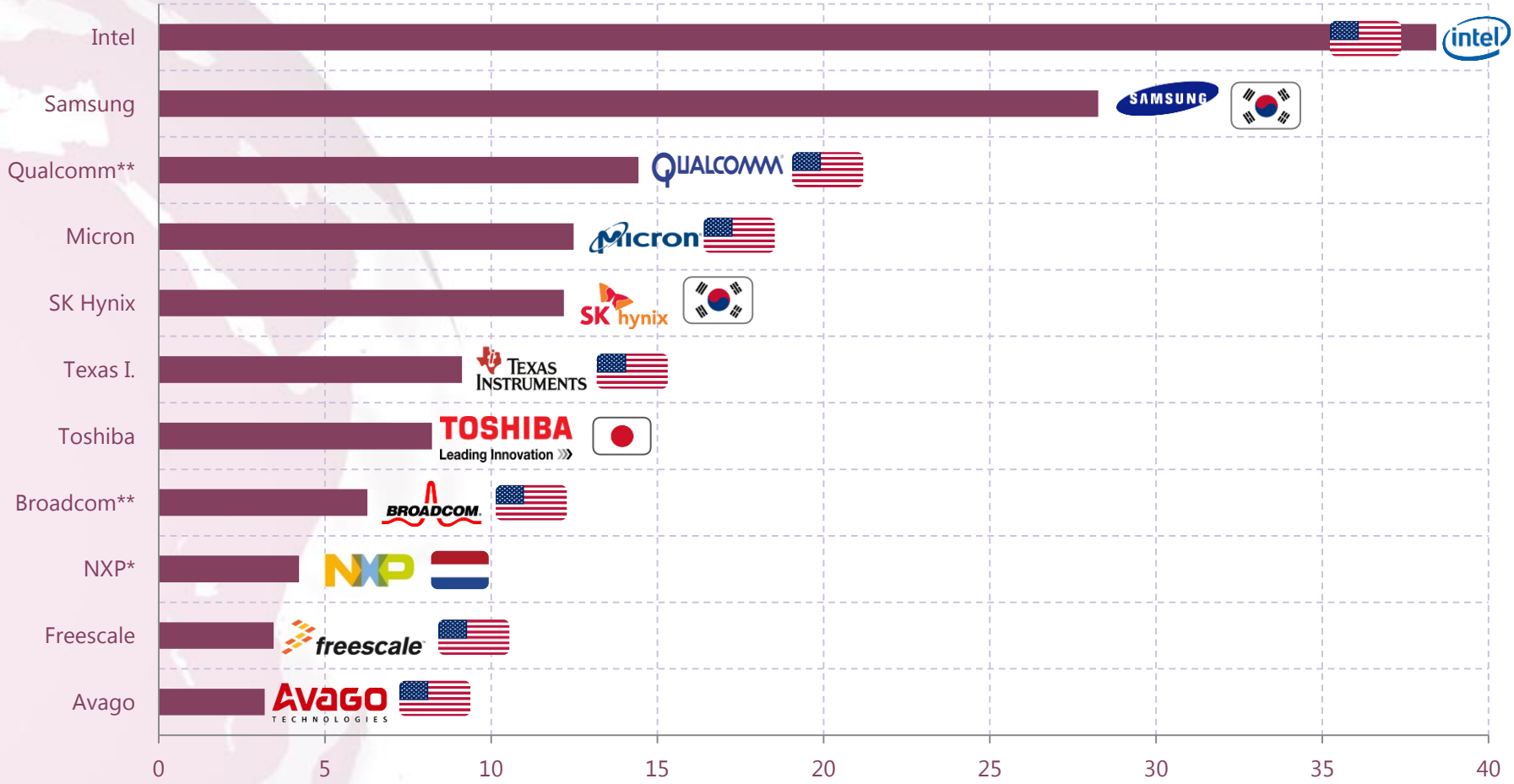


Source: Xerfi Global with Gartner

...although most leading chipmakers are based in the US and Europe

Overview of total semiconductor-related sales of groups analysed in this report (2014)

unit: billion euros

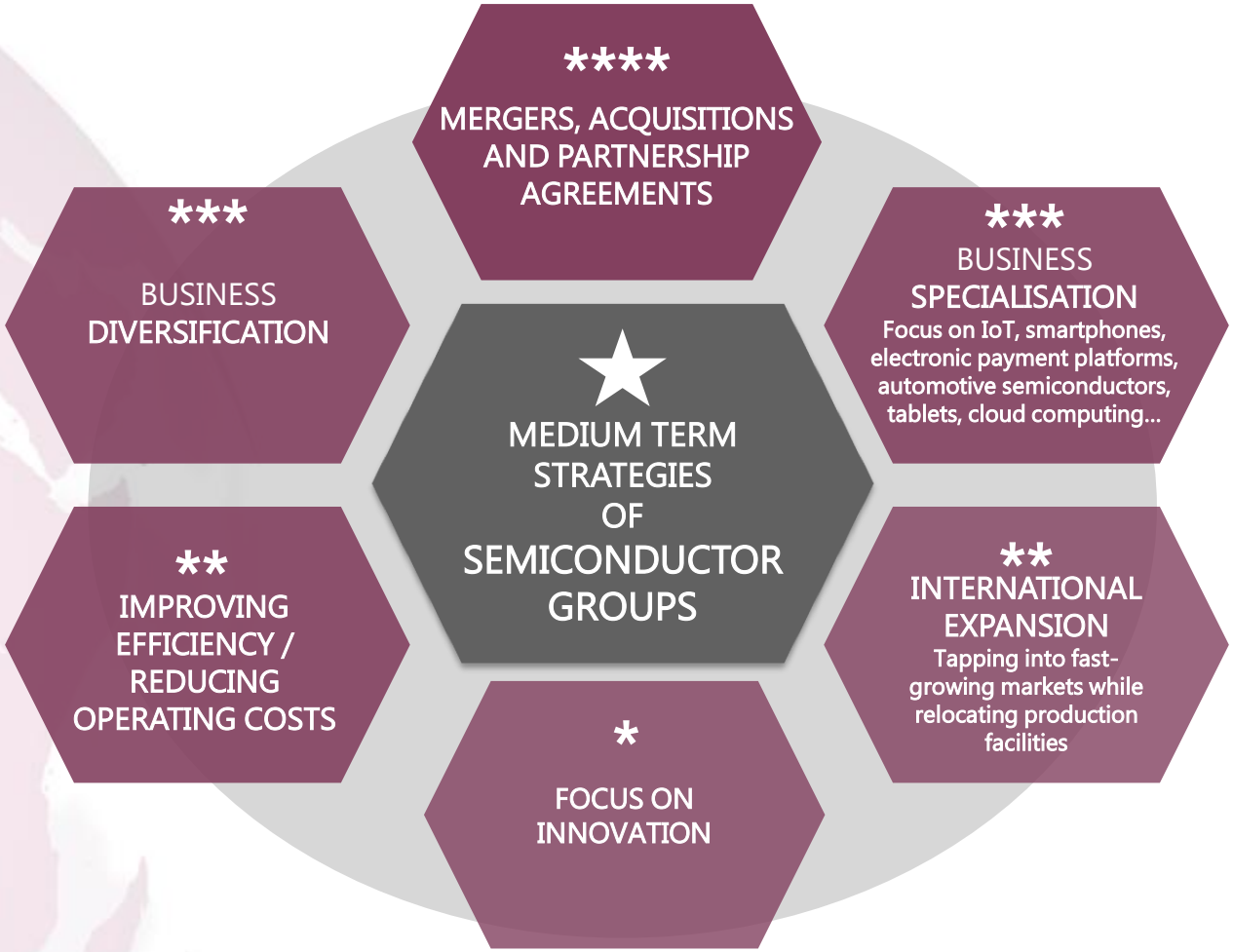


Source: Xerfi Global with companies' annual reports; *NXP was acquired by Freescale in March 2015; **Fabless

Rivalry is set to increase as players aim to benefit from new technologies

Leading semiconductor groups' main medium term business strategies

unit: number of stars proportional to the importance of the strategy



Source: Xerfi Global with companies' annual reports and business press

US leading groups are more profitable than their Asian competitors

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: billion euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
SAMSUNG	147.02	8.6%	12.1%	12.3%	Samsung's main source of revenue was Asia, which generated 67.4% of sales in 2014. Around 75% of its Semiconductor segment's profits relied on memory products. It was the only business unit of Samsung Electronics recording growth for the 2013-2014 period.
TOSHIBA	46.32	0.4%	4.5%	2.2%	Toshiba's profitability mainly came from its Electronic Devices & Components business unit, which generated €1.70bn profits in 2014. Since 2010, it has been the company's second main revenue driver value, only behind its Energy and Infrastructure business. Toshiba's sales went up slightly in 2014 for the first time since 2011 as a result of a sharp increase of sales in its Electronic Devices & Components' division, as well as higher sales in all its markets including Japan, its home market.
INTEL	41.77	9.7%	27.5%	27.5%	Intel's growth was mainly driven by its Data Centre unit whose operating margin reached 50.6% in 2014. Its Internet of Things segment represented nearly 4% of this year's revenue, and was Intel's best performing segment in fiscal 2014 with 18.9% sales growth.
QUALCOMM	19.80	20.0%	28.5%	29.4%	In 2014, Qualcomm's growth was fueled by rising connectivity in both 3G and 4G worldwide, which led to growth in smartphones sales, mainly in emerging countries. Qualcomm's profitability was driven by its fabless business model, allowing large research expenses by shrinking manufacturing costs, and its ability to set up industry standards.

Source: Xerfi Global with companies' reports

Margins have increased in recent years among large groups

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: million euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
SK HYNIX	12.21	16.7%	29.8%	16.4%	SK Hynix's 2014 revenues and operating income rose mainly as a result of the steady growth of demand for DRAM products and services and a favourable pricing environment. At the end of 2014, its Chinese production facility suffered from a fire incident. This event had a negative impact on the company's production and results.
MICRON	12.23	27.8%	18.9%	6.2%	For the fiscal year 2014, the growth in NAND and DRAM sales had a positive impact on Micron's sales, which almost doubled between 2009 and 2014. The company recorded continuous sales increase since 2009, with 27.8% CAGR. In 2014, Micron's operating margin, reached 18.9%, positively influencing profitability ratios.
TEXAS INSTRUMENTS	9.75	14.0%	34.4%	26.9%	In 2014, Texas Instruments' profitability increase primarily came from its high degree of specialisation of its two main segments and the efficiency improvement measures it has taken. Products sold at its Analog division, which have over ten years of lifecycle, provided high margins and generated 70.6% of revenue in 2014, are long term key growth drivers.
BROADCOM	6.30	13.9%	8.2%	9.6%	From a global perspective, Broadcom benefits from its wide portfolio and geographical presence, which reduces risks. In 2014, Broadcom's profitability was mainly driven by its Infrastructure and Networking segment, whose sales saw double digit growth for the second consecutive year, reaching 17.2% growth for the 2013-2014 period. Excluding its Cellular Baseband segment, Broadcom's overall operating margin reached 22.0% in 2014.

Source: Xerfi Global with companies' reports

Smaller semiconductor manufacturers struggle with indebtedness

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: million euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
NXP	4.22	9.9%	18.6%	8.3%	In 2014, NXP's main revenue driver was its Portable & Computing segment, which recorded an increase in revenues of 45.9% for the 2013-2014 period. The company's net income, margin and investment expenses remained relatively low because of yearly interest expenses representing 34.5% of net income.
FREESCALE	3.46	5.7%	15.7%	2.8%	During the 2009-2014 period, Freescale's profitability suffered from debt burden, incurred by its subsidiary Freescale Semiconductor Inc., up to €4.5bn. In 2014, the firm reduced this debt by 1.2bn$ allowing its operating margin to increase up to 15.7%.
AVAGO	3.19	23.5%	10.3%	14.8%	Avago's growing sales in 2014 were driven by the production of its Film Bulk Acoustic Resonator. The firm's profitability comes from its efficient global supply chain and its low-cost operating model with outsourced manufacturing operations. Furthermore, Avago is carrying out M&As and only keeping the most profitable acquired segments.

Source: Xerfi Global with companies' reports

Global presence is a key priority for the industry's leaders

SWOT analysis of semiconductor companies analysed in this report

COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
SAMSUNG	• Largest memory chip production • Tight control of its value chain • Its size allows massive economies of scale • Wide global presence	• Smartphone segment squeezed by competitors • Inefficient administrative structure • High reliance on few customers and the Android operating system • Patent wars against Apple, diverting focus on building new technologies	• Repositioning in the semi-conductor market to offset dropping sales of smartphones • Taping into the tablet, and Smart TVs markets • Acquiring patents through bold acquisitions • Diversifying its semiconductor business by investing in non-memory fields and system semiconductors • Bolstering 3D flash memory solutions
TOSHIBA	• Major partnerships with Cisco and Microsoft to improve IoT value proposal • Balanced segment portfolio • Created and owns a developing platform for IoT applications	• Low liquidity ratios and growing inventory turnover • Low profitability • High reliance on the Japanese market • Legal proceedings about false advertising on products characteristics threatening customers confidence	• Connecting business segments altogether through cloud computing solutions • Taking advantage of the fast-growing demand for consumer electronics in emerging markets • Miniaturizing products to tap into the IoT
INTEL	• Greatest processor technology • Biggest semiconductor chip producer • Global presence • High bargaining power due to it size • Strong profitability	• Latecomer to the smartphone market • Reliance on the personal computer market • High exposition to currency volatility	• Taping into emerging markets • Taking advantage of the tablet market • Benefiting from cloud computing demand growth • Enhancing innovation • Diversifying its activities
QUALCOMM	• High R&D expenditure • Efficient fabless business model • Intellectual property	• Reliance on few customers and the Asian market, representing 84% of sales in 2014 • Weak presence in non CDMA technologies • Patent wars misallocating treasury fund weakens Qualcomm's focus and efforts on developing new solutions	• Developing its mobile banking portfolio • Improving data network densification and upgrade the existing one • Accelerating IoT strategy implementation • Cooperating with other companies to settle in the IoT market • Enlarging Intellectual Property to keep a technological edge

Source: Xerfi Global with companies' reports

Medium-size players differentiate through diversifications

SWOT analysis of semiconductor companies analysed in this report

COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
SK HYNIX	• Leading positions in the DRAM market and the NAND Flash markets • Healthy financial situation • Strong profitability and sales growth • Global presence	• Reliance on its Dynamic Random Access Memory segment (77.2% of 2014 revenues) • Weak economic context in the United States (22.3% of its revenues in 2014)	• Benefiting from growing global demand in the NAND Flash and CMOS image sensors • Improving product quality • Become a leading CMOS provider in China
MICRON	• Strong R&D expenditure • Large portfolio of joint ventures and partnerships • Global presence • High profitability	• Micron is under legal proceedings and lawsuits related to its intellectual property • Lack of product diversification compared to top competitors	• Benefiting from the adoption of wireless technologies to implement its products in mobile devices • Reaching the increasing demand in the DRAM, NAND and 3D NAND markets with mobile solutions from the IFMT joint venture, among other things • Enhancing Intellectual Property through R&D
TEXAS INSTRUMENTS	• Global customer base • Sales growing steady in the 2009-2014 period • High operating margin • R&D skilfulness	• High exposition to US dollar fluctuations • High fixed costs due to in-house production	• Becoming a reference of the IoT in the automotive market • Restraining business scope to shape up production effectiveness • Positioning itself for growing global demand for analog semiconductors
BROADCOM	• Leading semiconductor intellectual property holdings of 20,450 patents • Diversified product portfolio and market applications • Highly skilled workforce	• High reliance on external suppliers • In 2014, the 5 largest customers represent 44.1% of sales • Strong reliance on Asian markets • Relatively small company in terms of production capacities when compared with main competitors such as Intel and Qualcomm	• Tapping into the cloud computing infrastructure market • Gaining from the global LTE adoption trend • Benefiting from the growth perspective for IoT by improving all type of wireless communications with its NFC solutions • Pursue its deeply rooted M&A behaviour • Monetize patents

Source: Xerfi Global with companies' reports

Smaller firms tend to merge to face competition from large groups

SWOT analysis of semiconductor companies analysed in this report

COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
NXP	• NXP is the first provider of contact and contactless interfaces for PIN entry devices and secured card controller applications • Improving profitability and fast-growing revenues • Production facilities close to customers markets	• Debt burden • Weakening R&D spending • Highly reliant on the Chinese market	• Using own skills or acquiring some to become a major player in the connected automotive market • Benefiting from the IoT market expansion • Enhancing its NFC skills to tap into this developing market • Strengthening its banking portfolio
FREESCALE	• Major expertise in securing data transmission and storage • Early orientation towards the Internet of Tomorrow • Improving-profitability ratios • Copper-based products, much more appreciated by customers than gold-based products	• The three major clients represent 35% of revenues • Numerous business units to manage • High volatility of copper	• Using its Asian localization to build long term customer relationships with other original equipment manufacturers • Developing its intellectual property to pursue securing data transmission and storage while improving system performance • Enriching its wireless communication expertise to offer differentiated IoT value proposition
AVAGO	• High R&D ratio • Offers broad portfolio to customers • Major intellectual property rights in diversified fields	• The largest customer contributes 20% of revenues • Highly reliant on its Wireless Communications segment, 39.6% of 2014 revenues. • High exposition to raw materials price fluctuations • Third-party manufacturing and testing located in opposite regions (America, Asia)	• Benefiting from LTE adoption with its Radio Frequency semiconductor devices and LTE power amplifiers • Setting up in Asian area to be close to customer factories • Pursuing M&A strategy to drive external growth, reduce products' time-to-market , and enlarge its customer base.

Source: Xerfi Global with companies' reports

1. Market Fundamentals

The semiconductor industry, a promising and dynamic business

€272.16bn

Global semiconductor sales went up by 9.8% in 2014 and reached 272.16 billion euros, a new record high in the industry's history.

58%

The semiconductor industry is increasingly concentrated. In 2014, the world's five largest integrated device manufacturers encompassed 58% of the industry.

49.8 billion

The emerging Internet of Things is expected to encompass 49.8 billion connected devices, three times more than in 2014 (12.7 billion devices).

+10.4% CAGR

Sensors and actuators are expected to be the fastest-growing semiconductor components, rising at a 10.4% annual rate between 2015 and 2020 driven by the rapid development of the Internet of Things.

56.5%

China is the world's largest consumer of integrated circuits. In 2014, this country accounted for 56.5% of the global semiconductor market and its share is expected to increase to 60.5% by 2020.

Source: Xerfi Global

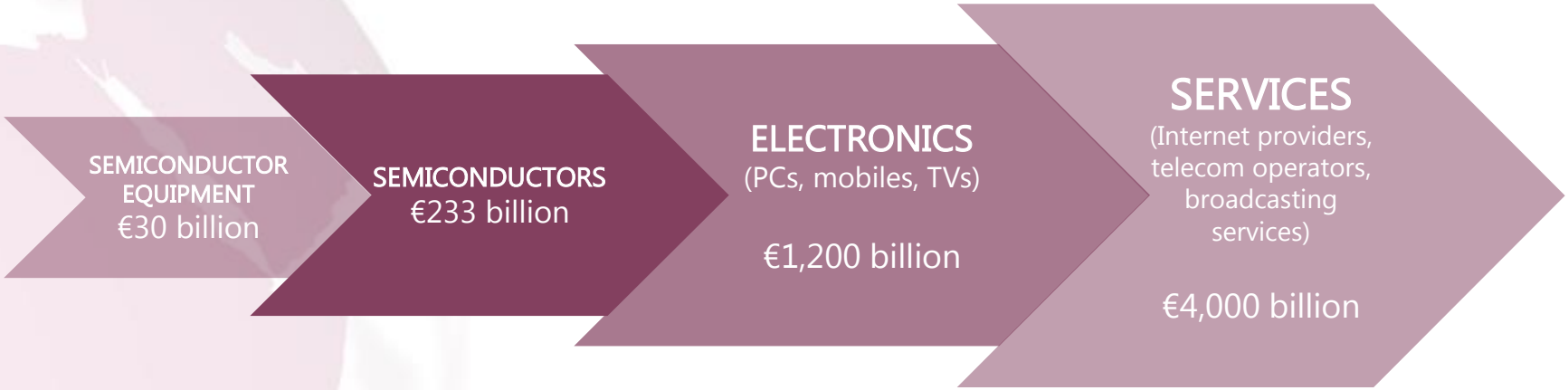
Some concepts to better understand the semiconductor industry

Memory	Memory chips serve as temporary storehouses of data and pass information to and from computer devices' brains. The consolidation of the memory market continues, driving memory prices so low that only a few giants (i.e. Toshiba and Samsung) can afford to stay in the game.
Microprocessor	These are central processing units that contain the basic logic to perform tasks. Intel's domination of the microprocessor segment has forced nearly every other competitor out of the mainstream market and into smaller niches or different segments.
Commodity Integrated Circuit	Sometimes called 'standard chips', these are produced in huge batches for routine processing purposes. Dominated by very large Asian chip manufacturers, this segment offers razor-thin profit margins that only the biggest semiconductor groups can compete for.
Complex System on a Chip (SOC)	'System on a Chip' is essentially all about the creation of an integrated circuit chip with an entire system's capability on it. The market revolves around growing demand for consumer products that combine new features and lower prices. With the doors to the memory, microprocessor and commodity integrated circuit markets tightly shut, the SOC segment is among the ones left with enough opportunity to attract a wide range of companies.
Internet of Things (IoT)	The network of physical objects ('things') embedded with electronics, software, sensors, and connectivity to enable objects to exchange data with the manufacturer, operator and other connected devices. It allows objects to be sensed and controlled remotely, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.
Fabless chip maker	Semiconductor companies that carry out design and marketing, but choose to outsource some or all of the manufacturing. These companies have high growth potential because they are not burdened by the overhead associated with manufacture.
IDM	Integrated Device Manufacturer, whose activity chain includes the fabrication of wafers.
Foundry	A service company that ensures the processing and manufacturing of silicon wafers. A pure-play foundry offers no end products.
Wafer	Short for silicon wafer, a thin disk of purified crystalline semiconductor that is cut and processed into individual chips.
ODM	Acronym for Original Development Manufacturer. It refers to companies that develop and manufacture a product that is then sold under their own or under other brand names.
SoC	Designates a system-on-a-chip or systems-on-chip. A SoC is an integrated chipset platform that combines multiple semiconductor technologies, hardware and software.

Semiconductors are at the core of all electronic devices & services

Overview of the electronics ecosystem, 2014

unit: market value in billion euros

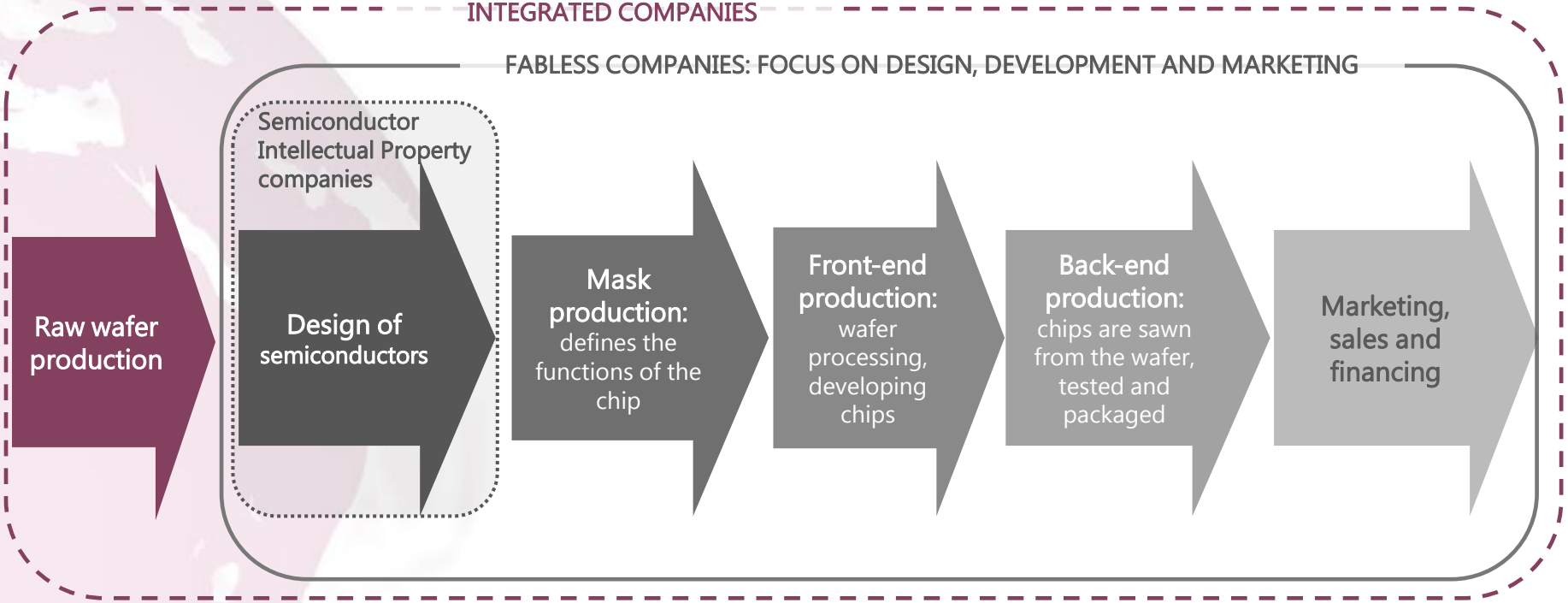


Source: Xerfi Global with GSA

Semiconductors are basic electronic components for an extremely diverse range of products from consumer electronics such as PCs, mobile phones and TV sets, to solutions and services such as telecommunications handsets, networks or infrastructure. The semiconductor industry is important to major downstream sectors. Valued at over €233bn in 2012, the semiconductor industry enables the manufacturing of €1,200bn in electronics devices and €4,000bn in services. The occurrence of semiconductors in other fields has become key to the industry's growth. For instance, in the automotive industry, semiconductor content used to enhance safety and energy consumption is expected to increase from about €250 per vehicle to €600 per vehicle in the medium term.

Two major business models co-exist

The semiconductor manufacturing value chain



Source: Xerfi Global

Most companies in the industry are fabless (around 1,200 out of 1,500 companies), outsourcing the manufacturing of silicon wafers. However, an increasing number of companies are tending to externalise additional parts of the value chain, namely back-end production which involves lower added-value activities such as testing and packaging. Thus, the structure of semiconductor companies is becoming leaner and more asset-light, focused on added-value operations such as research and development, supply-chain management and sales.
A third type – semiconductor IP companies – are focused only on the design of semiconductors, licensing their intellectual property to other chip manufacturing companies.

Semiconductors' manufacturing process is highly complex

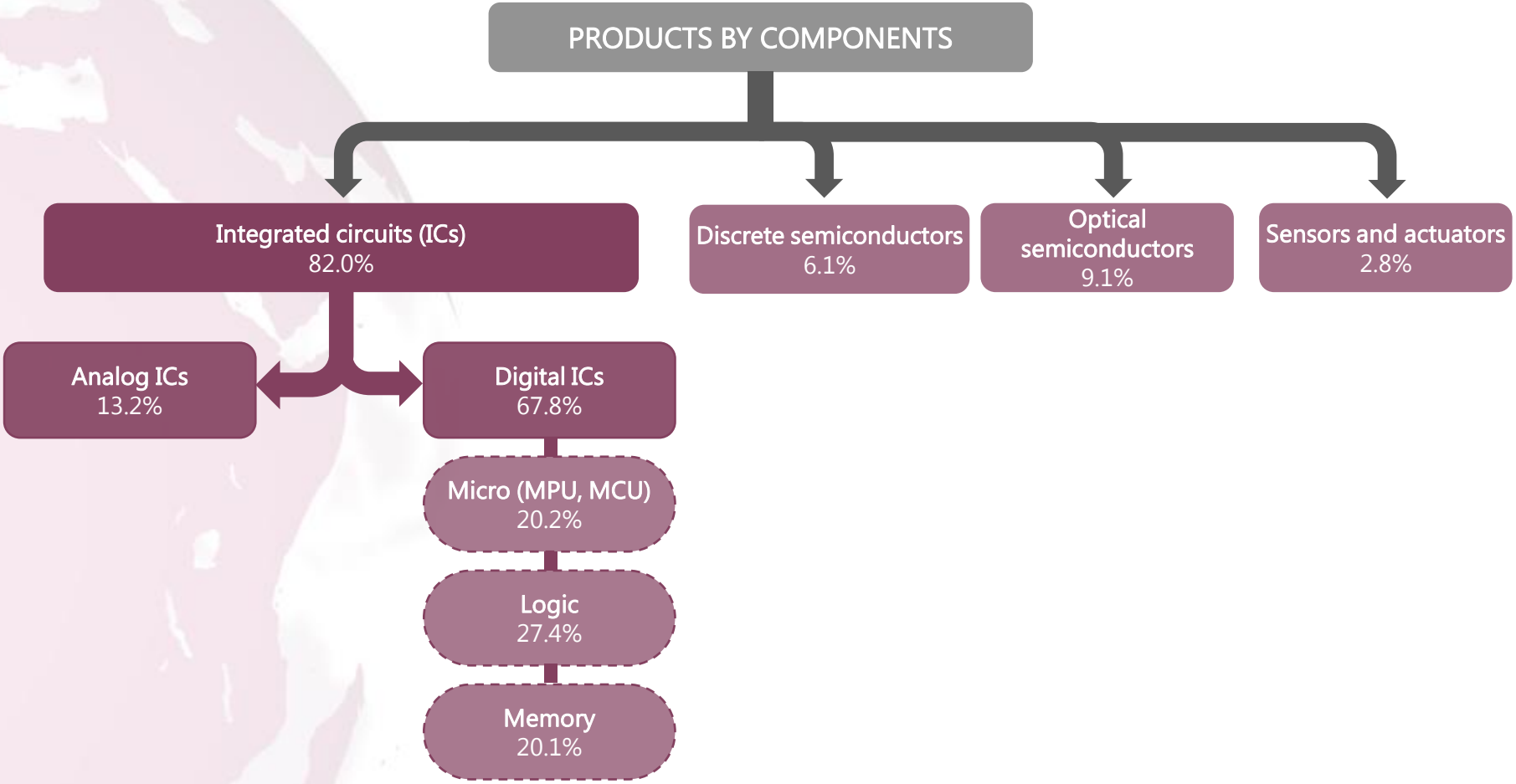
Overview of how semiconductors are made

Semiconductor manufacture	Semiconductors manufacture consists of more than a hundred steps in which hundreds of copies of an integrated circuit are formed on a single wafer. The process involves the creation of eight to 20 patterned layers on and into the substrate, ultimately forming the complete integrated circuit. This layering process creates electrically active regions in and on the semiconductor wafer surface.
Wafer production	In this process, purified polycrystalline silicon is heated to a molten liquid. A small piece of solid silicon (seed) is placed on the molten liquid, and as the seed is slowly pulled from the melted mass the liquid cools to form a single crystal ingot that later is ground to a uniform diameter and a diamond saw blade cuts the ingot into thin wafers, which are ready to be sent to the wafer fabrication area to be used as the starting material for manufacturing integrated circuits.
Wafer fabrication	The heart of semiconductor manufacturing is the wafer fabrication facility where the integrated circuit is formed in and on the wafer. Typically it takes from 10 to 30 days to complete the fabrication process.
Thermal oxidation or deposition	Wafers are pre-cleaned using high purity, low particle chemicals. The silicon wafers are heated and exposed to ultra-pure oxygen in the diffusion furnaces forming a silicon dioxide film of uniform thickness on the surface of the wafer.
Masking	Masking is used to protect one area of the wafer while working on another. This process is referred to as photolithography or photo-masking. A photoresist or light-sensitive film is applied to the wafer and a photo aligner aligns the wafer to a mask and then projects an intense light through the mask and through a series of reducing lenses, exposing the photoresist with the mask pattern. Precise alignment of the wafer to the mask prior to exposure is critical.
Etching	The wafer is developed and baked to harden the remaining photoresist pattern. It is then exposed to a chemical solution so that areas not covered are etched away. The photoresist is removed and the wafer is inspected.
Doping	Atoms with one less electron than silicon, or one more electron than silicon, are introduced into the area exposed by the etching process to alter the electrical character of the silicon.
Repeating the steps	The thermal oxidation, masking, etching and doping steps are repeated several times until the last "front end" layer is completed (all active devices have been formed).
Dielectric deposition and metallization	Following completion of the "front end," the devices are interconnected using metal depositions and patterning steps of dielectric films. Semiconductor fabrication has as many as three metal layers separated by dielectric layers.
Passivation and electrical test	After the last metal layer is patterned, a final dielectric layer is deposited to protect the circuit from damage and contamination. Openings are etched to allow access to the top layer of metal by electrical probes and wire bonds. An automatic, computer-driven electrical test system then checks the functionality of each chip on the wafer.
Assembly	A diamond saw typically slices the wafer into single chips. The inked chips are discarded, and the remaining chips are visually inspected under a microscope before packaging. The chip is then assembled into a package that provides the contact leads for the chip. A wire-bonding machine then attaches wires to the leads of the package. Encapsulated with a plastic coating for protection, the chip is tested again prior to delivery to the customer.

Different chips serve different purposes

Breakdown of the major families of semiconductors

unit: market share in % of total global sales value



Source: Xerfi Global with WSTS; MPU= micro-processors, MCU= micro-controllers

Manufacturers depend on an extensive network of suppliers

Main players by sales are vertically integrated manufacturers which are present all along the value chain. However, they depend on installation developers for their manufacturing activities.

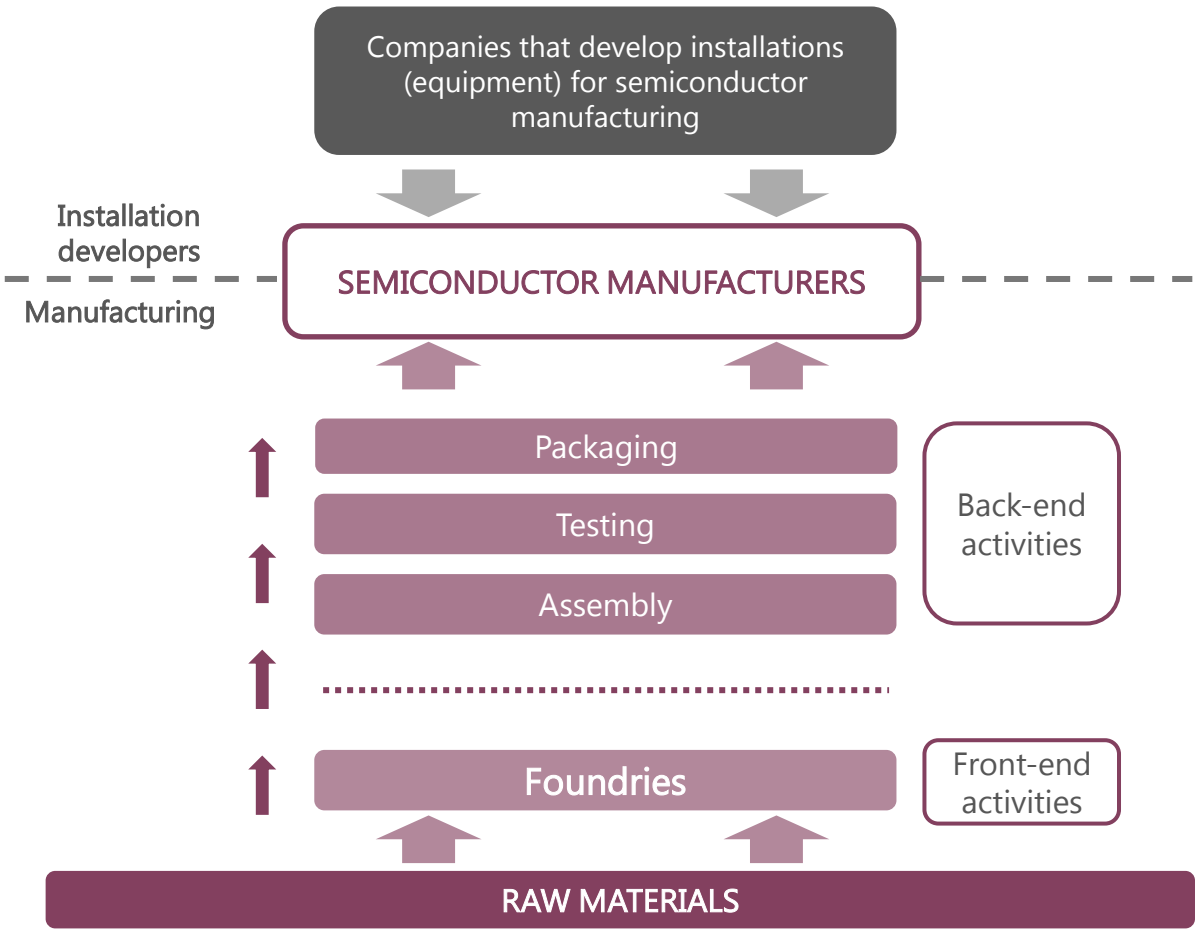
Due to the complex nature of semiconductor manufacturing, fabless makers tend to rely on the expertise of numerous suppliers. However, foundries play the most important role.

This trend has intensified as an increasing number of companies have been shifting to the 'fabless' model, spinning off parts of manufacturing (Texas Instruments, Toshiba) or completely moving away from production operations (Sony, NEC).

Also, 'fab-lite' companies are integrated companies who have chosen to outsource part of their wafer production (up to 75%).

An increasing number of companies are outsourcing back-end activities, to low-cost countries in Asia-Pacific.

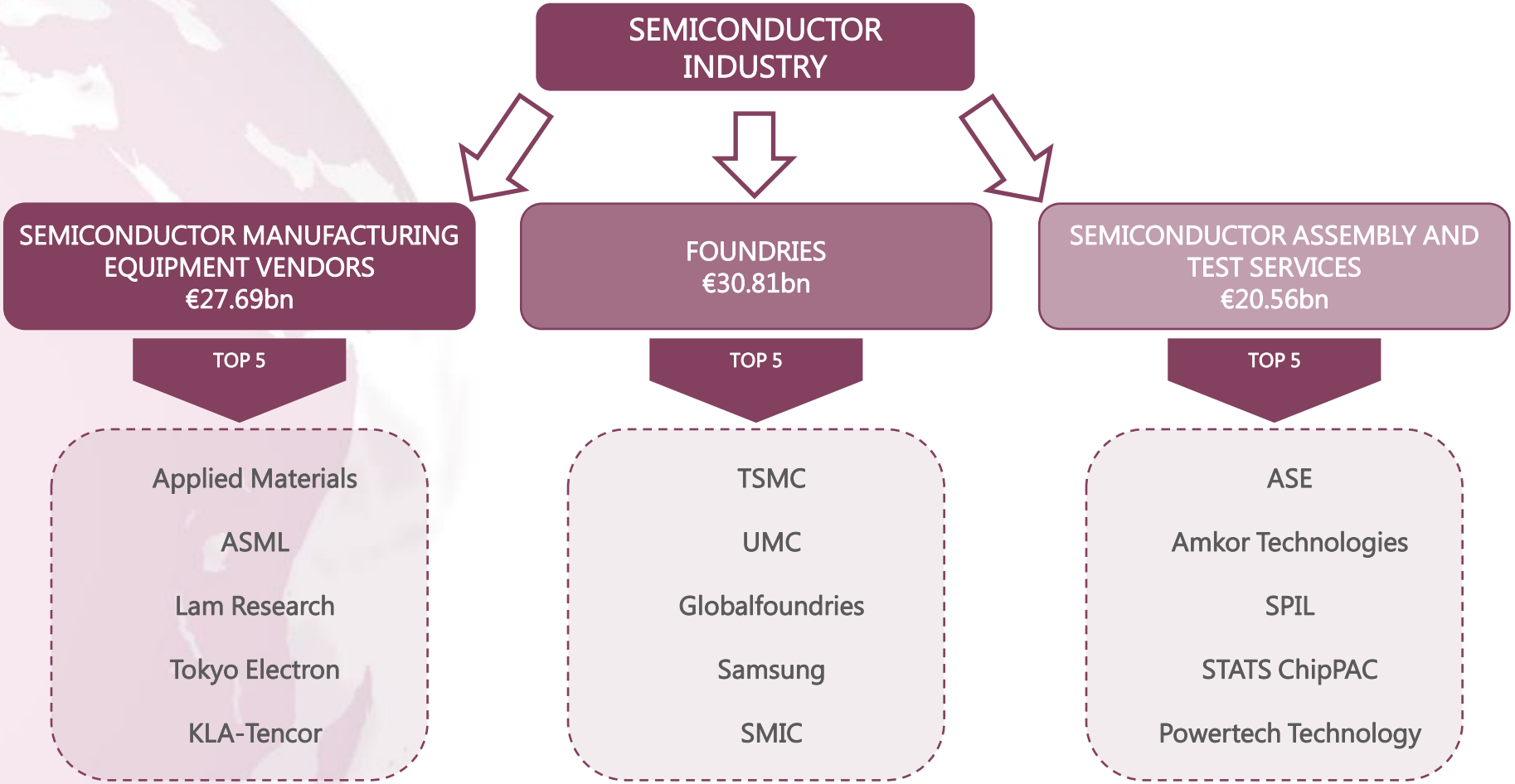
Suppliers of semiconductor companies



Source: Xerfi Global

Equipment, foundries, assembly and test supply: a €80 billion market

Overview of top five main suppliers of semiconductor manufacturers, 2014

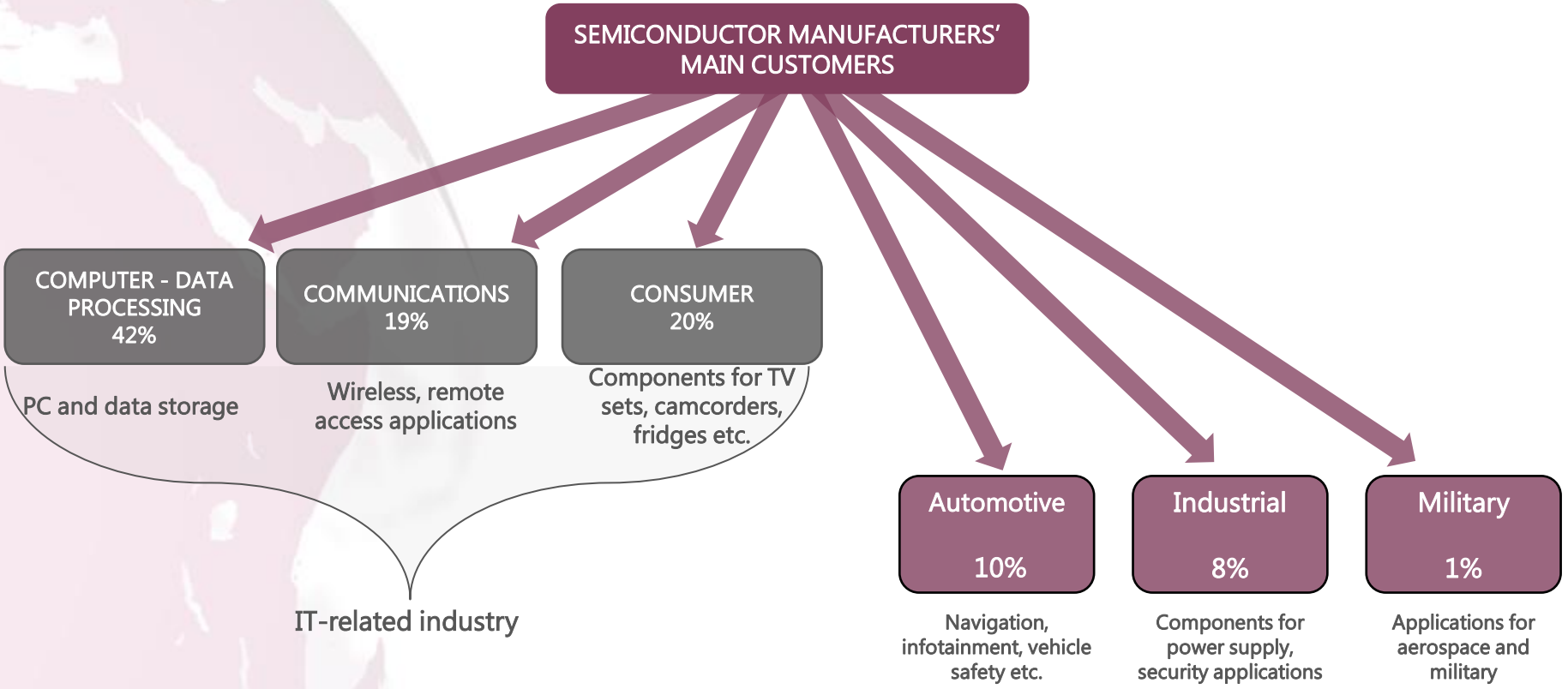


Source: Xerfi Global with Gartner

IT related industries account for two thirds of semiconductors sales

Major client industries of the semiconductor sector (2014)

unit: % of global market sales



Source: Xerfi Global with WSTS

Three fabless and two foundries among the top 11 semiconductor groups

The world's leading chipmakers are mainly headquartered in industrialised countries. As companies increasingly go fab-lite or entirely entrust manufacturing to third-party suppliers, major foundries are going from strength to strength. Qualcomm, based in the US is the third largest semiconductor group by sales and operates as a fabless company. Intel continues to retain its overall leadership in the industry, which it has occupied since the late 1990s.

Among the industry's top 11, integrated device manufacturers remain mainstream (9 out of 11), and two companies are fabless.

Last, but not least, included in the scope of this report is ARM, the global leader among semiconductor design companies. An IP (intellectual property) company, ARM has no other activity but the design of semiconductors, generating revenues via royalties and licence fees after selling its technologies to other semiconductor companies. ARM is the global leader in the market, but its revenues are far less significant than those of other industry leaders.

Top semiconductor groups analysed in this report (2014)

units: billion euros; % share of total sales

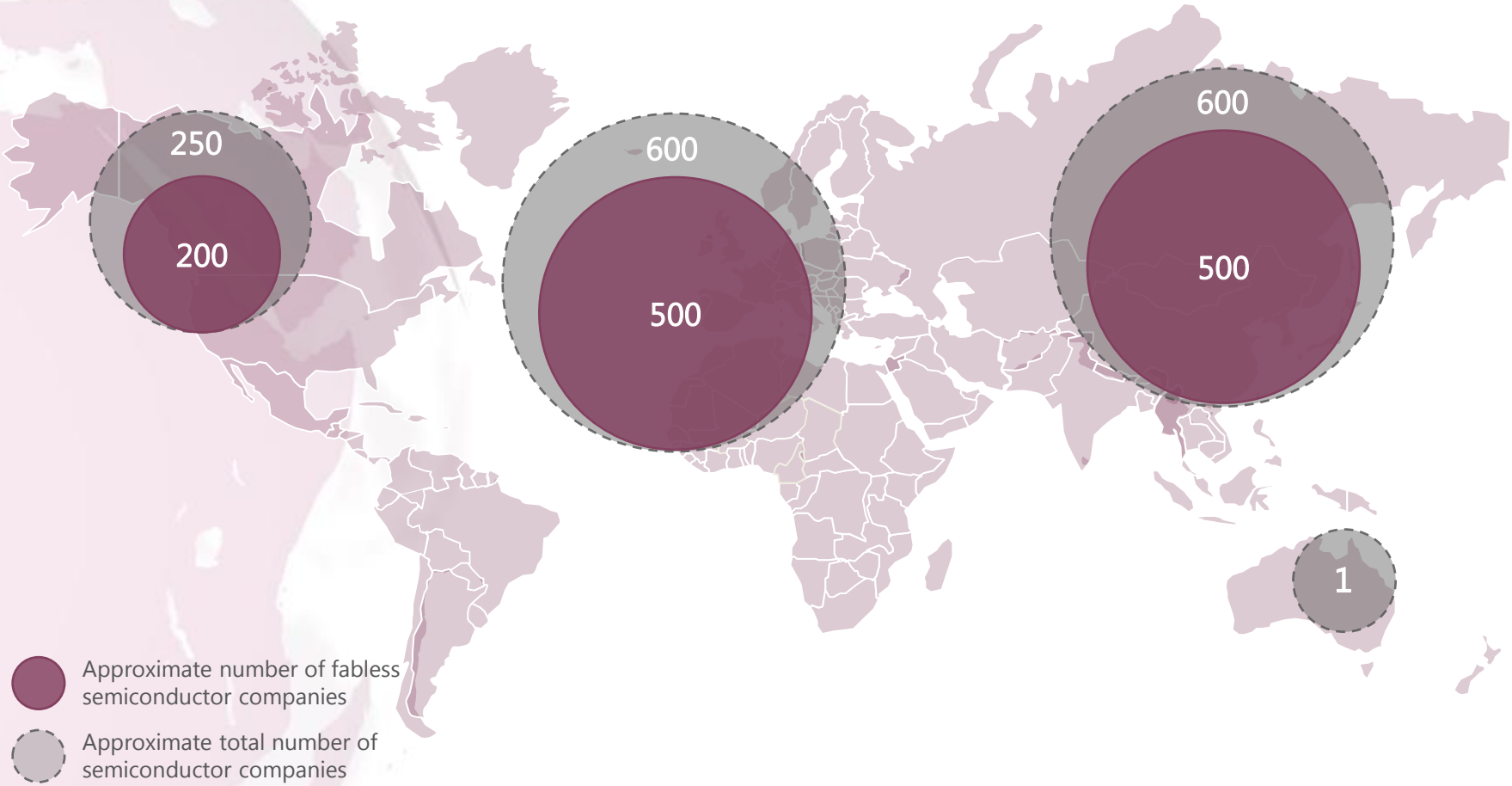
MANUFACTURER	COUNTRY	2014 SALES	% OF TOTAL SALES	MAIN IC BUSINESSES	BUSINESS MODEL
INTEL		38.42	91.9%	Micro-processors	IDM
SAMSUNG		28.25	19.2%	Memory and mobile	IDM
QUALCOMM		14.42	73.0%	Wireless	Fabless
MICRON		12.48	100%	Memory	IDM
SK HYNIX		12.18	100%	Memory chipsets	IDM
TEXAS INSTRUMENTS		9.12	94.0%	Micro-controllers	IDM
TOSHIBA		8.22	18.0%	Memory and consumer	IDM
BROADCOM		6.27	100%	Communications	IDM
NXP		4.22	100%	Mobile and wireless	Fabless
FREESCALE		3.46	100%	Micro-processors, memory	IDM
AVAGO		3.19	100%	Wireless and optoelectronics	IDM

Source: Xerfi Global with GSA and company annual reports

Asia, Europe and North America concentrate the semiconductor industry

Breakdown of overall semiconductor companies by region (2014)

key: circle's diameter proportional to number of semiconductor companies



Source: Xerfi Global with GSA

2. Market Environment and Prospects

Several factors create a favourable scenario for the semiconductor market

PESTEL analysis of the semiconductor industry

	POSITIVE	NEGATIVE	IMPACT
POLITICS	Public support for the industry	Market protectionism	- +
ECONOMY	Asia's and Latin America market potential Growing consumer spending	Slow economic growth in mature markets Weakening economic context in China and other large developing markets	- +
SOCIETY	Population growth in emerging markets Rising demand in the Internet of Things segment	Increasing environmental awareness, particularly in developed markets	- +
TECHNOLOGY	Fast-growing technological innovations	Counterfeits	- +
ENVIRONMENT	Technological innovations improve energy efficiency	Semiconductors' manufacturing processes are in general highly polluting	- +
LEGISLATION	New free-trade agreements	Weak legal protection of intellectual property rights in several countries	- +

An industry driven by the rapid evolution of technology

Semiconductors are vital to many industries	Semiconductors, also known as chips or integrated circuits (ICs), are present in virtually all electronics and appliances, from refrigerators and ovens to flat screen TVs and industrial applications. The industry's main markets are the IT-related businesses: computer, communications and consumer electronics.
A cyclical industry linked to economic growth	The semiconductor industry is directly tied to consumer electronic demand, which, in turn, depends on the health of the economy. After a period of slowdown as a result of the 2008-09 financial and economic crisis, sales recovered in 2010 and 2011 and dropped again in 2012 against the background of economic headwinds that rocked mature economies. In 2013 and 2014 semiconductor sales recovered growth mainly driven by higher demand for new technologies such as mobile devices, cloud computing, tablets, etc.
300mm wafer production prevails, 450mm to come on-stream in 2016-17	•Semiconductor manufacturing involves producing silicon wafers etched with hundreds of micro-processors. They are cut out of the wafer then packaged and sold separately. By manufacturing larger wafers, unit cost is greatly reduced, although initial investment is huge: erecting a modern facility for 300mm wafers requires a minimum of €3bn. •Semiconductors have been increasingly produced on 300 mm wafers, and less on smaller surfaces, however, 200 mm wafers still accounted for a large share of the industry's capacity. Smaller-size wafers are also in use, but their share will gradually decline as the industry is set to embrace the new 450mm wafer technology in the coming years. •A 450mm fab is estimated to cost more than €7bn and a joint venture between Intel, Samsung and TSMC is the only entity to have announced a clear timetable for beginning production. Due to the high investments associated with building 450mm wafer fabs, 300mm sizes will remain mainstream for years to come. In 2016-2017, chips from 450mm wafers are expected to make up for only a small share of production (around 0.1%).
Business models have evolved	More IDM (integrated device manufacturers) are looking to move up the value chain to particularly focus solely on chip design and marketing. This business model is known as 'fabless'. Besides wafer production, they are outsourcing an increasing amount of the back-end processes to low-cost locations (India, China, Vietnam). Outsourcing parts of production to foundries alleviates the high investment associated with building increasingly more complex fabs, but it also increases dependence on suppliers.
The industry moves along Moore's law	Gordon Moore, the co-founder of Intel, stated that the number of transistors that can be placed on a standard processor doubles every 18 to 24 months. His statement holds true to this very day and explains the high pace of innovation in the industry.
The industry is inexorably linked to R&D	Semiconductor manufacturing inherently requires a high level of capital investment, as manufacturing processes and product development are carried out using the latest technologies. Moreover, semiconductor lifecycles are extremely short, thus, continuous research and development is necessary to ensure frequent innovations.

Technological innovations will be the main growth drivers

A fairly resilient industry	The semiconductor industry has been able to weather the fallout from the global financial crisis and realize several years of healthy growth, partially due to the widespread adoption of smartphones, tablets and other new devices that created additional demand. The industry's average annual growth rate between 2009 and 2014 was around 5% and is expected to keep growing at a fast pace in the coming years as new technologies, such as wearables and the Internet of Things, are creating new demand. Furthermore, middle-classes growth in developing markets are also a positive factor for the semiconductor market's short- and middle-term future.
Technology moves towards lower prices and a better functionality	Some of the semiconductor components that are central to most applications are showing much more functionality at lower prices. Newer processors use only about one-tenth of the power that most of previous processors used only two years ago, encouraging customers to replace them. This leap forward in technological capabilities is evolving in several markets, such as that of wearables (i.e. smart-watch), the Internet of Things, and the smartphone market.
Tablets and smartphones continue replacing PCs	Tablets and smartphones and other handheld devices continue being marketed *en masse*, with PCs gradually losing ground. Gartner estimates that tablet shipments will come to make up for as much as half of the number of laptops in just two years' time. Tablets will not only by used at home, but increasingly at work, to help achieve greater productivity. As mobile penetration rates continue to skyrocket across the world driven by emerging Asia, people will produce, share and consume content from everywhere, therefore requiring greater processing power for devices and servers led by increasingly complex applications.
Cloud computing is consolidating	Cloud computing is also gaining momentum. After its sharp growth in developed economies, the great majority of IT decision makers in Asia have already started implementing clouds and are conducting pilot-tests to that end. Furthermore, small and medium enterprises in South East Asia (Indonesia, Malaysia, Singapore and Thailand) are devoting a large share of their investment budget to IT innovations. As businesses will depend more on the cloud to conduct their day-to-day operations, demand for more standardized, open and interoperable cloud computing platforms will increase.

China aims to be the center of gravity of the semiconductor industry

Asia will drive the industry's growth

Asia-Pacific represents around 50% of the world's youth and will also account for nearly half of expected global GDP growth by 2020. In spite of weakening economic growth in some large Asian economies, particularly China, economic development in Asia-Pacific has ushered in an increasingly wealthier and more connected middle-class population which is purchasing more sophisticated devices, spurring higher semiconductor demand. Furthermore, with 300 million people in Asia-Pacific which have not yet gone digital, demand for basic devices is set to expand rapidly in coming years.

The Chinese government aims to boost China' semiconductor industry

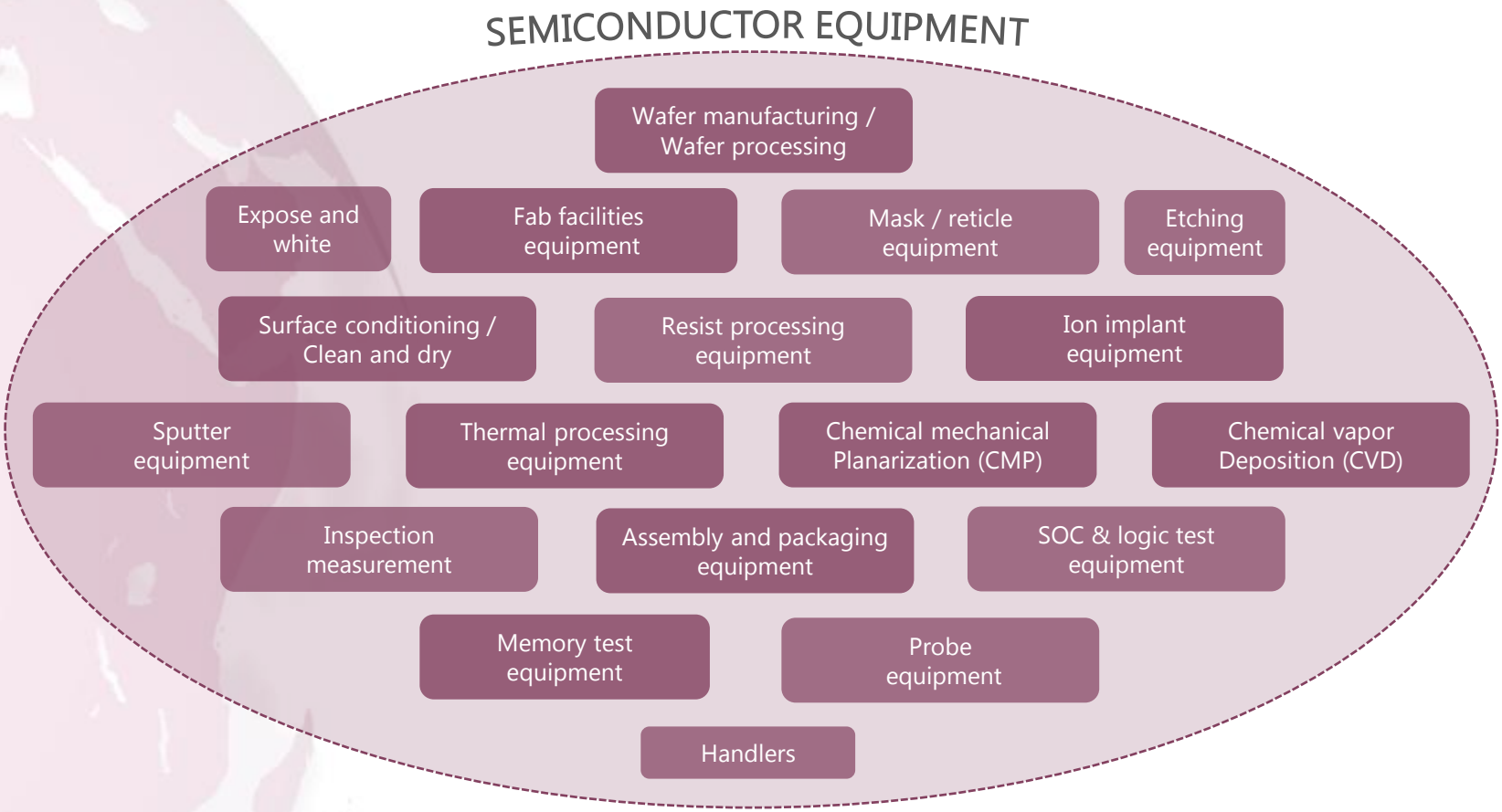
China is the world's largest consumer of semiconductors, with around 45% of the global demand for chips, used both in China and for exports. Nevertheless, around 90% of its consumption relies on imported integrated circuits. IC companies in China entered the semiconductor market relatively late, and have been playing catch-up since in an industry in which success highly depends on scale and learning efficiencies. The Chinese government is now making several attempts and putting significant funding and efforts behind new policies to build a local semiconductor industry. As a result, multinational corporations in several industries are increasingly establishing design centres on the mainland to be closer to customers and benefit from local Chinese talent. As the migration of design continues, China could soon influence up to 50% of hardware designs globally, including smartphones, wireless devices, and other consumer electronics.

Fabless semiconductor companies also emerge in China

Fabless chipmakers are emerging in China to serve local customers. For reasons including costs, scale, and export controls among others, fabless players traditionally have been reluctant to invest in cutting-edge technologies, always lagging three or four years behind the industry leaders. Nevertheless, today the performance gap is shrinking and global players such as Samsung, Taiwan Semiconductor Manufacturing Company and Texas Instruments are setting up shop in China, leading local foundries poised to benefit from the development of a true technology cluster.

Semiconductor groups design and manufacture a wide range of products

Summary of different types of categories of semiconductor equipment



Source: Xerfi Global with SEMI

The semiconductor industry is highly reliant on the economic context…

World consumer spending and GDP

units: change in real spending and GDP in %

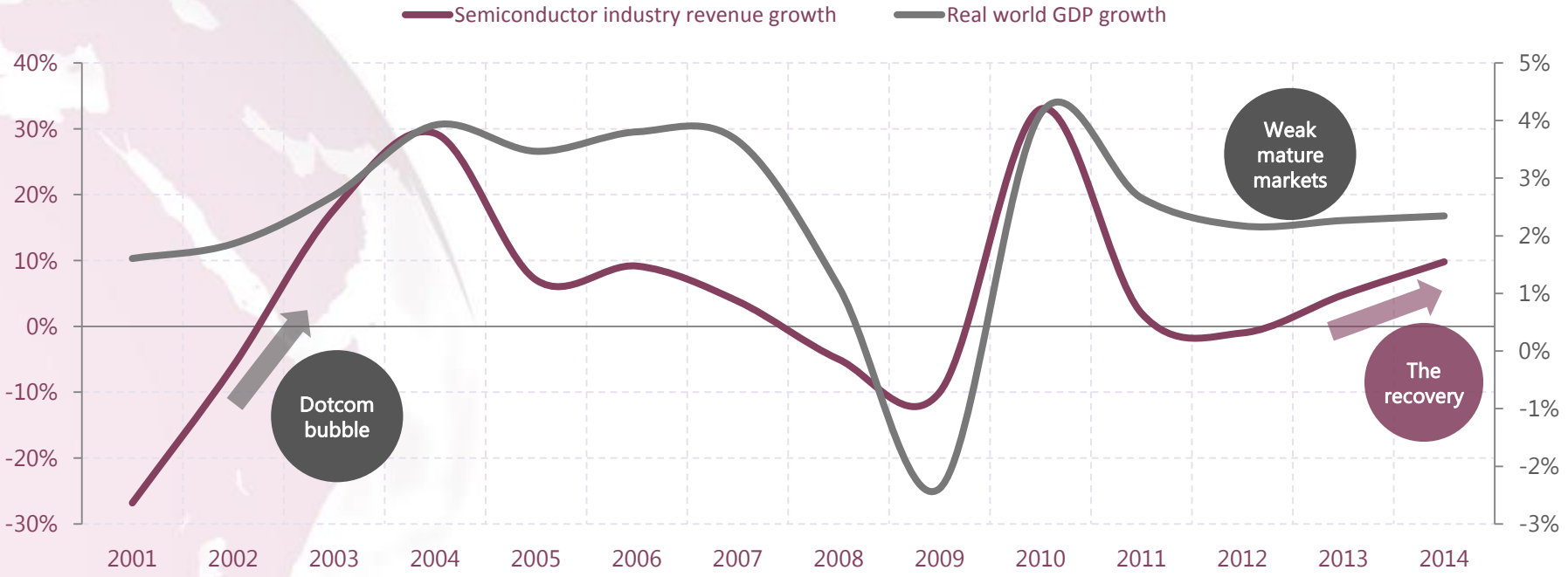
Source: Xerfi Global estimations and forecasts with national statistics bodies

The growth of the semiconductor industry is highly related to the economic context. After recording a considerable slow-down between 2011 and 2012, in 2014 the global economy showed signs of recovery that opened the door for optimistic forecasts in the coming years. Nevertheless the world's GDP and consumer spending, which are two important indicators in the semiconductor industry, are not expected to experience significant growth as the effects of the Eurozone crisis and austerity policies are still present, and the economic growth of some large emerging economies (China, Brazil, India…) slowed down during 2014 and the first half of 2015.

...and it is expected to grow in line with the world's GDP

World semiconductor sales and world GDP growth, 2001-2014

unit: annual % change in revenue (left axis); annual % change in real world GDP (right axis)



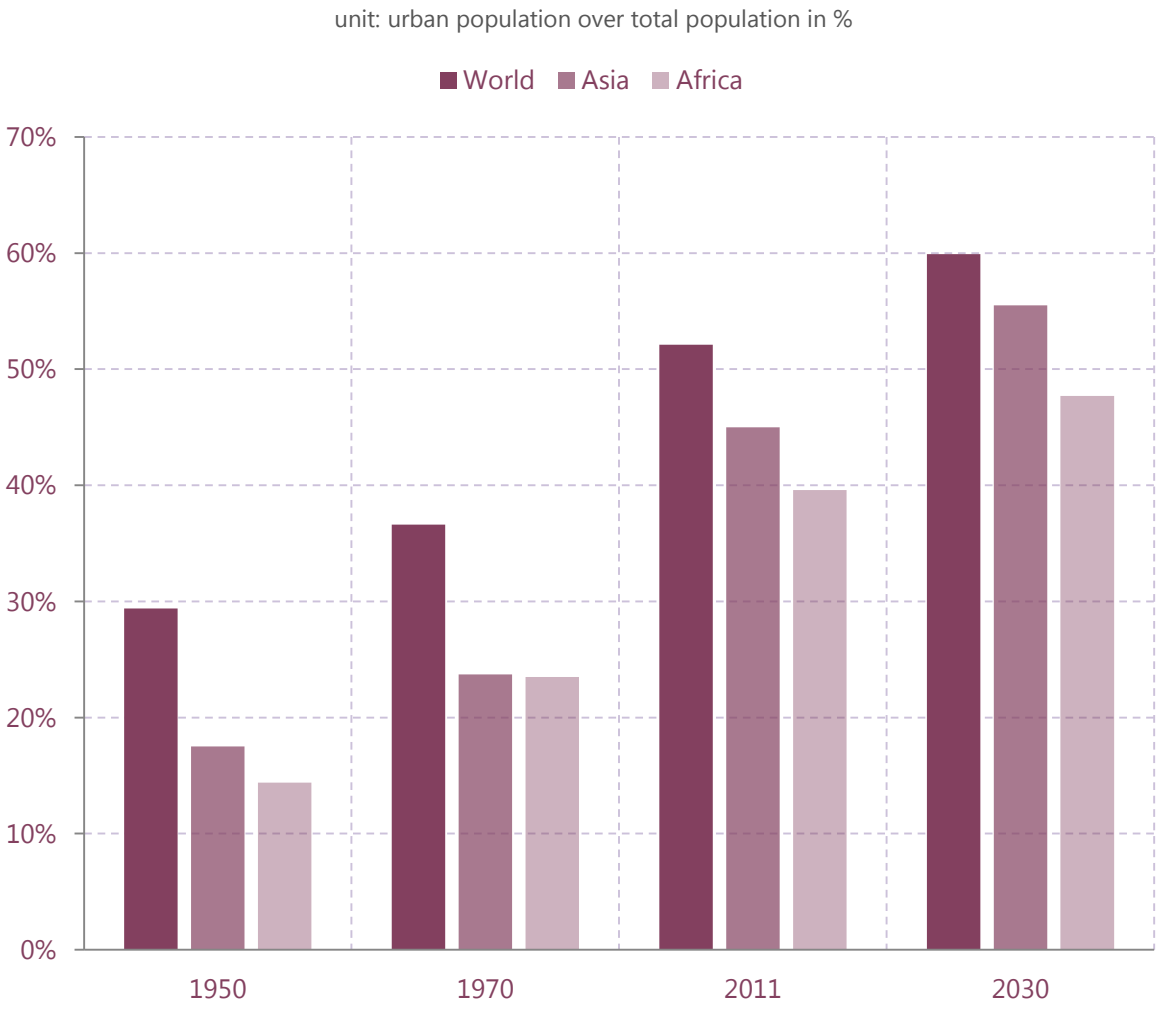
Source: Xerfi Global calculations with GSA and PWC

Demand for semiconductors is highly dependent on economic cycles. Periods of fast expansion, with high investment and equipment spending, leads to stages of overcapacity and price decreases, which ultimately results in declining sales. Over the past decade, the increased usage of semiconductors in an ever-expanding range of applications as well as increasing product functionality has driven industry growth. Nevertheless, semiconductor growth was interrupted as a result of the 2008-09 crisis and the 2011-12 global economic settings. In 2013 and 2014 the semiconductor market left the red and went up by 4.8% and 9.8% respectively. As mobile device demand will continue to rise, the chip making sector is expected to experience a moderate recovery also backed by a higher global economic output.

Higher urbanisation rates also favour semiconductor demand

Household income will grow and consumption patterns will change as educated labour forces expand, urbanization progresses, investment in social infrastructure increases and the relative importance of economic sectors shifts within emerging economies. The growing global middle class will expect to enjoy standards of living comparable to those in developed economies. In 2009, for the first time in history, more people lived in cities than in rural areas. By 2030, the world's urban population is calculated to reach 4.9 billion with all developing regions, including Asia and Africa, having the majority of their citizens living in urban areas.
As population grows, demand for international goods and services increases, as does semiconductors demand.

Rate of urbanisation in selected regions

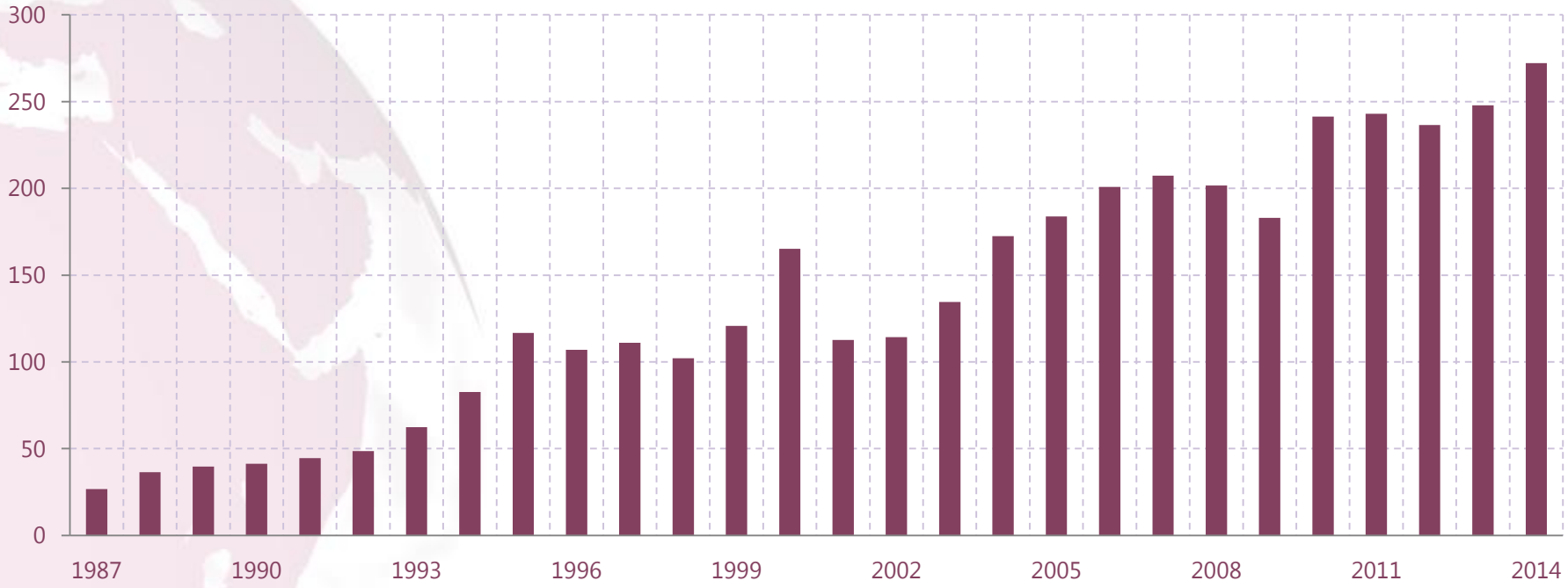


Source: Xerfi Global with UN World Urbanization Prospects The 2013 Revision

In 2014 the industry reached a new record high

Global semiconductor sales (1987 – 2014)

unit: billion euros

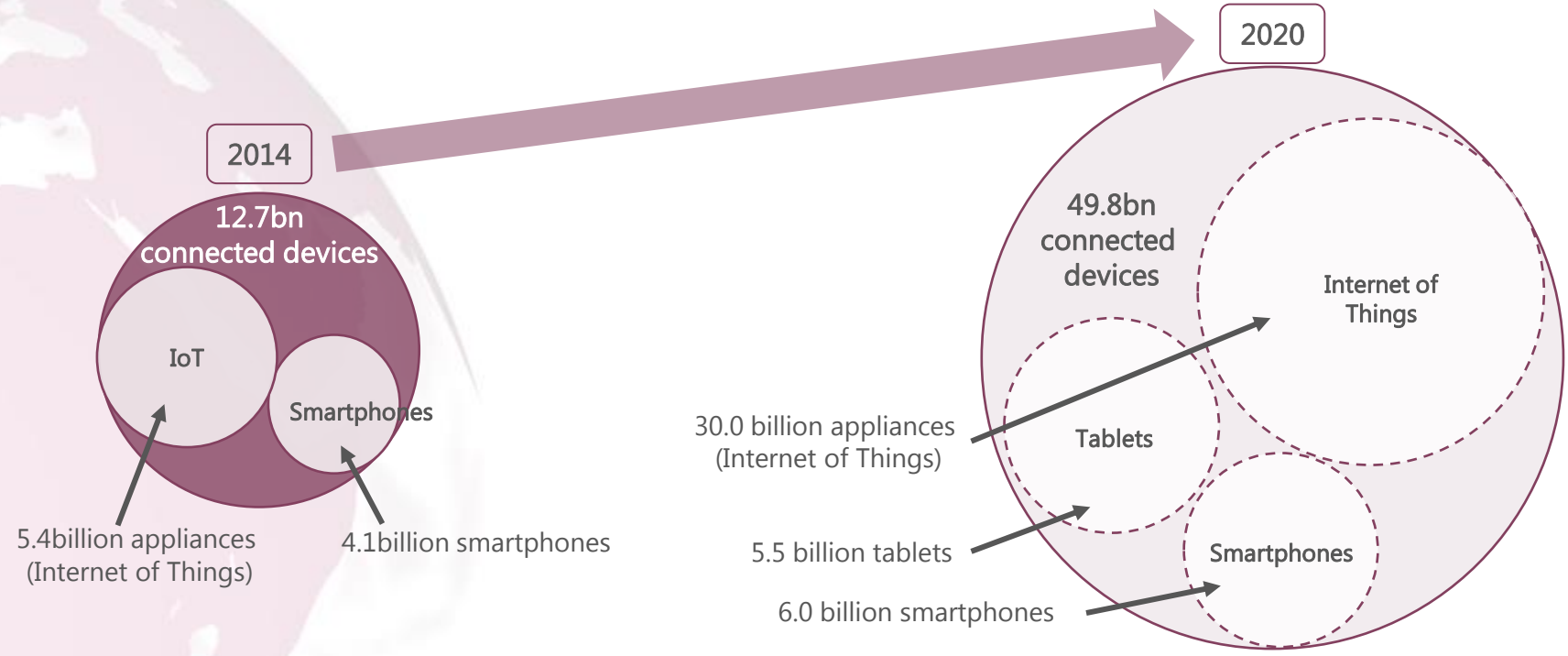


Source: Xerfi Global with WSTS

In 2014, global semiconductor revenues increased for the second consecutive year and set a new historic record high (€272.16 billion). After two periods of bust (the dotcom bubble crisis at the beginning of the 2000s and the 2008-09 recession) industry revenues climbed to all time highs in 2011 and 2014. The impact of weak economic growth in mature markets combined with lower demand for PC transistors resulted in a new drop in market value in 2012, although the market recovered and reached a new record mainly driven by higher demand in developing markets and the fast-growing mobile and automotive markets. In the medium term, the industry is likely to see moderate overall growth (around 4% yearly). Sales will be boosted by emerging markets (shift from 2G to 3G, increased digital awareness) and technological improvements in developed countries (4G, growing demand for smartphones, tablets and next-generation cars). Nevertheless, it will also be offset by tighter and stagnant consumer spending in several large mature markets and the slowing economic growth in countries such as China, India and Brazil.

Demand is further driven by increasing connectivity…

Overview of connected devices (2014-2020)



Source: Xerfi Global with IDC and PwC

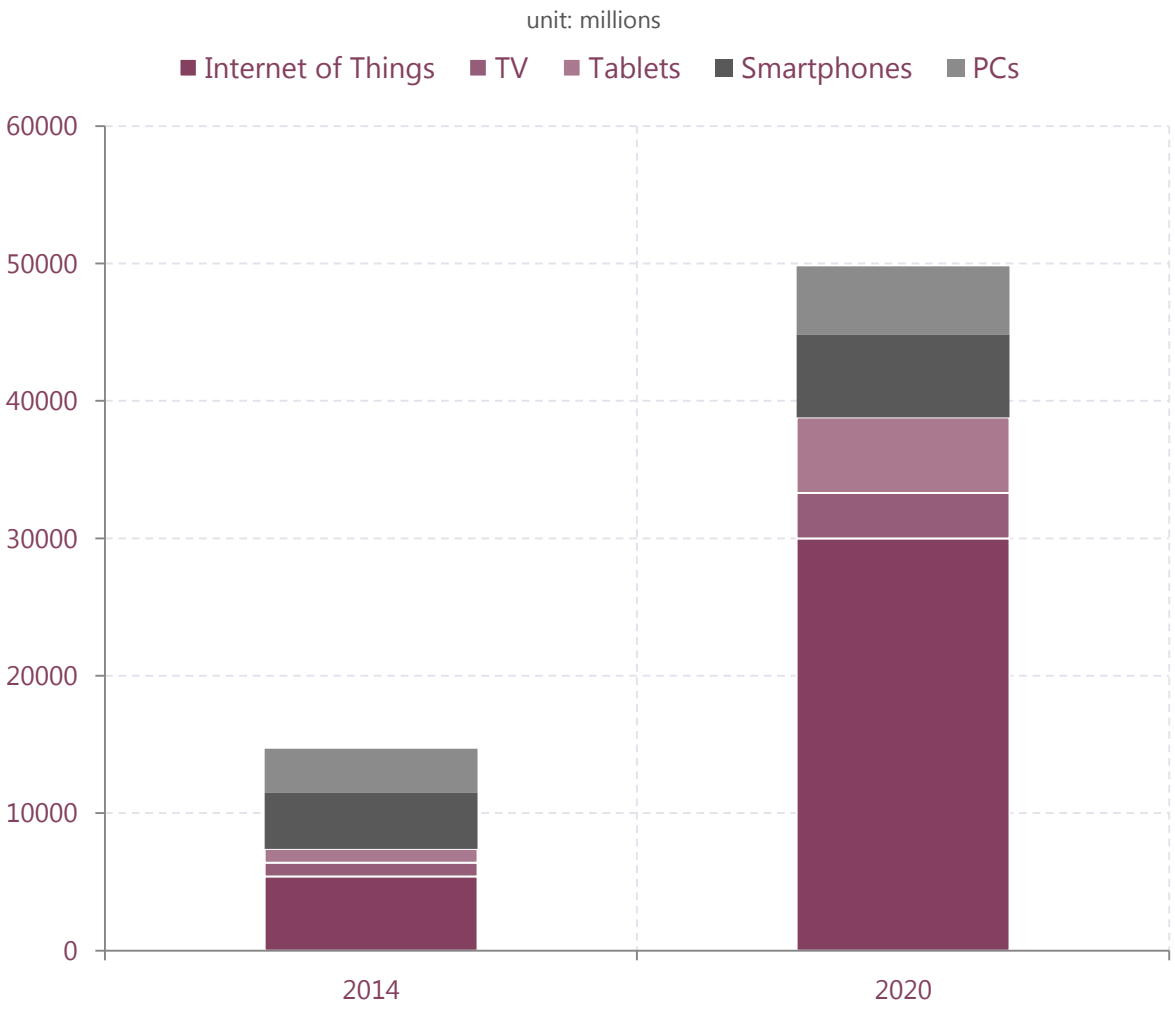
Semiconductor groups are developing new chips in line with demand for smaller, faster and higher quality devices. These next-generation semiconductors will allow mobile applications and connected appliances to take advantage of high-speed data connections and high-performance chipsets, which equally enhance processing capabilities and battery lifetime as the global mobile data traffic is set to increase 9 times between 2014-17.

...mainly new connected home appliances, tablets, smartphones and TVs

By 2020, the number of connected devices is expected to almost triple from that of 2014, jumping from 14,700 million connected devices to 49,800 million. Each of these devices will require, at a minimum, a microcontroller to add intelligence to the device, one or more sensors to allow for data collection, one or more chips to allow for connectivity and data transmission, and a memory component. For semiconductor players, this represents a direct growth opportunity that goes beyond almost all other recent innovations, with the exception of smartphones.

The irruption of the Internet of Things will lead to a wide range of new connected appliances that will change consumer's daily. The IoT is expected to increase faster than any other device category, and it will represent more than 60% of all the devices in the world, up from the 36% in 2014. The number of tablets, smartphones and connected TVs will also experience considerable growth in the five coming years.

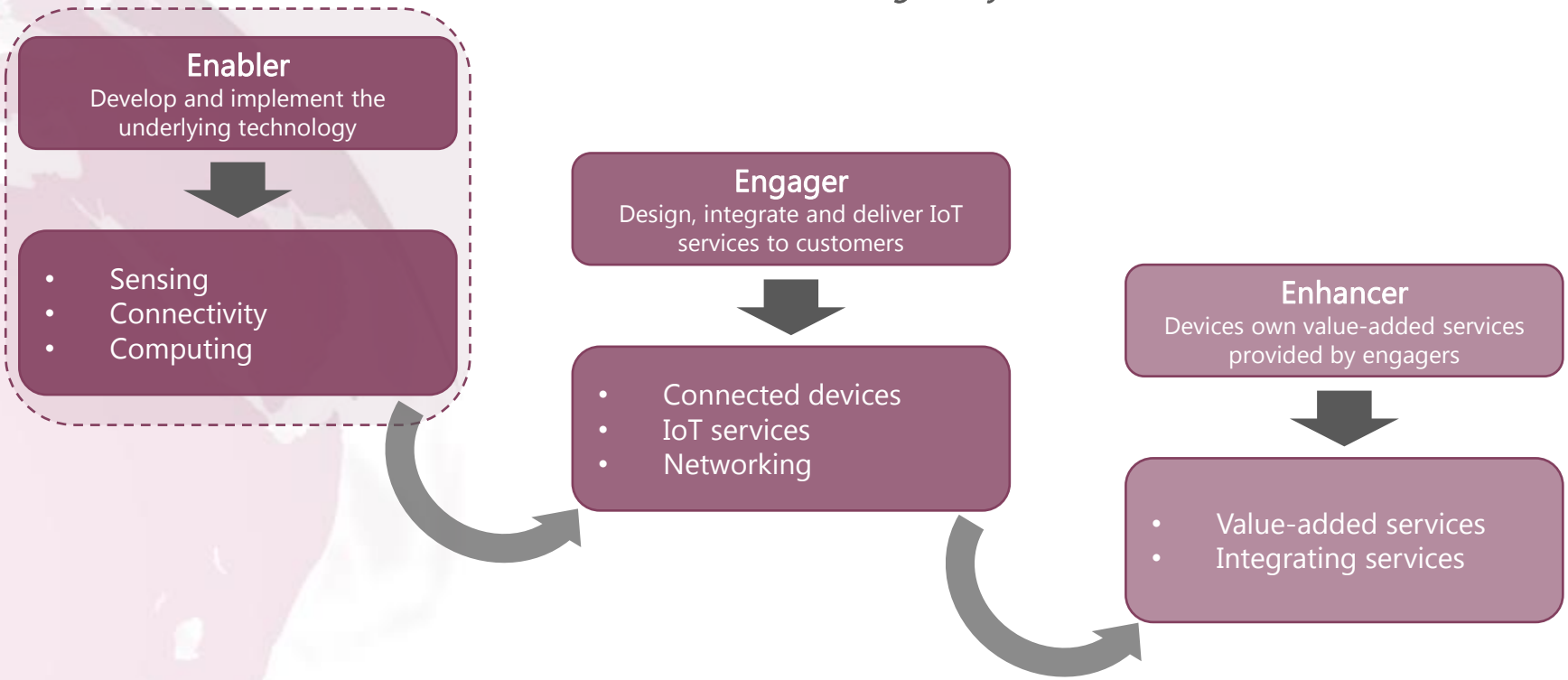
Number of connected devices (2014 – 2020 forecast)



Source: Xerfi Global with IDC

Semiconductor groups are at the heart of the Internet of Things

Overview of the Internet of Things ecosystem



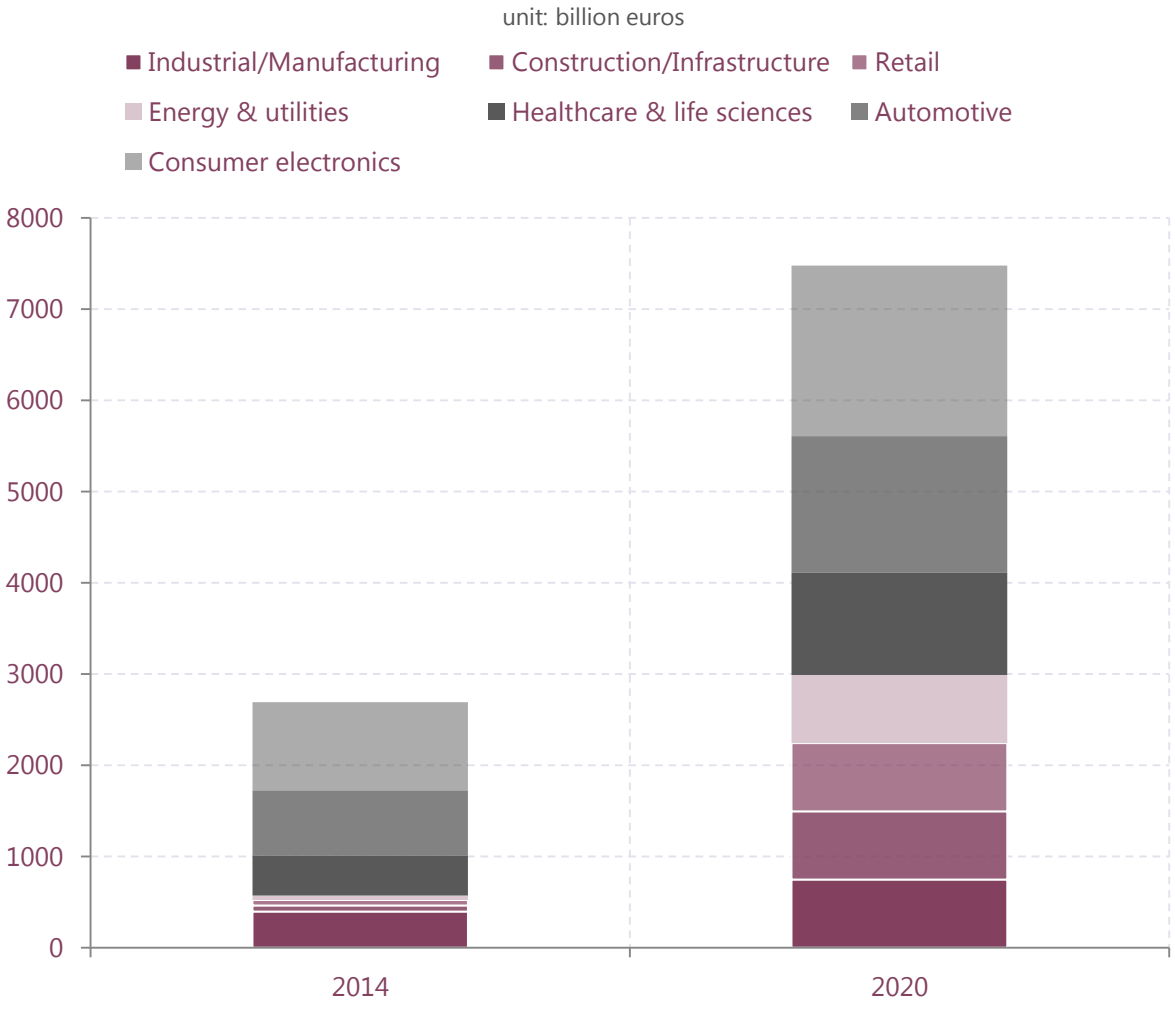
Source: Xerfi Global

Semiconductor companies could be classified as "enablers" as they provide the technology building blocks for the "things" within the Internet of Things. These infrastructure components help collect, process, and transmit real world signals and data for IoT products and applications. Sensing, connectivity and computing are essential capabilities for the IoT ecosystem and convenient categories for analysing market trends. Among these three categories, the market for sensing in IoT applications is expected to grow the fastest, at a CAGR of more than 40%, followed by computing and connectivity at almost 30% CAGR between 2014 and 2020. Computing is expected to account for more than half of the total IoT semiconductor revenues, with the remainder of the revenues being split almost equally between sensing and communications device types.

Cars, consumer electronics and healthcare devices will boost the IoT

The emerging Internet of Things encompasses a large range of segments in different sectors of the economy and people's life.
In 2014, consumer electronics and automotive were the two largest segments in the Internet of Things market, accounting for 35.9% and 26.5% respectively in terms of value. By 2020 these two segments are expected to double their value in the Internet of Things market, while other segments such as retail, construction and energy will multiply their value more than tenfold. In total, the IoT market value will jump from €2.69 billion in 2014 to €7.47 billion in 2014, a 177.4% increase.

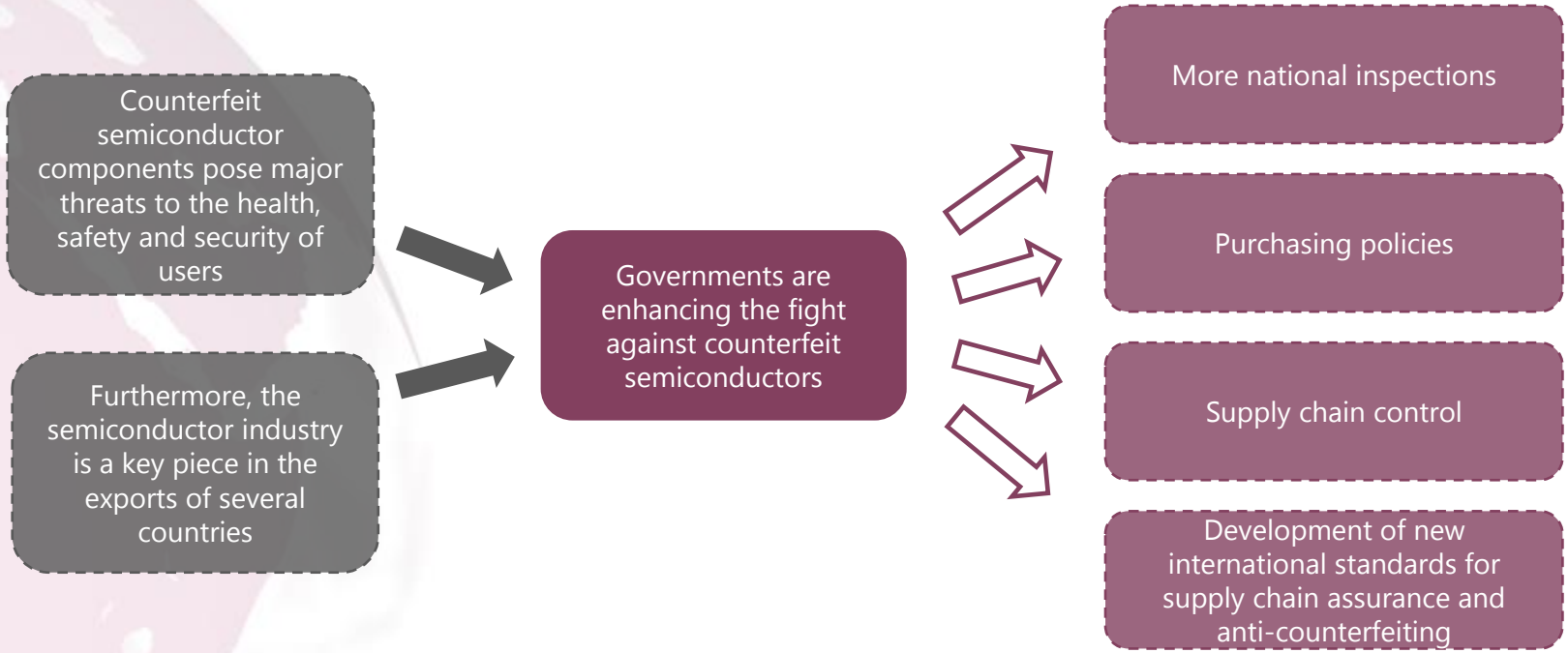
Internet of Things' market size by segment (2014 – 2020 forecast)



Source: Xerfi Global with IDC

Governments are putting pressure on counterfeit semiconductors

Overview of risks related to counterfeited semiconductor products



Source: Xerfi Global

Semiconductors are embedded into countless products and systems that perform critical functions and the failure of a single component in one of these products or systems can have dramatic consequences. While some counterfeited products, such as jewellery and apparel, result in economic harm and do not endanger consumers, counterfeit semiconductors can be particularly dangerous depending on their end application and, in addition, have a strong negative impact on the industry. As a result, several governments are strengthening the legal fight against counterfeit semiconductor products. Public national and international agencies are working closely with distributors and customers to reduce semiconductors counterfeits.

Technological advances bring new virtual storage units

Data size table and examples

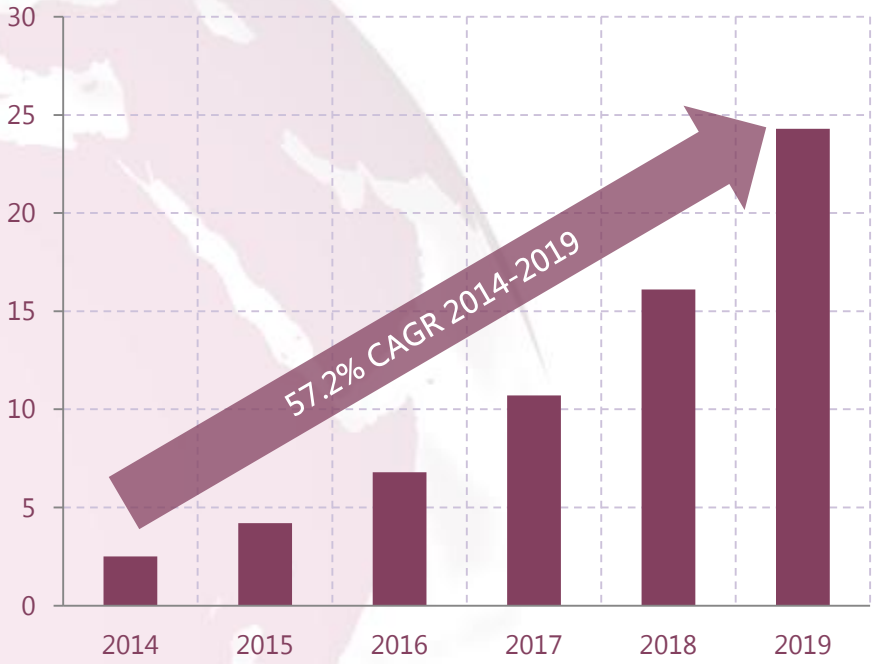
Unit	Description	Example
Bit	A Bit is the smallest unit of data that a computer uses. It can be used to represent two states of information, such as Yes or No.	-
Byte	A Byte is equal to 8 Bits. A Byte can represent 256 states of information, for example, numbers or a combination of numbers and letters.	1 byte = 1 character 10 bytes = one word
Kilobyte	A Kilobyte is approximately 1,000 Bytes, actually 1,024 Bytes depending on which definition is used.	1 kilobyte = one paragraph 100 kilobytes = one page
Megabyte	A Megabyte is approximately 1,000 Kilobytes. In the early days of computing, a Megabyte was considered to be a large amount of data. These days with a 500 Gigabyte hard drive on a computer being common, a Megabyte doesn't seem like much anymore.	1.44 megabytes = small book 600 megabytes = CD-ROM
Gigabyte	A Gigabyte is approximately 1,000 Megabytes. A Gigabyte is still a very common term used these days when referring to disk space or drive storage.	1 gigabyte = 10 yards of books on a shelf
Terabyte	A Terabyte is approximately one trillion bytes, or 1,000 Gigabytes. Today one and two terabyte drives are the normal specs for many new computers.	1 terabyte = 3.6 million of high resolution images 1 terabyte = 300 hours of high quality video
Petabyte	A Petabyte is approximately 1,000 Terabytes or one million Gigabytes.	1 petabyte = 500 pages of standard printed text
Exabyte	An Exabyte is approximately 1,000 Petabytes or approximately one quintillion bytes or one billion Gigabytes. There is not much to compare an Exabyte to. It has been said that 5 Exabytes would be equal to all of the words ever spoken by mankind.	1 exabytes = the global monthly Internet traffic in 2004
Zettabyte	A Zettabyte is approximately 1,000 Exabytes	1 zettabyte = all the information sent through broadcast technology (tv, GPS, ...) in 2007
Yottabyte	A Yottabyte is approximately 1,000 Zettabytes. It would take approximately 11 trillion years to download a Yottabyte file from the Internet using high-power broadband.	1 yottabyte = the entire internet traffic in 2015
Brontobyte	A Brontobyte is approximately 1,000 Yottabytes.	-

Source: Xerfi Global with CISCO and Smartdata Collective

Growing mobile, video and data traffic will require more powerful chips

Exabytes per month of mobile data traffic (2014-2019)

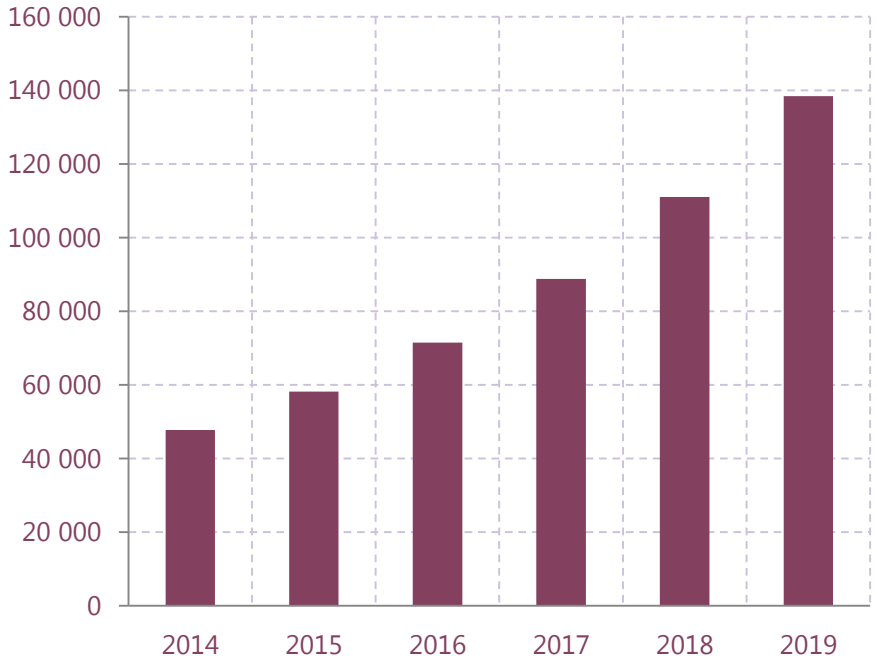
unit: exabytes per month



Source: Xerfi Global with CISCO

Global data volume created (2014-2019)

unit: petabytes per month



Source: Xerfi Global with CISCO

As video and data traffic is increasing worldwide, global data volume is set to rise ten-fold over the 2014-2019 period. Overall, mobile data traffic is expected to grow to 24.3 exabytes per month by 2019, nearly a tenfold increase over 2014.

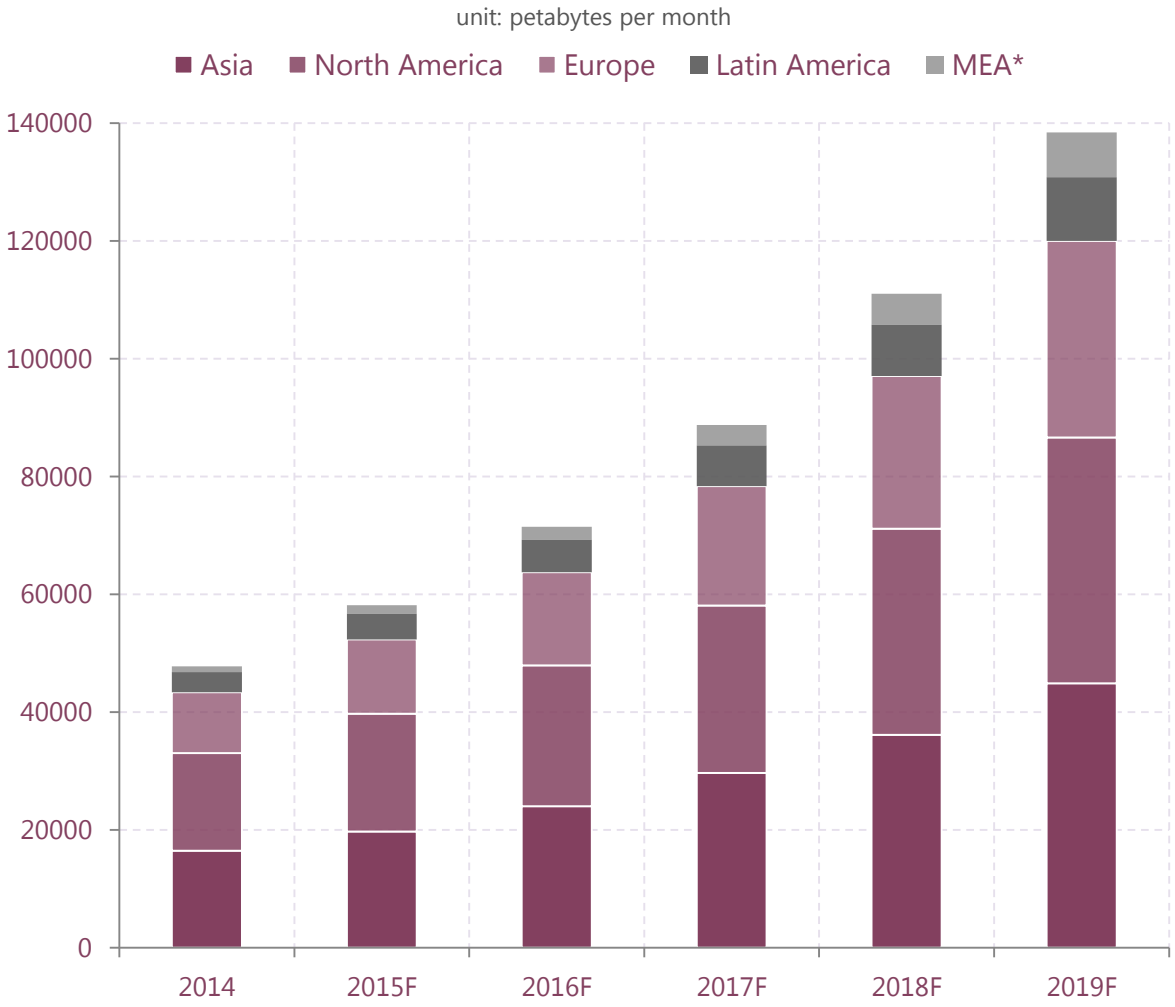
Global internet traffic is growing sharply

Total internet traffic has experienced dramatic growth in the past two decades. In 1992, global Internet networks carried around 100 GB of traffic per day. Ten years later, in 2002, global internet traffic amounted to 100 GB per second, and in 2014, global internet traffic reached 16,144 GB per second.

Annual global IP traffic will pass the zettabyte (1,000 exabytes) threshold by the end of 2016, and will reach 2 zettabytes per year by 2019. Global IP traffic has increased fivefold over the past five years, and will increase threefold over the next five years. Overall, IP traffic will grow at a compound annual growth rate of 23% from 2014 to 2019.

IP traffic will grow faster in the Middle East and Africa, followed by Asia. In 2016, Asia's IP traffic will overcome that of North America. In 2014, these two regions accounted for 34.4% and 34.8%. As other regions are developing fast, Asia and North America will continue leading the global consumer IP traffic, although its share will drop slightly to 32.4% and 30.1% respectively.

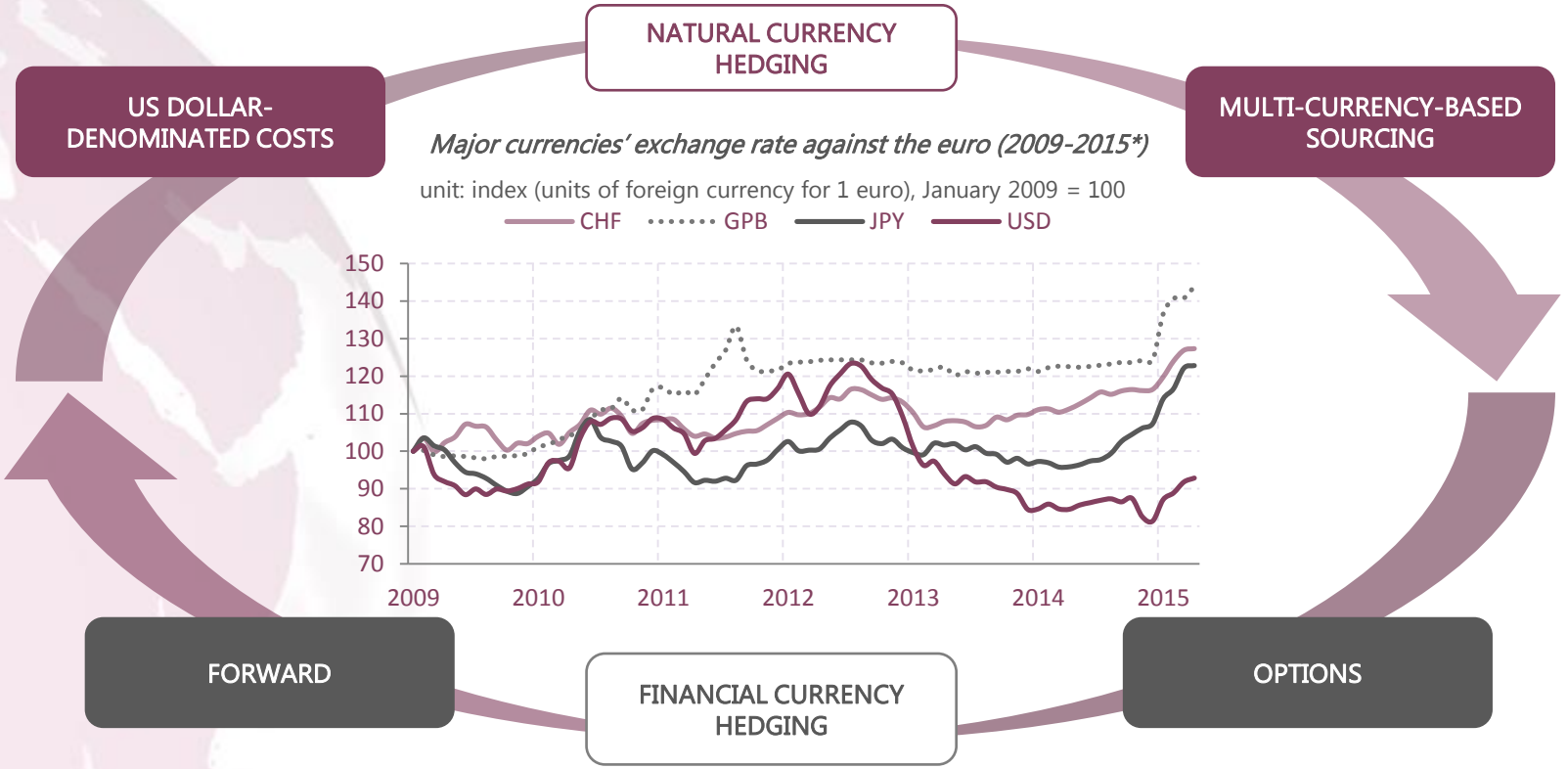
Regional breakdown of volume of global consumer IP traffic (2014-2019)



Source: Xerfi Global with Statista; *Middle East and Africa

Semiconductor groups must reduce exposure to currency volatility

Currency hedging methods used by semiconductor groups

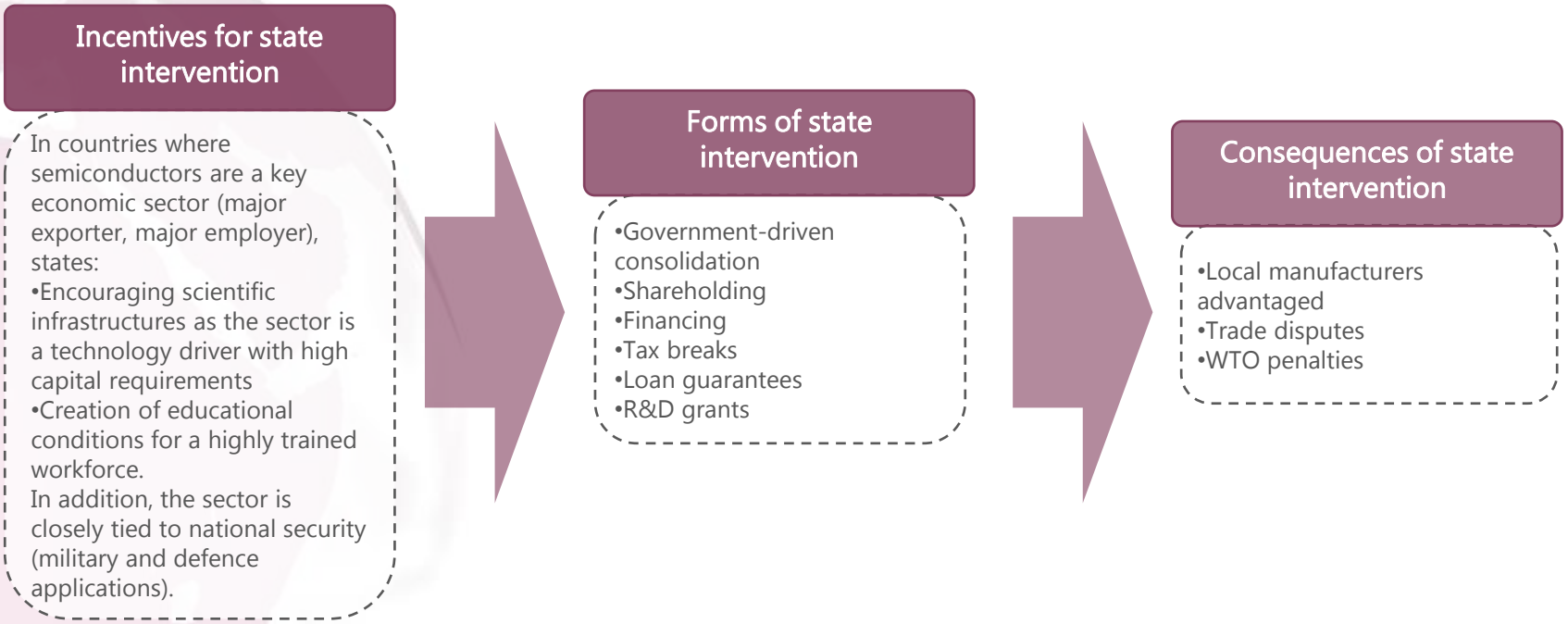


In the semiconductors industry, products are generally sold in US dollars, while several groups sell their components in euros, Japanese yens and other major currencies. Exchange rate fluctuations therefore have a direct impact on these groups with a significant portion of costs in other currencies. This is particularly true for European manufacturers, who saw the dollar weaken against the euro by around 60% over 2003-2013, putting pressure on their margins, and nowadays see the euro weakening against the dollar to historic records. To reduce exposure, manufacturers have two options: hedging with financial instruments, which implies extra charges, or increasing the level of multi-currency based sourcing.

Source: Xerfi Global with INSEE data; * 2015 data until April

States often interfere in countries where the industry is key

State intervention in the semiconductor manufacturing industry: incentives, forms and consequences

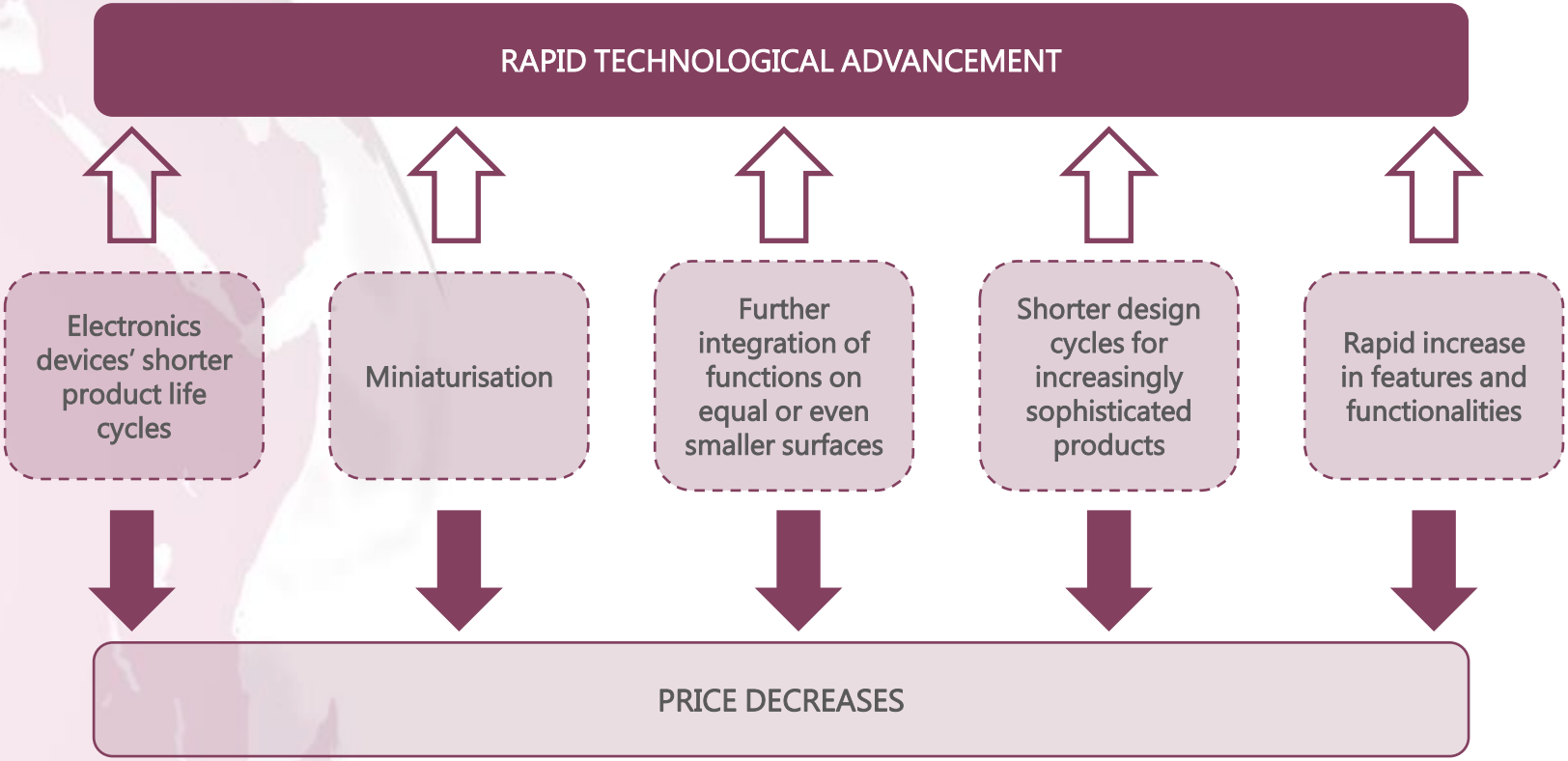


Source: Xerfi Global with USITC

State intervention, meant to boost the development of the semiconductor industry, was commonplace in several countries and often led to international friction. One controversial episode took place in the 1980s, between the US and Japan. At the time the Japanese government went to lengthy measures to encourage development of its domestic semiconductor industry: Japanese firms were protected from import competition and were exempted from anti-monopoly laws, thus, ample joint R&D projects were carried out. These factors, combined with direct subsidies and loans at low interest rates led to rapid technological advancement of the Japanese semiconductor industry. At the end of 2012, a Japanese government-led investment fund purchased about two-thirds of Renesas' stocks, in a move to save the ailing company. The fund plans to make massive changes, including shedding 5,000 jobs and merging the company's LSI business with similar divisions of Fujitsu and Panasonic.

Technology obsolescence is quick and results in price decreases

Drivers of semiconductor industry technological advancements

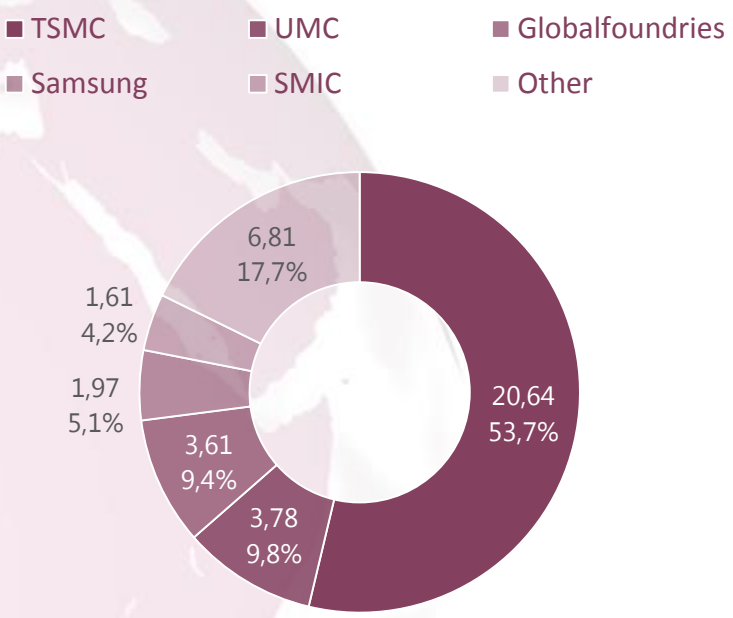


Source: Xerfi Global

TSMC represents more than half of the semiconductor foundries market

Top 10 global semiconductor foundries (2014)

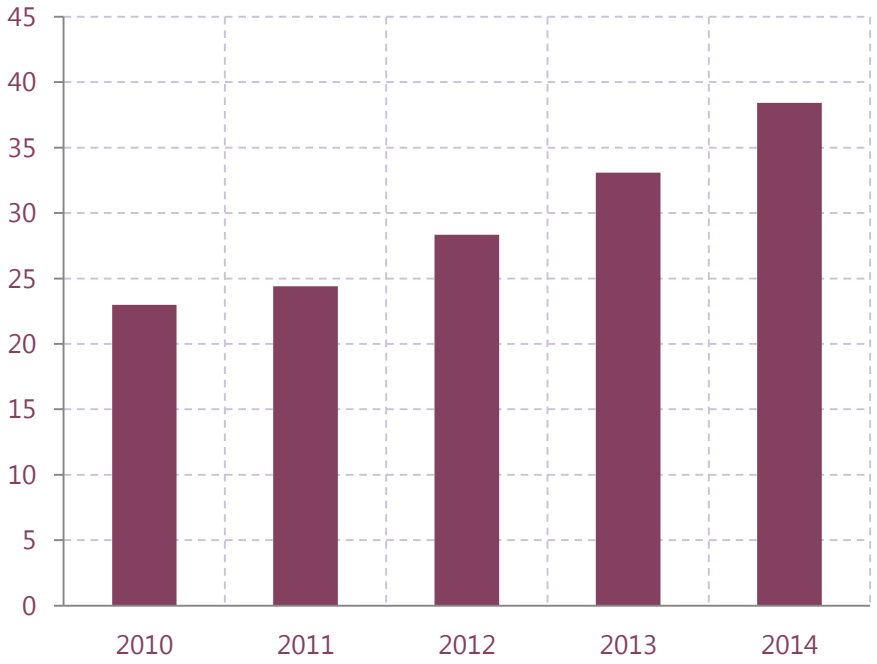
unit: billion euros; % market share



Source: Xerfi Global with Gartner

Global semiconductor foundry market (2010-2014)

unit: billion euros



Source: Xerfi Global with Gartner

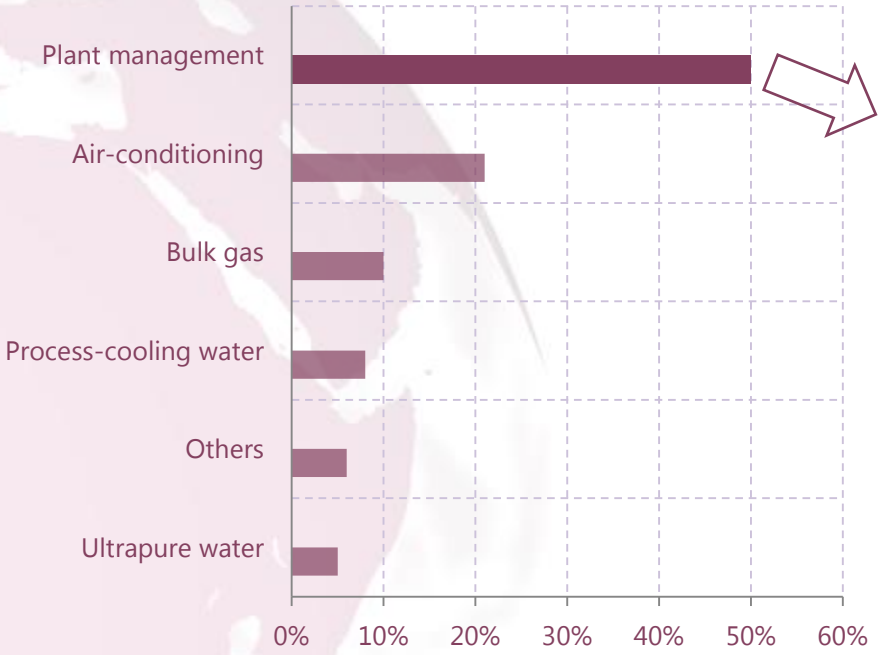
In 2014, the global semiconductor foundry industry went up for the third consecutive year and rose by 16.1%, reaching 38.42 billion euros. While traditional notebook and desk-based PC unit production declined and mobile phone unit production grew at a relatively low pace, ultramobile unit production grew faster in 2014. This fact, coupled with the hype surrounding the Internet of Things, including wearable and smart watches, prompted some players to stockpile off-the-shelf chips as early as 2014, in order to prepare for new product announcements.

TSMC, the leader in semiconductor foundry, increased its market share in 2014 to 53.7% mainly due to the success of its advanced technologies of 20 and 28 nanometers. In the second position, United Microelectronics Corporation's sales represented 9.0% of the foundry market, closely followed by Globalfoundries (9.4%). The foundry market is expected to remain a seasonal industry due to the scheduled introduction of electronics equipment, and therefore the second and third quarters will be the strongest quarters every year.

A 450-mm fab could reduce energy costs by 30%

Breakdown of estimated potential savings of 300-mm fab

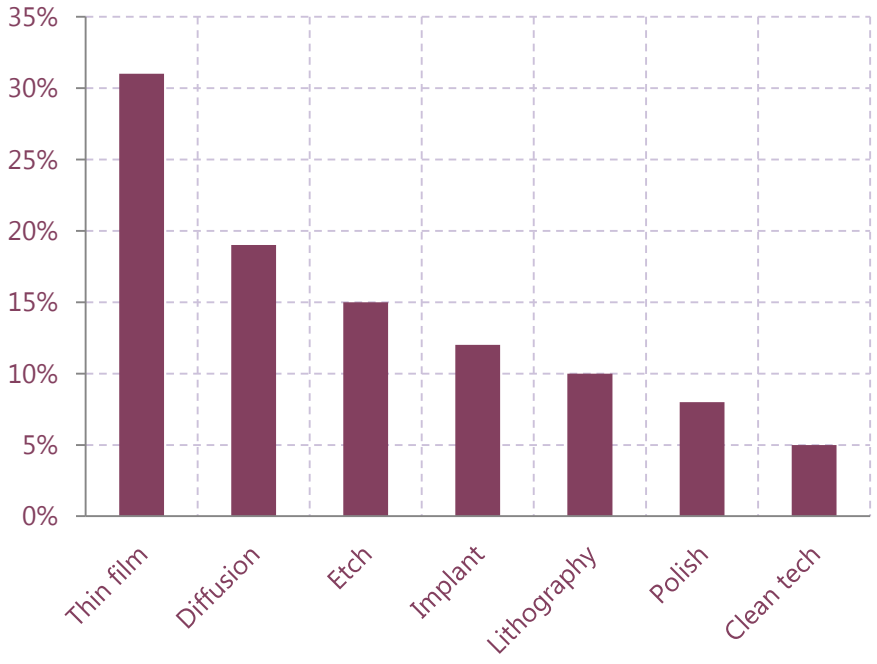
unit: % savings



Source: Xerfi Global with iSupply

Estimated potential savings in specific management processes

unit: % savings



Source: Xerfi Global with iSupply

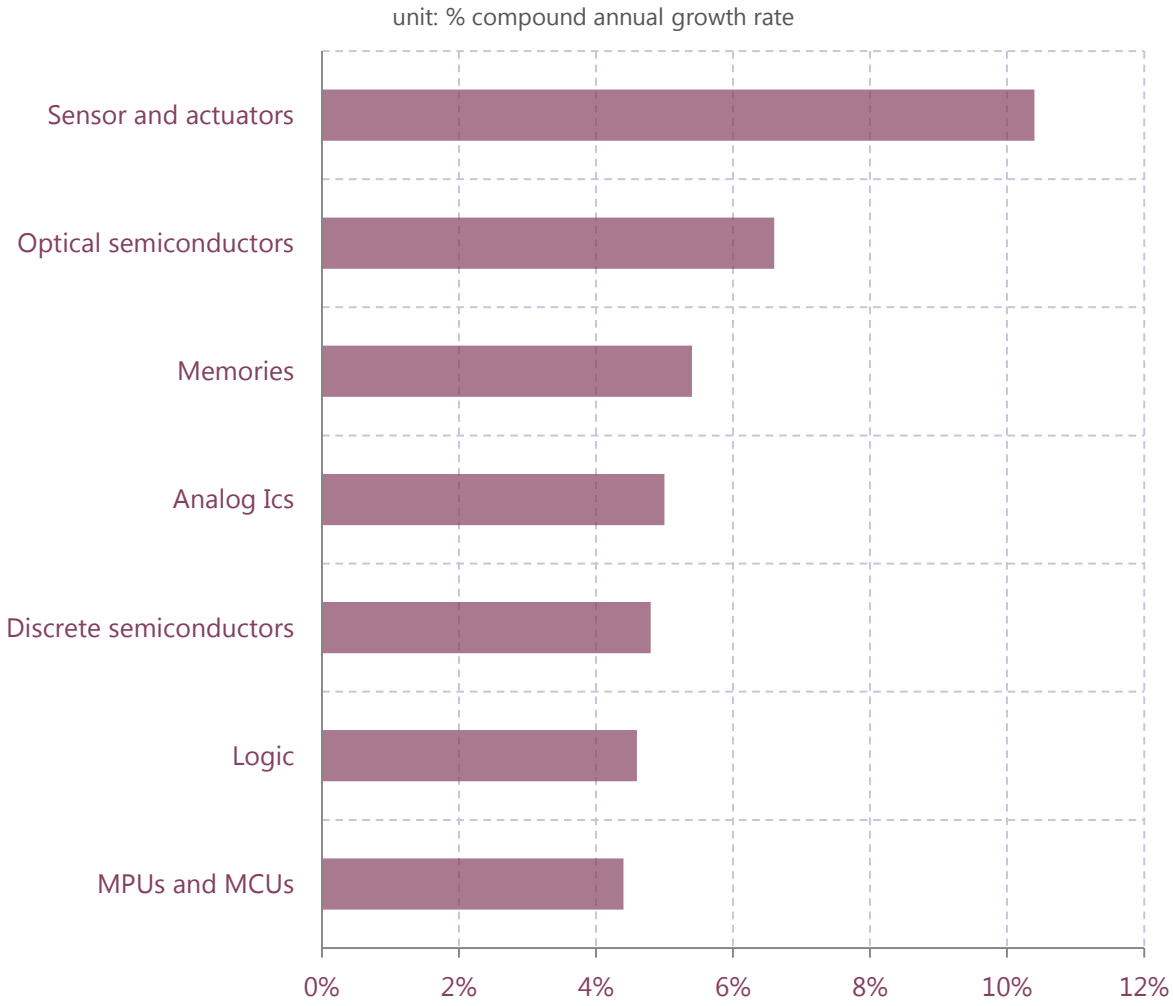
Large semiconductor fabs use as much as 100 megawatt-hours of power each hour, which is more than many automotive plants or oil refineries and the equivalent of around 50,000 homes. In some markets, electricity accounts for up to 30% of fab operating costs, so there is significant opportunity in rethinking power usage and management.
Integrated device manufacturers and foundries have invested to achieve energy-efficient solutions. Through the years, the industry has made productivity improvements by transitioning to larger wafer sizes: 300 mm by 2000 from 150 mm in the early 1980s. Today all leading-edge production occurs on 300 mm wafers. The industry's next step is to switch to 450 mm wafers, which could provide a 125% increase in area compared with the current 300 mm wafer and would lower labor costs, although the equipment cost will increase considerably. Furthermore, it will led to a reduction in energy cost that could decrease fab's electricity expenses by 30%.

The Internet of Things will boost sales of sensors and actuators

Looking at the global semiconductor market in terms of installed components, logic integrated circuits (ICs) will remain the largest single segment in the five coming years. Nevertheless, the highest growth rate will be seen in the sensors and actuators segment, with a forecasted CAGR of 10.4% for the 2014-2020 period. It will be followed by optical semiconductors (+6.6% CAGR), memories (5.4% CAGR) and analog integrated circuits (+5.0% CAGR) for the same period.

Key drivers for the growth forecasted by component will be mainly found in the application markets, particularly for smartphones, cars, and consumer electronics. In the case of sensors and actuators, the emerging Internet of Things will be a key growth driver as sensors enable the collection of changes in a range of ambient conditions that are essential for this new market.

Breakdown of CAGR forecasted by component (2014-2020)

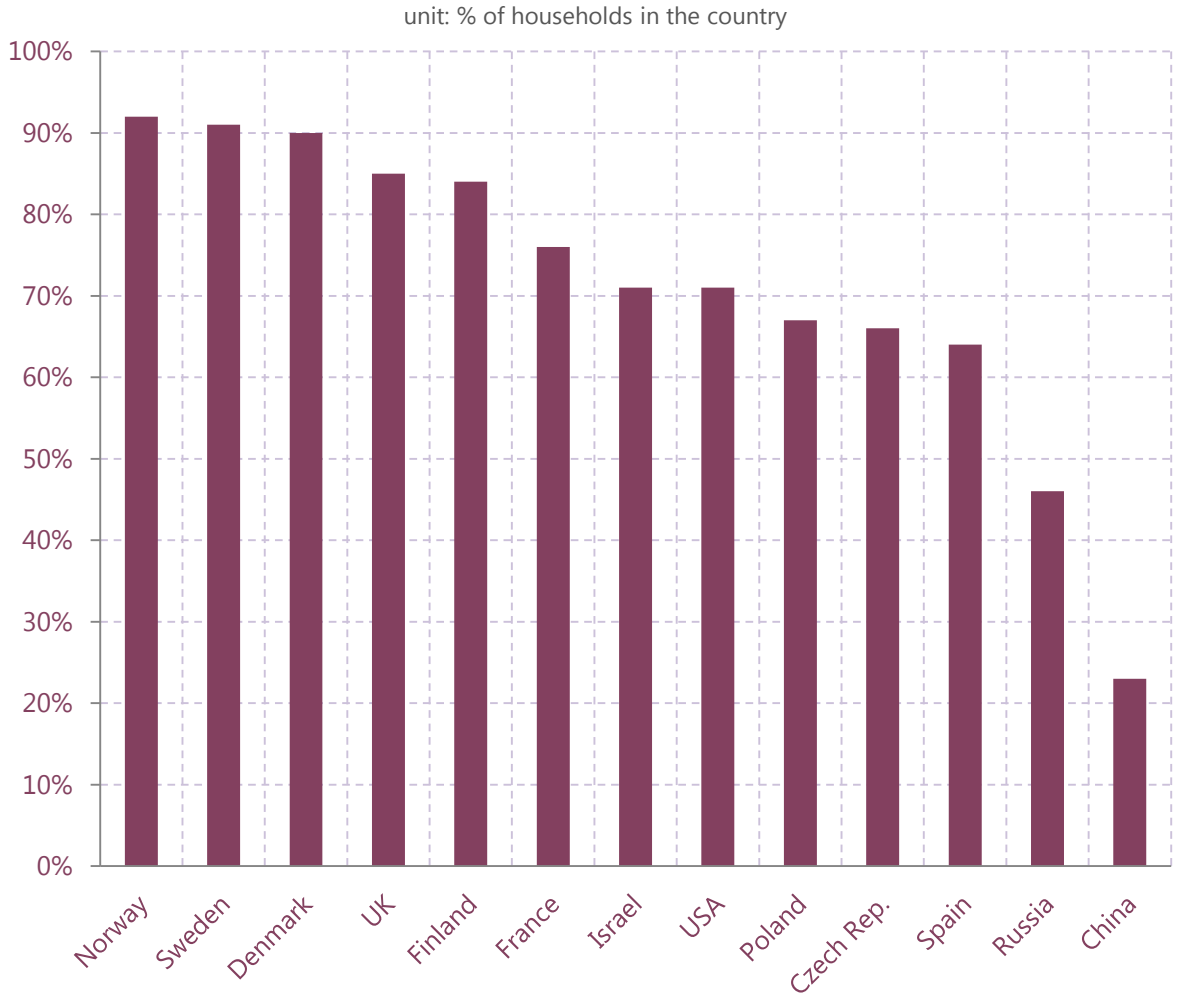


Source: Xerfi Global with Gartner

A long road ahead for internet access in the most populated countries

Fueled by Internet infrastructure and the proliferation of mobile connected devices, particularly smartphones and tablets, the number of connected people around the world is increasing rapidly.
Household Internet penetration is highest in several Nordic countries, while on the other hand less than half of Russian and Chinese households have Internet access, most likely due to poor infrastructure and lower household incomes.

Households with internet access in selected countries (2014)



Source: Xerfi Global with CEA

Rising demand for consumer electronics encourages semiconductors

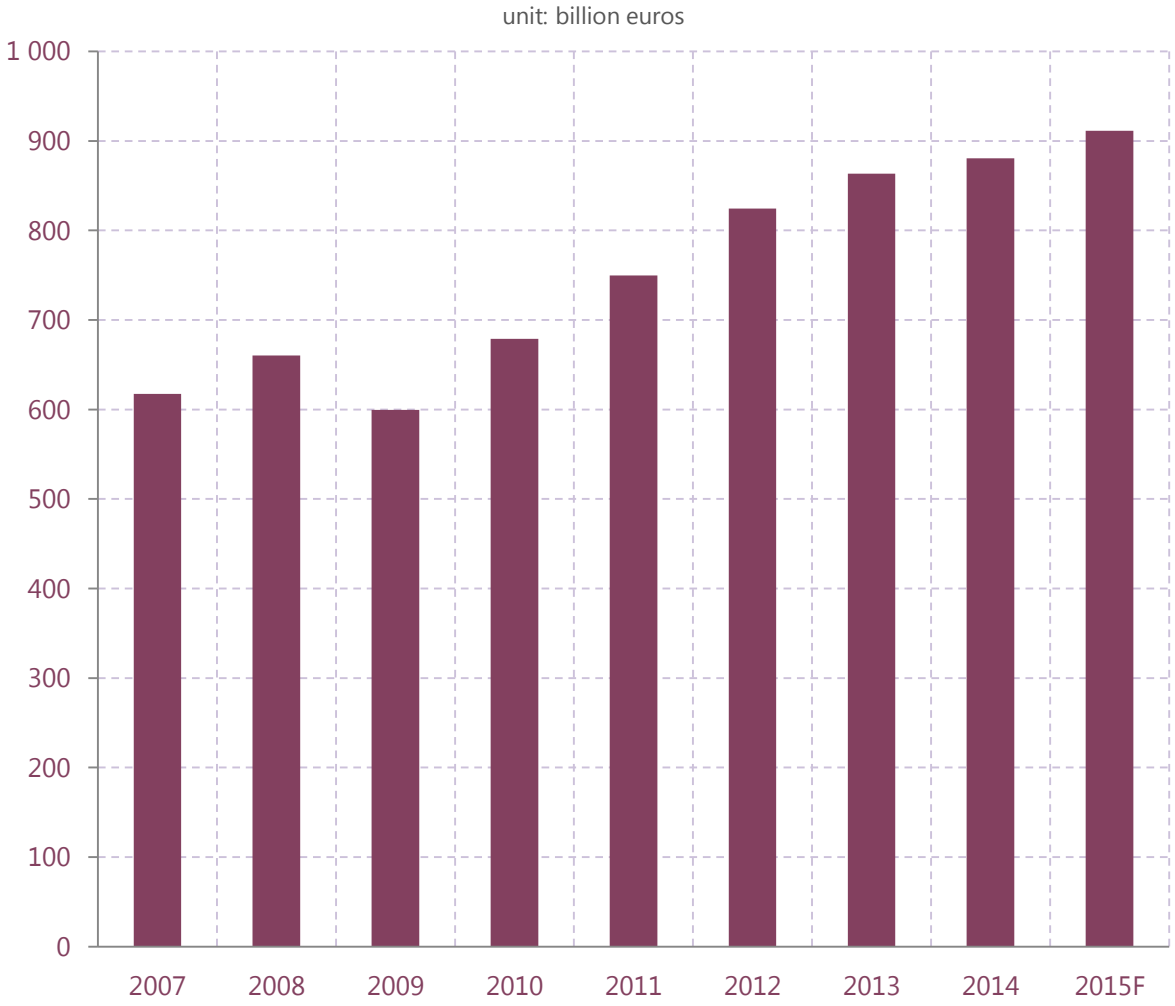
The world's retail consumer electronics market continued to expand steadily in the 2010-2014 period after the drop recorded in 2009 mainly as a result of the lower demand in industrialised economies.

In 2014, the global retail consumption of consumer electronics reached €880.67 billion, a 1.9% increase compared to 2013 and a 46.8% rise since 2009. The consumer electronics market's main growth drivers in the 2009-2014 period were the rising demand in emerging markets such as China, and the development of new technologies and the telecommunications infrastructure in several countries.

This market is expected to reach €911.5 billion in 2015, a 3.5% increase compared to the previous fiscal year.

Demand for basic consumer products; including consumer electronics, is set to continue growing in both developing and developed economies as middle-class populations keep growing globally.

Global retail consumer electronics (2007-2015)

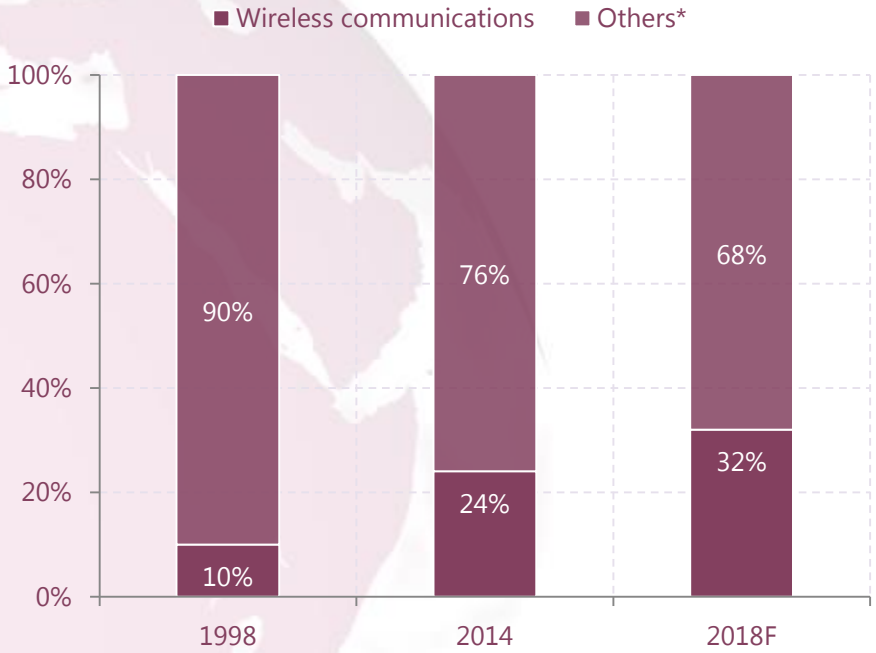


Source: Xerfi Global with CES and CEA

Mobile is consolidating as a key growth driver

Mobile' share of semiconductor sales (1997 – 2018F)

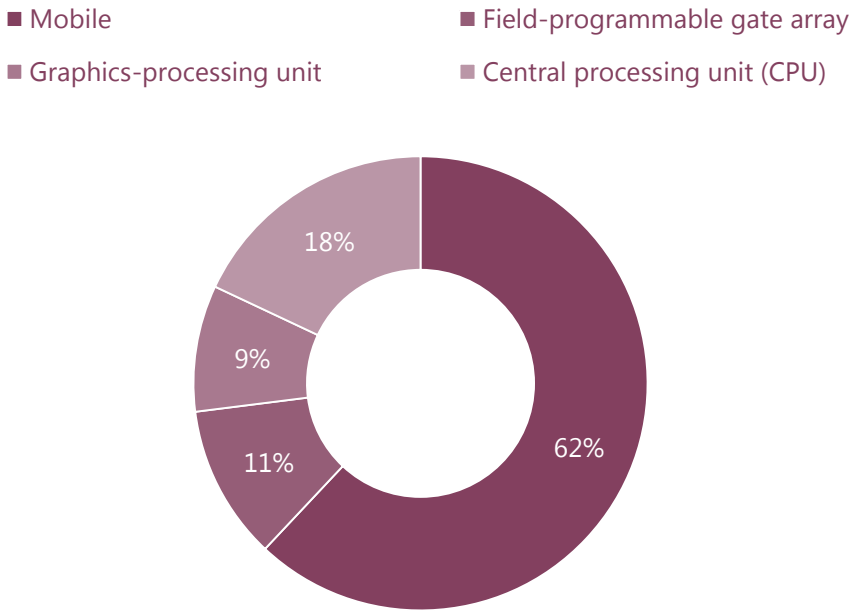
unit: % share



Source: Xerfi Global with iSupply; *Data processing, wired communications, consumer electronics, automotive electronics, and industrial electronics

Leading-edge foundry volumes by application (2013)

unit: % share

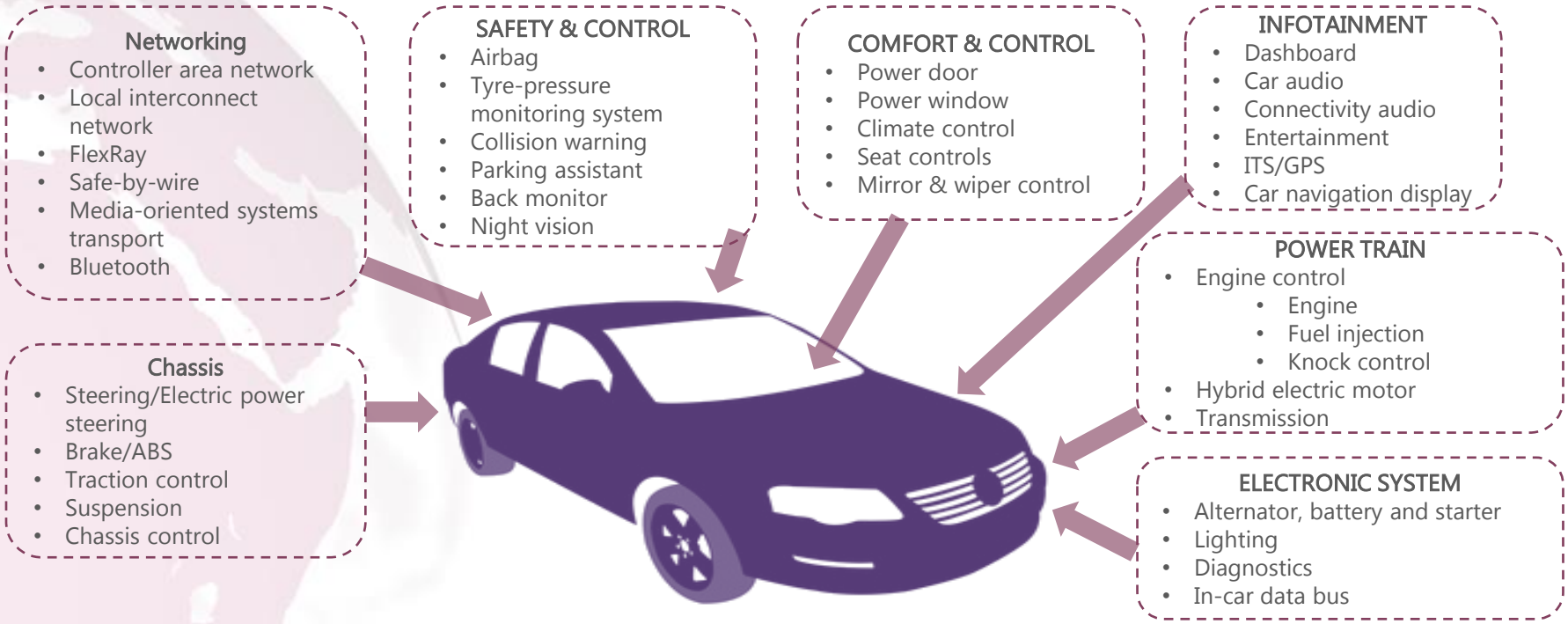


Source: Xerfi Global with iSupply

Fast-growing mobile sales have given a lift to global semiconductor sales, partially enabled by the fabless-foundry model, which allowed manufacturers and designers to launch more powerful and innovative mobile chips to the market. The rise of mobile phones has been one of the main growth driver in the semiconductor industry over the past 15 years. Around 62% of leading-edge foundry output in 2014 served the mobile segment, far outstripping microprocessors, graphics-processing units, and field-programmable gate arrays.

Semiconductors are gaining momentum in the automotive market

Semiconductors use in automobiles



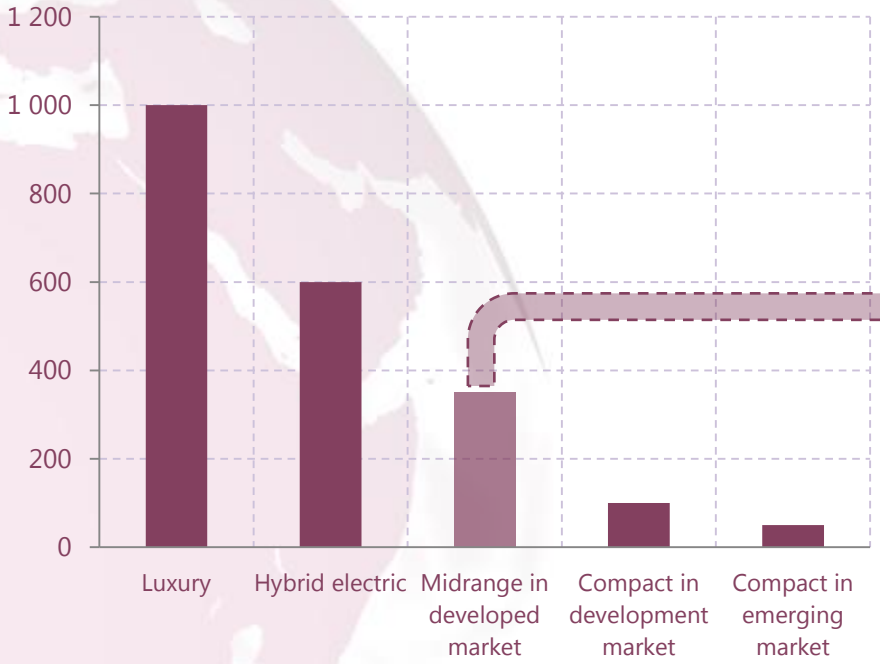
Source: Xerfi Global

Automotive semiconductors have experienced one of the fastest growth rates of any large segment in the chip market, with sales growing at around 8% year-on-year in the 2004-2014 period. From self-parking cars to anticipatory braking, semiconductors have been important to automotive innovations in recent years and will play a more relevant role in the next generation of automobiles. In 2013, the automotive semiconductors market was worth more than 30 billion euros.
Hybrids and full electric vehicles, in which electronic components have a faster innovation cycle, also represent an opportunity for semiconductor companies to win share in the next generation of the automobile engine.

The average automobile has around €350 of semiconductor content

Estimated semiconductor content per car by car type (2013)

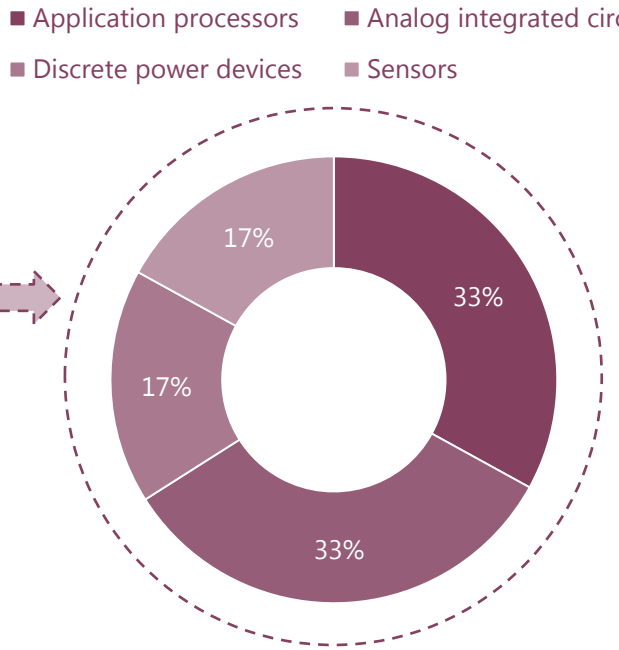
unit: euros



Source: Xerfi Global with iSupply

Type of semiconductor content in average car (2013)

unit: %



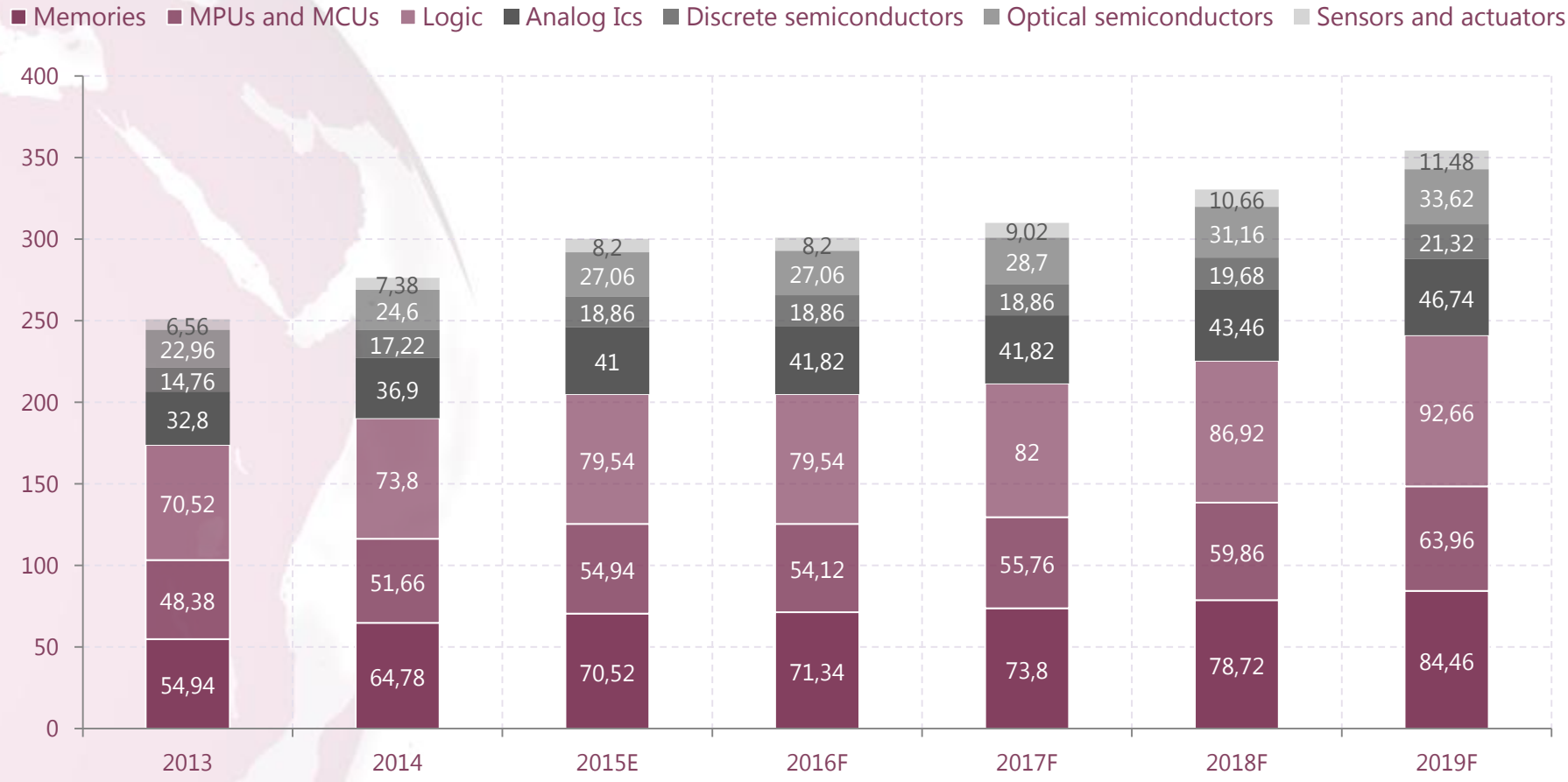
Source: Xerfi Global with iSupply

The electrification of the drivetrain, due to the rise of hybrid and full electric vehicles, will lead to the largest expansion of semiconductor usage in automobiles in the coming years. Features in luxury cars are already migrating to midrange cars, which are largely more numerous, and new connectivity-enhanced driving features will enter the marketplace. While fully autonomous driving is still relatively far in terms of time, continued increases in driving assistance and related semiconductor content will be seen in the coming years. In 2013, midrange cars, the main car category in developed markets, had an average of 350 semiconductor components, of which 33% were application processors and analog integrated circuits respectively.

Sensors and actuators will be the fastest-growing component

Global semiconductor sales and forecast by component (2013-2019)

unit: billion euros

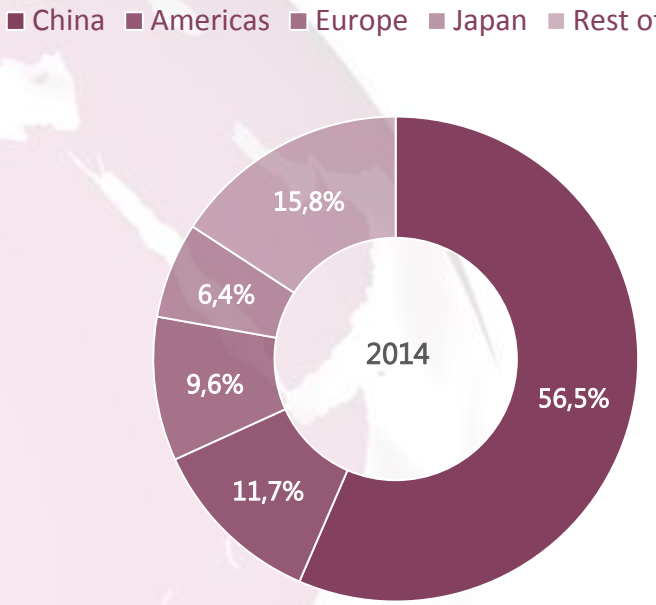


Source: Xerfi Global with Gartner

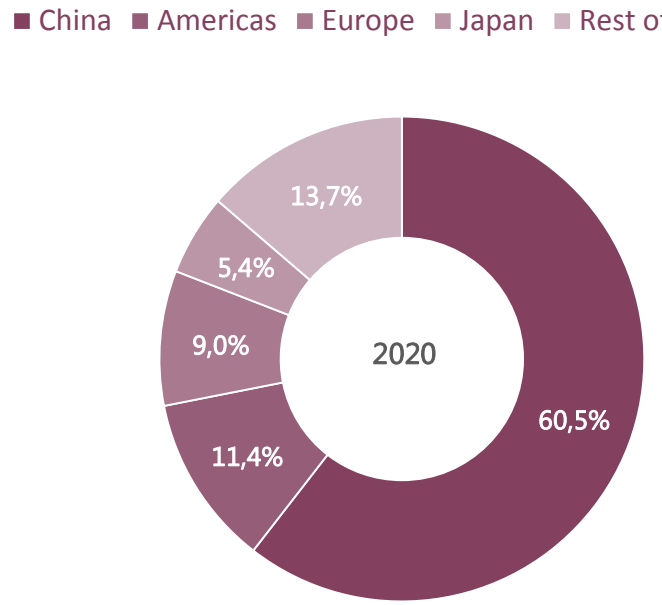
China will reinforce its position as the largest semiconductor market

Global semiconductor consumption by region (2014 – 2020 forecast)

unit: % share



Source: Xerfi Global with Gartner



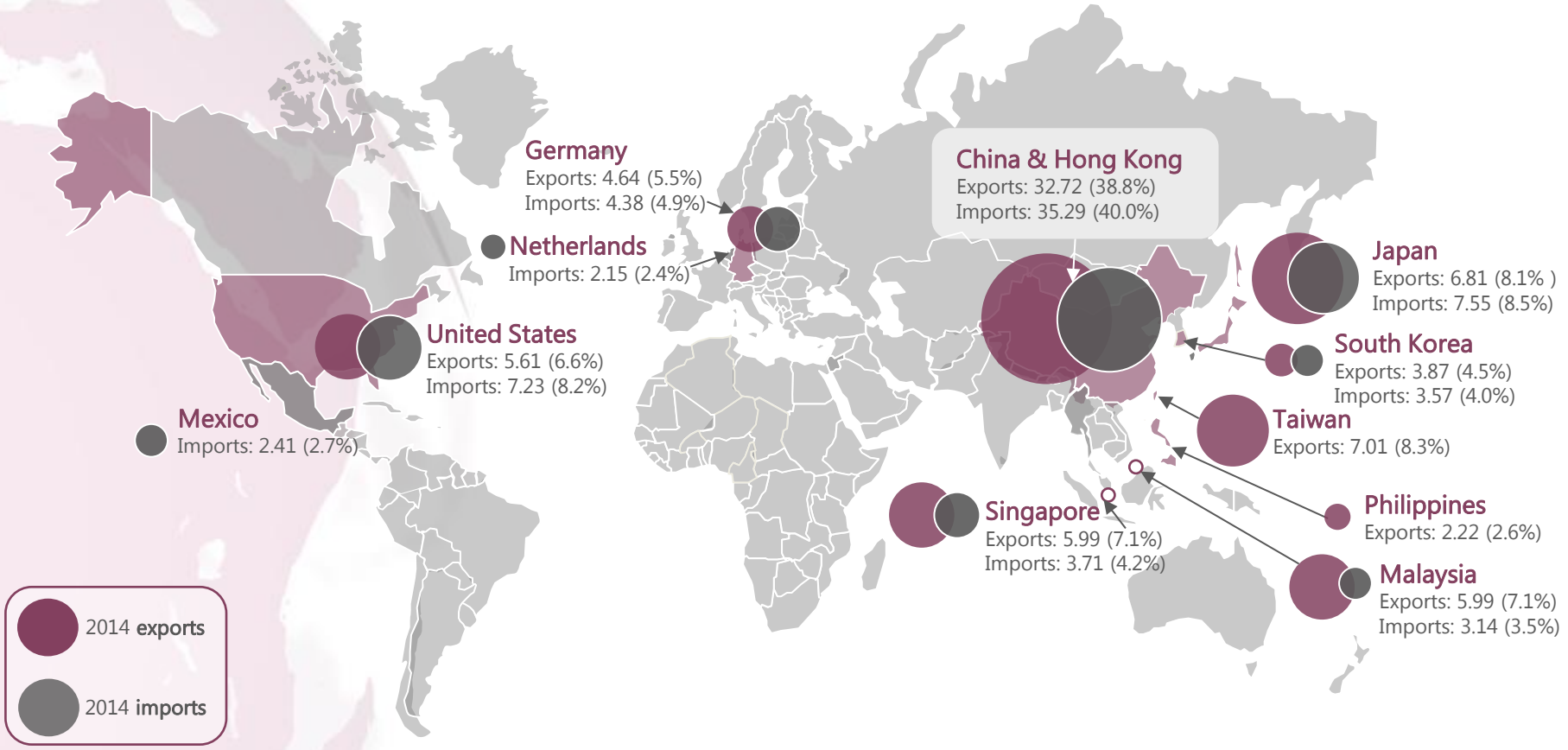
Source: Xerfi Global with Gartner

Observing the global semiconductor market, several regional variations appear. In Asia, China will continue to expand its semiconductor market leadership and increase its market share from 56.5% to 60.5% mainly as a result of its economic growth and the rapid growth of its integrated circuit design sector. In contrast, Japan will grow only by an annual rate of 1.5% in the 2015-2020 period and its semiconductor market share is likely to continue shrinking. Europe and the Americas will see moderate growth rates of 3.9% and 4.5% respectively in the five coming years, while the rest of the world's slice will drop in spite of positive forecasts for large markets such as Taiwan, South Korea and Singapore.

Asia is the center of gravity of the semiconductor trade

Breakdown of world´s top 10 exporters and importers of semiconductor devices (2014)*

units: billion euros; % share



Source: Xerfi Global with Intracen; *Diodes, transistors and semiconductor devices

Japan-based companies negatively impacted by the decline of the yen

Top 10 worldwide semiconductor manufacturing equipment vendors by revenue and market share (2014)

unit: billion euros

MANUFACTURER	RANK IN 2014 (2013)	COUNTRY	2014 SALES	MARKET SHARE
Applied Materials	1 (1)		4.47	16.2%
ASML	2 (2)		4.34	15.7%
Lam Research	3 (4)		2.59	9.4%
Tokyo Electron	4 (3)		2.50	9.1%
KLA-Tencor	5 (5)		1.77	6.4%
Dainippon Screen	6 (6)		1.00	3.6%
Hitachi High-Technologies	7 (8)		0.70	2.6%
Advantest	8 (7)		0.69	2.5%
Teradyne	9 (11)		0.67	2.4%
Nikon	10 (9)		0.52	1.9%
Others	-	-	8.39	30.3%
Total market	-	-	27.69	100%

Source: Xerfi Global with company annual reports and Gartner

Semiconductor suppliers are investing in cheaper options to gold wire

Cost-down is a priority in the electronics industry and is challenging the semiconductors supply chain as the industry seeks to deliver improved performance to the consumer at a lower cost. Pricing pressures are abundant throughout the supply chain and can impact material selection in both wafer fab and package manufacturing.

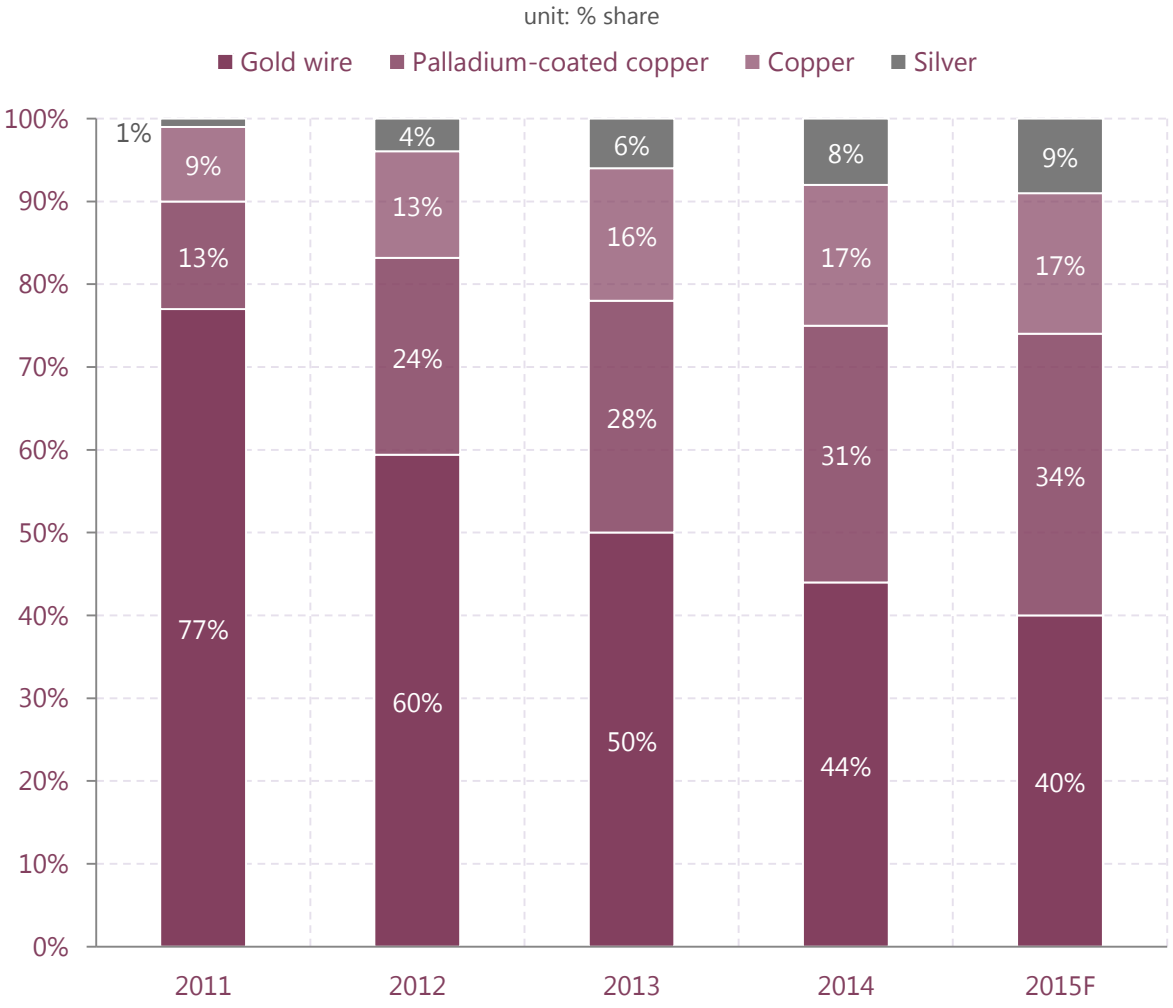
A particularly dramatic change in materials has been seen over the past years as companies have sought to reduce the impact of gold metal costs in semiconductor packaging.

For decades, gold bonding wire was the mainstay material in wire-bonded packages. Semiconductor manufacturers began to closely examine the use of copper wire material to offset rising gold metal prices as gold pricing began to rise in 2006.

As a result, companies along the bonding wire supply chain invested in alternatives to gold wire, specifically copper wire, palladium-coated copper wire, and silver alloy wire. By 2013, gold wire shipments declined to just about half of total bonding wire shipments and further declined to an estimated 44% share of the over 20 billion meters of wire shipped in 2014.

This trend should continue in the coming years at a lower pace, as gold prices started dropping rapidly in 2015.

Bonding wire shipment share by type (2011 – 2015F)



Source: Xerfi Global with SEMI data and forecast

The global semiconductor packaging market is worth €6.10 billion

Most semiconductors' packaging material segments are encountering low revenue growth as end users seek lower cost solutions for packaging and downward pricing pressures are severe. In addition, the transition to copper and silver bonding wire has significantly reduced the impact of gold metal pricing in wire bond packages.

Despite price pressures, organic substrates remain the largest segment of the semiconductor packaging market, worth an estimated 6.1 billion euros globally in 2014. This segment is expected to continue growing to reach 7.2 billion euros by 2017.

The market for semiconductor packaging materials is expected to stay at around 17 billion euros through 2017, despite shifts away from the use of precious metals such as gold in wire bonding.

Global semiconductor packaging materials market (2014)

unit: billion euros; % market share

Semiconductor packaging material	Value	Market share
Organic substrates	6.07	38.3%
Leadframes	2.74	17.3%
Bonding wire	3.65	23.1%
Mold compounds	1.14	7.2%
Liquid encapsulants	0.69	4.4%
Die attach materials	0.54	3.4%
Thermal interface materials	0.51	3.2%
Solder balls	0.23	1.4%
Underfill materials	0.17	1.1%
Wafer level package dielectrics	0.07	0.5%

Source: Xerfi Global with SEMI

Silicon is a key element for the semiconductor industry

Global shipments of silicon materials for semiconductor applications

unit: million of square inches

Source: Xerfi Global with SEMI

Silicon wafers are the fundamental building material for semiconductors. The highly engineered thin round silicon disks are produced in various diameters and serve as the substrate material on which most semiconductor devices or chips are fabricated.

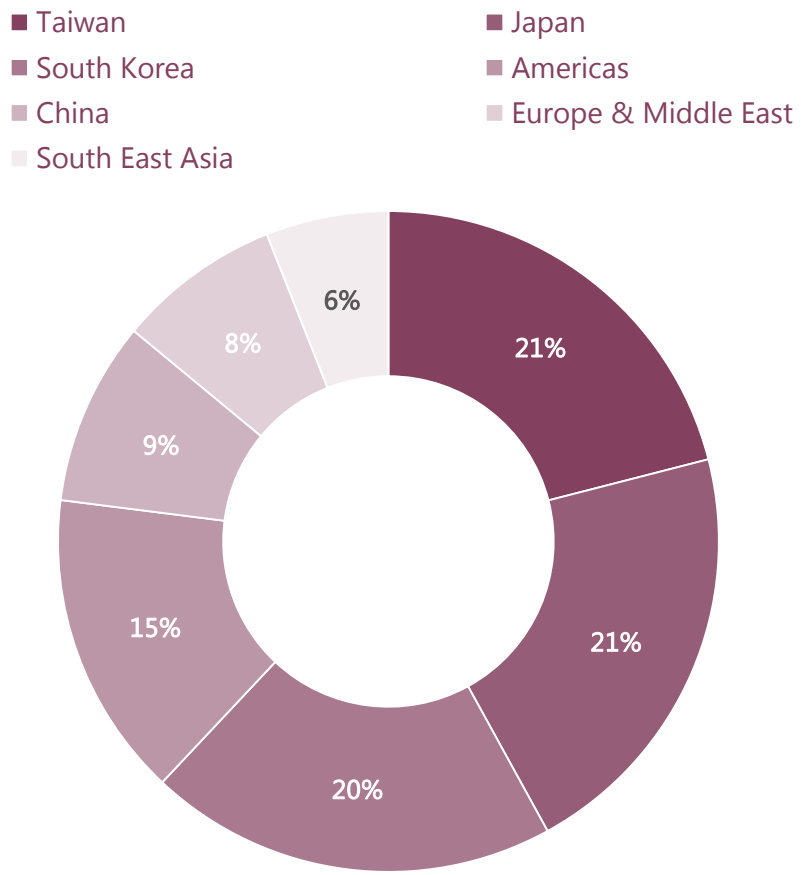
Worldwide silicon wafer shipments increased by 11% in 2014, although silicon revenues increased by just 1% in the same year, reaching a new record high (the previous market high was in 2010).

Taiwan's fab capacity overtook that of Japan in 2011

The global semiconductor materials market, which includes both fab and packaging materials, was worth more than 35 billion euros in 2014 (up 3% compared to the previous year).
Looking at the materials market by wafer fab and packaging materials, the wafer fab materials was the best-performing segment in the industry. The continuing transition to copper-based bonding wire from gold is negatively impacting overall packaging materials revenues.
In 2014, Taiwan maintained the top spot for the fifth year in a row, followed by Japan, South Korea and China. Driving the materials market in Taiwan are advanced packaging operations and foundries. Japan still claims a significant installed fab base and has a tradition in domestic-based packaging, although many companies in Japan have rapidly adopted a fab lite strategy and have consolidated their fab and packaging plants. South Korea passed South East Asia, which includes Singapore, Malaysia and Philippines) as the third largest market for semiconductor materials given the dramatic increase in advanced fab capacity in the region in recent years.

Worldwide fab capacity (2014)*

unit: % share

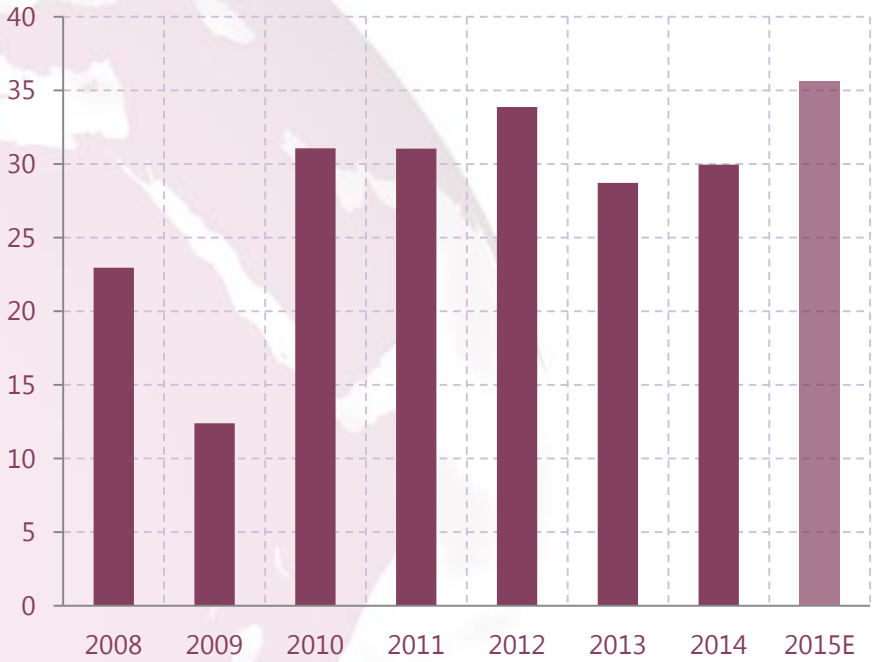


Source: Xerfi Global with SEMI; *Excluding discretes

Semiconductor equipment spending will set a new record high in 2015

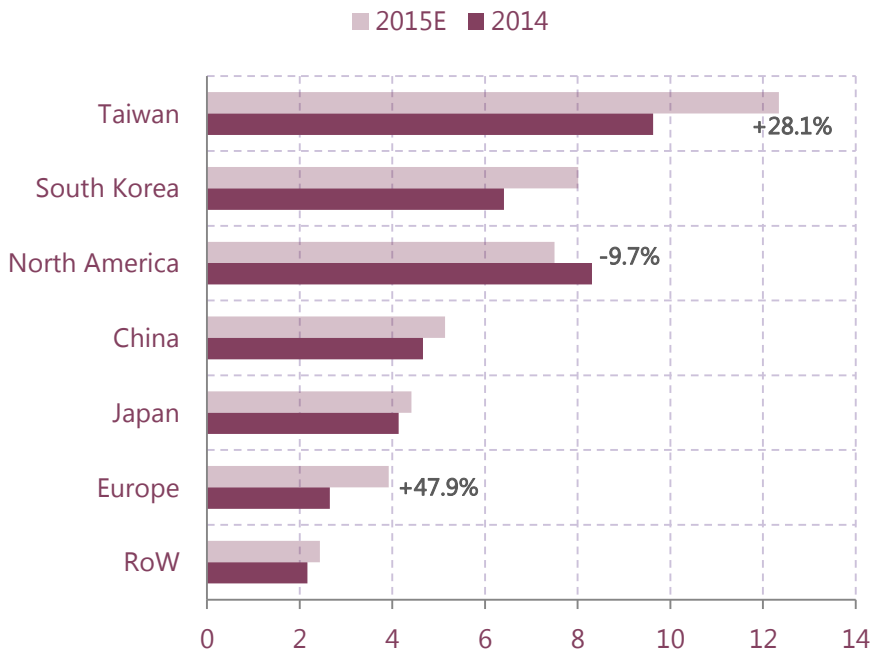
Global semiconductor equipment spending, 2008-2015E

unit: billion euros



Global equipment spending, by region , 2014-2015E

units: billion euros; year-on-year growth

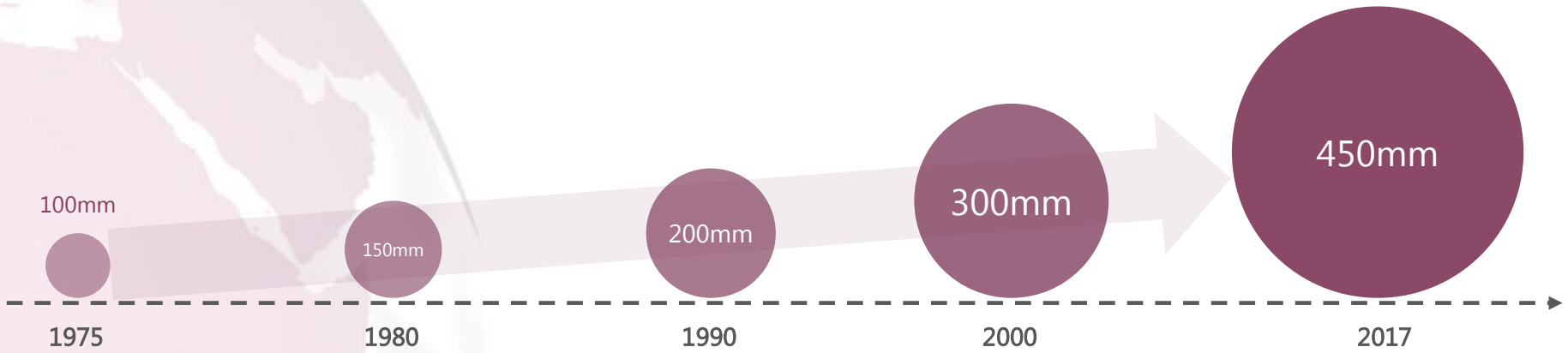


Source: Xerfi Global with SEMI

Semiconductor equipment sales amounted to €29.95bn in 2014, 4.2% higher than in 2013 due to growth in all major markets, including wafer processing equipment and assembly, packaging and test equipment, except in North America. Fuelled by aggressive spending by TSMC, Taiwan was the top spender ahead of South Korea and North America. South Korea kept its equipment investments rising and in 2015 it is expected to reach €8.01 billion. Sustained robust demand for smartphones and tablets, and the growing IoT segment, have resulted in greater spending to expand memory, logic and wireless equipment.

Since 2000, chips have been mainly produced on 300mm wafers...

Evolution of wafer sizes for semiconductor manufacturing, 1975-2017



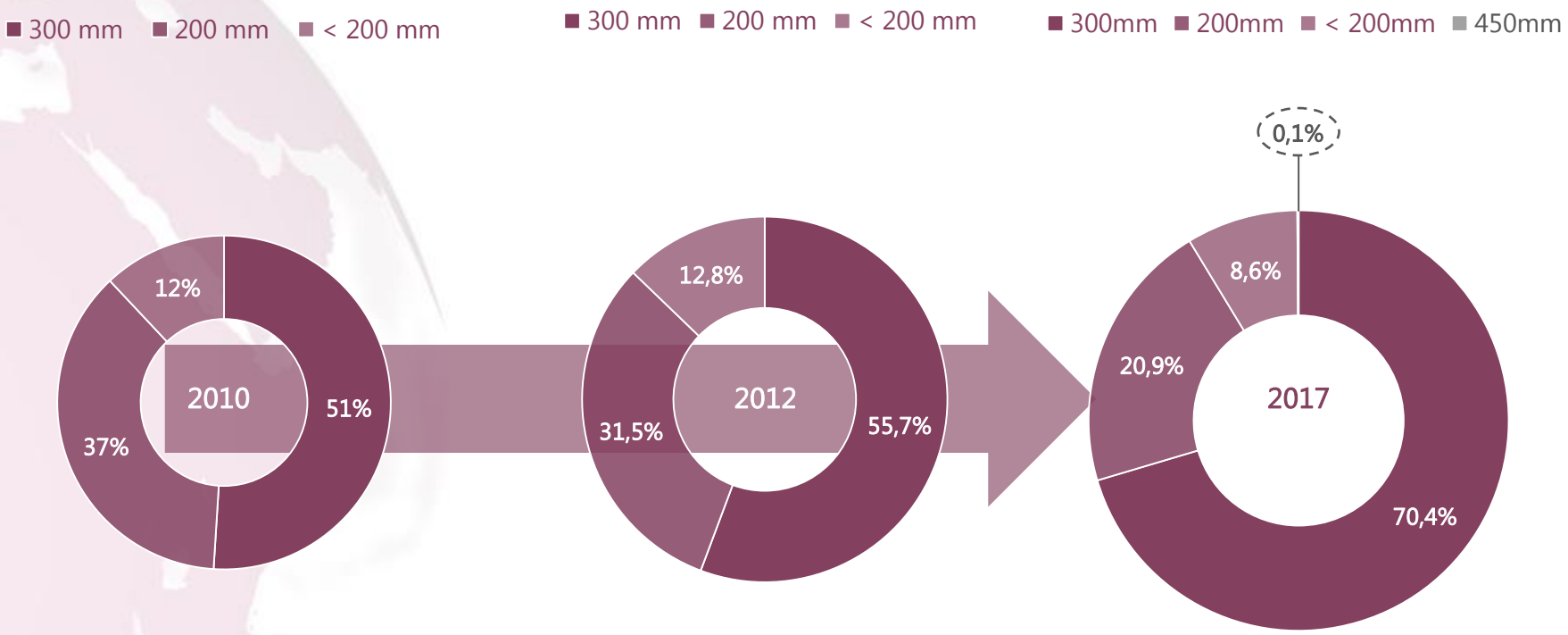
Source: Xerfi Global with business press

Silicon wafers are the most essential element in the realization of integrated circuits. The size of wafers on which chips are manufactured has been gradually increasing as larger surfaces offer significant economies of scale. Since 2000, 300mm technologies prevailed in terms of installed capacity with over 96% of semiconductor equipment orders based on the 300mm systems. However, with technological improvement the costs of establishing a fab have risen so much that a decreasing number of chip makers are able to afford the necessary investments for technology transition. All the more so for next-generation 450mm facilities – the cost of a 450mm fab is estimated at €7 billion compared to €3 billion for a 300mm one. Currently, only players with deep pockets such as Intel and Samsung have a clear schedule for deploying 450mm wafer fabs.

...while 450mm wafer technology is in the making

Global installed semiconductor capacity by wafer size, 2010, 2012, 2017

unit: % share in total capacity



Source; Xerfi Global with SEMI, IC insights

Capacity additions have slowed in recent years

Global wafer capacity in 200mm equivalents, 2001-12

unit: wafer additions in million, annual % change

Source: Xerfi Global with SEMI

Global volume fabs in operation by wafer size (2004-18)*

unit: wafer size in mm

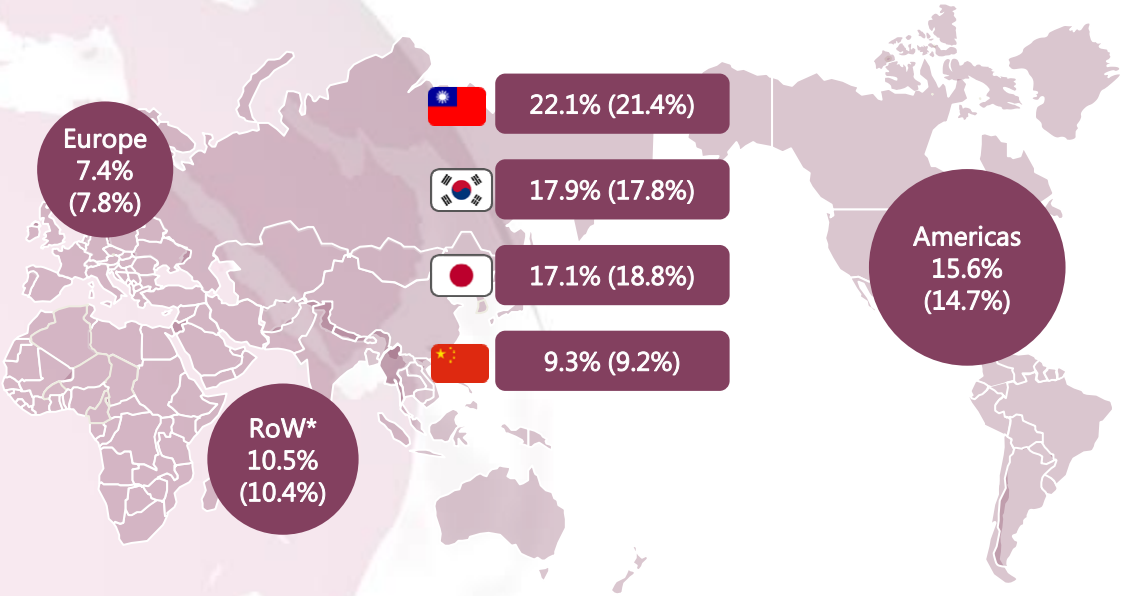
Source: Xerfi Global with SEMI; *Excluding R&Ds, LEDs and EPI

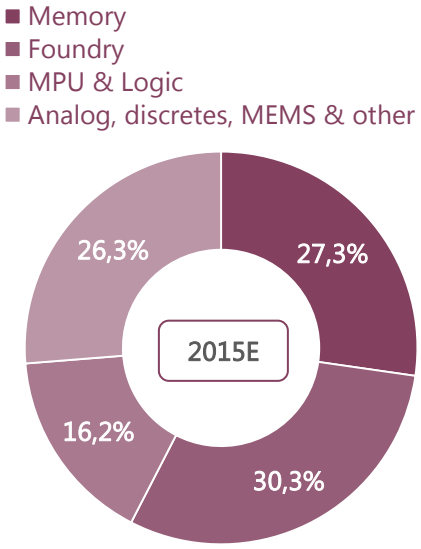
Additional semiconductor capacities have been added since 2010, driven by demand in memory and foundry markets. Chip production recovered after the 2008-2009 downturn, with capacity utilisation hovering above 90% in 2011, and at about 80% in 2012. Global volume fabs in operation also dropped in recent years, particularly in small fabs (150mm wafer size), while new 300mm fabs are in development and 450mm fabs are expected to enter operations between 2016 and 2017. China's government efforts to enhance its semiconductor industry will led to the opening of new fabs in the world's largest semiconductor market.

Taiwan is the leader by installed capacity since 2011

Installed capacity worldwide, equivalent 200 mm wafers, (2012-2014)

units: % share in total capacity in 2014 (2012); million wafers in 200mm-equivalent wafers per month

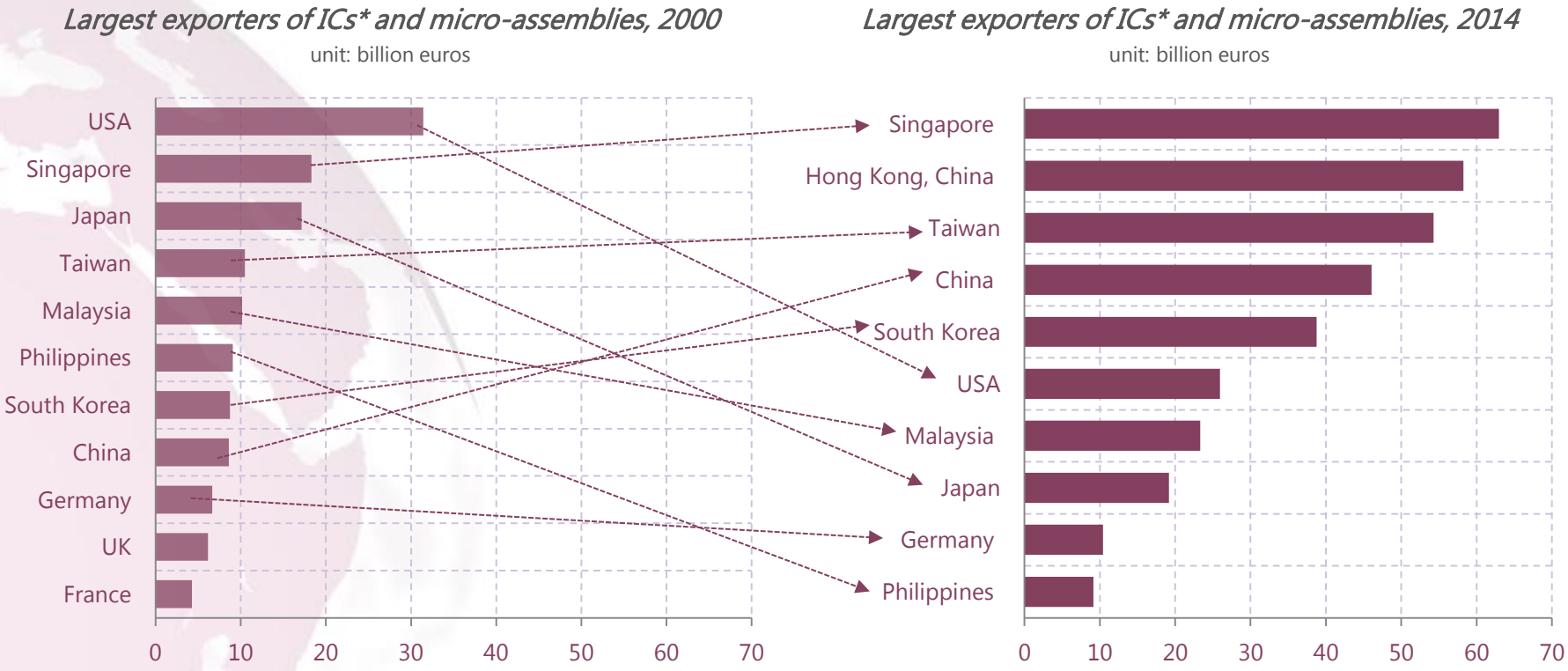




Source: Xerfi Global with IC Insights and SEMI; *Rest of the world

Taiwan had a 22.1% share of global fab capacity at the beginning of 2014, followed by Japan, South Korea and the US. Taiwan overtook Japan in 2011 to become the industry's largest manufacturing base driven by robust orders for its foundries. Memory and foundries accounted for over half of the industry's installed capacity in 2014 (14.5 million wafers in 200mm-equivalent wafers). In years past, memory and foundry capacities were among the fastest growing.

The bulk of semiconductor exports is concentrated in Asia



Calculations: Xerfi Global, primary source: ITC calculations based on COMTRADE statistics; *ICs stands for Integrated Circuits

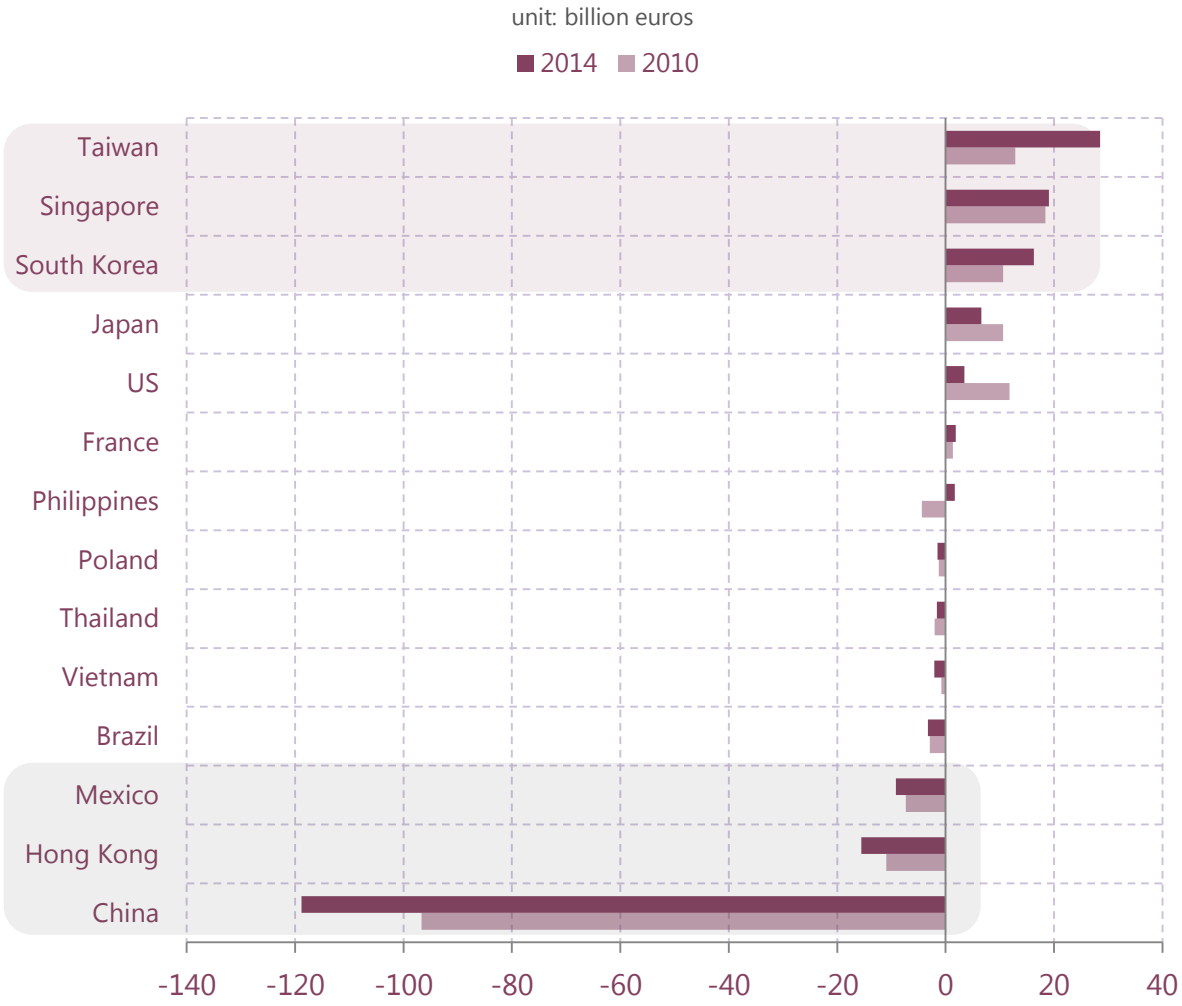
Until the beginning of the 21st century, the US was the centre of gravity for the global semiconductor industry and the leading country in terms of integrated circuit and micro assembly exports. In a decade manufacturing centres shifting to low-cost locations and increased competitiveness of Asian players have reversed this situation. Currently, leading exporters include Singapore, Hong Kong, Taiwan, China and South Korea. China's chip exports skyrocketed, while Germany was the sole European country to stay in the top 10 rankings and the US has the sixth place among the world's top exporters.

China has a huge negative semiconductors trade balance

China is still highly dependent on imports of the high-value components needed for the manufacture of integrated circuits and to satisfy its growing consumers demand. Its trade deficit in electronic integrated circuits and microassemblies has been growing steadily in the last decades to reach -118.83 billion euros, a 22.9% increase compared to 2010's deficit. As the Chinese authorities have decided to support its national semiconductor industry, China's deficit in semiconductors should start decreasing in the coming years.

On the contrary, Taiwan had the world's largest surplus of integrated chips and microassemblies. In 2014 its surplus was worth 28.48 billion euros, more than double of that of 2010 (12.86 billion euros).

IC and microassemblies trade balances of selected countries (2010-2014)*

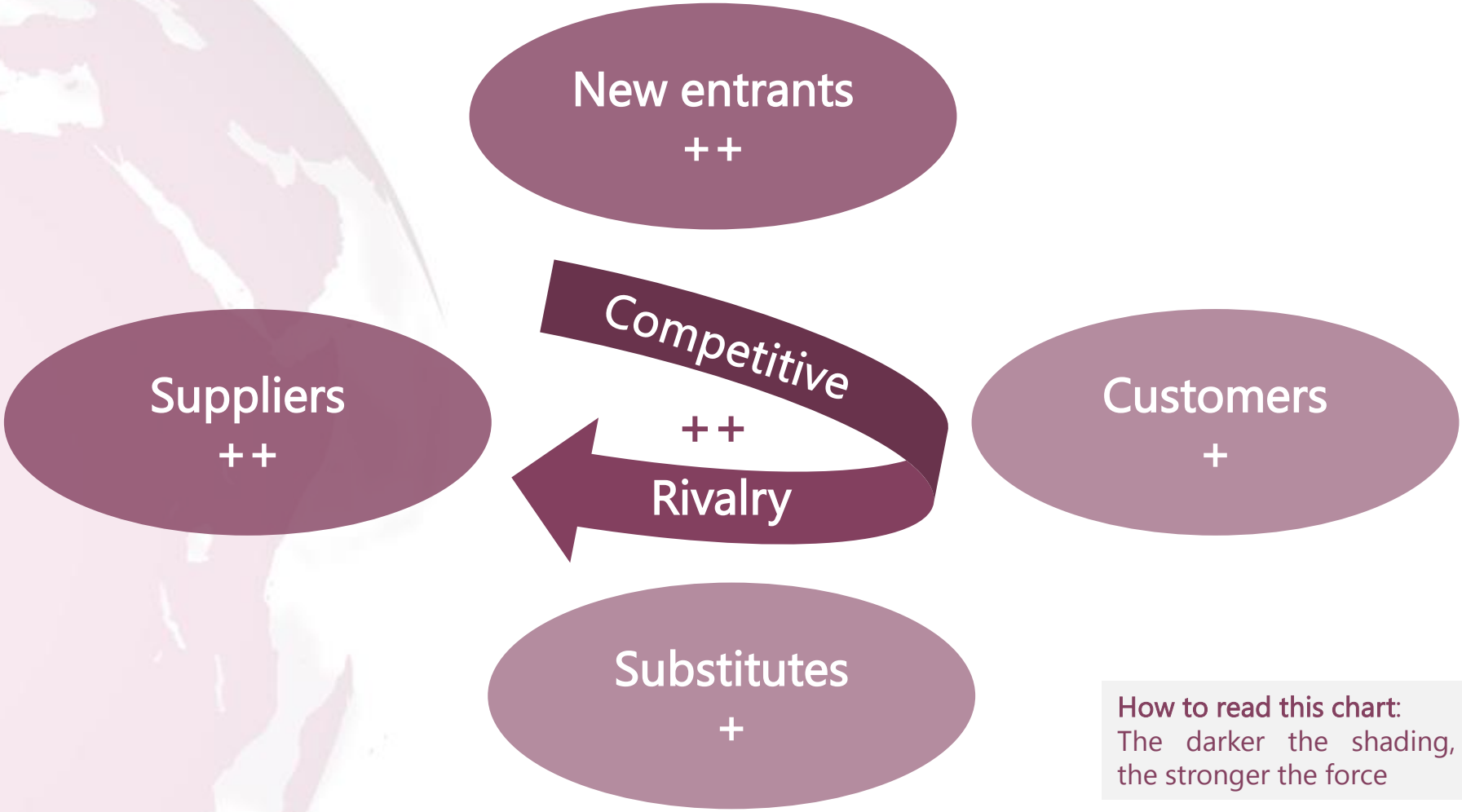


Source: Xerfi Global with Intracen; *Integrated Circuits

3. Corporate Strategies and Competition

Competition intensity varies considerably in each business segment

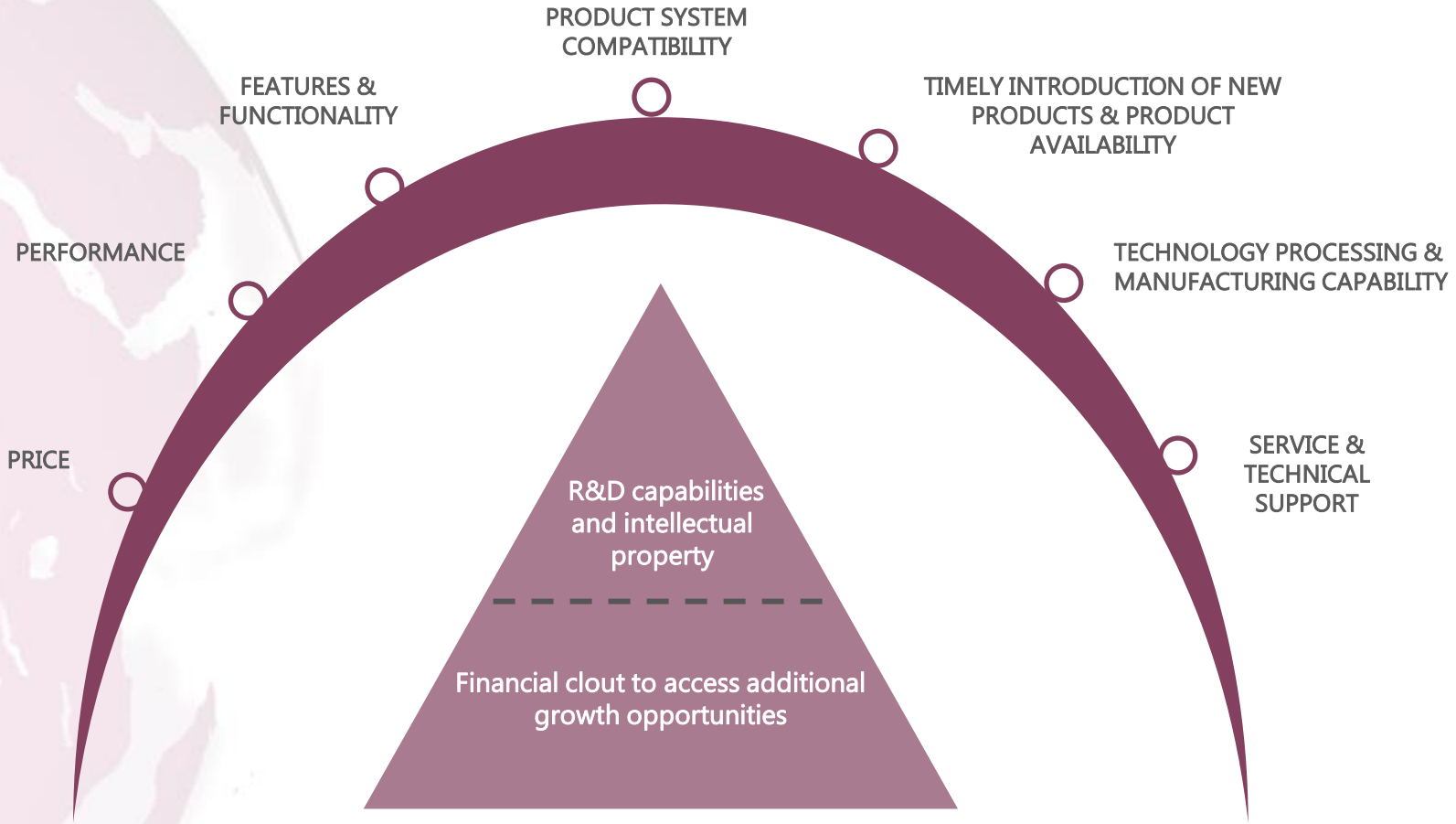
Competitive forces of the semiconductor industry



How to read this chart:
The darker the shading, the stronger the force

Several factors put pressure on rivalry...

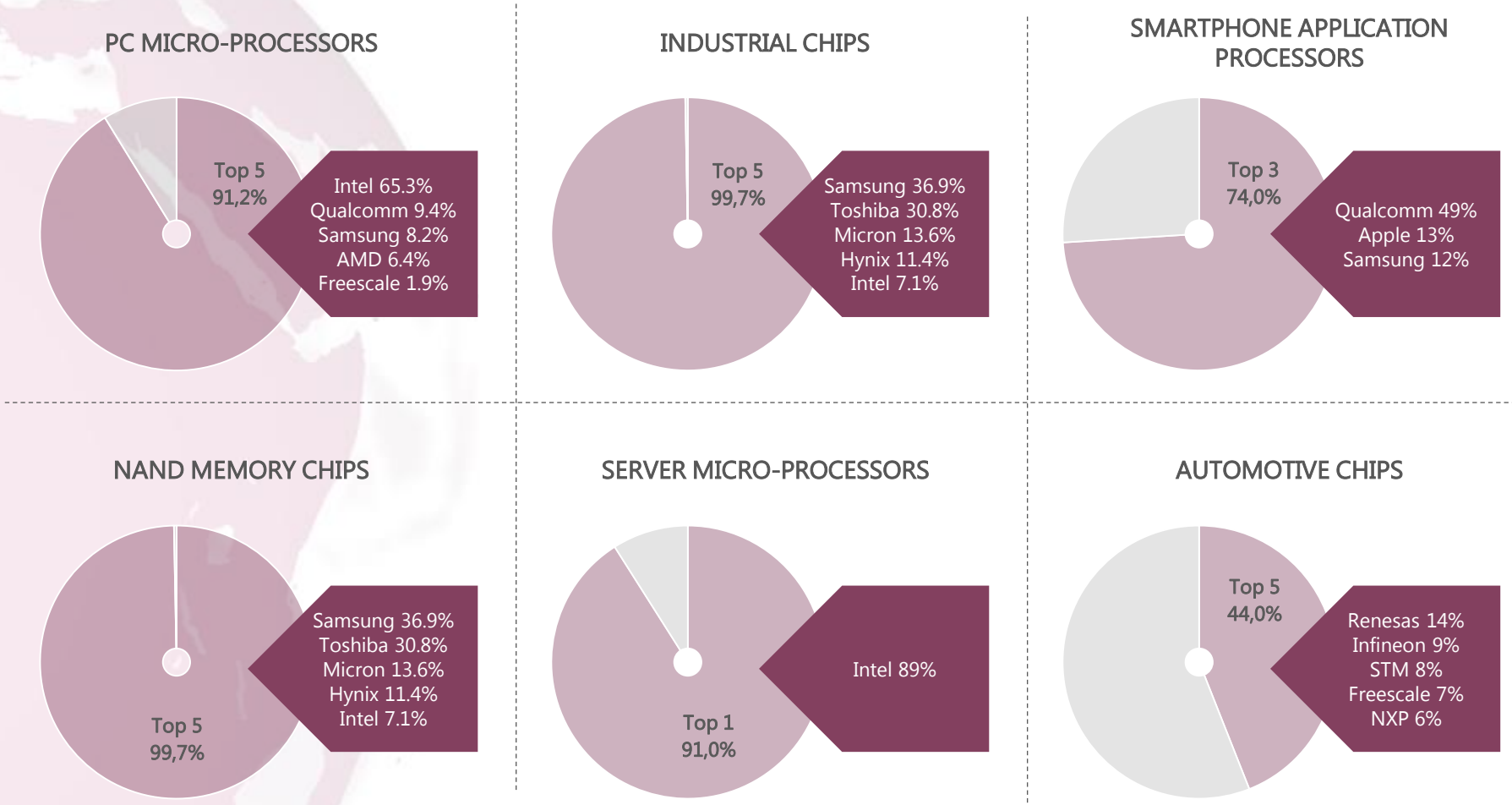
Overview of characteristics of competition in the semiconductor industry



Source: Xerfi Global with companies

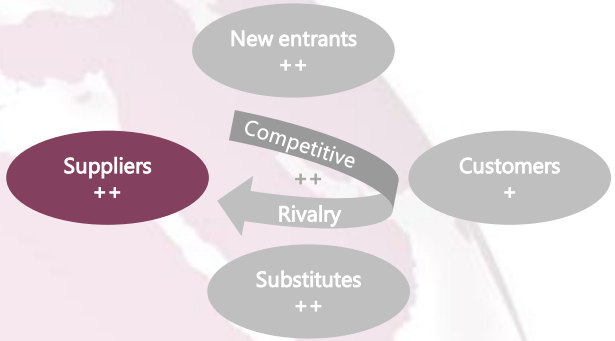
...with each company leading in a specific business line

Main competitors on selected semiconductor markets (2013)



Source: Xerfi Global with companies, HIS iSuppli

Chipmakers are finding new growth opportunities in the supply chain



Semiconductor players will need to invest heavily to adapt their chip designs and development processes to account for specific requirements for smartphones, tablets, and the Internet of Things, among other things. Furthermore, as many applications will require devices that are self-sustaining and rely on energy harvesting of long-life batteries, semiconductor companies must address the need for optimal power consumption and outstanding power management in their products. Connectivity load will be also a critical concern given that thousands of devices will need to be connected at the same time.
Manufacturing will also need to emphasize flexible form factor to a greater degree than they do today. Components must be small enough to be embedded in today's smart watches, smart glasses and other small devices.
The list of challenges also includes security and privacy issues to prevent hacking, loss of intellectual property and other potential breaches.
Furthermore, some semiconductor groups are investing in new integration capabilities, particularly expertise in packaging and in through silicon, a connectivity technique in electronic engineering, as well as in software development. The emergence of more integrated system-in-package and system-on-a-chip devices is helping to overcome some of these challenges, in part by addressing power, cost, and size factors.

Potential upstream partners or target markets in the semiconductor industry

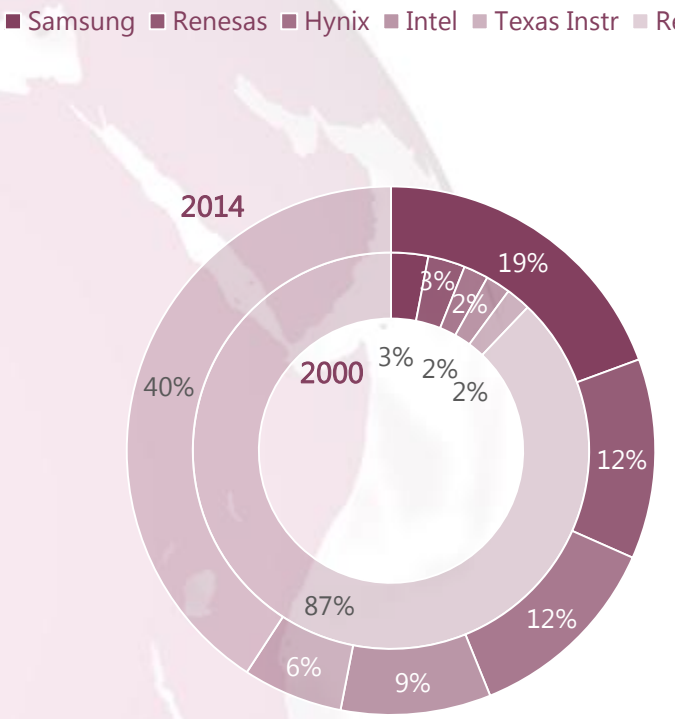
Component suppliers	Equipment makers	Semiconductor manufacturing	Component manufacturing	System-level assembly-land test stages
•Laser •Optical components •Sensors •Image processors •Optomechanical machine controllers	•Lithography •Metrology •Software	•Integrated circuits •Passive components •Memory •Microelectro-mechanical systems •Packaging •Other materials	•Subassembly processes •Subsystem manufacturing •Functional and electronic testing	•Original-equipment manufacturers •Original-design manufacturers

Source: Xerfi Global

Concentration has intensified due to pressures to optimise costs

Global top 5 integrated device manufacturers (2000-2014)*

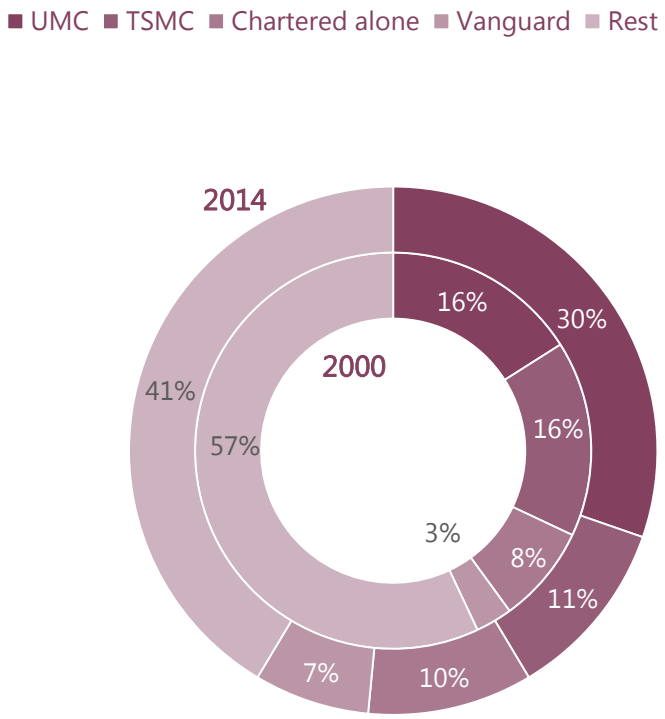
unit: % share of worldwide installed capacity



Source: Xerfi Global with SEMI; *Without discretes

Global top 5 foundries (2000-2014)*

unit: % share of worldwide installed foundry capacity



Source: Xerfi Global with SEMI; *Without discretes

US leading groups are more profitable than their Asian competitors

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: billion euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
SAMSUNG	147.02	8.6%	12.1%	12.3%	Samsung's main source of revenue was Asia, which generated 67.4% of sales in 2014. Around 75% of its Semiconductor segment's profits relied on memory products. It was the only business unit of Samsung Electronics recording growth for the 2013-2014 period.
TOSHIBA	46.32	0.4%	4.5%	2.2%	Toshiba's profitability mainly came from its Electronic Devices & Components business unit, which generated €1.70bn profits in 2014. Since 2010, it has been the company's second main revenue driver value, only behind its Energy and Infrastructure business. Toshiba's sales went up slightly in 2014 for the first time since 2011 as a result of a sharp increase of sales in its Electronic Devices & Components' division, as well as higher sales in all its markets including Japan, its home market.
INTEL	41.77	9.7%	27.5%	27.5%	Intel's growth was mainly driven by its Data Centre unit whose operating margin reached 50.6% in 2014. Its Internet of Things segment represented nearly 4% of this year's revenue, and was Intel's best performing segment in fiscal 2014 with 18.9% sales growth.
QUALCOMM	19.80	20.0%	28.5%	29.4%	In 2014, Qualcomm's growth was fueled by rising connectivity in both 3G and 4G worldwide, which led to growth in smartphones sales, mainly in emerging countries. Qualcomm's profitability was driven by its fabless business model, allowing large research expenses by shrinking manufacturing costs, and its ability to set up industry standards.

Source: Xerfi Global with companies' reports

Margins have increased among large semiconductor groups

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: million euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
SK HYNIX	12.21	16.7%	29.8%	16.4%	SK Hynix's 2014 revenues and operating income rose mainly as a result of the steady growth of demand for DRAM products and services and a favourable pricing environment. At the end of 2014, its Chinese production facility suffered from a fire incident. This event had a negative impact on the company's production and results.
MICRON	12.23	27.8%	18.9%	6.2%	For the fiscal year 2014, the growth in NAND and DRAM sales had a positive impact on Micron's sales, which almost doubled between 2009 and 2014. The company recorded continuous sales increase since 2009, with 27.8% CAGR. In 2014, Micron's operating margin, reached 18.9%, positively influencing profitability ratios.
TEXAS INSTRUMENTS	9.75	14.0%	34.4%	26.9%	In 2014, Texas Instruments' profitability increase primarily came from its high degree of specialisation of its two main segments and the efficiency improvement measures it has taken. Products sold at its Analog division, which have over ten years of lifecycle, provided high margins and generated 70.6% of revenue in 2014, are long term key growth drivers.
BROADCOM	6.30	13.9%	8.2%	9.6%	From a global perspective, Broadcom benefits from its wide portfolio and geographical presence, which reduces risks. In 2014, Broadcom's profitability was mainly driven by its Infrastructure and Networking segment, whose sales saw double digit growth for the second consecutive year, reaching 17.2% growth for the 2013-2014 period. Excluding its Cellular Baseband segment, Broadcom's overall operating margin reached 22.0% in 2014.

Source: Xerfi Global with companies' reports

Smaller semiconductor manufacturers struggle with indebtedness

Key performance indicators and main growth drivers of semiconductor companies analysed in this report

units: million euros, compound annual growth rate (CAGR) of sales in percentage, operating profit as a percentage of sales

key: colours related to average industry performance (green: above average; orange: within average; red: below average)

COMPANY	2014 SALES	2009-2014 SALES TREND	2014 EBITDA MARGIN	2009-14 AVERAGE EBITDA MARGIN	KEY GROWTH AND PROFITABILITY DRIVERS
NXP	4.22	9.9%	18.6%	8.3%	In 2014, NXP's main revenue driver was its Portable & Computing segment, which recorded an increase in revenues of 45.9% for the 2013-2014 period. The company's net income, margin and investment expenses remained relatively low because of yearly interest expenses representing 34.5% of net income.
FREESCALE	3.46	5.7%	15.7%	2.8%	During the 2009-2014 period, Freescale's profitability suffered from debt burden, incurred by its subsidiary Freescale Semiconductor Inc., up to €4.5bn. In 2014, the firm reduced this debt by 1.2bn$ allowing its operating margin to increase up to 15.7%.
AVAGO	3.19	23.5%	10.3%	14.8%	Avago's growing sales in 2014 were driven by the production of its Film Bulk Acoustic Resonator. The firm's profitability comes from its efficient global supply chain and its low-cost operating model with outsourced manufacturing operations. Furthermore, Avago is carrying out M&As and only keeping the most profitable acquired segments.

Source: Xerfi Global with companies' reports

Global presence is a key priority for the industry's leaders

SWOT analysis of semiconductor companies analysed in this report

COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
SAMSUNG	• Largest memory chip production • Tight control of its value chain • Its size allows massive economies of scale • Wide global presence	• Smartphone segment squeezed by competitors • Inefficient administrative structure • High reliance on few customers and the Android operating system • Patent wars against Apple, diverting focus on building new technologies	• Repositioning in the semi-conductor market to offset dropping sales of smartphones • Taping into the tablet, and Smart TVs markets • Acquiring patents through bold acquisitions • Diversifying its semiconductor business by investing in non-memory fields and system semiconductors • Bolstering 3D flash memory solutions
TOSHIBA	• Major partnerships with Cisco and Microsoft to improve IoT value proposal • Balanced segment portfolio • Created and owns a developing platform for IoT applications	• Low liquidity ratios and growing inventory turnover • Low profitability • High reliance on the Japanese market • Legal proceedings about false advertising on products characteristics threatening customers confidence	• Connecting business segments altogether through cloud computing solutions • Taking advantage of the fast-growing demand for consumer electronics in emerging markets • Miniaturizing products to tap into the IoT
INTEL	• Greatest processor technology • Biggest semiconductor chip producer • Global presence • High bargaining power due to it size • Strong profitability	• Latecomer to the smartphone market • Reliance on the personal computer market • High exposition to currency volatility	• Taping into emerging markets • Taking advantage of the tablet market • Benefiting from cloud computing demand growth • Enhancing innovation • Diversifying its activities
QUALCOMM	• High R&D expenditure • Efficient fabless business model • Intellectual property	• Reliance on few customers and the Asian market, representing 84% of sales in 2014 • Weak presence in non CDMA technologies • Patent wars misallocating treasury fund weakens Qualcomm's focus and efforts on developing new solutions	• Developing its mobile banking portfolio • Improving data network densification and upgrade the existing one • Accelerating IoT strategy implementation • Cooperating with other companies to settle in the IoT market • Enlarging Intellectual Property to keep a technological edge

Source: Xerfi Global with companies' reports

Medium-size players differentiate through diversifications

SWOT analysis of semiconductor companies analysed in this report

COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
SK HYNIX	• Leading positions in the DRAM market and the NAND Flash markets • Healthy financial situation • Strong profitability and sales growth • Global presence	• Reliance on its Dynamic Random Access Memory segment (77.2% of 2014 revenues) • Weak economic context in the United States (22.3% of its revenues in 2014)	• Benefiting from growing global demand in the NAND Flash and CMOS image sensors • Improving product quality • Become a leading CMOS provider in China
MICRON	• Strong R&D expenditure • Large portfolio of joint ventures and partnerships • Global presence • High profitability	• Micron is under legal proceedings and lawsuits related to its intellectual property • Lack of product diversification compared to top competitors	• Benefiting from the adoption of wireless technologies to implement its products in mobile devices • Reaching the increasing demand in the DRAM, NAND and 3D NAND markets with mobile solutions from the IFMT joint venture, among other things • Enhancing Intellectual Property through R&D
TEXAS INSTRUMENTS	• Global customer base • Sales growing steady in the 2009-2014 period • High operating margin • R&D skilfulness	• High exposition to US dollar fluctuations • High fixed costs due to in-house production	• Becoming a reference of the IoT in the automotive market • Restraining business scope to shape up production effectiveness • Positioning itself for growing global demand for analog semiconductors
BROADCOM	• Leading semiconductor intellectual property holdings of 20,450 patents • Diversified product portfolio and market applications • Highly skilled workforce	• High reliance on external suppliers • In 2014, the 5 largest customers represent 44.1% of sales • Strong reliance on Asian markets • Relatively small company in terms of production capacities when compared with main competitors such as Intel and Qualcomm	• Tapping into the cloud computing infrastructure market • Gaining from the global LTE adoption trend • Benefiting from the growth perspective for IoT by improving all type of wireless communications with its NFC solutions • Pursue its deeply rooted M&A behaviour • Monetize patents

Source: Xerfi Global with companies' reports

Smaller firms tend to merge to face competition from large groups

SWOT analysis of semiconductor companies analysed in this report

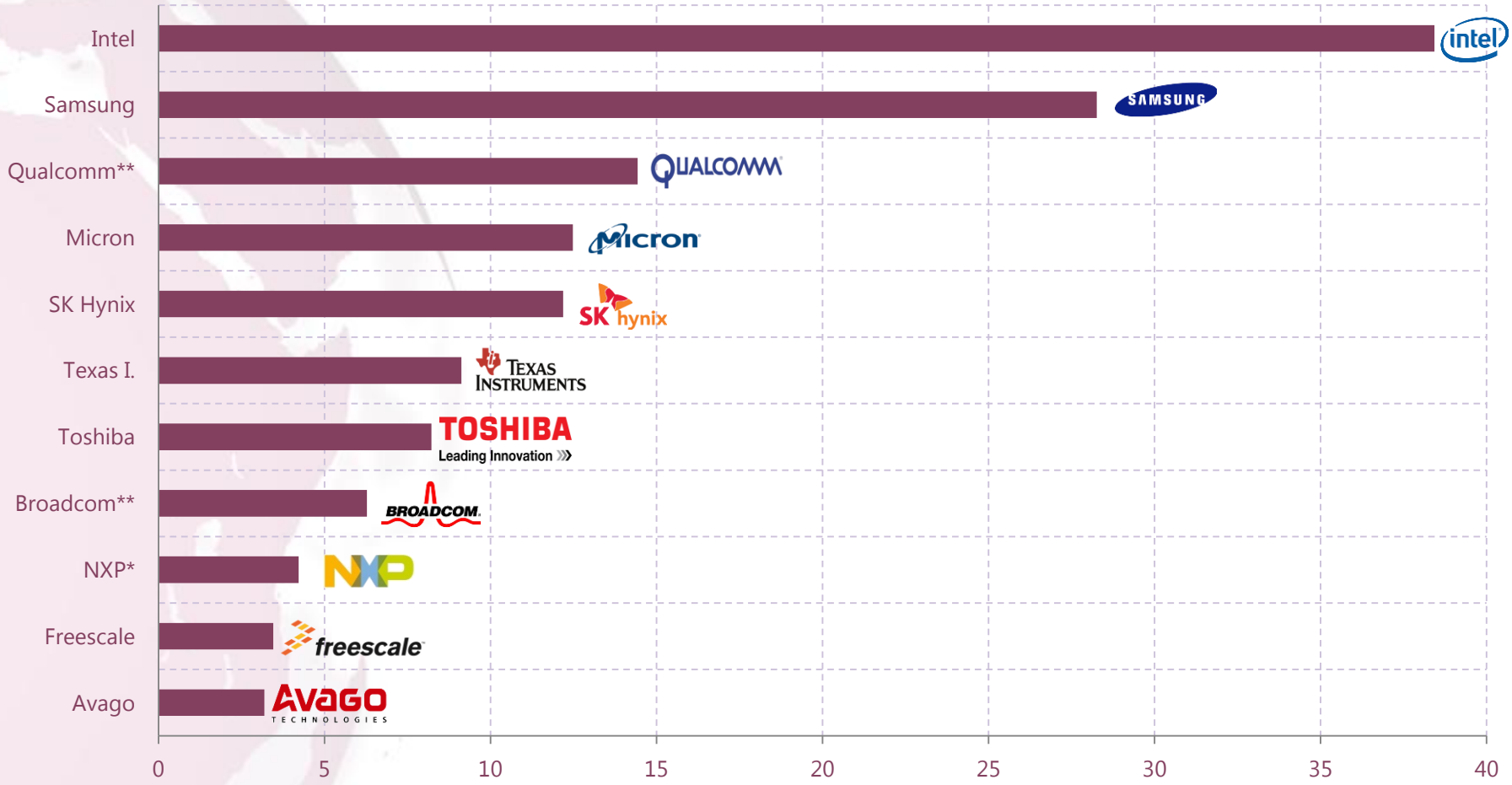
COMPANY	STRENGTHS	WEAKNESSES AND RISKS	MAIN STRATEGIC PRIORITIES
NXP	• NXP is the first provider of contact and contactless interfaces for PIN entry devices and secured card controller applications • Improving profitability and fast-growing revenues • Production facilities close to customers markets	• Debt burden • Weakening R&D spending • Highly reliant on the Chinese market	• Using own skills or acquiring some to become a major player in the connected automotive market • Benefiting from the IoT market expansion • Enhancing its NFC skills to tap into this developing market • Strengthening its banking portfolio
FREESCALE	• Major expertise in securing data transmission and storage • Early orientation towards the Internet of Tomorrow • Improving-profitability ratios • Copper-based products, much more appreciated by customers than gold-based products	• The three major clients represent 35% of revenues • Numerous business units to manage • High volatility of copper	• Using its Asian localization to build long term customer relationships with other original equipment manufacturers • Developing its intellectual property to pursue securing data transmission and storage while improving system performance • Enriching its wireless communication expertise to offer differentiated IoT value proposition
AVAGO	• High R&D ratio • Offers broad portfolio to customers • Major intellectual property rights in diversified fields	• The largest customer contributes 20% of revenues • Highly reliant on its Wireless Communications segment, 39.6% of 2014 revenues. • High exposition to raw materials price fluctuations • Third-party manufacturing and testing located in opposite regions (America, Asia)	• Benefiting from LTE adoption with its Radio Frequency semiconductor devices and LTE power amplifiers • Setting up in Asian area to be close to customer factories • Pursuing M&A strategy to drive external growth, reduce products' time-to-market , and enlarge its customer base.

Source: Xerfi Global with companies' reports

Intel and Samsung are the industry's leaders in terms of sales...

Overview of total semiconductor-related sales of groups analysed in this report (2014)

unit: billion euros

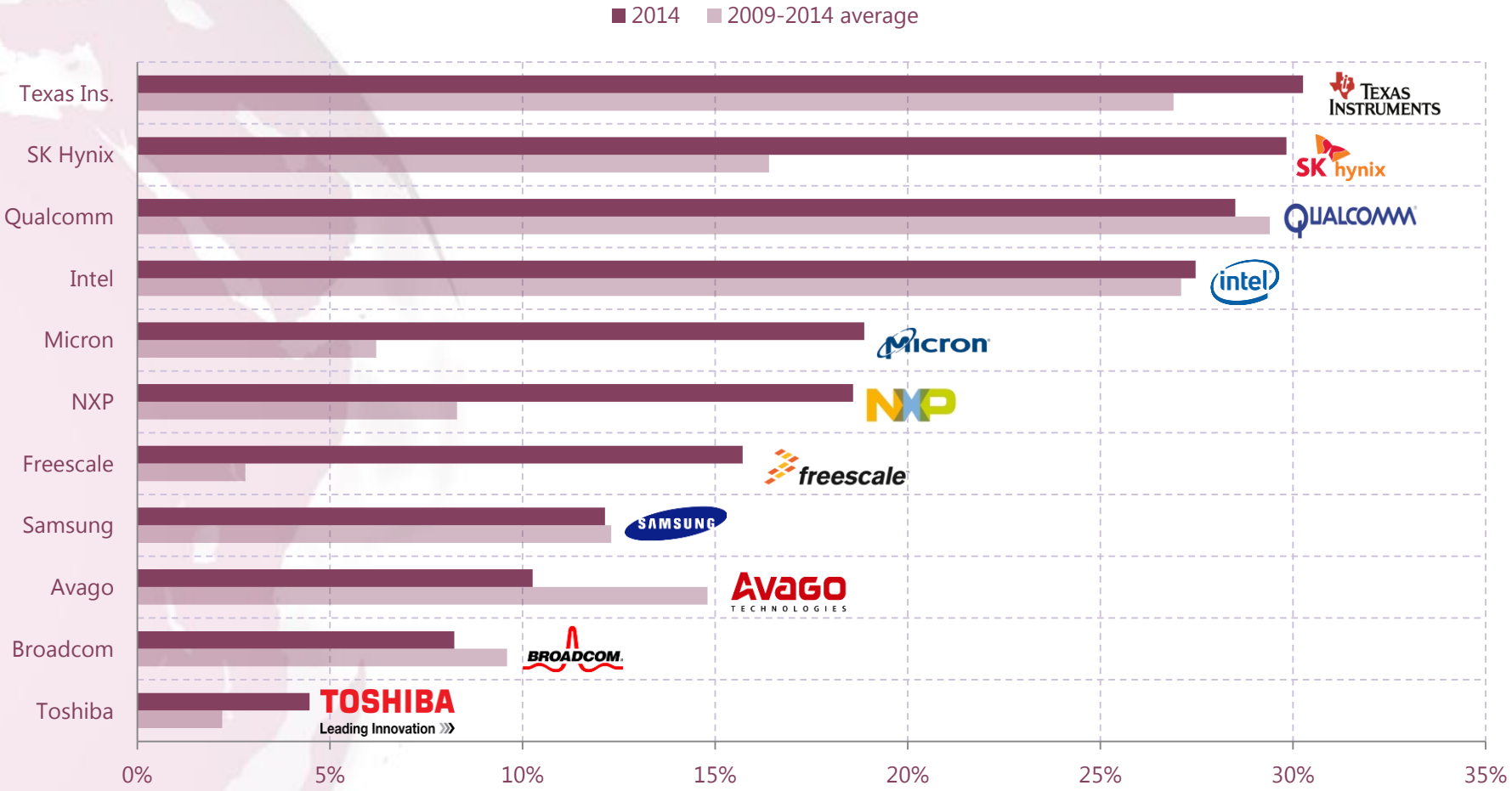


Source: Xerfi Global with companies' annual reports; *NXP was acquired by Freescale in March 2015; **Fabless

...while Texas Instruments and SK Hynix are the most profitable

Overview of operating margins of semiconductor groups analysed in this report (2009-2014)

unit: billion euros



Source: Xerfi Global with companies' annual reports

Profitability largely improved among the industry's leaders

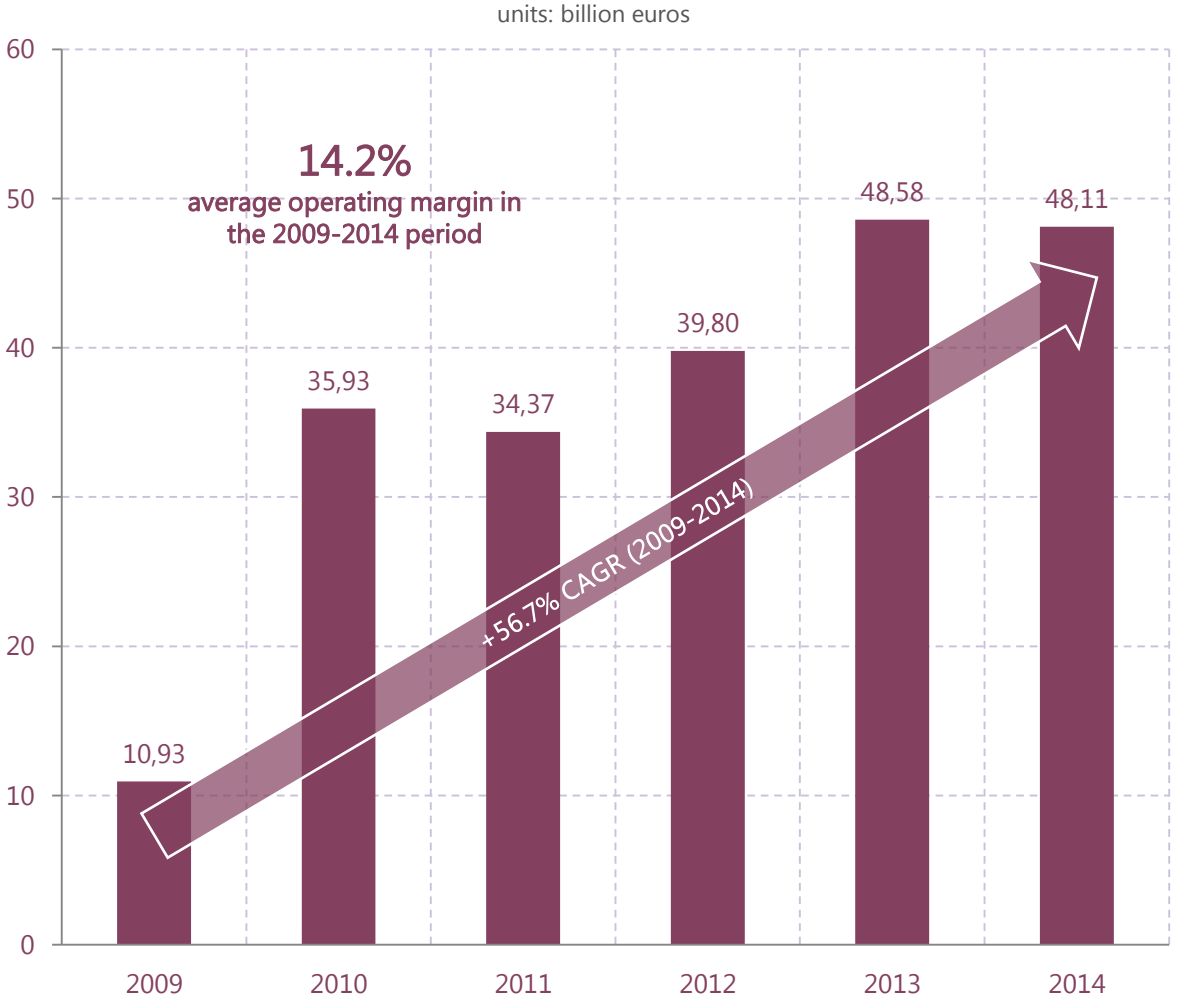
Aggregate operating profit has grown substantially in recent years mainly as a result of streamlining operations that started in 2010 and the development of new technologies such as tablets and smartphones, as well as the company's efforts to maintain high margins to attract investors and the growing demand in Asia.

The leading semiconductor groups have seen aggregate operating profit growing sixfold in the 2009-2014.

In 2014 aggregate operating profit of groups analysed in this report went down slightly (-0.9%), mainly as a result of the strong drop in sales of Samsung.

The average operating margin of the groups analysed in this report was 14.2% for the 2009-2014.

Aggregate operating profit of semiconductor groups analysed in this report

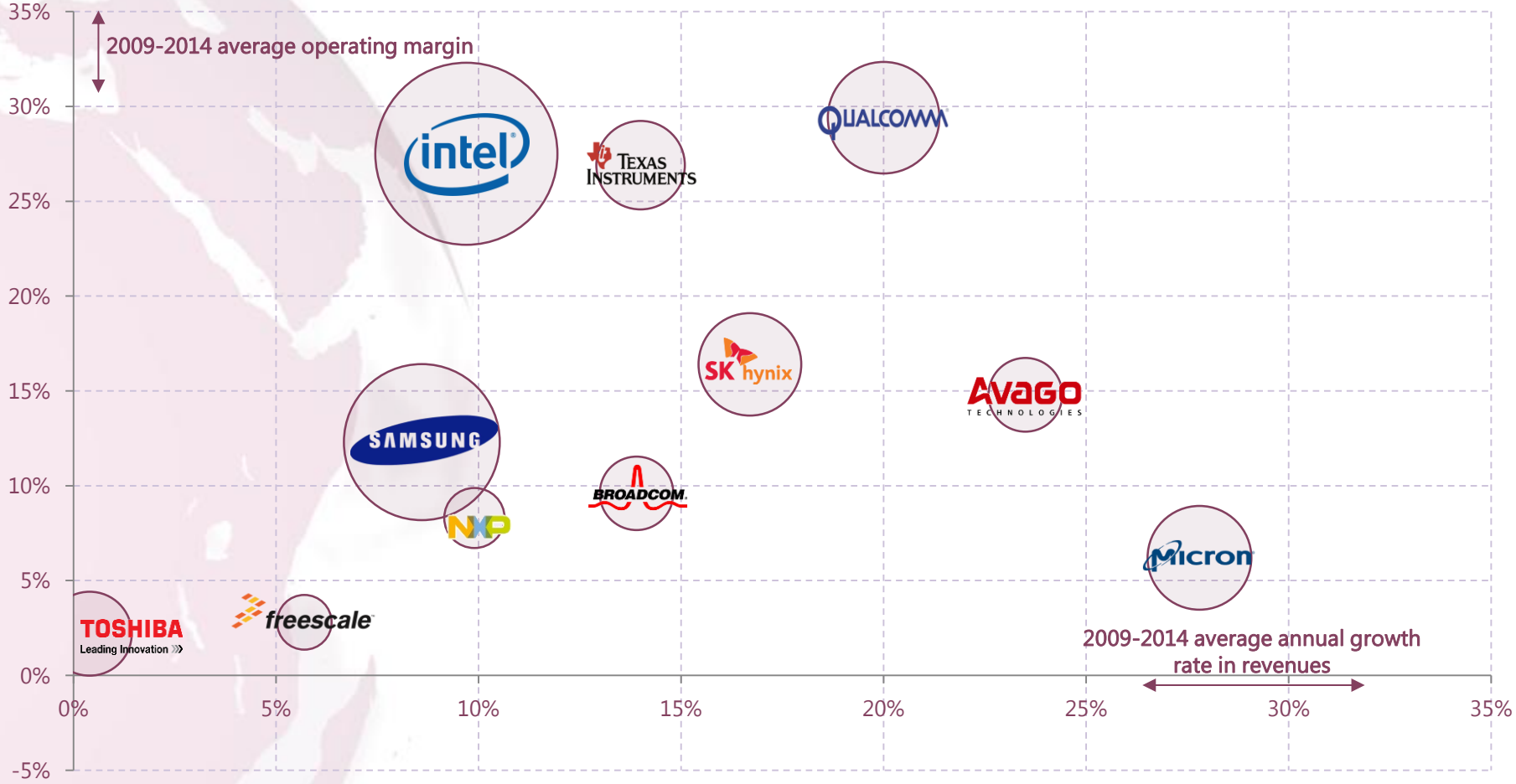


Source: Xerfi Global with companies' annual reports

US-based semiconductor groups are the best performing players

Average annual growth rate of sales and average operating margin of leading semiconductor groups (2009-2014)

units: CAGR rate in %; average operating margin in %; size of bubbles proportional to semiconductors related sales in 2014

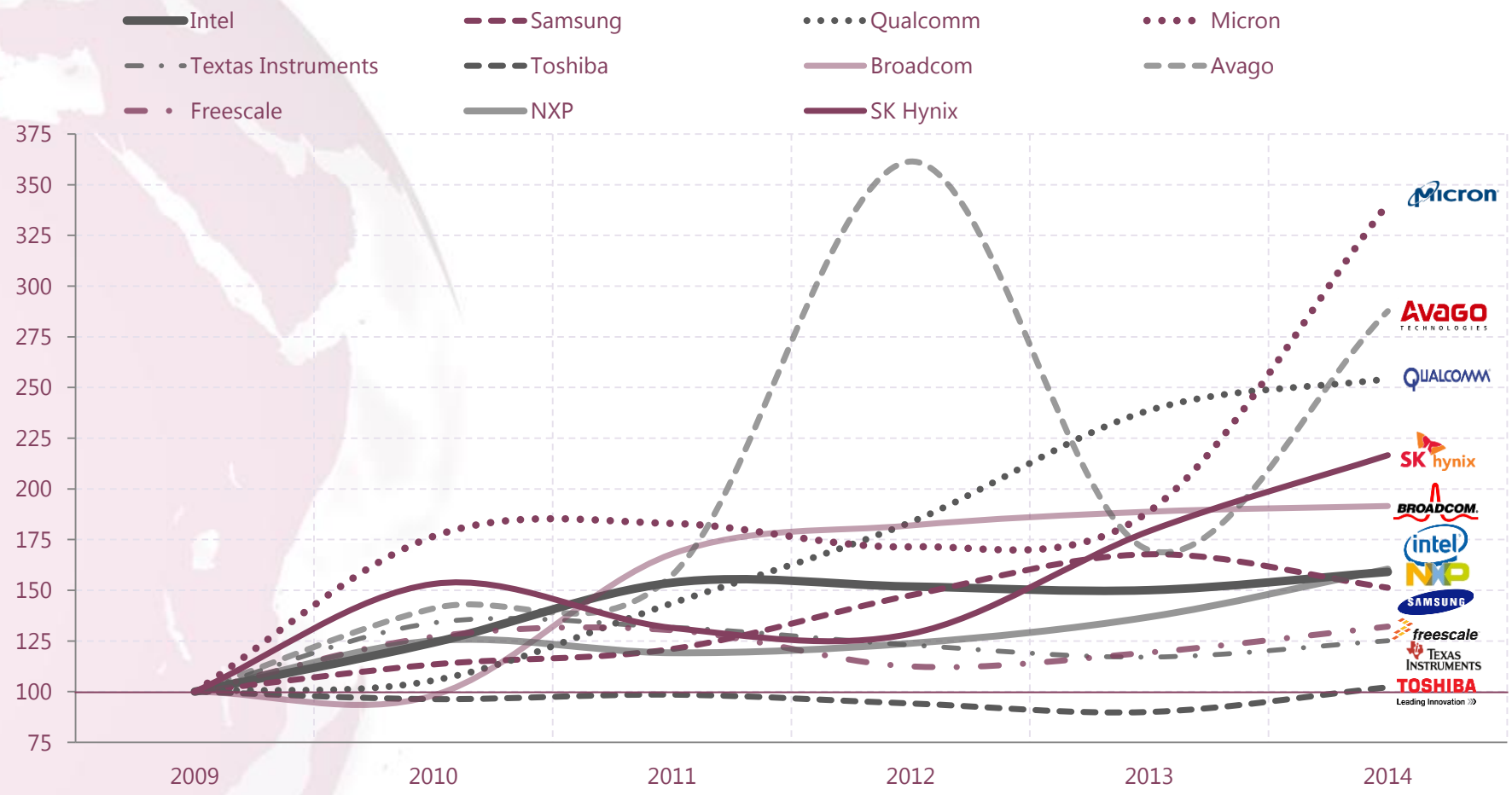


Source: Xerfi Global with companies' annual reports

Several large semiconductor groups deal with sales stagnation

Sales growth of selected analysed semiconductor groups (2009-14)

index: 2009=100

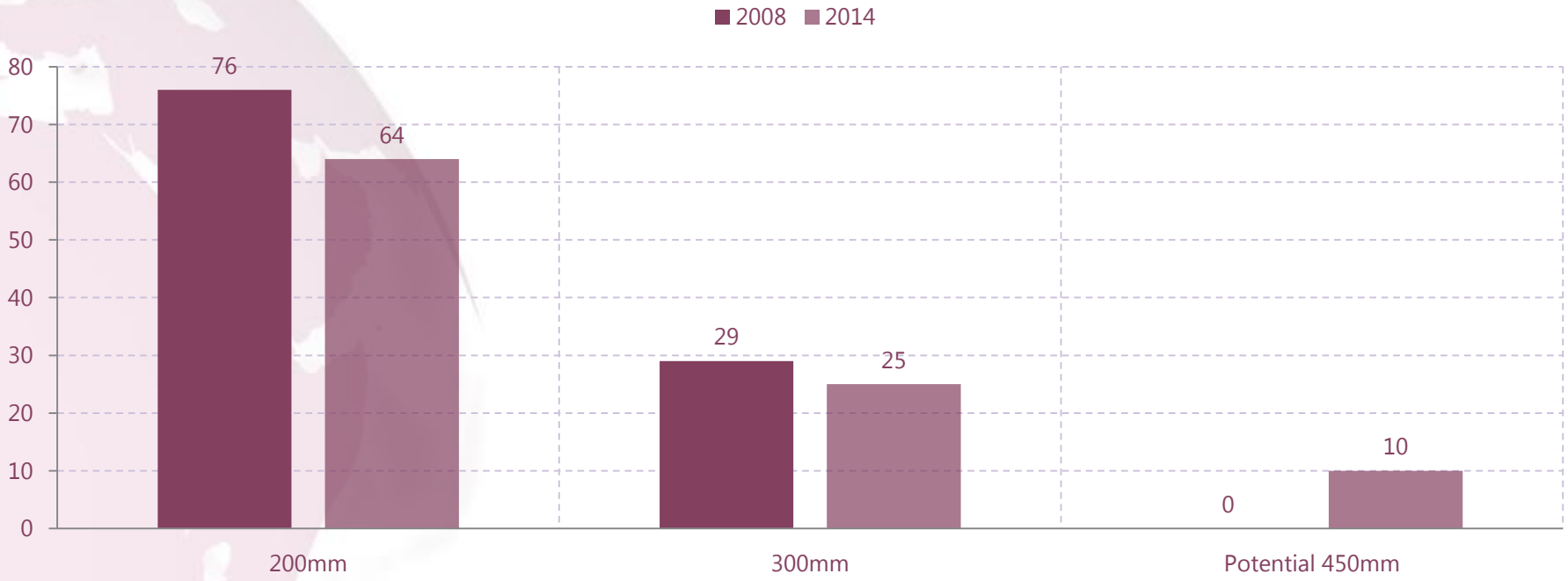


Source: Xerfi Global with companies' annual reports

The number of semiconductor makers which own fabs is dropping...

Number of semiconductor makers which own fabs, 2008-2014

unit: number of companies with fabs



Source: Xerfi Global with Global Wafer Capacity

A significant trend which is likely to adversely impact semiconductor equipment and material suppliers in the medium-long run is that the number of chip makers shifting to larger wafers will continue to shrink. There are only 25 manufacturers which operate 300mm wafer fabs compared to 64 which own 200mm facilities. Among manufacturers using 300mm wafers, 15 companies comprise 90% of the total future available market for leading-edge chip production. 450mm wafers are expected to encompass only about a tenth of global chip capacity at the end of 2017, as only around 10 companies are expected to own the necessary fabrication technology.

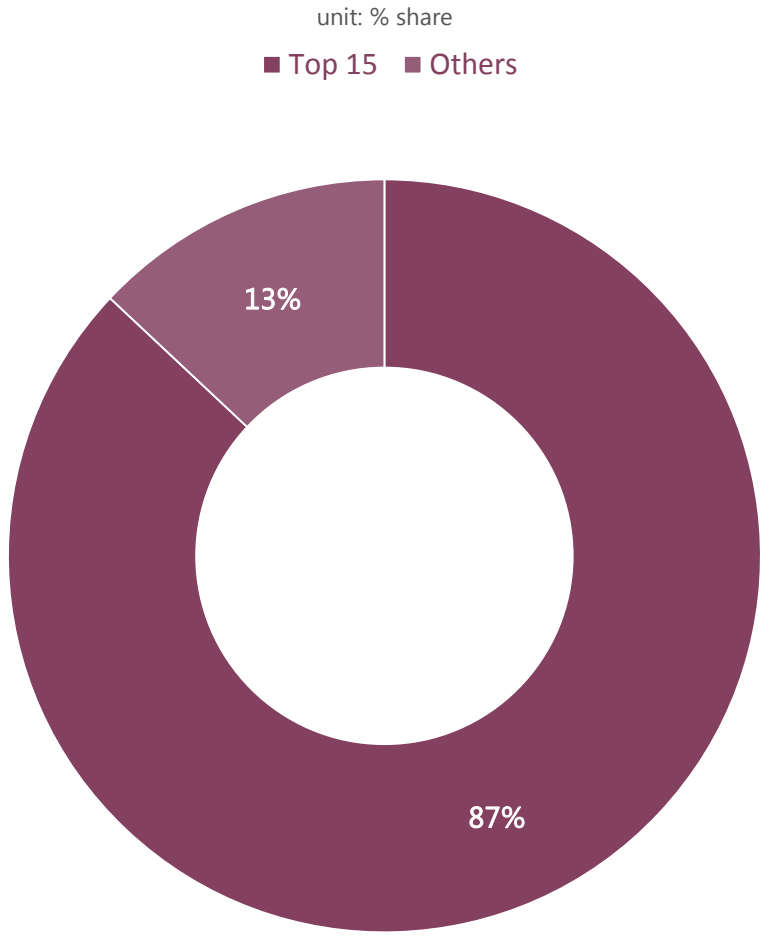
...with 15 players owning 87% of the industry's 300mm capacity

15 players currently account for approximately 94% of the industry's 300mm wafer capacity, essentially comprising the entire future total available market (TAM) for leading-edge IC fabrication equipment and materials.

Among them are memory players such as Samsung, SK Hynix, Toshiba, Micron, Elpida, the industry's micro-processor supplier Intel and the world's leading foundries, TSMC and Globalfoundries.

As 300mm fabs are, for the most part, employed in the manufacturing of high-volume devices (such as memories), these producers are the only ones that can amortise the costs of using 300mm wafer facilities.

Breakdown of the industry's 300mm wafer capacity (2014)

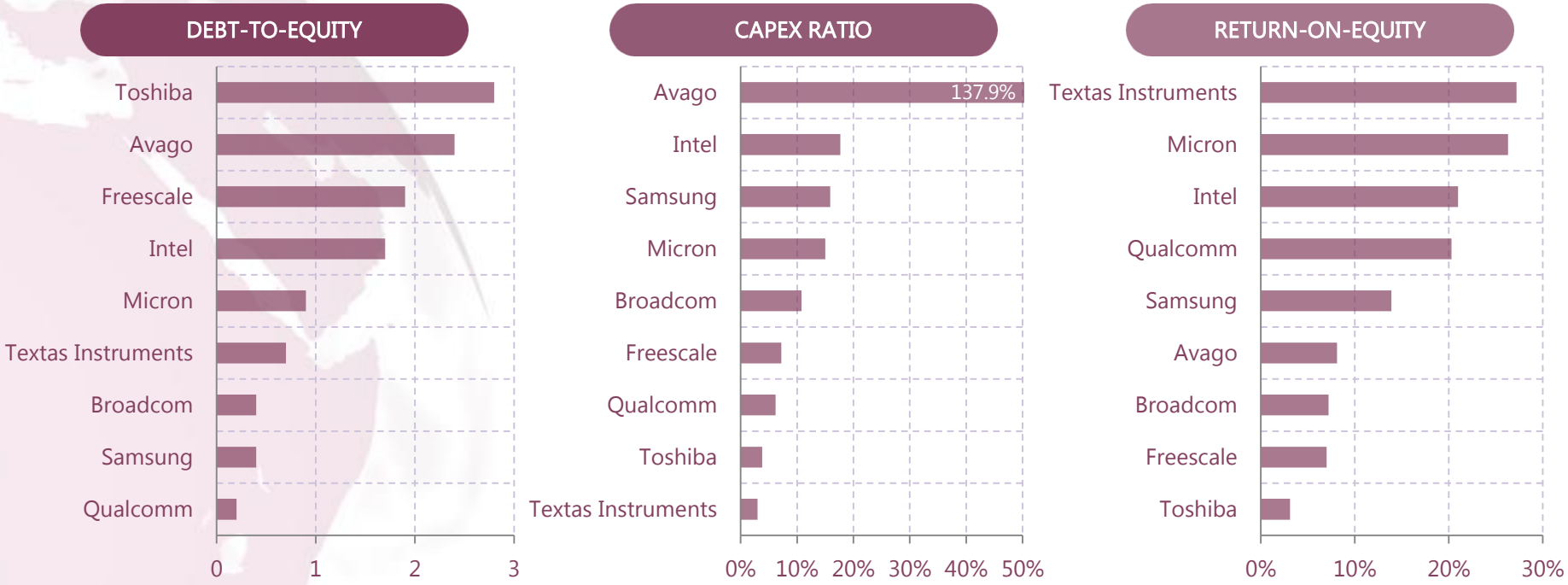


Source: Xerfi Global with Global Wafer Capacity

Toshiba has the worst financial position among leading groups

Average financial indicators of selected semiconductor groups (2014)

units: debt-to-equity ratio; capital expenditure as % of sales; return on equity: net income divided by equity in percentage



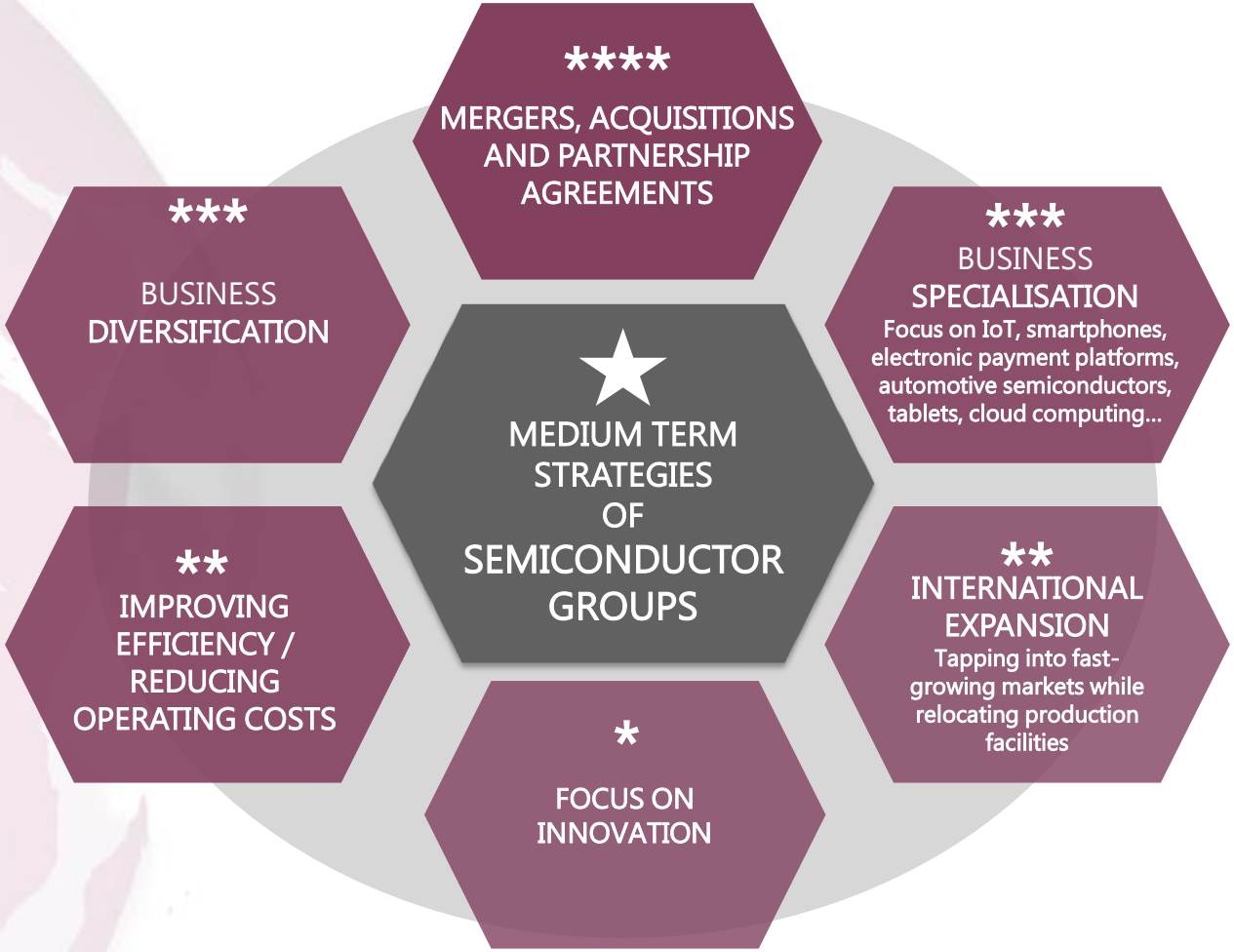
Source: Xerfi Global with companies' annual reports; *2010-2014 figures

In 2014, most major semiconductor groups improved their margins, recording considerable sales growth after a considerable demand drop in 2012 and a relatively weak growth in 2013. Some large groups such as Toshiba and Avago enlarged their debts to face the weakening demand in developed economies. In the 2014, Toshiba was by far the semiconductor group with the highest debt-to-equity ratio (2.8) in spite of recording a considerable debt decrease in the 2011-2014 period. In terms of capital expenditure, Avago was the group with the largest capex ratio mainly as a result of its focus on acquisitions (in May 2015 it purchased Broadcom). Nevertheless, leading semiconductor companies show a wide range of financial positions which vary according to external factors, such as its reliance on its domestic market, efforts to enlarge international presence, business repositioning and specialisation, and their strategic vision of research and development.

Semiconductors aim to take advantage of new technologies

Leading semiconductor groups' main medium term business strategies

unit: number of stars proportional to the importance of the strategy



Source: Xerfi Global with companies' annual reports and business press

Two fabless semiconductor groups among the industry's top 10 since 2012

Top semiconductor companies by semiconductor sales (1955-2014)

RANK	1955	1965	1977	1987	1997	2007	2012	2014
1	Huges	Texas Inst.	Texas Inst.	NEC	Intel	Intel	Intel	**Intel**
2	Transitron	Fairchild	Motorola	Toshiba	NEC	Samsung	Samsung	**Samsung**
3	Philco	Motorola	NEC	Hitachi	Motorola*	Toshiba	Qualcomm***	**Qualcomm*** **
4	Sylvania	General Inst.	Hitachi	Motorola*	Texas Inst.	Texas Inst.	Texas Inst.	**Micron**
5	Texas Inst.	GE	Philco	Texas Inst.	Toshiba	STM	Toshiba	**SK Hynix**
6	GE	RCA	National Semicond.	Fujitsu	Hitachi	Infineon**	Renesas	**Texas Inst.**
7	RCA	Sprague	Toshiba	Philips	Samsung	Hynix	Hynix	**Toshiba**
8	Westinghouse	Philco	Fairchild	Intel	Fujitsu	Renesas	STM	**Broadcom*** **
9	Motorola	Transitron	Intel	National Semicond.	Philips*	NXP*	Broadcom***	**NXP**
10	Clevite	Raytheon	Siemens**	Matsushita	STM	NEC	Micron	**Freescale**

Source: Xerfi Global with companies' annual reports and GSA; Hitachi merged with Mitsubishi to form Renesas, Renesas in turn merged with NEC and the newly formed entity kept the name Renesas; Avago acquired Broadcom in 2015; Freescale acquired NXP in 2015.

*Motorola's spin-off, Freescale, is among top fabless companies. Philips's spinoff is NXP.

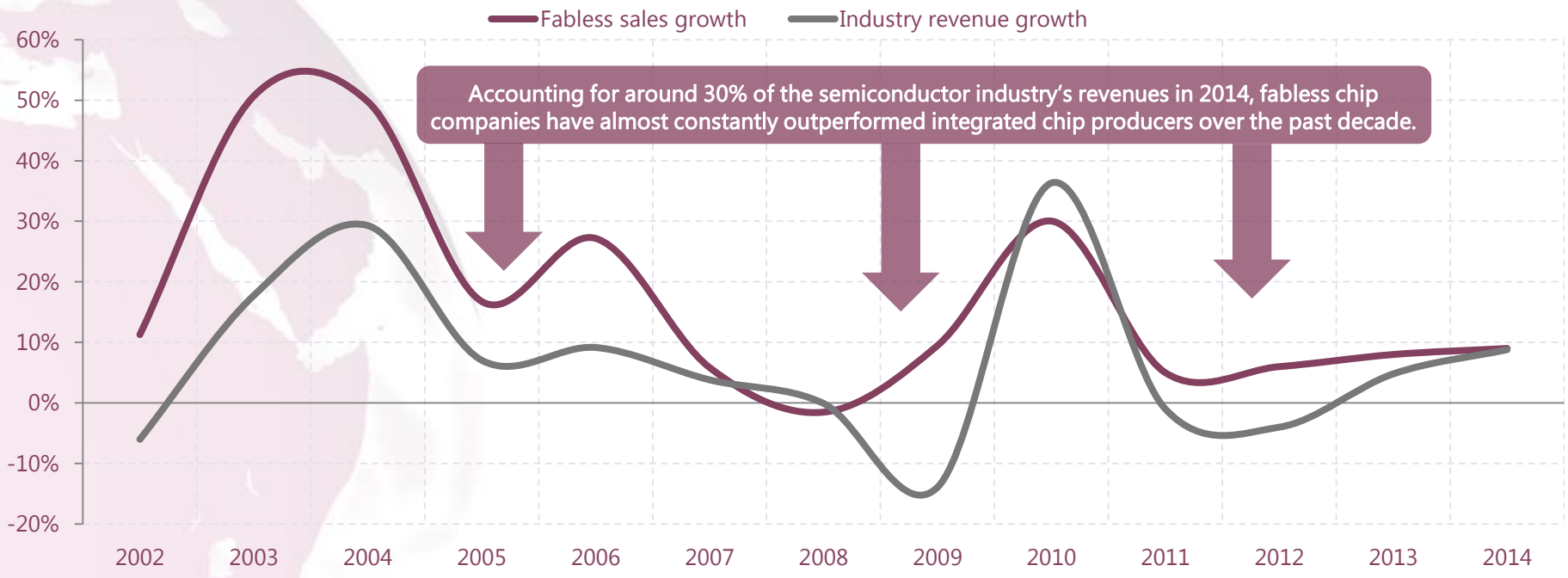
** A spinoff of Siemens.

***Qualcomm and Broadcom are fabless semiconductor groups

Fabless semiconductor companies are generally better performing

Fabless companies' sales growth versus overall semiconductor industry growth (2002-2014)

unit: annual change in %



Source: Xerfi Global with GSA

Many companies have decided to focus on the design of semiconductors and are outsourcing manufacturing to third-party foundries due to growing manufacturing costs. For instance, producing the next generation facilities is expensive – from €3 billion per plant for the current 300mm-size wafer technology to €7 billion for manufacturing a plant for 450mm size wafers. More and more companies have switched to fabless in the past decade, with the proportion of revenues of fabless firms accounting for around 30% of the industry's total, a strong increase compared to 13% in 2002. In 2014 there were two fabless companies among the top 10 semiconductor groups.

Asia is by far the largest semiconductor market in the world

Breakdown of sales by region of semiconductor groups analysed in this report (2014)

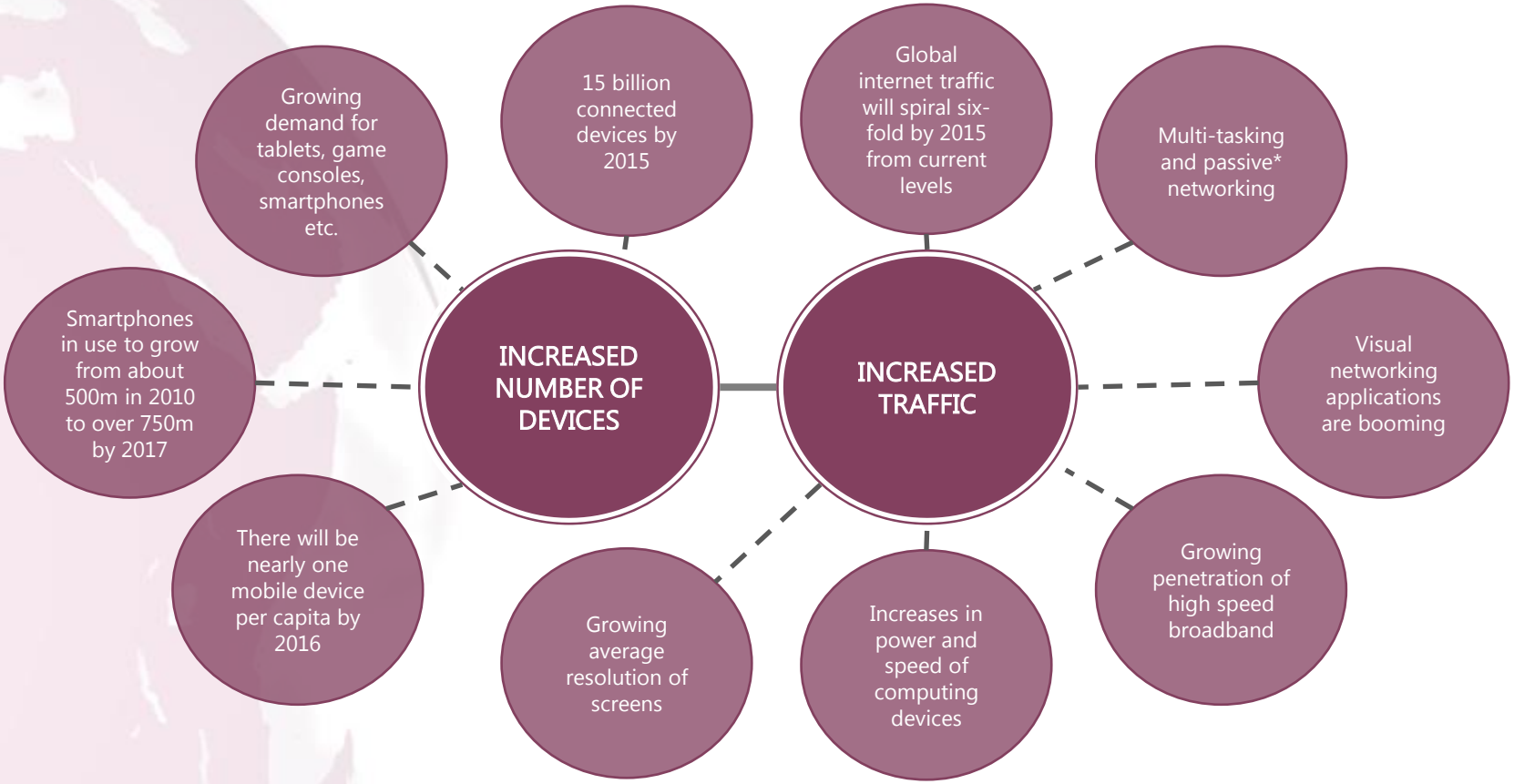
unit: % of sales

Company	North America	Latin America	Asia (China)	Middle East	Europe	Africa	Other
INTEL	17.6%	-	61.7% (20.7%)	-	-	-	20.7%
SAMSUNG	33.8%		45.6% (15.9%)	-	20.7%	-	-
QUALCOMM	1.4%	-	84.0% (49.8%)	-	-	-	14.6%
MICRON	16.1%	-	76.0% (42.3%)	-	7.8%	-	-
TEXAS INSTRUMENTS	12.4%	-	69.0%	-	17.5%	-	1.0%
TOSHIBA	17.9%	-	63.2%	-	13.1%	-	5.7%
BROADCOM	4.3%	-	84.3% (24.1%)	-	2.3%	-	9.1%
AVAGO	11.4%	-	(49.3%)	-	-	-	39.3%
FREESCALE	21.4%	-	54.4%	-	-	-	24.2%
SK HYNIX	37.1%	-	56.4% (22.4%)	-	6.6%	-	-
NXP	-	-	(56.4%)	-	-	-	43.6%

Source: Xerfi Global with companies' annual reports

Rising connectivity shifts demand to communications integrated chips

Main factors driving mobility semiconductor demand: visual networking, hyperconnectivity and high-definition

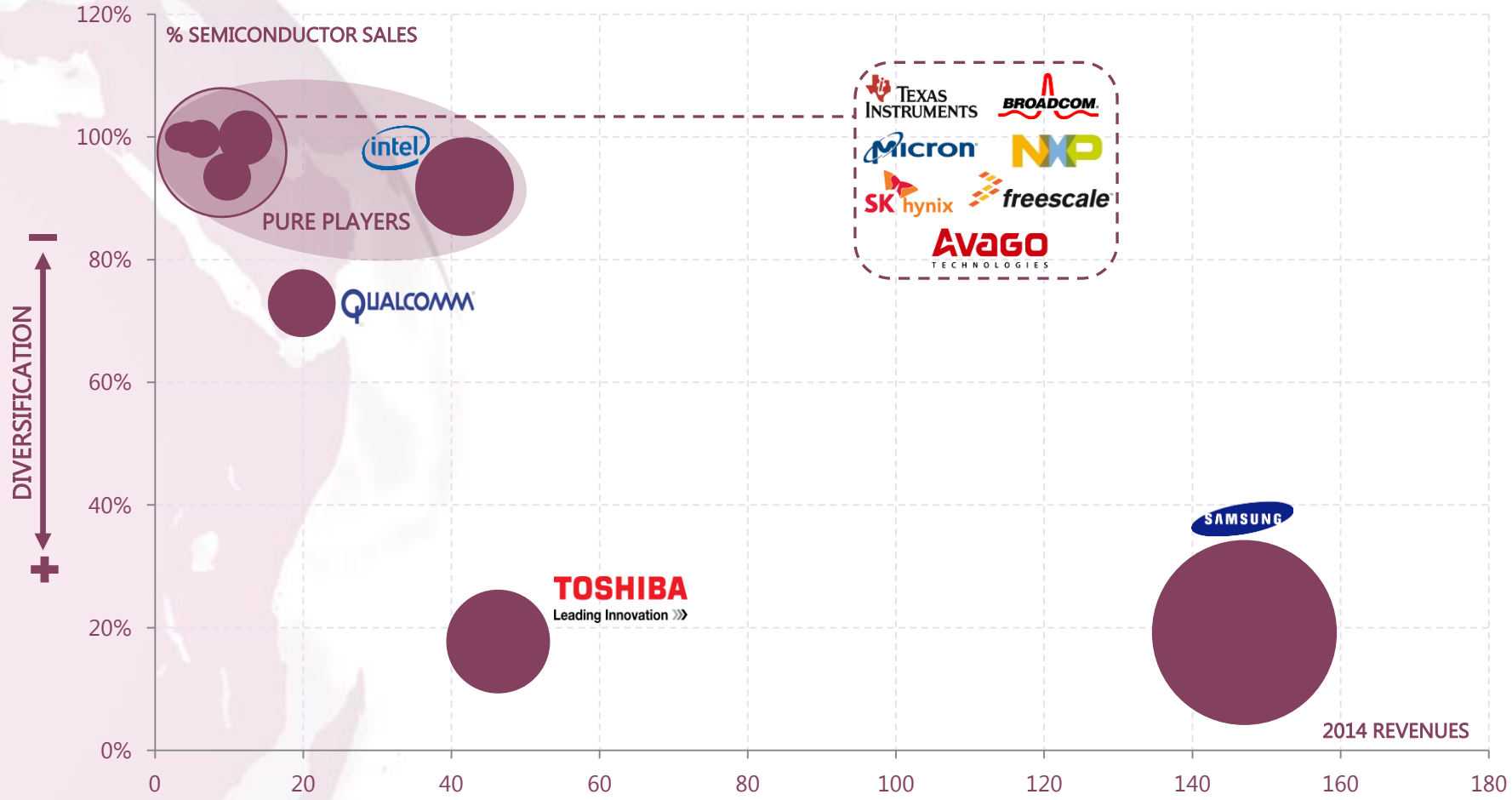


Source: Xerfi Global with Cisco; *passive networking refers to devices such as hubs, ethernet cables, coaxe cable, fibre optic cables, WAP (wireless access points), computers servers, NAS (network attached storage), remote access servers.

Most of players are specialised in semiconductors…

Business diversification and size (2014)

units: billion euros; percentage share of semiconductor revenues; bubbles' size proportional to 2014 semiconductor sales

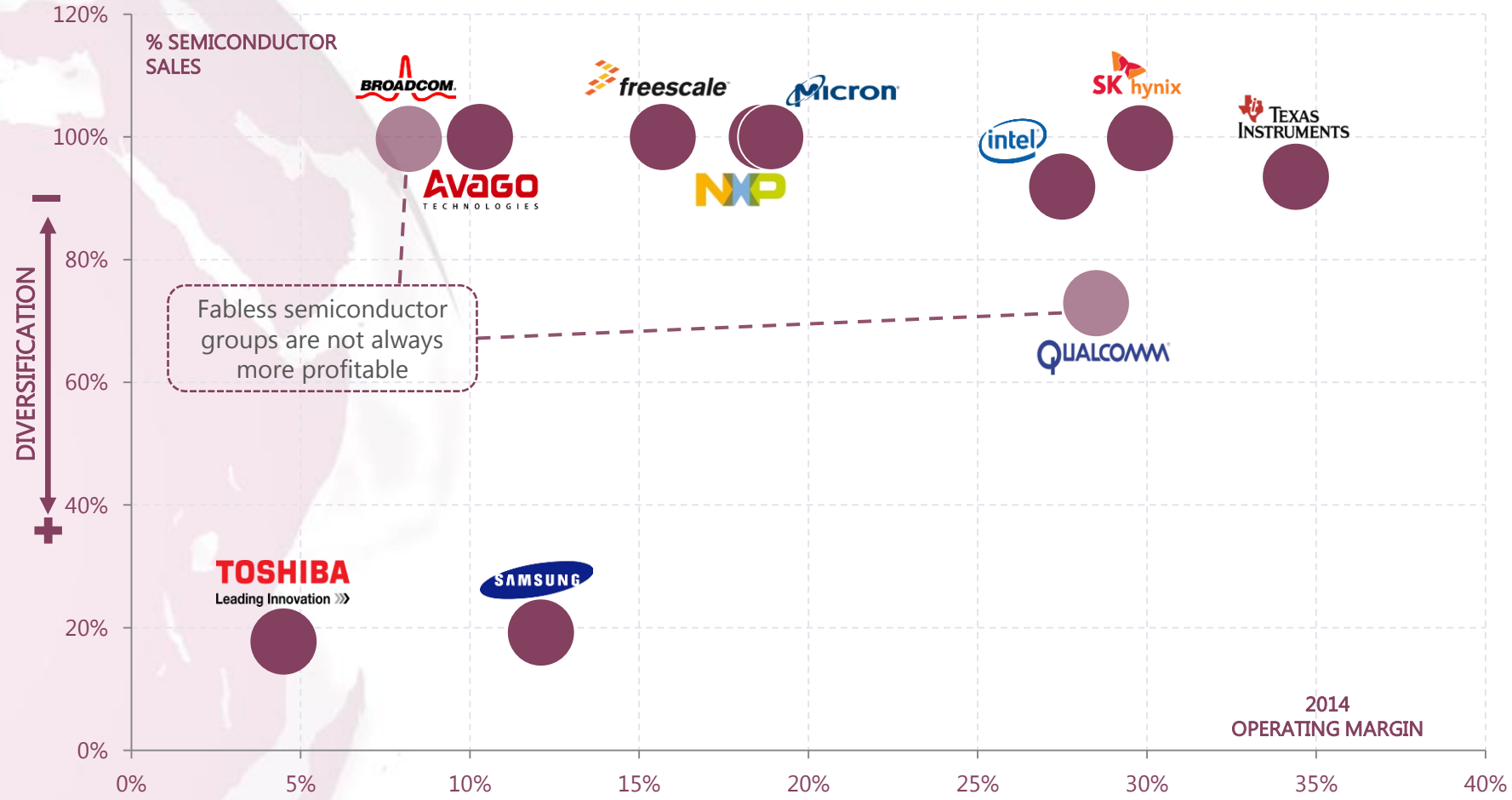


Source: Xerfi Global with company annual reports

...as specialised groups are generally more profitable

Business diversification and operating margin of semiconductor groups (2014)

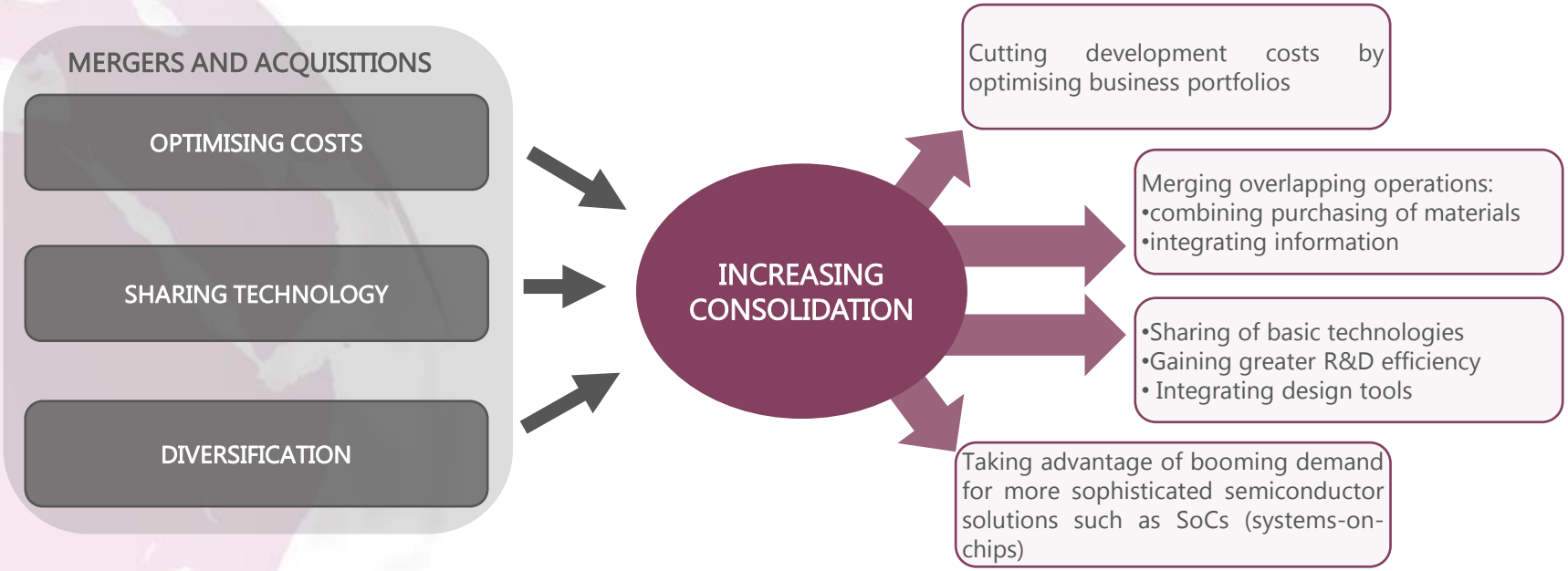
units: percentage share of total 2014 revenues; 2014 operating margin



Source: Xerfi Global with company annual reports

Mergers and acquisitions are driven by product and cost competitiveness

Key drivers of semiconductor mergers and acquisitions

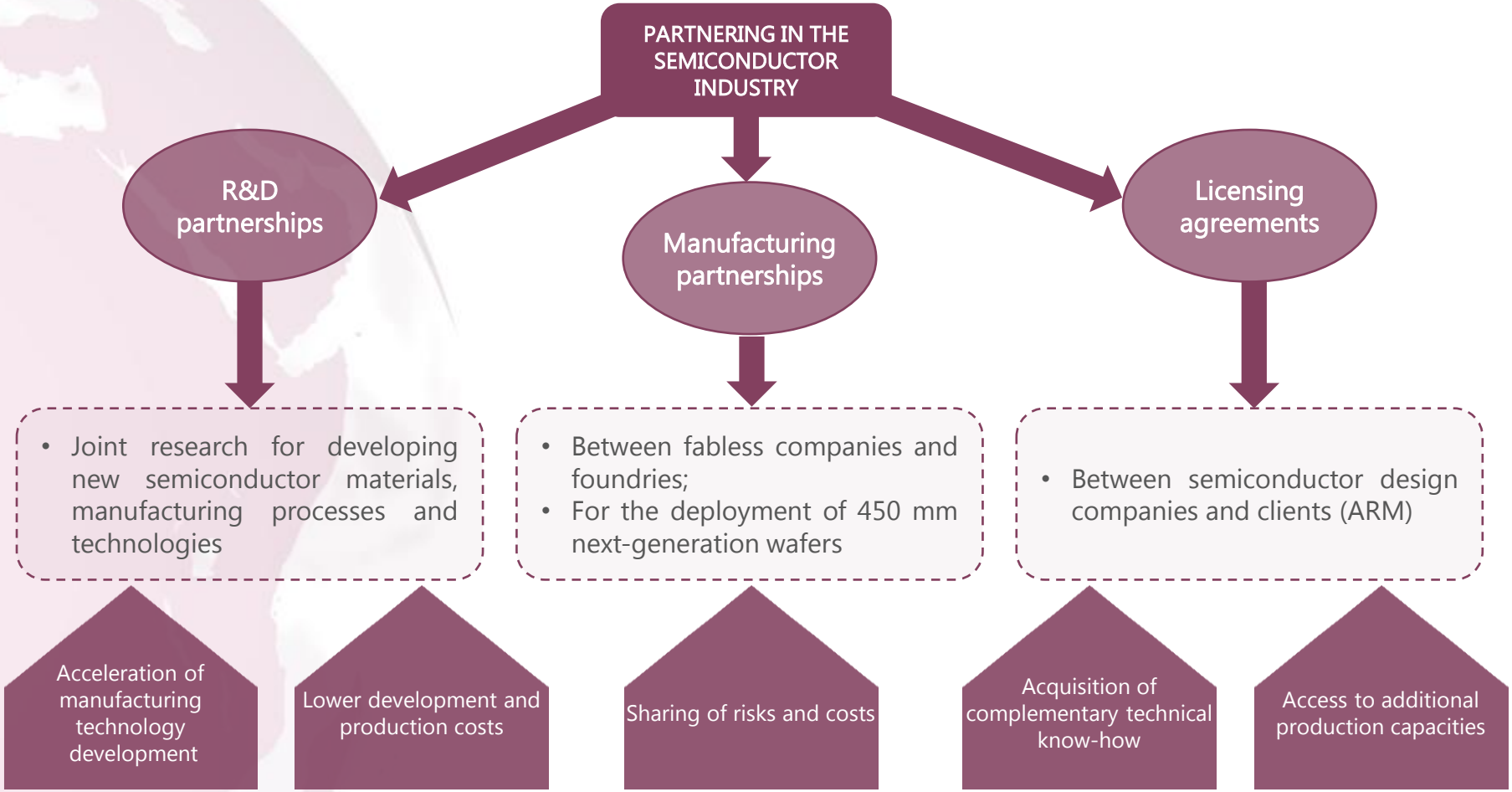


Source: Xerfi Global

Competition in the industry also relies on reducing costs to fend off competition from companies with manufacturing bases in low-cost locations, which has led to several mergers in the semiconductor sector. A recent example is that of the acquisition of Broadcom by Taixan-based Avago in 2015, a transaction worth €27.7 billion. Companies expect to optimise costs from combined purchasing of raw materials, the integration of information systems and router processors know-how, and the creation of synergies in its supply chains.

Partnerships encourage innovation and product portfolio upgrades

Main types of alliances between leading semiconductor companies



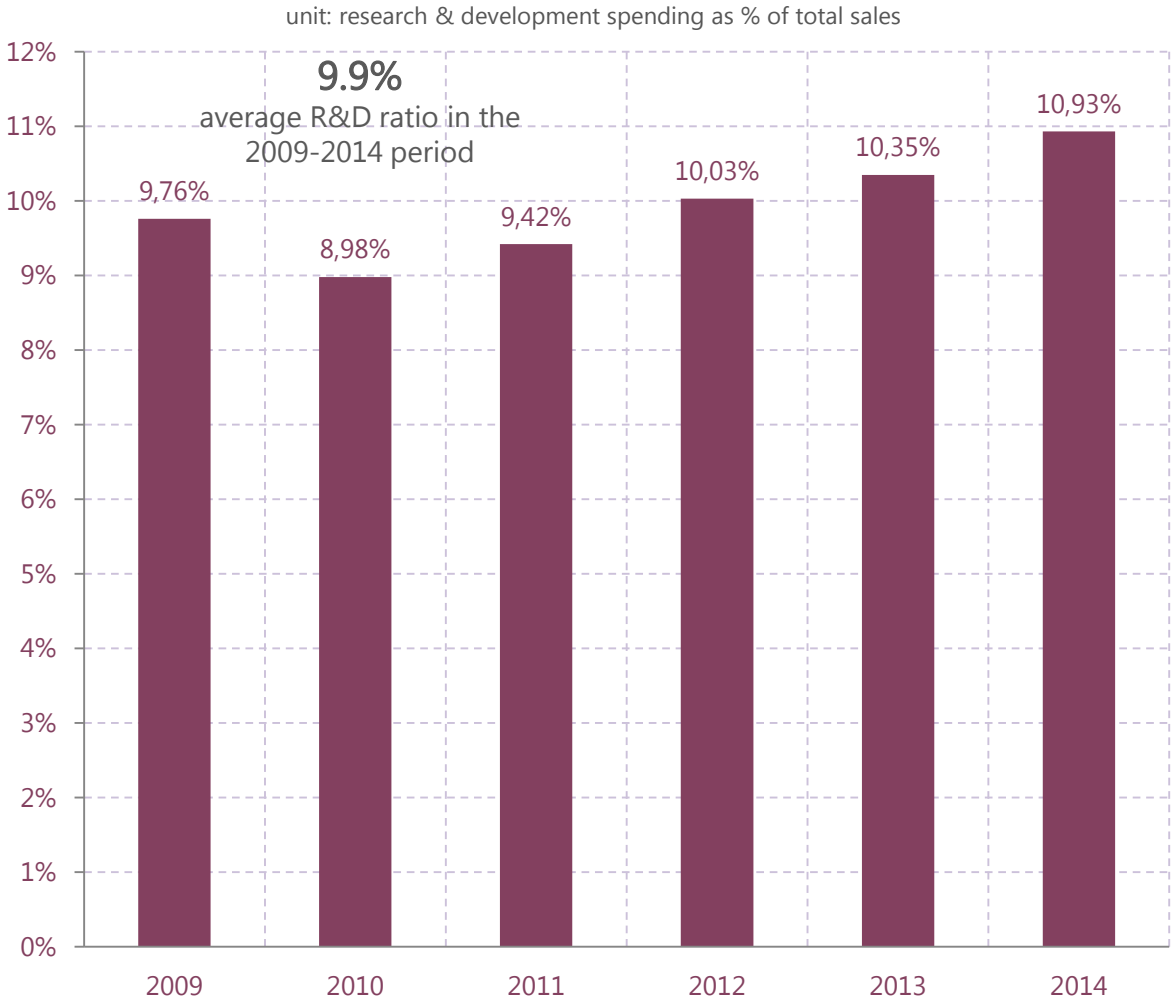
Source: Xerfi Global

Research & development is one of the main expenses of chip makers...

Rapid technological innovations are continuously driving growth in the semiconductor industry. As more and more cutting-edge devices such as tablets, wearable devices, smartphones and electric cars emerge, innovations are constantly expanding the number of semiconductor components in the market.

In 2014 the average share of research and development on semiconductor groups' revenues went up for the fourth consecutive year to reach 10.93%, a record high in the 2009-2014 period. The average proportion spent on R&D in the last five years was 9.9%, slightly under that of 2014.

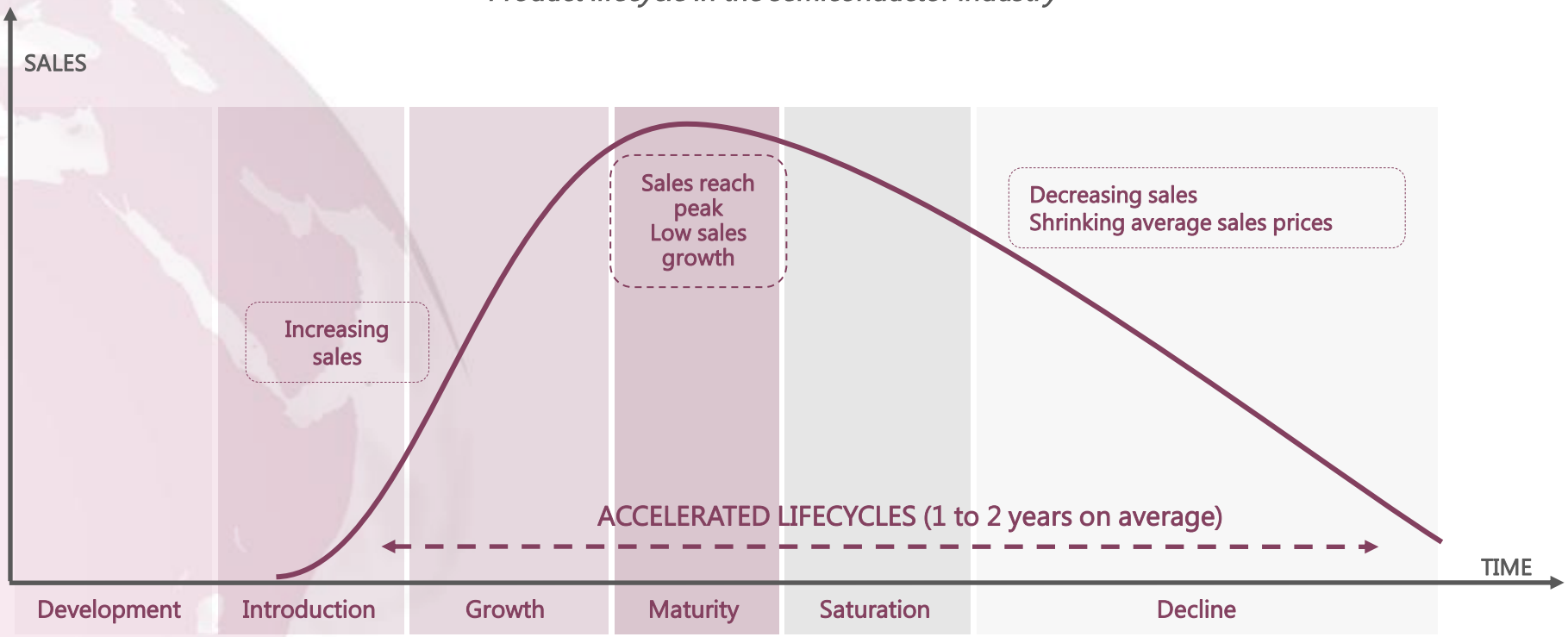
Average R&D ratio of selected semiconductor groups (2009-14)*



Source: Xerfi Global with companies' annual reports; *Companies analysed in this report

...in spite of the short product life of semiconductors' portfolios

Product lifecycle in the semiconductor industry



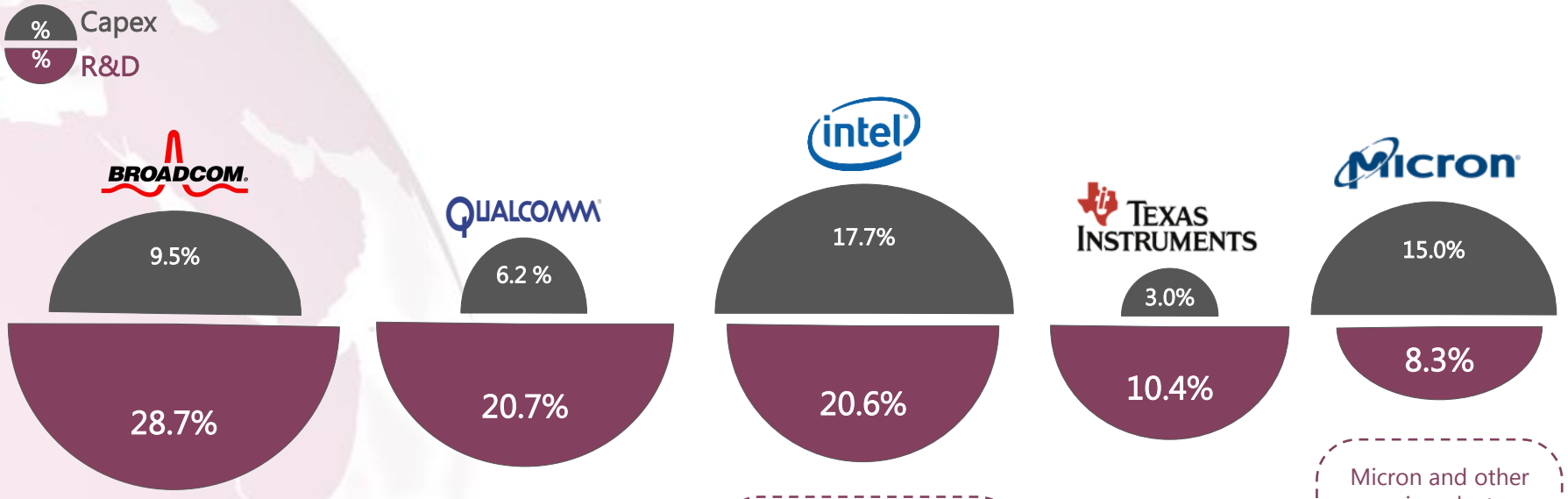
Source: Xerfi Global

Semiconductor devices and products have extremely short lifecycles. At the same time, the semiconductor industry's rate of price-performance improvement continues to be staggering. As a result, semiconductor companies can capitalise on its innovations for a very short period of time. Periods of fast expansion, with high investment and equipment spending, lead to periods of overcapacity and price decreases, which ultimately result in periods of declining sales. These factors combine to present semiconductor groups with constant challenges to deliver innovations.

Fabless firms can scrap capex, focusing resources on innovation

Overview of capex and R&D expenses of fabless vs. integrated manufacturers (2014)

units: % of capex and R&D to sales



Qualcomm and Broadcom are fabless chip makers that outsource manufacturing as well as test and assembly operations to focus on chip design development.

Vertically integrated chip manufacturers such as Intel and Freescale must devote a large share of sales mainly to maintain and upgrade production technologies.

Texas Instruments is a fab-lite model with part of production being outsourced.

Micron and other semiconductor groups focus on manufacturing and packaging processes, which means lower research and development expenditure and a higher capital spending to upgrade facilities.

Source: Xerfi Global with company annual reports

4. Case Studies

Avago's targeted acquisition programme improves its leading position

Overview of Avago's recent acquisitions

Avago is driving a considerable proportion of its external growth by mergering and acquiring targeted rival semiconductor companies.

March 2013	Avago acquires US-based Javelin Semiconductor, a group specialized in radio frequency components for the smartphone market.
April 2013	Avago buys Israel-based CyOptics to enhance its fibre optic product portfolio.
May 2014	Avago acquires LSI Corporation for €4.9 billion. LSI has a leading position in the enterprise storage and the mobile data traffic markets.
June 2014	Avago purchases US-based PLX Technology to improve its portfolio of enterprise storage and networking businesses.
February 2015	Avago acquires Emules to reinforce its position in the memory business and enhance its portfolio of software storage solutions for the enterprise and data centre markets.

May 2015: Avago acquires US-based Broadcom for 27.7 billion euros, building up the world's third largest semiconductor player of the industry. Avago will benefit from Broadcom's expertise in wire and wireless communications and from its large portfolio of products and customers in the mobile communication business.

Source: Xerfi Global with business press and Avago's annual reports and presentations

Intel is diversifying to reduce its reliance on the PC market

Overview of Intel's diversification strategy

Intel, the world's largest chipmaker, plans to become more diversified. With the personal computer market forecast to decline for a third consecutive year and Intel failing to win significant market share in phones, the group is working now to ensure that it will not miss new opportunities such as wearable devices, the Internet of Things and other new technologies.

The company remains heavily dependent on servers and PCs. In 2014, Intel had more than 80% of the market for PC processors and more than 95% share in server chips.

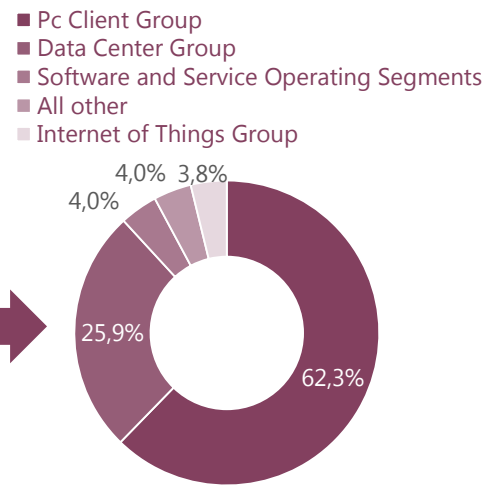
The company is now taking steps to adapt its portfolio to new market requirements and demands, rather than following its traditional method of designing and producing products aimed at determining the direction of technology.

DIVERSIFICATION PRIORITIES FOR INTEL

- Production of chips for rivals
- Lower-power products
- Growing in the smartphone and tablet markets
- Updating/opening production to keep its leading position in transistor technology
- Increasing its R&D budget
- Entering the smartwatches, glasses and the IoT

Intel's sales by segment (2014)

unit: % of revenue



Source: Xerfi Global with Intel's annual reports and business press

Samsung aims to take advantage of its semiconductor business

Overview of Samsung' strategy to reposition in the semiconductor market

South Korea-based Samsung is the world's second largest semiconductor group after Intel and the world's largest memory chipmaker. The company is globally known because of its smartphones, although its mobile segment's revenues have been slowing in recent years. In 2014, Samsung's Semiconductor division profits overtook its IT & Mobile division profits and reached €6.3 billion. As the group sees strong potential in its Semiconductor business, Samsung is set to enhance its position in this market by investing, expanding, partnering and acquiring rivals in the semiconductor market.

PARTNERSHIP AGREEMENTS
Example: in April 2014, Samsung and GlobalFoundries signed a collaboration agreement to allow the fabless semiconductor designers to access its 14nm FinFET technology in their facilities.

ACQUIRING
Example: in August 2015, Samsung acquired US-based start-up SmartThings. This company builds and sells home automation kits and enhances Samsung's portfolio in the Internet of Things.

BOOSTING PRODUCTION
Example: Samsung is increasing the share of its Semiconductor business in its results. For example, in February 2014 the company started mass producing its 3GB LPDDR3 DRAM, as well as its 32GB eMMC ePoP memories used for smartphones and tablets.

INVESTING
Example: in June 2014, Samsung announced investments worth up to 1.1 billion euros to build a new electronics factory in Ho Chi Minh (Vietnam). In May 2015, Samsung invested 7.3 billion euros to build a new semiconductor production facility in Gyeonggi (South Korea).

INNOVATING
Example: in March 2014, Samsung launched its DRAM memory of 20nm, becoming the only company in the world able to manufacture this type of memory. Samsung's R&D spending has more than doubled between 2009 and 2014.

Source: Xerfi Global with Samsung's annual reports and business press

Texas Instruments is developing the "Internet of Cars"

Overview of Texas Instruments' strategy to take advantage of the Internet of Things

Texas Instruments forecasts that more than 50 billion devices will be connected by 2020. In 2014, the company had one of the semiconductor industry's broadest portfolios of embedded wireless connectivity technologies, microcontrollers, processors and other products that are key for the IoT. One of the company's main strategic priorities is to become a global leader in the Internet of Things and taking advantage of the increasing demand for cloud based solutions, particularly in the automotive industry. To achieve this goal, Texas Instruments is redesigning its product and services portfolio while deploying a growing share of its research & development projects in the automotive industry.

- GPS directions
- Bluetooth phone calls

- Download music & videos via Wi-Fi
- Fleet tracking
- Electronic brake systems

- Cars learning how to coexist to prevent accidents
- Autonomous vehicles
- Sensors to detect congestion and redirect traffic
- Sensors to detect impairment

TEXAS INSTRUMENTS

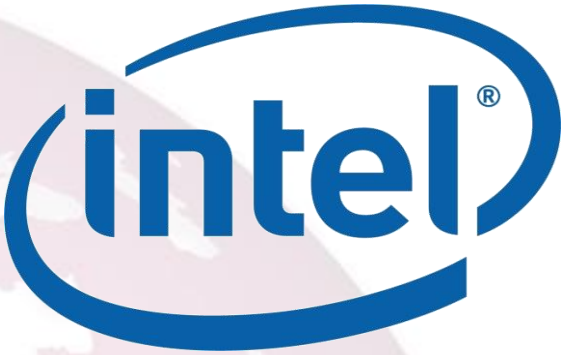
Texas Instruments' automotive business is growing faster than the rest of the company driven by its microprocessor and car technology, which have been bought by Ford, BMW and other large carmakers. Some of Texas Instruments' recent innovations in the automotive sector include:

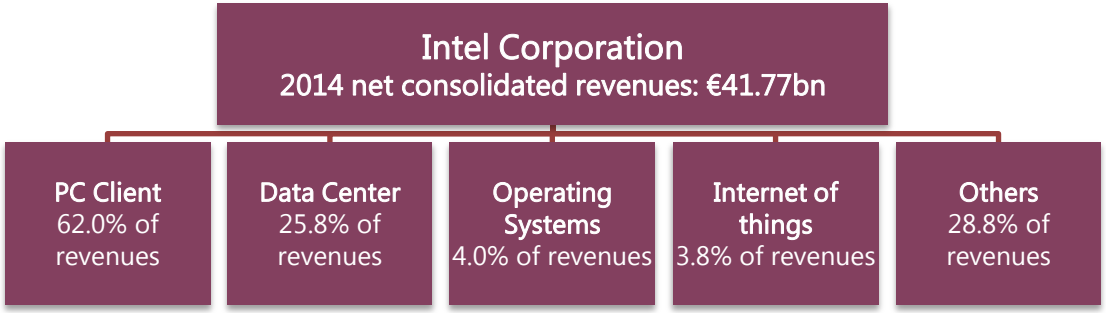
Emergency-brake assist	Radars	Power management systems	Night vision systems
Traffic-sign-recognition	Camera-based systems	Adaptative cruise control	Camera-based systems (park assistant)

Texas Instruments offers a wide range of innovative technologies for the modern automobile and is currently developing a next generation advanced driver assistance system (ADAS) for innovations for the Internet of Things and wearable technology. Furthermore, the company announced at the end of 2014 that it would launch more than 100 new products in the coming months and said it was already developing new platforms for a future driving car. Some products and solutions included in its automotive portfolio are the critical active and passive safety and advanced driver assistance systems, as well as brake intelligent systems, electronic solutions for airbags, electronic stability control systems, electric power steering systems and solutions for hybrid-electric power train systems and wireless connectivity technology.

Source: Xerfi Global with Texas Instruments' annual reports and business press

5. Company Profiles





Fiscal year ended December 27, 2014

Headquarters

Santa Clara, California, United States

2014 key figures (consolidated)

Net sales	€41.77bn
Operating margin	27.5%
Net margin	20.9%
Capex ratio	17.7%
R&D ratio	20.6%
Staff	106,700

- Intel is the largest semiconductor chip maker in the world based on revenue.
- The Company develops, manufactures and sells computing and communication components, such as microprocessors, chipsets, motherboards, and wireless and wired connectivity products, as well as platforms that integrate these components. The group's solutions can be found in a wide range of applications, such as desktop PCs, notebooks, servers, tablets, smartphones, automobiles, automation systems, and medical services.
- In 2014, Hewlett-Packard contributed to roughly 18% of Intel's revenues, followed by Dell and Lenovo Group, with 16% and 12%, respectively.

Revenue by region (2014)

Singapore	20.7%
Other countries	20.7%
China	20.0%
United States	17.6%

SEGMENT	% OF SALES	OPERATING MARGIN	DESCRIPTION
PC Client Group	62.1%	42.2%	Creation and sale of notebooks (including Intel's Ultrabook devices), 2 in 1 systems and desktop computers for consumers and businesses.
Data Centre Group	25.8%	50.6%	Conception and sale of server, network and storage platforms designed for the enterprise, cloud, communications infrastructure, technical computing segments.
Internet of Things Group	3.8%	28.8%	Configuration and sale of platforms for customers to design products for the retail, transportation, industrial and buildings, and home market segments. It establishes an end-to-end secure and manageable architecture capturing information for consumers.
Mobile and Communication Group	24.8%	-2,082.2%*	Production and sale of products that incorporate connectivity hardware and software for mobile platforms such as tablets and smartphones, as well as wireless systems.
Software and Services Operating Segments	4.0%	2.5%	Design and sale of software promoting Intel as a developing platform, including software products for security issues through its McAfee service and software for the embedded and mobile segments.
All other	4.0%	-134.5%	Conception and sale of non-volatile memory solutions including Intel's NAND flash memory products.

*€3.1bn lost in 2014

Diversification at the heart of Intel's strategy

Despite PC sales dropping in the 6 last years, Intel was a relative latecomer to the fast-growing mobile market and could not close the gap with competitors. Since its creation in 2012, Intel's Mobile and Communications segment has collapsed and its operating margin has been in the red. In the meantime, datacenters and cloud computing companies have driven demand for computing services as a result of the sharp growth of the mobile market. In the coming years, Intel will continue diversifying its operations to take advantage of emerging technologies such as wearables. To achieve this goal, the company will use its financial strength and enhance its external growth by acquiring innovative companies operating in reprogrammable chipset, home networking and wearables markets.

April 2012	Intel enters the smartphone market by implementing its Intel inside technology in an Indian mobile handset company, sold by Lava International.
February 2014	Intel and Altera, a fabless programmable chip designer, sign an agreement in which Intel commits to produce Altera's chips. This type of chipset is considerably useful for datacentres as it allows easy hardware and software updates.
January 2015	Intel acquires Composyt Light labs, a Swiss company that produces smart glasses which have a relatively important place in the mobile computing industry. This is in line with Intel's aim to develop its Internet of Things segment.
	Intel launches the Curie chip, a low power solution that allows companies to develop wearable technologies, in line with Intel's strategy to tap into the wearable technology market.
February 2015	Intel buys German-based Lantiq for an undisclosed amount and acquires over 2,000 patents of broadband communications and home networking technologies.
April 2015	Intel buys Lemoptix for an undisclosed price. Lemoptix is a provider of scanning micro mirrors, a technology used in the 3D printing industry.
	Intel starts cooperating with Ingenico Group to merge Intel Technology and Ingenico secure payment capabilities. Intel's purpose is to build mobile payment capabilities through a wide array of connected devices for its Internet of Things segment.
May 2015	Intel and Altera enter negotiations for an acquisition deal. Altera is a world leader in the design of programmable chipsets, a product that is mainly used in datacentres to update hardware and software.

Enhancing innovation to improve product performance

Since 2009, Intel's research and development budget has increased steadily to reach €8.6bn in 2014, representing an 18.3% CAGR in the 2009-2014 period and 15% of total sales in the last fiscal year. In 2007, Intel created the Tick-Tock model to improve its innovation programmes annually. Today, Intel's innovation strategy prioritizes several plans that aim to enhance its manufacturing and microarchitecture processes. As a result, the company expects to improve its processors' performance, add new capabilities and improve the energy efficiency of its products.

July 2012	Intel provides R&D funding worth €3.3bn to Dutch company ASML to contribute to the development of the Extreme Ultraviolet lithography and deep ultraviolet immersion lithography, two critical fields for the long-term growth of the semiconductor industry. ASML is a leading company in the design and sale of manufacturing machines for the semiconductor industry.
June 2013	Intel launches the Haswell micro-architecture. It is the first x86 core to compete in the tablets market.
August 2014	Intel releases the Intel Core i7-5960X Processor, a chipset oriented to desktop computers, in line with the company' strategy to enhance its activities in the PC industry.
September 2014	Intel releases Broadwell-based Intel Core M CPU's, whose size has been reduced by one third when compared to the previous version.
	Intel launches Skylake, a new micro-architecture for chipsets providing wireless charging, increasing performance, battery life and power efficiency.
January 2015	Intel announces the release of its 5th generation core processor series during the CES 2015 conference to show that the company follows its Tick-Tock plan.

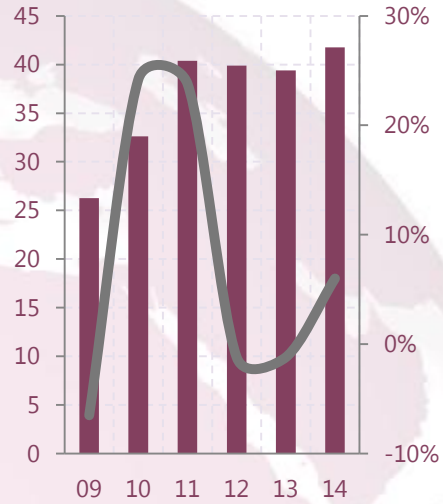
Tapping Asia's developing markets

Intel aims to take advantage of fast-growing technology markets in Asia, particularly China, Singapore and Taiwan, a group of high demand markets for smartphones. To reinforce its link with customers in the region, Intel is partnering with local companies such as Asus, and working together with universities and research centres. Singapore and China respectively represented 20.7% and 20.0% of Intel's 2014 net revenues respectively.

April 2013	Taiwanese producer Asus starts selling the Fonepad powered by Intel Atom processor Z2420.
December 2014	Intel announces a €1.2bn investment plan over 15 years on its Chinese facilities in Chengdu, in line with its plans to increase its presence in Asia.
May 2015	Intel's quad-core Atom processor powers the Iball Slide i701 tablet made by Iball and sold in India.

Consolidated net sales

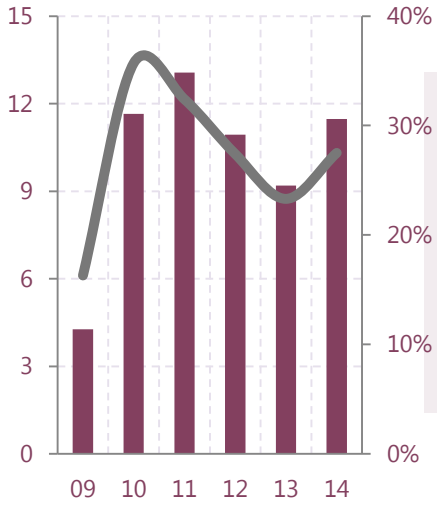
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

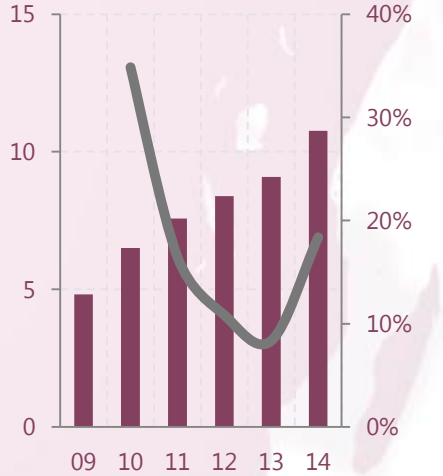
units: billion euros; %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Data Center Group revenues

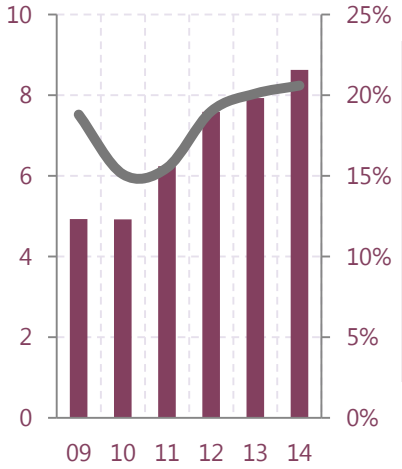
units: billion euros; change in %



Intel's Data Center business revenues.

R&D and R&D ratio

units: billion euros; % of total sales

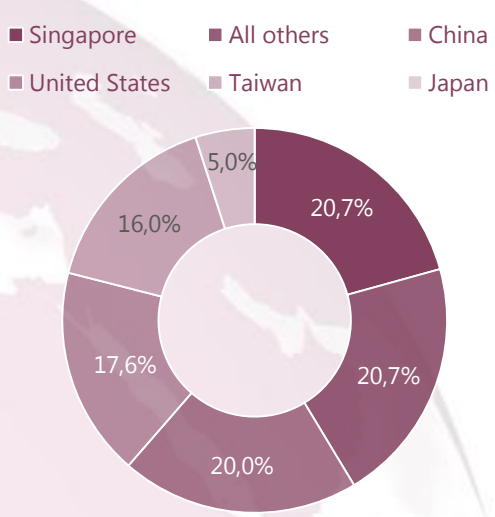


Intel's research and development expenditure and ratio.

Source: company information

Sales by region

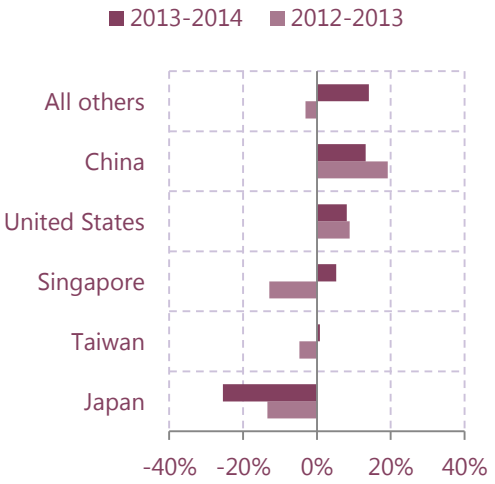
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

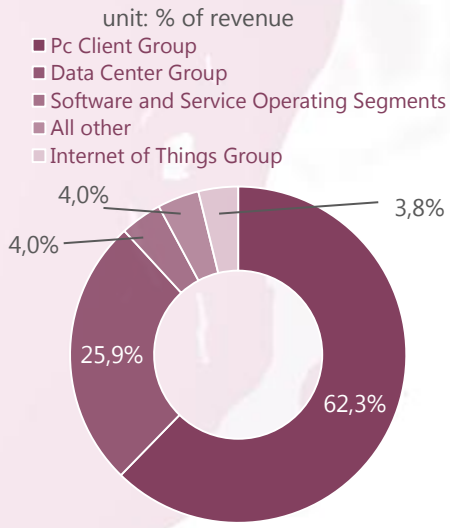
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

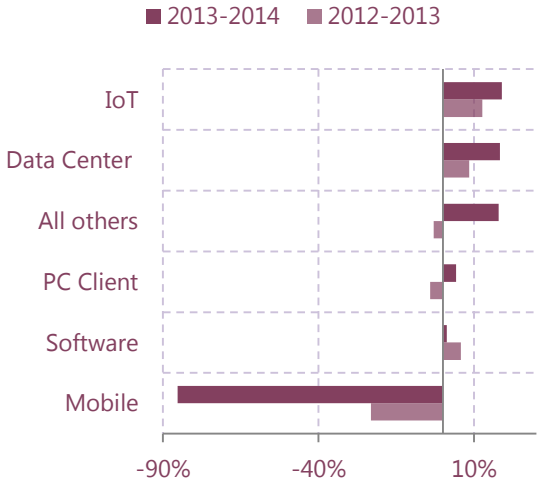
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

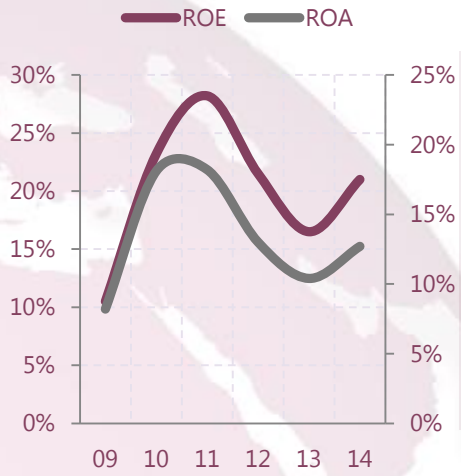


Annual sales change by operating segment, expressed as a percentage.

Source: company information

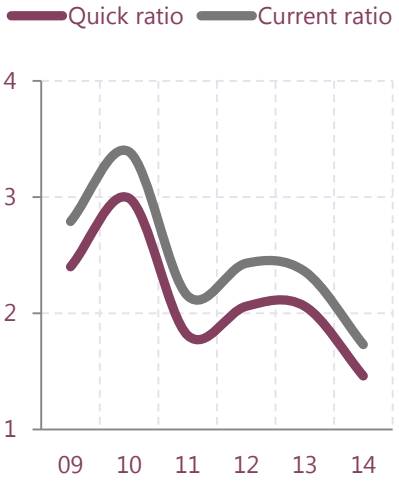
Profitability ratios

unit: %



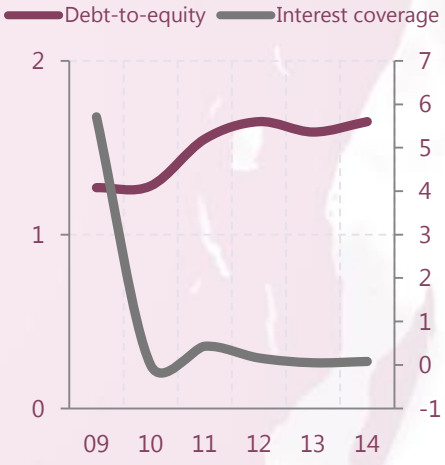
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

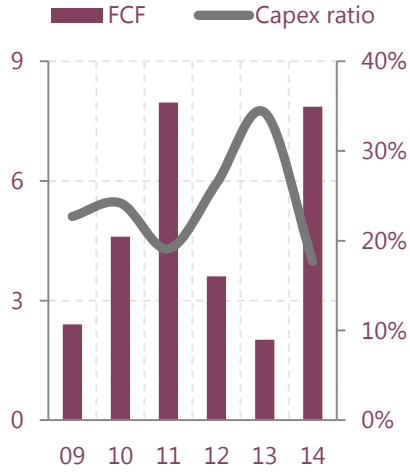
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	26.26	-6.5%	4.27	16.3%	3.27	12.4%
2010	32.61	24.2%	11.65	35.7%	8.57	26.3%
2011	40.37	23.8%	13.07	32.4%	9.68	24.0%
2012	39.88	-1.2%	10.94	27.4%	8.23	20.6%
2013	39.41	-1.2%	9.19	23.3%	7.19	18.3%
2014	41.77	6.0%	11.47	27.5%	8.75	20.9%

units: billion euros; % change; operating income and net income as % of sales

Year	Data Center Group revenues	Annual % change	R&D expenses	R&D ratio
2009	4.82	-2.2%	4.93	18.8%
2010	6.50	34.9%	4.92	15.1%
2011	7.57	16.5%	6.24	15.5%
2012	8.39	10.8%	7.59	19.0%
2013	9.09	8.3%	7.93	20.1%
2014	10.76	18.4%	8.63	20.6%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Pc Client group	25.92	62.1%	42.2%	24.87	63.1%	4.2%	25.93	-4.1%
Data Centre Group	10.76	25.8%	50.6%	9.09	23.1%	18.3%	8.39	8.4%
Internet of Things Group	1.60	3.8%	28.8%	1.35	3.4%	18.9%	1.20	12.6%
Mobile and Communication Group	0.15	0.4%	-2,082.2%	1.03	2.6%	-85.3%	1.34	-23.2%
Software and Services Operating Segments	1.66	4.0%	2.5%	1.64	4.2%	1.2%	1.55	5.7%
All other	1.69	4.0%	-134.5%	1.43	3.6%	17.9%	1.47	-3.0%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Singapore	8.65	20.7%	8.22	20.9%	5.2%	9.44	-12.9%
China	8.37	20.0%	7.39	18.8%	13.2%	9.20	19.2%
United States	7.35	17.6%	6.80	17.2%	8.1%	6.24	8.9%
Taiwan	6.70	16.0%	6.65	16.9%	0.8%	6.97	-4.7%
Japan	2.08	5.0%	2.78	7.1%	-25.5%	3.22	-13.4%
Other Countries	8.63	20.7%	7.56	19.2%	14.1%	7.81	-3.1%

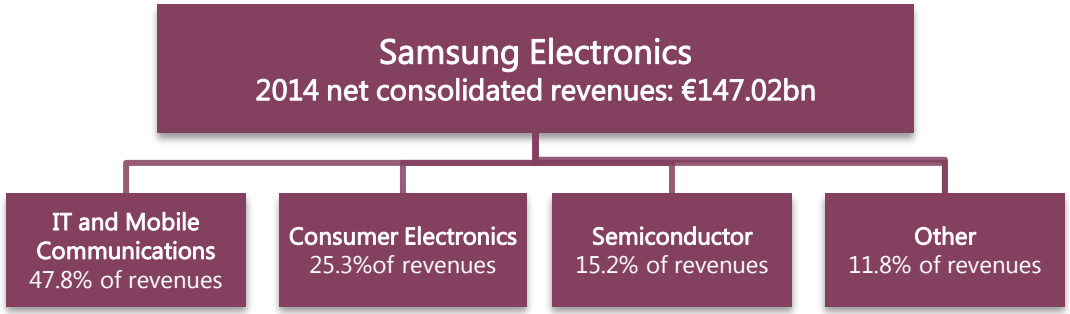
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	39.7	39.7	31.2	1.3	10.5%	8.2%	0.75	5.71
2010	47.2	47.2	37.0	1.3	23.2%	18.1%	0	0
2011	53.2	53.2	34.3	1.6	28.2%	18.2%	30.7	0.43
2012	63.1	63.1	38.3	1.7	21.5%	13.0%	67.3	0.16
2013	69.1	69.1	43.6	1.6	16.5%	10.4%	182.4	0.05
2014	68.8	68.8	41.8	1.7	21.0%	12.7%	143.6	0.08

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	15.8	5.7	2.4	2.8	8.4	6.0	22.7%	2.4
2010	23.6	7.0	3.0	3.4	12.5	7.9	24.2%	4.6
2011	19.3	9.0	1.8	2.2	15.7	7.7	19.1%	8.0
2012	23.4	9.6	2.1	2.4	14.1	10.5	26.4%	3.6
2013	24.0	10.1	2.1	2.4	15.5	13.5	34.3%	2.0
2014	20.7	12.0	1.5	1.7	15.3	7.4	17.7%	7.9

units: billion euros; percentage, ratio



Fiscal year ended December 27, 2014

Headquarters

Suwon, South Korea

2014 key figures (consolidated)

Net sales	€147.02bn
Operating margin	12.1%
Net margin	11.3%
Capex ratio	15.9%
R&D ratio	7.4%
Staff	95,794

- Samsung Electronics was established in 1969 and covers a wide range of electronics equipment and products from semiconductors and LCD panels to mobile devices, home and health appliances.
- Samsung is South Korea's top electronic company. It is a leading global player in the LCD TV, smartphone, mobile display and mobile memory market segments, which have been the group's most important sources of revenues and profits over 2012-2014. More than half of its revenues come from the Asia-Pacific region.
- Samsung operates four business segments through a total of 153 subsidiaries. Although mobile phones have provided Samsung's highest share of revenues in the past years, the company is the world's number one player in the memory chip market and the second global semiconductor manufacturer, after Intel.

Revenue by region (2014)

America	33.8%
Europe	20.7%
Asia	19.7%
China	15.9%
Korea	10.0%

SEGMENT	% OF SALES	OPERATING MARGIN	DESCRIPTION
Consumer Electronics	25.3%	0.9%	Development and distribution of visual display products (Smart TV), digital appliances (Home innovation), printing solutions and Samsung's Health & Medical Equipment products.
IT & Mobile Communications	47.8%	6.2%	Creation and sale of Mobile Communications, Networks Infrastructures and Digital Imaging products comprising smartphones, tablets, smartwatches, and cameras.
Display Business	10.6%	11.7%	Design and sale of innovative LED solutions, memory infrastructure and system LSI including mobile application processors for smartphones, and CMOS image sensors for mobile cameras.
Semiconductors	15.2%	1.3%	Development and manufacture of logic chip named Exynos, chipsets for semiconductors companies and memory cups such as Nand, Dram, and eMCP.
Other	1.2%	-	All other non reportable segments

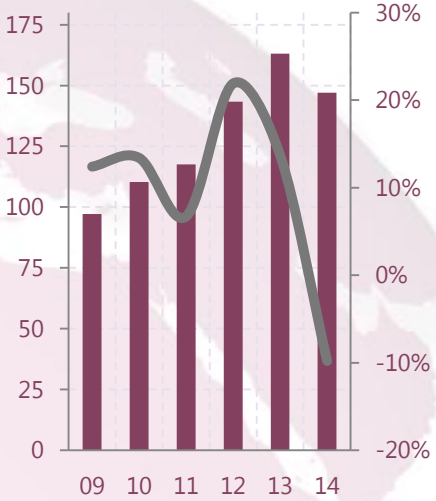
Repositioning in the semiconductor market

Samsung is a vertically-integrated company relatively independent from external suppliers. Its memory products are driving 75% of its Semiconductor segment's revenues and make the company the world's largest memory chipmaker. In fiscal year 2014, Samsung's Semiconductor division profits overtook IT & Mobile profits and reached €6.3bn. Both the sales and operating margin grew by 5.9% and 20.3% respectively during fiscal year 2014. Samsung aims to become the largest player in the semiconductor segment in order to offset the squeeze in the smartphone market. Despite being a latecomer in this industry, Samsung invested in this segment to quickly close the gap with top competitors and will go on to strengthen its position. In 2014, the capex for the semiconductor segment rose to 60% of its total capital spending.

January 2012	Samsung releases its eMCP, a multichip package that combines DRAM and NAND flash memories into one module. This component is commonly used in the smartphone industry.
December 2012	Samsung and Synopsys, a global leader in the design and process of chips and systems, announce that their collaboration resulted in the successful tape out of the first 14nm FinFET conception. It brings lower power consumption and higher device performance.
December 2013	Samsung develops the first 8Gb LPDDRA Mobile DRAM of the industry. This device provides a high level of density, performance and energy efficiency for mobile memory applications, enabling end users to have faster, more responsive applications, more advanced features, and higher resolution displays while maximizing battery life.
March 2014	Samsung launches its DRAM of 20NM and becomes the only company in the world that is able to manufacture such DRAM memory.
April 2014	Samsung and GlobalFoundries sign a collaboration deal to allow fabless semiconductor designers to access 14nm FinFET technology in their worldwide facilities.
June 2014	Samsung invests over €1.1bn in Ho Chi Minh to build a new electronics factory.
February 2014	Samsung starts mass producing 3GB LPDDR3 DRAM, 32GB eMMC ePoP memories, used for both high-end smartphone and tablets.
Octobre 2014	Samsung begins mass manufacturing of the world's first 3D V-Nand SSD.
May 2015	Samsung invests €7.3bn in Gyeonggi province, South Korea, and starts building a high-end semiconductor production line that will start operations in 2017.

Consolidated net sales

units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

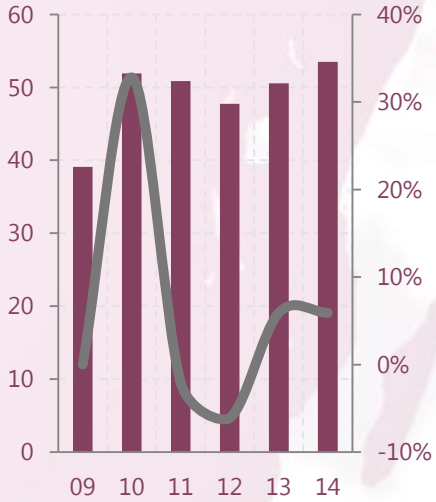
Consolidated operating income and margin

units: billion euros; %

Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Semiconductor segment revenues

units: billion euros; change in %

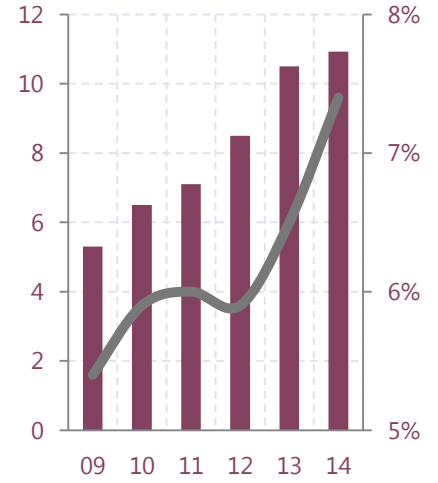


Source: company information

Samsung's semiconductor segment revenues.

R&D and R&D ratio

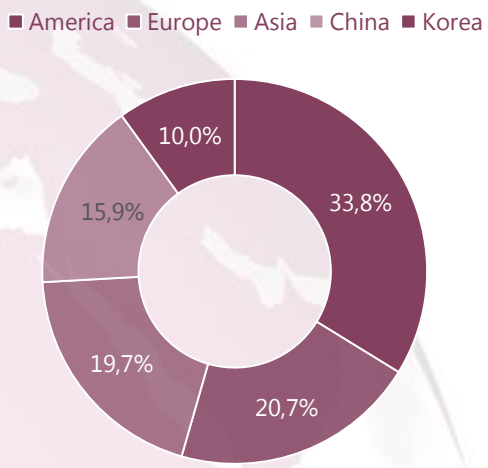
units: billion euros; % of total sales



Samsung's research and development expenditure and ratio.

Net revenue by region

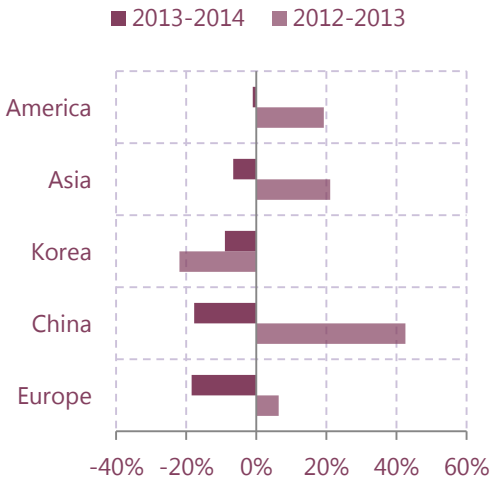
unit: % of net revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

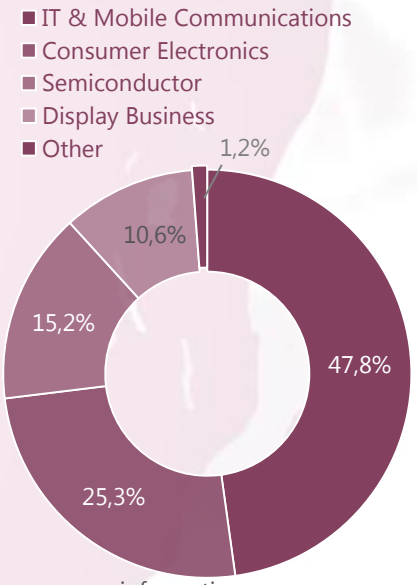
Unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

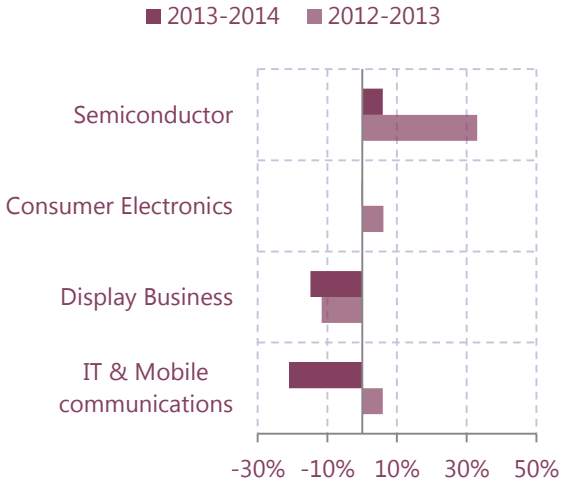
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

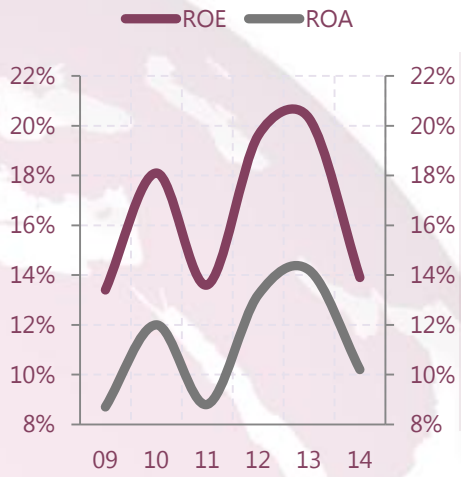


Annual sales change by operating segment, expressed as a percentage.

Source: company information

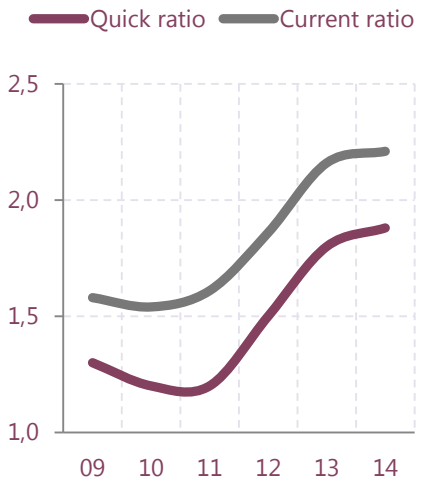
Profitability ratios

unit: %



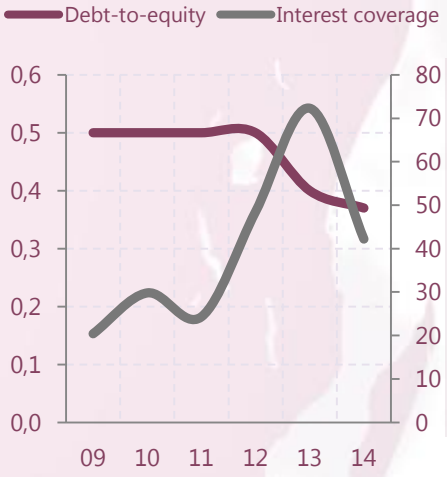
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

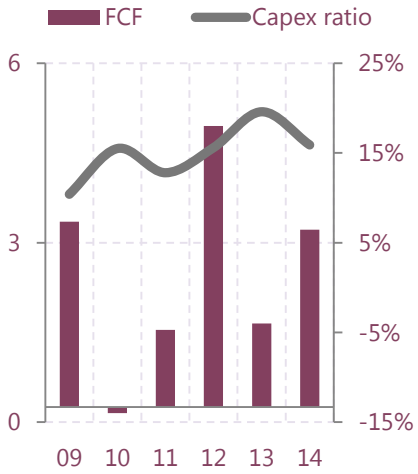
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	97.20	12.4%	7.79	8.0%	6.96	7.2%
2010	110.25	13.4%	12.33	11.2%	11.51	10.4%
2011	117.64	6.7%	11.15	9.5%	9.81	8.3%
2012	143.38	2.9%	20.71	14.4%	17.00	11.9%
2013	163.05	13.7%	26.23	16.1%	21.73	13.3%
2014	147.02	-9.8%	17.84	12.1%	16.68	11.3%

units: billion euros; % change; operating income and net income as % of sales

Year	Semiconductor revenue	Annual % change	R&D expenses	R&D ratio
2009	39.08	-	5.27	5.4%
2010	51.91	32.8%	6.49	5.9%
2011	50.84	-2.1%	7.12	6.0%
2012	47.75	-6.1%	8.48	5.9%
2013	50.56	5.9%	10.54	6.5%
2014	53.51	5.9%	10.93	7.4%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Consumer electronics	89.06	25.3%	0.9%	89.18	22.4%	-0.1%	84.06	6.1%
Information technology & Mobile Communications	168.57	47.8%	6.2%	213.29	53.6%	-21.0%	160.36	33.0%
Semiconductor	53.51	15.2%	11.7%	50.56	12.7%	5.9%	47.75	5.9%
Display Business	37.24	10.6%	1.3%	43.70	11.0%	-14.8%	49.45	-11.6%
Other	4.23	1.2%	-	1.24	0.3%	240.1%	0.25	404.3%

units: billion euros; % change; operating income as % of sales

Region	2014 net revenue	% of total sales 2014	2013 net revenue	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Korea	14.78	10.0%	16.24	10.0%	-9.0%	20.80	-21.9%
America	48.98	33.8%	49.47	30.3%	-1.0%	41.47	19.3%
Europe	30.62	20.7%	37.56	23.0%	-18.5%	35.31	6.4%
Asia	29.09	19.7%	31.15	19.1%	-6.6%	25.72	21.1%
China	23.55	15.9%	28.63	17.6%	-17.7%	20.08	42.6%

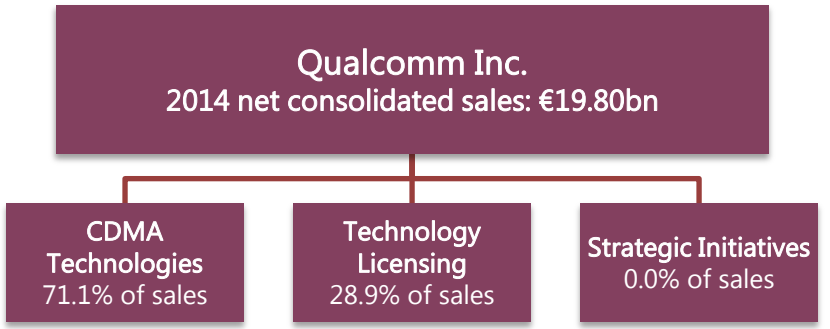
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	80.0	27.9	52.1	0.5	13.4%	8.7%	0.4	20.4
2010	95.7	32.0	63.7	0.5	18.1%	12.0%	0.4	29.8
2011	111.1	38.9	72.2	0.5	13.6%	8.8%	0.5	24.3
2012	129.1	42.5	86.6	0.5	19.6%	13.2%	0.4	48.5
2013	152.6	45.7	107.0	0.4	20.3%	14.2%	0.4	72.3
2014	164.3	44.4	119.8	0.4	13.9%	10.2%	0.4	42.2

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	38.7	24.4	1.3	1.6	13.2	10.1	10.4%	3.1
2010	43.8	28.5	1.2	1.5	17.0	17.1	15.5%	-0.1
2011	51.0	31.6	1.3	1.6	16.3	15.1	12.8%	1.3
2012	62.2	33.5	1.5	1.9	27.1	22.3	15.6%	4.7
2013	79.0	36.6	1.8	2.2	33.3	31.9	19.6%	1.4
2014	82.1	37.1	1.9	2.2	26.4	23.4	15.9%	3.0

units: billion euros; percentage, ratio



Fiscal year ended September 28, 2014

Headquarters

San Diego, California, United States

2014 key figures (consolidated)

Net sales	€19.80bn
Operating margin	28.5%
Net margin	30.1%
Capex ratio	6.2%
R&D ratio	20.7%
Staff	31,300

- Qualcomm is a fabless chipmaker founded in California in 1985. Its devices are marketed under the Qualcomm, QES, QChat, Brew, Snapdragon, gpsOne, MSM and Plaza brands.
- The company designs and markets integrated circuits (chips or chipsets) and Radio Frequency (RF) and Power Management (PM) chips as well as system software. It additionally licenses intellectual property (patent rights) for the manufacture and sale of certain wireless products.
- In 1989, Qualcomm introduced CDMA, one of the main technologies currently used in digital wireless communications networks.
- Qualcomm's growing revenue is fuelled by the development of LTE networks worldwide and high margins in its licensing segment.

Revenue by region (2014)

China	49.8%
South Korea	23.3%
Other foreign	14.6%
Taiwan	10.9%
United-States	1.4%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
CDMA Technologies	71.1%	20.4%	Development and supply of integrated circuits and system software for in voice and data communications platforms, networking, application processing, multimedia and global positioning systems products.
Technology Licensing	28.9%	87.1%	Grant of licences and patent rights for the manufacturing of Qualcomm's intellectual property. It includes patent rights key for the manufacture and sale of wireless products.
Strategic Initiatives *	-	-	Investments in the expansion for technologies supporting the company's design and the development of new products and services for voice and data communications.

* This segment does not generate revenues as it is exclusively engaged in investing activities.

Partnering to enhance its position in the Internet of Things market

Qualcomm is a fabless chip designer with a growing interest for radio frequency devices and the Internet of Things. In recent years, the company's high R&D expenditure and its patenting policy strengthened Qualcomm's position in several wireless technology niches such as 3G and 4G. Between 2009 and 2014, Qualcomm's R&D budget recorded a 20.4% CAGR. In 2020, Qualcomm aims to be the world's number one mobile-computing company. To achieve this goal, the company will diversify collaborations with operating-system manufacturers, fabrication plants, other semi-conductor players and car manufacturers among others.

October 2014	Qualcomm enlarges its portfolio by acquiring CSR, a global specialist in Bluetooth technologies. CSR develops semiconductor platforms and technologies for the auto, consumer and voice and music segments. This strategic move is in line with Qualcomm's aims to have a bigger role in the Internet of Things market.
December 2014	Qualcomm, in partnership with EE and Huawei, successfully completes LTE Category 9 test. It is the latest network technology, allowing network operators to reduce costs, and improve their services quality through simplified infrastructures. This is its first successful completion of interoperability testing with this two major operators in Europe.
March 2015	Qualcomm announces the release of its Snapdragon Sense ID 3D fingerprint technology which provides higher security through ultrasonic finger print recognition technology.
	Qualcomm and Mercedes AMG Petronas partner to enhance vehicle reliability, operational and power efficiencies. Qualcomm strives to improve its real-time data transmission, sensor networks and wireless charging capacities.
	Qualcomm and AMC Health, a privately held provider of real-time patient management solutions, sign a collaboration agreement to enhance connectivity efficiency and virtual care coordination for patients with chronic diseases.
May 2015	Qualcomm's Snapdragon Sense ID biometrics platform is adopted by NTT Docomo. Financial details were not disclosed. This platform currently supported by Qualcomm's processor allows mobile biometric identification and improves security in mobile payments.
	Sony introduces Xperia Z3+, a smartphone powered by Qualcomm Snapdragon 810 processor with support for Category 6 LTE and the Qualcomm's quick charge technology.
	Qualcomm and German-based carmaker Daimler announce a strategic collaboration agreement to create connected cars. This partnership relies on Qualcomm's 3G/4G connectivity and in-vehicle wireless charging technologies.

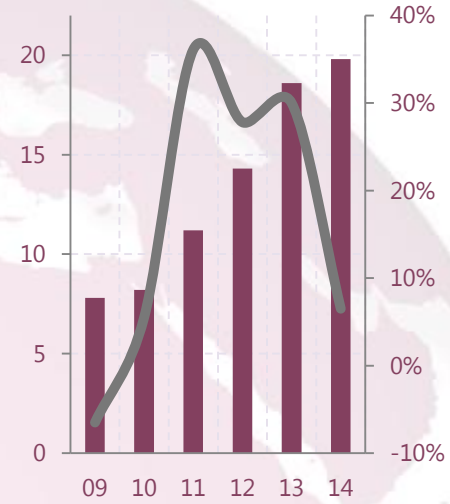
Developing its intellectual property to set up industry standards

Qualcomm is a pioneer in wireless technologies, although the company also develops different skills as shows its patenting activity on other domains such as electrical machinery, optics and micro-structures. Qualcomm broadly patents every of its invention to gain advantages arising from this intellectual property. The company's purpose is to develop technologies that will become industry standards and from which companies cannot do away. As an example, Qualcomm has 146 standard essential patents, the world's second highest number, related to 3G networks.

June 2013	Qualcomm's Snapdragon 800 processors powers the world's first LTE-Advanced smartphone, the Samsung Galaxy S-4, offering data speeds up to 150 Mbps.
April 2015	Qualcomm files patent application for its system and method for managing resources of a portable computing device which helps reduce need for customized application programming interface when a hardware or a software element are added to a portable computing device.
	Qualcomm records patent for methods and apparatus for Wide Area Network assisted contention detection and resolution in peer to peer networks, providing assistance to the peer to peer network to avoid a collision or facilitate its detection by the peer to peer devices. It is in line with its strategy to develop wireless communications technologies.
May 2015	Qualcomm files patents of its Synchronized Group Messaging, which allows users to send and receive group messaging via wireless connections.
	Qualcomm registers the patent for its Non-Linear Interference Cancellation for Multiple Receiver Antennas application. This innovation reduces interferences due to the non–linearity of messages transmitted and received through one device.
	Qualcomm files patent of its Method and Apparatus application to optimize cloud based radio access networks. This innovation optimizes cloud solutions by placing radio frequency processing units close to antennas with high bandwidth short cable, in line with the group's strategy to develop of wireless technologies.

Consolidated net sales

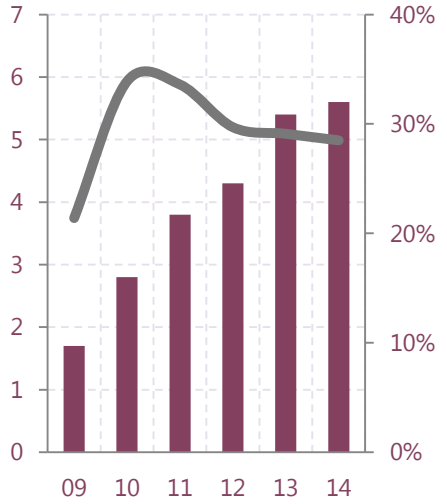
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

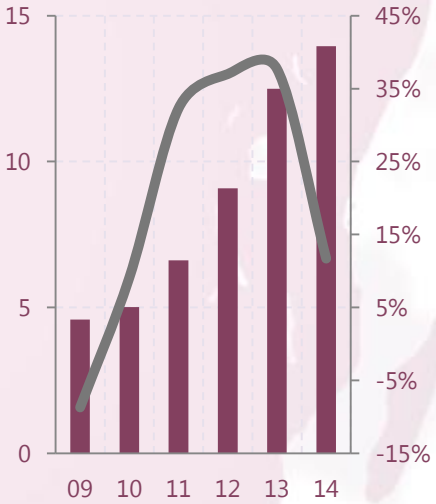
units: billion euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

CDMA Technologies segment revenues

units: billion euros; change in %

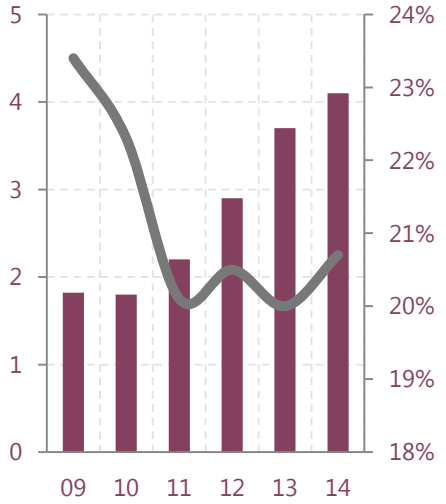


Source: company information

Qualcomm's CDMA Technologies segment revenues.

R&D and R&D ratio

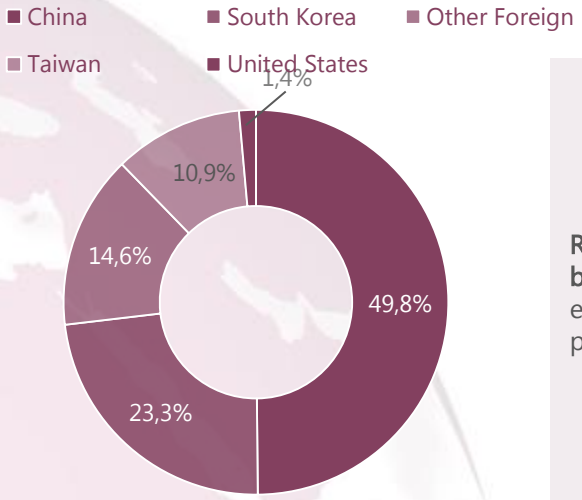
units: billion euros; % of total sales



Qualcomm's research and development expenditure and ratio.

Sales by region

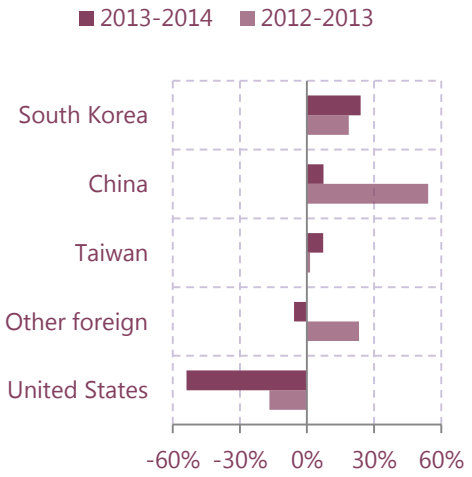
unit:% of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

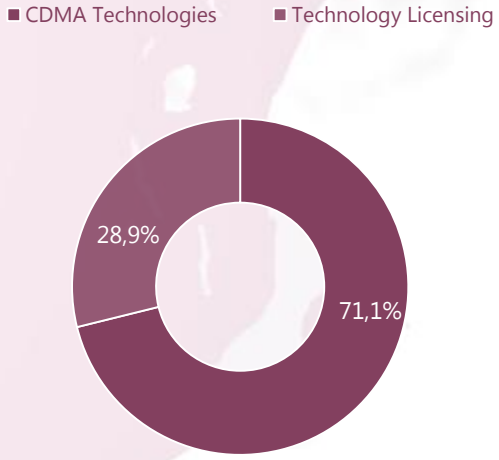
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

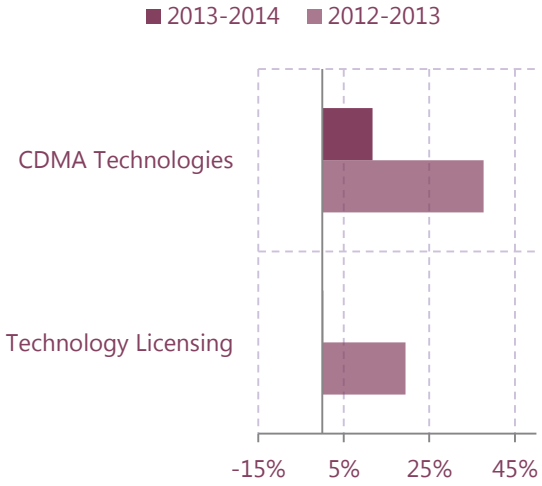
unit:% of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

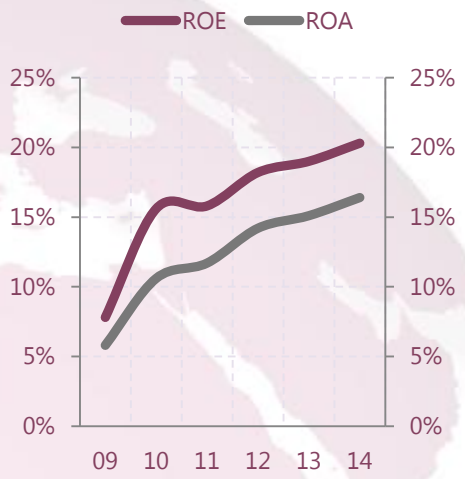
unit: change in %



Annual sales change by operating segment, expressed as a percentage.

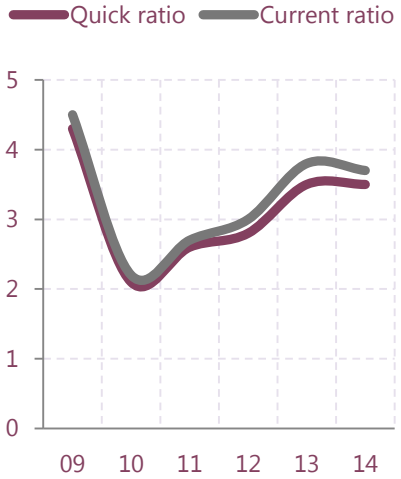
Source: company information

Profitability ratios



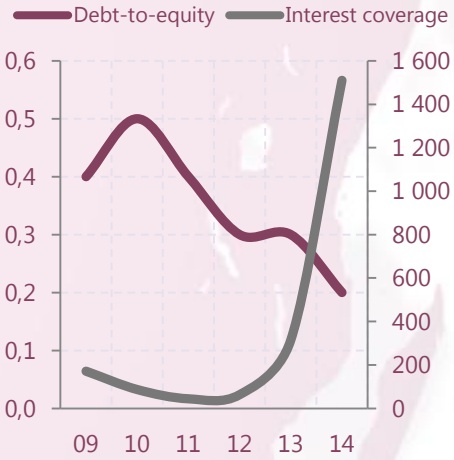
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

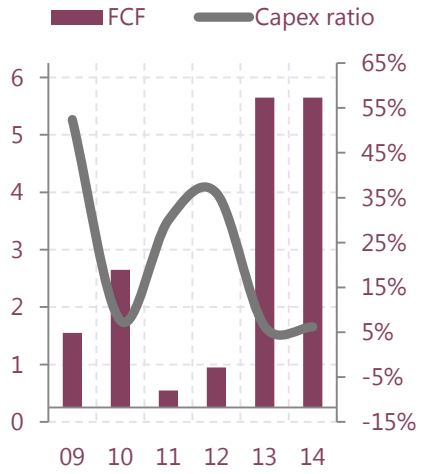
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	7.79	-6.5%	1.66	21.4%	1.19	15.3%
2010	8.22	5.5%	2.79	33.9%	2.43	29.5%
2011	11.18	36.1%	3.76	33.6%	3.18	28.5%
2012	14.30	27.8%	4.25	29.7%	4.57	31.9%
2013	18.59	30.0%	5.41	29.1%	5.12	27.6%
2014	19.80	6.5%	5.64	28.5%	5.96	30.1%

units: billion euros; % change; operating income and net income as % of sales;

Year	CDMA revenue	Annual % change	R&D expenses	R&D ratio
2009	4.59	-8.7%	1.82	23.4%
2010	5.01	9.1%	1.83	22.3%
2011	6.62	32.3%	2.24	20.1%
2012	9.08	37.0%	2.93	20.5%
2013	12.50	37.7%	3.71	20.0%
2014	13.95	11.7%	4.09	20.7%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
CDMA Technologies	13.95	71.1%	20.4%	12.50	68.9%	11.7%	9.03	37.7%
Technology Licensing	5.66	28.9%	87.1%	5.65	31.1%	0.2%	4.73	19.4%
Strategic Initiatives*	-	-	-	-	-	-	-	-

units: billion euros; % change; operating income as % of sales; * This segment does not generate revenues as it is exclusively engaged in investing activities.

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
China	9.87	49.8%	9.19	49.4%	7.4%	5.96	54.2%
South Korea	4.61	23.3%	3.73	20.0%	23.9%	3.14	18.6%
Taiwan	2.15	10.9%	2.01	10.8%	7.2%	1.98	1.3%
United States	0.28	1.4%	0.60	3.2%	-53.8%	0.72	-16.8%
Other foreign	2.89	14.6%	3.07	16.5%	-5.8%	2.49	23.3%

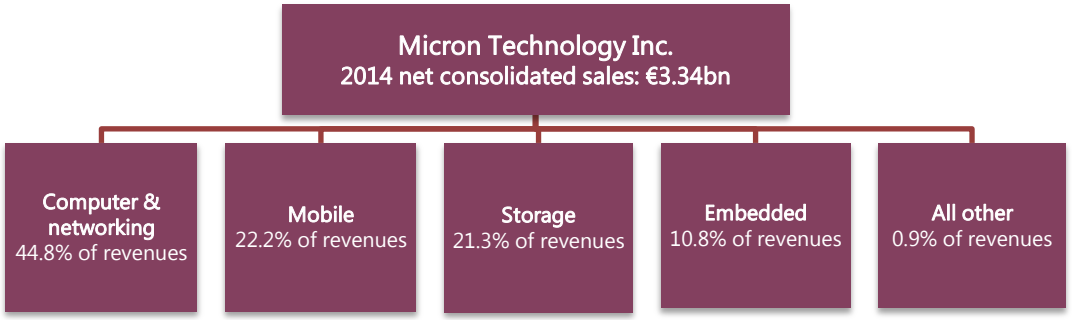
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	20.5	5.3	15.2	0.4	7.8%	5.8%	0.0	171.2
2010	22.9	7.3	15.6	0.5	15.6%	10.6%	0.0	86.7
2011	27.2	7.1	20.2	0.4	15.8%	11.7%	0.1	44.1
2012	32.2	7.1	25.1	0.3	18.2%	14.2%	0.1	63.1
2013	34.0	7.1	27.0	0.3	19.0%	15.1%	0.0	314.4
2014	36.3	7.0	29.3	0.2	20.3%	16.4%	0.0	1,510.0

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	9.4	2.1	4.3	4.5	5.4	4.1	52.4%	1.3
2010	9.1	4.1	2.1	2.2	3.1	0.6	7.6%	2.4
2011	10.7	4.0	2.6	2.7	3.7	3.4	30.0%	0.3
2012	11.7	4.0	2.8	3.0	4.5	5.1	36.0%	0.7
2013	14.6	3.9	3.5	3.8	6.6	1.2	6.3%	5.4
2014	16.8	4.5	3.7	3.7	6.6	1.2	6.2%	5.4

units: billion euros; percentage, ratio



Headquarters

Fiscal year ended August 29, 2014

Boise, Idaho, United States

2014 key figures (consolidated)

Net sales	€12.23bn
Operating margin	6.2%
Net margin	5.9%
R&D ratio	8.3%
Staff	30,400

- Micron was founded in 1978 and is headquartered in Boise, Idaho. The company provides advanced semiconductor solutions.
- Micron manufactures and markets a range of dynamic random access memory (DRAM), NAND Flash and NOR Flash memory technologies, packaging solutions and semiconductor systems for computing, consumer, networking, automotive, industrial, embedded and mobile products and platforms.
- In the 2009-2013 period, Micron's performance slowed down because of decreasing sales of PC equipped with their technologies. The acquisition of Elpida led to a 45% increase in its production capacity, resulting in Micron doubling its DRAM market share to 24%, and quadrupling its mobile DRAM share to 19.7%. This acquisition positively impacted the group's operating income and margin in 2014.

Revenue by region (2014)

China	42.3%
United States	16.1%
Taiwan	14.6%
Asia Pacific	11.3%
Europe	7.8%
Japan	7.8%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
Computer and Networking Business Unit	44.8%	26.7%	Manufacture and sale of DRAM and NOR flash memories computers, network platforms, graphic systems and cloud server customers.
Mobile Business Unit	22.2%	18.8%	Design and supply of DRAM, NAND Flash and NOR flash memories for smartphones, feature phones and tablet mobile-devices.
Storage Business Unit	21.3%	7.3%	Creation and sale of NAND Flash components and SSDs memories for enterprise and client storage, cloud and removable storage systems. It also includes NAND Flash products sold to Intel through the Intel Micron Flash Technologies joint venture.
Embedded Business Unit	10.9%	18.7%	Development and trade of DRAM, NAND Flash and NOR Flash products for automotive and industrial applications, as well as connected home platforms and consumer electronics market.
All other	0.9%	65.3%	All other non reportable activities.

Partnering and acquiring to enlarge its market share

Since 2005, Micron has been developing partnership and joint venture agreements worldwide. These alliances allow the company to spread the costs of developing new products and process technologies with its partners. Through joint-venture associations, Micron also enhanced its global manufacturing presence and was able to raise its production capacities. Inter Micron Flash Technology joint venture established an industry leader and a global manufacturing network, now heading to extend the 3D NAND technology adoption. In fact, Micron benefitted from this strategy by selling and licensing part of its intellectual property to associate companies. The company is set to continue using and enlarging its network of partners to increase its market share in the memory chip business.

January 2013	Micron Technology signs an agreement with Taiwan-based Nanya Technology Corporation to set new conditions in their joint venture involving Inotera, a leading Taiwanese DRAM manufacturer. Micron purchases all Inotera's production as part of the agreement.
July 2013	Micron acquires Japanese company Elpida for €1.9bn and improves its position in the memory industry.
	Micron takes control of Taiwanese Rexchip Electronics and becomes the second-largest memory company in the world by buying a 24% share of the company for €250mn. Micron now owns 89% of Rexchip. This acquisition also raises its production capacity and proves its interest on the Asian region.
November 2013	Micron purchases a 40% stake of Japan-based Tera Probe, an entity that provides semiconductor probe and wafer testing services.
June 2014	Micron and Intel create an on-package memory solution for Intel's next-generation Xeon Ph processor.
July 2014	Micron and Tessera technologies sign a licence agreement involving its Multi-Die-Face-Down semiconductor packaging technology.
December 2014	Micron and Taiwanese Powertech Technology, a supplier of integrated circuit backend services, enter a series of agreements assembly and packaging services to provide in Xi'an, China. The company will built a new assembly and packaging facility to complement its existing test and module manufacturing operations in the Xi'an High Tech Zone.
October 2014	Micron, Wave systems, Lenovo and American Megatrends announce an agreement to develop advanced enterprise-class security services and products, to address the growing security concerns from governments and multinational companies.
February 2015	Micron and Seagate technology announce a multi-year strategic agreement to develop flash-based storage solutions using the NAND flash memory developed by Micron.

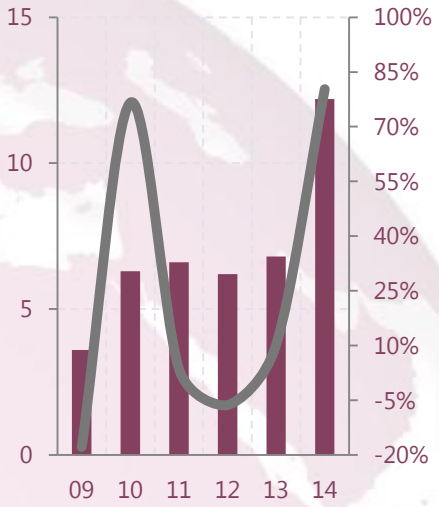
Focusing on research programmes to enhance its portfolio

Micron's R&D drives its patent expansion. In 2014, Micron spent over one billion euros on research and development activities. Micron's R&D investments focus on different memory structures, material and package as well as smaller line width process technologies. By the end of fiscal year 2014, the corporation owned more than 20,000 patents worldwide. The company shares its R&D costs with its business partners to lower the financial cost and benefit from partner's expertise. Micron uses its intellectual property to develop, market and upgrade products. This strategy led to the creation of emerging technologies such as 3D NAND flash memory, developed with Intel.

March 2014	Micron updates its M550 SSD memory both in terms of battery life and performance, in line with its strategy to improve its products by using the company's intellectual property.
April 2014	Micron introduces SATA, a SSD memory designed to allow companies to manage digital information flowing in and out of data centres.
July 2014	Micron releases its monolithic 8GB DDR3 SDRAM memory, the world's first massive memory kit, to help data centres managing and analysing data.
April 2015	Micron and Intel launch the 3D NAND technology, a top high-density flash memory. It has three times more capacity than existing 3D technology.
	Micron files patent for its Active Memory Data Compression System and Method. The production costs of this innovation is lower when compared to memory device coupled to an external processor and it maximizes data bandwidth, leading to greater data speed.
May 2015	Micron files system and method patents to determine in-motion parameters using Radio Frequency Identification tags, a solution that eases and improves communications accuracy for RFID. This innovation includes enhanced way of abilities for software treating data, and hardware reading these data.

Consolidated net sales

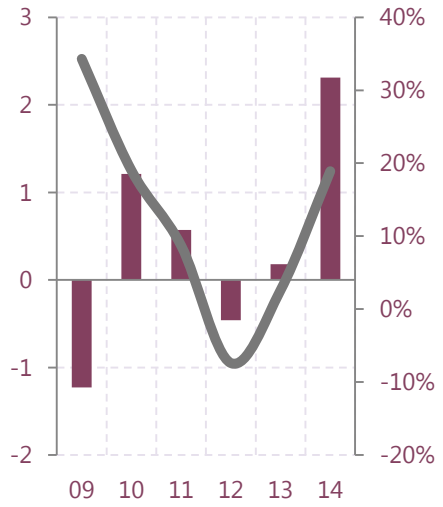
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

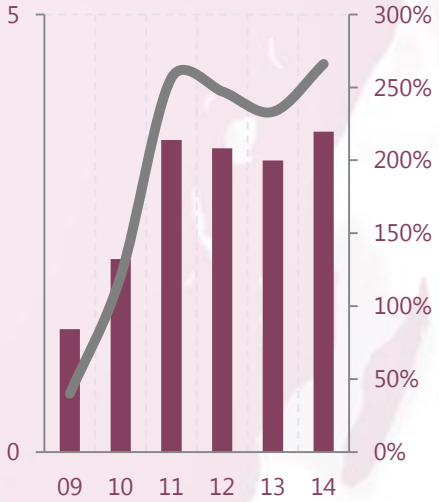
units: billion euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Sales of semiconductor products

units: billion euros; change in %

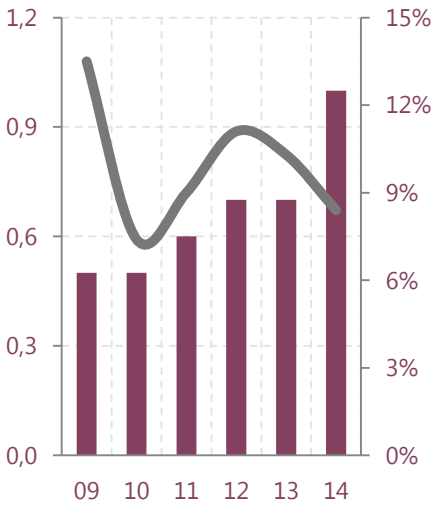


Source: company information

Micron semiconductor products revenues.

R&D and R&D ratio

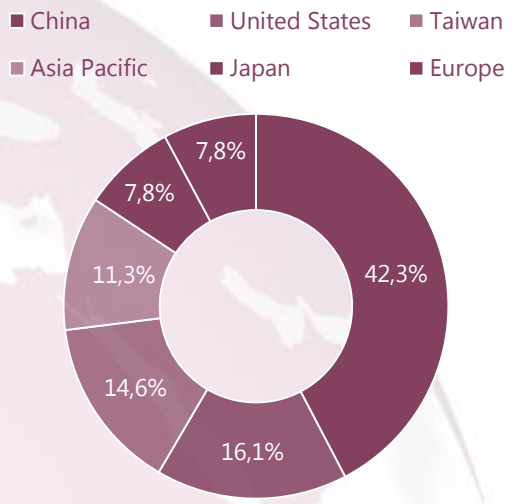
units: billion euros; % of total sales



Micron research and development expenditure and ratio.

Sales by region

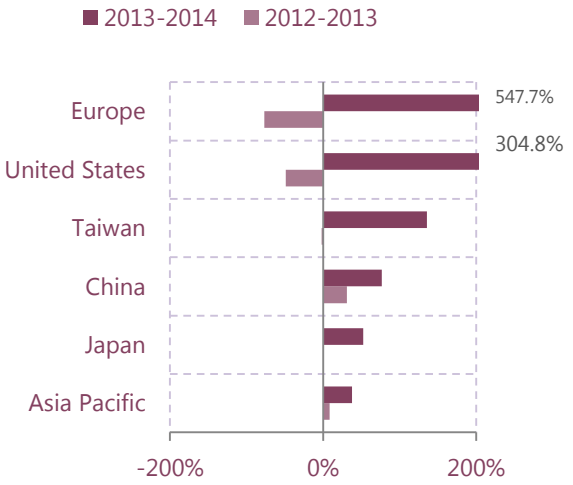
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

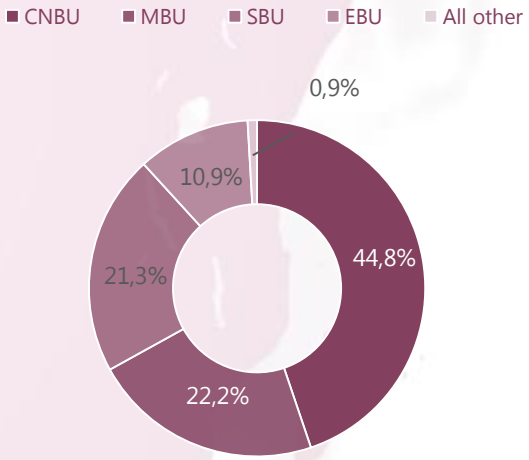
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

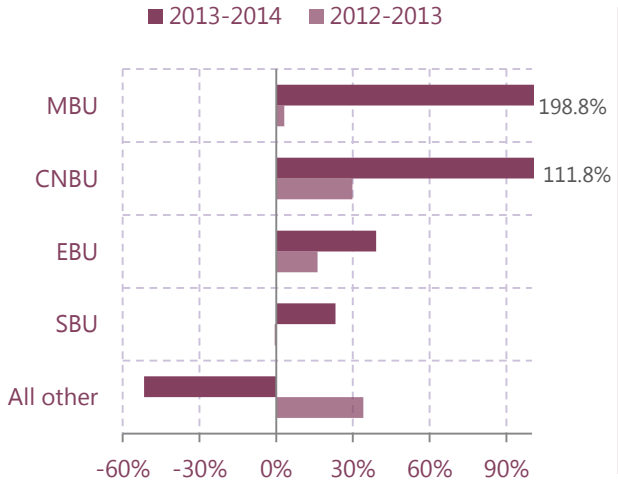
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

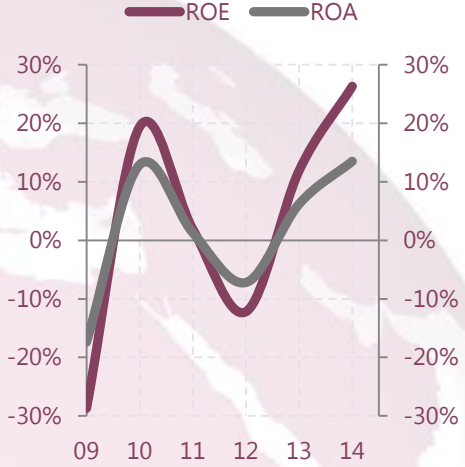


Annual sales change by operating segment, expressed as a percentage.

Source: company information

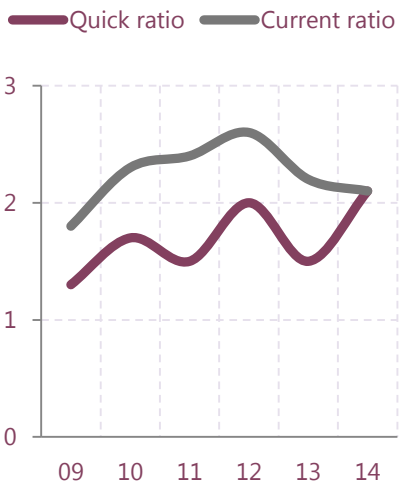
Profitability ratios

units: %



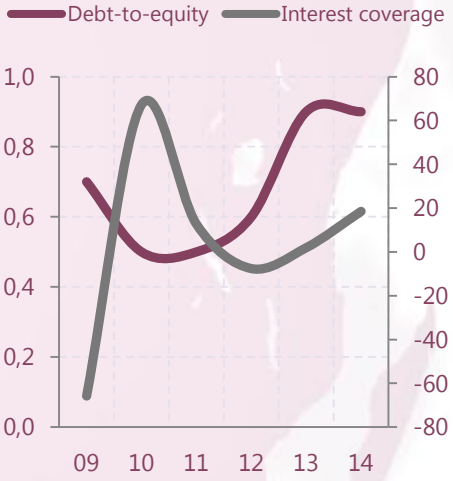
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

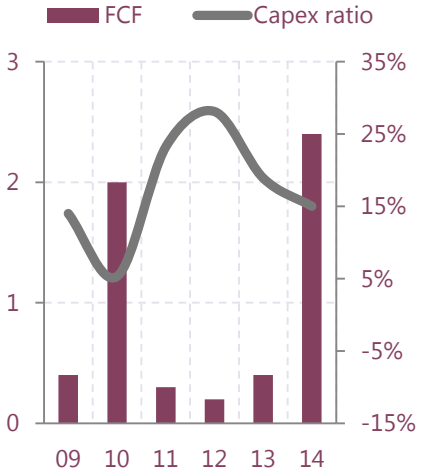
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	3.59	-17.8%	-1.23	34.3%	-1.49	-41.5%
2010	6.34	76.6%	1.21	19.0%	1.42	22.4%
2011	6.57	3.6%	0.57	8.7%	0.14	2.2%
2012	6.16	-6.3%	-0.46	-7.4%	-0.77	-12.5%
2013	6.78	10.2%	0.18	2.6%	0.89	13.2%
2014	12.23	80.3%	2.31	18.9%	2.28	18.6%

units: billion euros; % change; operating income and net income as % of sales

Year	Semiconductors revenues	Annual % change	R&D expenses	R&D ratio
2009	1.41	40.0%	0.48	13.5%
2010	2.21	120.5%	0.47	7.4%
2011	3.56	256.4%	0.59	9.0%
2012	3.47	247.2%	0.69	11.1%
2013	3.33	233.2%	0.70	10.3%
2014	3.66	266.0%	1.02	8.4%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Compute and Networking Business Unit	5.48	44.8%	26.7%	2.59	38.2%	111.8%	1.99	29.8%
Mobile Business Unit	2.71	22.2%	18.8%	0.91	13.4%	198.8%	0.88	3.2%
Storage Business Unit	2.60	21.3%	7.3%	2.11	31.1%	23.2%	2.12	-0.6%
Embedded Business Unit	1.33	10.9%	18.7%	1.95	14.1%	39.1%	0.82	16.2%
All other	0.11	0.9%	65.3%	0.22	3.3%	-51.7%	0.34	-34.1%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
China	5.02	42.3%	2.84	49.2%	76.8%	2.17	31.0%
Taiwan	1.73	14.6%	0.73	12.7%	135.7%	0.75	-2.0%
Japan	0.93	7.8%	0.61	10.6%	52.4%	-	-
Europe	0.93	7.8%	0.14	2.5%	547.7%	0.62	-76.7%
Asia Pacific	1.34	11.3%	0.97	16.8%	37.7%	0.90	8.3%
United States	1.91	16.1%	0.47	8.2%	304.8%	0.92	-48.8%

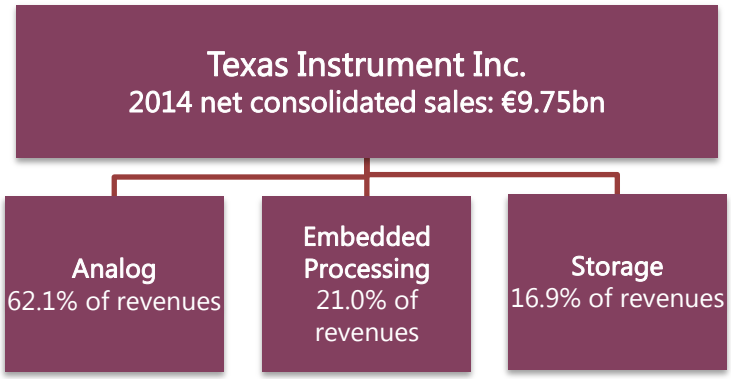
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	8.6	3.7	5.2	0.7	-28.7%	-17.4%	0.0	-65.8
2010	11.0	3.7	7.3	0.5	19.4%	12.9%	0.0	67.2
2011	11.0	3.7	7.4	0.5	1.9%	1.3%	0.0	12.7
2012	10.7	3.4	6.3	0.6	-12.2%	-7.2%	0.1	-7.6
2013	14.3	6.8	7.5	0.9	11.9%	6.2%	0.1	1.9
2014	16.8	8.1	8.7	0.9	26.3%	13.5%	0.1	18.5

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	2.5	1.4	1.3	1.8	0.9	0.5	14.0%	0.4
2010	4.7	2.0	1.7	2.3	0.3	0.3	5.3%	2.0
2011	4.4	1.9	1.5	2.4	1.5	1.5	23.2%	0.3
2012	4.3	1.7	2.0	2.6	1.7	1.7	28.1%	0.2
2013	6.7	3.1	1.5	2.2	1.3	1.3	18.9%	0.4
2014	7.7	3.6	2.1	2.1	1.8	1.8	15.0%	2.4

units: billion euros; percentage, ratio



Fiscal year ended December 31, 2014

Headquarters

Dallas, Texas, United States

2014 key figures (consolidated)

Net sales	€9.75bn
Operating margin	30.3%
Net margin	21.6%
R&D ratio	10.4%
Staff	31,003

- Texas Instruments is a US-based company that designs and sells semiconductors. The company was founded in 1930 and entered the semiconductor business in 1951.
- It mainly operates through two operating segments. Analog and Embedded Processing business units both generated over €8bn in 2014. Furthermore, Texas Instruments is deeply rooted in Asia both in terms of sales and production capacity.
- In the past years, Texas Instruments has been working on improving its profitability by reducing its reliance on PC sales and widening its customer base.

Revenue by region (2014)

Asia	60.7%
Europe	17.6%
United States	12.5%
Japan	7.9%
Other	1.4%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
Analog	62.1%	34.4%	Design, production and sale of semiconductors to electronic designers and manufacturers. This segment consists of High Volume Analog & Logic, Power Management, High Performance Analog and Silicon Valley Analog product lines.
Embedded Processing	21.0%	14.0%	Creation, manufacture and sale of Processors, Microcontrollers and Connectivity.
Other	16.9%	35.3%	All other non-reportable segments such as applications processors, connectivity products sold into smartphones and consumer tablets, royalties from licensing of patented technologies.

Focusing its business scope...

In 2012, the company implemented a strategy shift by leaving highly competitive wireless markets. The firm focused on designing, producing and selling only Analog and Embedded Processing divisions' products to get a less volatile long term growth. In 2014, it served a broad and global client base, in the computing, wireless infrastructure, industrial and automotive markets.

September 2012	Texas Instruments exits its smartphone and tablet operations despite having its chips distributed through the Amazon Kindle Fire and starts focusing on its Analog and Embedded Processing segments. Texas Instruments refused to compete with tech giants on these markets.
March 2015	Texas Instruments introduces TPS1H100-Q1, the first high-side power switch with programmable limit in powertrain and automotive body electronics. It allows designers to work on several loads with increased flexibility on powertrain, body-electronics safety and driver-information systems.
	Texas Instruments distributes its wireless infrastructure platform TCI66030K2L to LGS Innovations, a provider of networking and communications solutions for the US government, in line with its strategy to enhance its Embedded Processing segment.
May 2015	Texas Instruments launches the FRAM microcontroller powered with the Compute Through Power Loss technology, which enables smart wake-up and system-state restoration after an unexpected power loss. Its Embedded Processing segment benefits from this innovation.

...to improve efficiency

Texas Instruments produces most of its goods in-house, creating high fixed costs. Since 2011, as part of an efficiency improvement plan, the company has been continuously decreasing the number of employees. For the 2013-2014 period, restructuring actions, especially in its Embedded Processing segment and the Japan market, combined with an exit from wireless products, led to a reduction by 10.5% of R&D expenses. Texas Instruments works on both human and material production facilities to shape up production effectiveness.

November 2014	Texas Instruments opens a new 300mm wafer bumping plant in China, a production process from which 40% of Texas Instruments' wafers are made. This process ensures reduced production costs and raises margins.
December 2014	Texas Instruments reduces its workforce for the third consecutive year. The group had 31,003 employees in 2014, 3% less than in 2011.
February 2015	Texas Instrument upgrades both of its Dallas-based factories to produce 300mm wafers, leading to scale economies resulting in a 40% lower production costs.

A growing footprint into the Internet of Things . . .

Texas Instruments believes the IoT may affect over 50 billion objects by 2020. In that perspective, Texas Instruments sees the IoT as an empowerment for companies to change their way of doing business. Through production of nodes, gateways & routers and cloud solutions, Texas Instruments builds all required material to develop IoT solutions. The company aims to take advantage of the increasing demand for cloud based solutions due to growing global data wireless traffic.

April 2014	Texas Instruments introduces the Texas Instruments IoT Cloud Ecosystem to allow manufacturers using the company's technology to have easy access to IoT technologies. This ecosystem has members such as ARM and IBM.
June 2014	Texas Instruments launches CC3100 and CC3200, the world's first Wi-Fi certified chips, used for wireless networking solutions. Created for IoT applications, it allows users to easily add Wi-Fi and internet access to a wide range of industrial, home and consumer electronics devices.
April 2015	Texas Instruments and Sigfox partner to provide the French company with low cost high range connection with reduced power consumption. It helps Sigfox to offer fast devices that can handle billions of small messages per day.
	Texas Instruments collaborates with IBM to build management services for IoT devices and takes part into IBM €2.24bn investment to create an IoT solutions.

. . . particularly to help building tomorrow's car

The automotive industry is under a major transition period in which it becomes more computing intensive. The Texas-based company decided to diversify its activities to offer innovative on-board operating systems for the automobile industry. For example, in fiscal year 2014, the automotive market represented 13% of Texas Instruments' revenues.

July 2014	Texas Instrument receives the Leadership award for semiconductor solutions in Advanced Driver Assisted Systems (ADAS) industry from Frost & Sullivan. This rewards the TDA System-on-Chip family developed by Texas Instruments. It features the Vision AccelerationPac, which provides customers with an open, flexible platform to develop next-generation solutions for the ADAS business.
October 2014	Texas Instrument releases its TDA3x application processor, which enables car makers to improve algorithms and implement them in cars. This warns car drivers in case of emergency and takes control of brakes to avoid accidents.

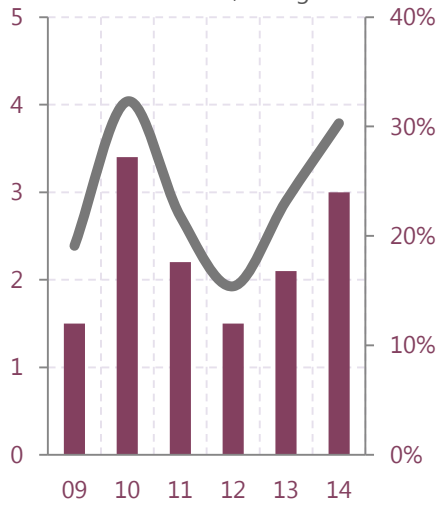
Consolidated net sales

units: billion euros; change in %

Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

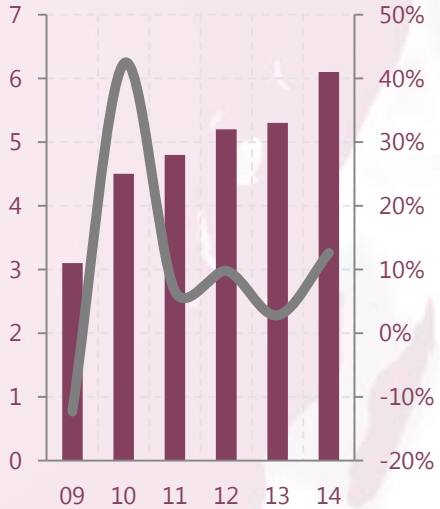
units: billion euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Analog's sales revenue

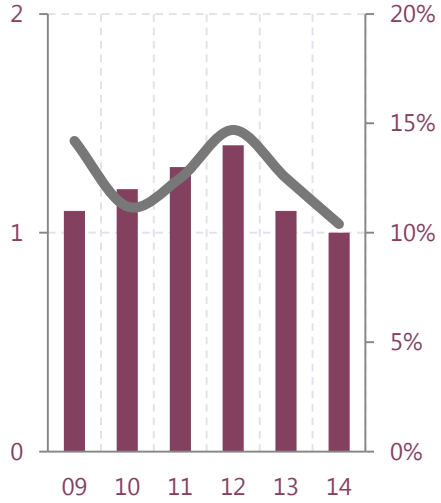
units: billion euros; change in %



Texas Instruments semiconductor products revenues.

R&D and R&D ratio

units: billion euros; % of total sales

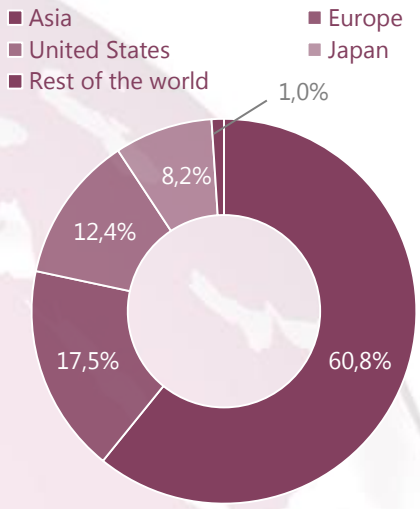


Texas Instruments research and development expenditure and ratio.

Source: company information

Sales by region

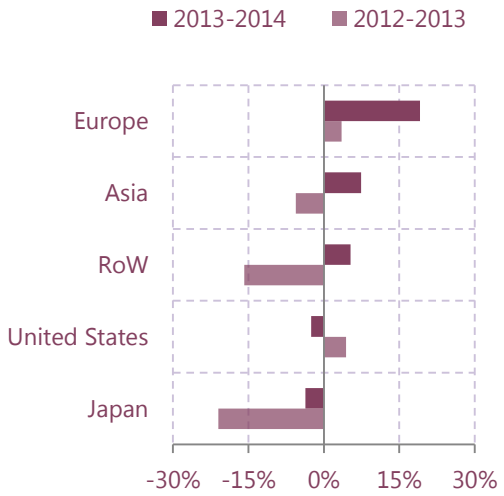
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

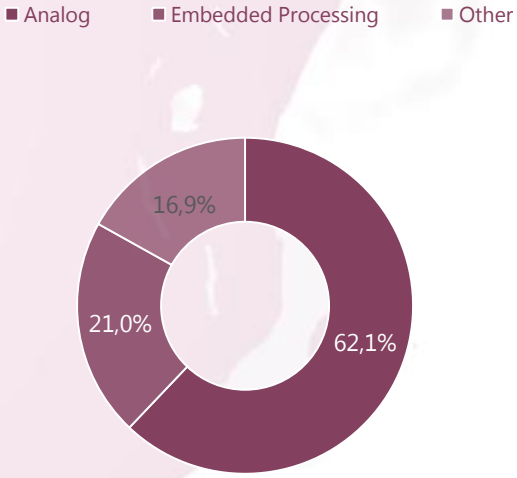
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

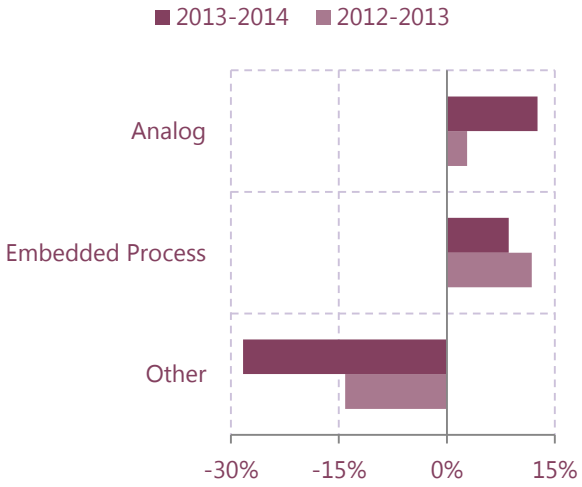
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

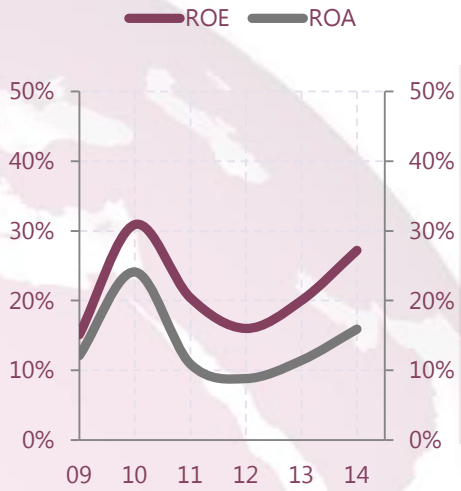


Annual sales change by operating segment, expressed as a percentage.

Source: company information

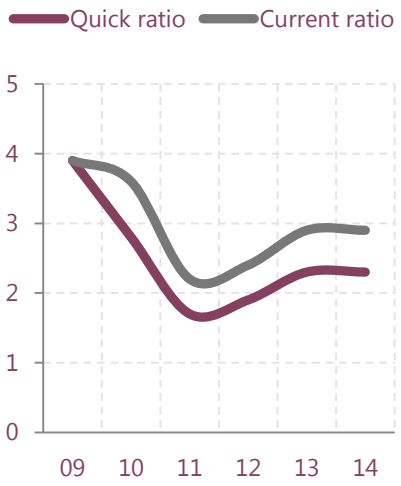
Profitability ratios

unit: %



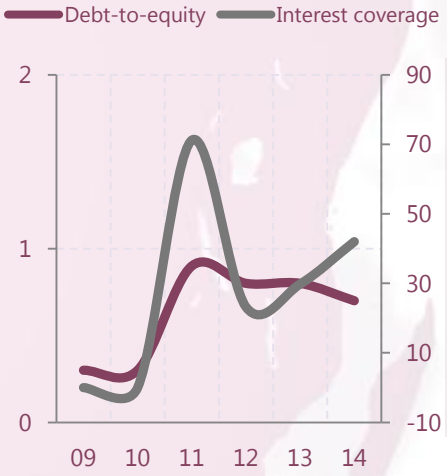
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

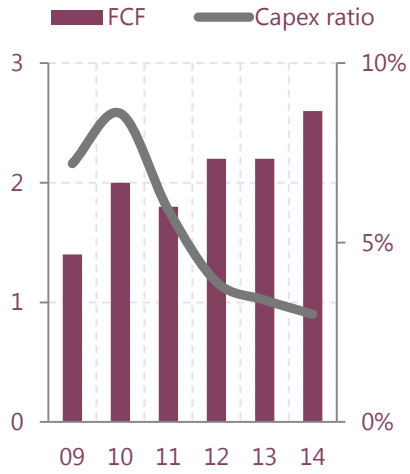
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

Units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	7.80	-16.6%	1.82	19.1%	1.10	14.1%
2010	10.44	33.9%	3.37	32.3%	2.41	23.1%
2011	10.27	-1.7%	2.24	21.8%	1.67	16.3%
2012	9.59	-6.6%	1.48	15.4%	1.32	13.7%
2013	9.12	-4.8%	2.12	23.2%	1.62	17.7%
2014	9.75	6.9%	2.95	30.3%	2.11	21.6%

units: billion euros; % change; operating income and net income as % of sales

Year	Analog revenues	Annual % change	R&D expenses	R&D ratio
2009	3.14	-12.3%	1.10	14.2%
2010	4.47	42.3%	1.17	11.2%
2011	4.77	6.6%	1.28	12.5%
2012	5.23	9.8%	1.41	14.7%
2013	5.34	2.8%	1.14	12.5%
2014	6.06	12.6%	1.02	10.4%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Analog	6.06	62.1%	34.4%	5.38	58.9%	12.6%	5.23	2.8%
Embedded Processing	2.05	21.0%	14.0%	1.83	20.1%	11.8%	1.69	8.6%
Other	1.65	16.9%	35.3%	1.91	21.0%	-14.1%	2.67	-28.3%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Asia	5.92	60.7%	5.51	60.4%	7.4%	5.84	-5.6%
Europe	1.71	17.6%	1.44	15.8%	19.1%	1.39	3.5%
United States	1.21	12.5%	1.25	13.7%	-2.5%	1.19	4.4%
Japan	0.77	7.9%	0.80	8.8%	-3.7%	1.01	-21.0%
Rest of the world	0.13	1.4%	0.13	1.4%	5.3%	0.15	-15.8%

units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	9.1	1.8	7.3	0.3	15.1%	12.1%	-	-
2010	10.0	2.2	7.8	0.3	30.9%	24.1%	-	-
2011	15.3	7.1	8.2	0.9	20.4%	10.9%	0.0	71.2
2012	15.0	6.8	8.2	0.8	16.0%	8.8%	0.1	23.2
2013	14.2	6.1	8.1	0.8	20.0%	11.4%	0.1	29.8
2014	13.3	5.5	7.8	0.7	27.2%	15.9%	0.1	42.0

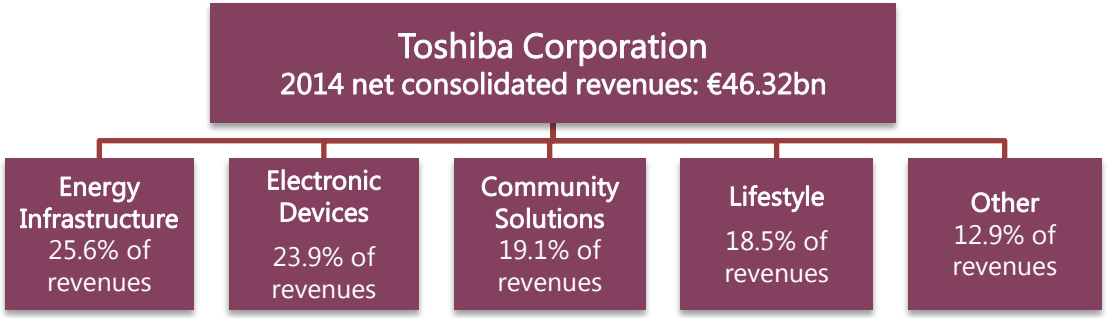
units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	4.6	1.2	3.9	3.9	2.0	0.6	7.2%	1.4
2010	5.3	1.5	2.8	3.6	2.9	0.9	8.6%	2.0
2011	5.9	2.6	1.7	2.2	2.4	0.6	5.9%	1.8
2012	6.2	2.6	1.9	2.4	2.6	0.4	3.9%	2.2
2013	6.0	2.1	2.3	2.9	2.5	0.3	3.4%	2.2
2014	5.8	2.0	2.3	2.9	2.9	0.3	3.0%	2.6

units: billion euros; percentage, ratio

TOSHIBA

Leading Innovation



Fiscal year ended March 31, 2014

Headquarters

Tokyo, Japan

2014 key figures (consolidated)

Net sales	€46.32bn
Operating margin	4.5%
Net margin	0.8%
R&D ratio	5.1%
Staff	200,000

- Toshiba is a Japanese manufacturer of electronic devices and a leading manufacturer in NAND Flash Memory in terms of global market share.
- In 2014, its Electronic Devices & Components segment reported its highest operating income, which reached €1.7bn. Segment's growth was mainly driven by memory activities.
- Toshiba envisioned the creation of a "Human Smart Community" connecting its Energy Infrastructure, Community Solutions, Healthcare Systems & Services, Electronic Devices & Components, Lifestyle Products & Services within a single cloud solution, allowing to create more value and better answer customer's needs.

Revenue by region (2014)

Japan	42.0%
Asia	21.2%
North America	17.9%
Europe	13.1%
Others	5.7%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
Energy Infrastructure	25.6%	1.8%	Engineer, manufacture, procurement, construction and service of power systems and distribution systems to ensure stable supply of generated power.
Community Solutions	19.1%	3.8%	Design and sale of wide area energy management systems, water supply and sewerage solutions, lighting plans and elevators and escalators systems.
Healthcare Systems & Services	5.8%	7.0%	Development, production and sale of medical IT systems, diagnostic imaging systems and ultrasound diagnostic systems.
Electronic Devices & Components	23.9%	14.1%	Creation, manufacture and market of semiconductors and storage products as well as large scale integration systems and discrete business.
Lifestyle Products & Services	18.5%	-3.9%	Design and sale of TVs, Blu-ray encoders, PCs, tablets, refrigerators, washer dryers and other home appliances.
Others	7.1%	1.7%	Promotion and sale of cloud business solutions.

Pursuing the miniaturization of products ...

Toshiba's Discrete business, System LSI business, Memory business and Storage Business operate in the integrated chip market, making the group one of the world's market leaders. Toshiba's purpose is to lead the industry's technical capabilities. To achieve this goal the group has continuously been reducing the space between transistors and chips, making its chips, denser leading to improved performance and lower power consumption. In the long run, the company aims at gaining competitive advantages from this technological edge.

August 2013	Toshiba opens a new production facility in Thailand. The previous one was flooded in 2011 and the company had to completely rebuilt it. This 1.4 times bigger plant is equipped with the latest production line technology to ensure productivity and reduce production costs.
February 2014	Toshiba launches its first Solid State Driver powered with 19nm NAND chips. It is 20% smaller than the previous versions and works with a new high speed writing method rising the write speed to 25Mbyte/second. It is the world's fastest write speed.
April 2014	Toshiba starts mass production of the world's first 15-nanometer process technology. This new chip writes as fast as previous generation and its data transfer rate is 1.3 times faster.
May 2014	Toshiba and California-based SanDisk announce a partnership agreement to develop 3D NAND flash memory technologies, allowing high on-chip density and enabling three times higher capacity than other NAND product. Both companies will invest in a replacement facility and build a new plant on a Toshiba's site to produce 3D NAND flash memory. This investment is worth €5.2bn and the plant will be operating for mass production by 2016.
March 2015	Toshiba starts sampling the Bit Cost Scaling 3D memory, its first 3D NAND product. The group implemented it with a relatively more advanced structure than its competitors. In fact, it is yet the market's better performing and power efficient 3D flash memory.

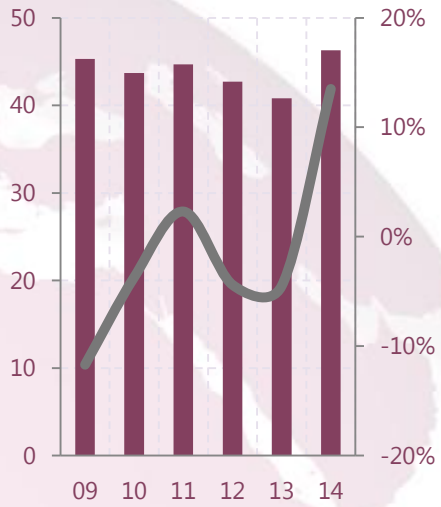
… to take advantage of the Internet of Things

Toshiba aims to benefit from the emergence of the IoT and provide its expertise in networking to its customers. The company plans to connect all its products and services under a "Human Smart Community" characterized by safety and comfort. This underpins Toshiba's efforts in creating platforms to ease IoT application development and partnering agreements. For instance, the group partnered with Cisco systems for their networking expertise and with Microsoft, which enlarges its customer base to all Microsoft users such Windows, Azure and Xbox.

November 2014	Toshiba starts selling its TMPV7608XBG image recognition processor, which supports complex Advance Driver Assistance System. It features new applications that will enter the Euro NCAP safety testing programme by 2018, such as traffic light recognition and enhanced pedestrian detection during the night. The group is stepping ahead in the connected automotive solutions.
	Toshiba and Cisco announce plans to work together to develop digital solutions in manufacturing processes, transportation platforms and smart cities with an IoT perspective.
December 2014	Toshiba starts selling its 6 TB capacity Hard Disk Drive, which delivers a 50% increase in maximum memory capacity and a 30% increase in sustained data rate. It is designed to prevent from data loss in case of power loss combined with improved performance and data reliability.
January 2015	Toshiba introduces the third version of its Flash Air Wireless SD Card, empowering its users with the ability to wirelessly share images, videos and files. This product enables users to instantaneously share without concern for users' location or the platform used.
March 2015	Toshiba launches the industry's most power efficient Metal Oxyde Semiconductor Field Effect Transistor for the automotive industry. It supports high-efficiency switching and servers & communications services, and is available for automotive applications to contribute to energy-saving. This is one step ahead in the IoT development of the company.
April 2015	Toshiba markets its TZ1000App lite, an application processor development platform for wearables and IoT devices. It includes hardware and software development kits and a software development tool support, and provides users with testing environment similar to reality.
June 2015	Toshiba starts mass producing a power supply integrated circuit system, with five different voltage per outputs, for mobile information devices and applications suiting car navigation systems.
	Toshiba and Microsoft partner under a Memorandum of Understanding agreement to deliver IoT solutions. This partnership will enter into force in the transportation and logistics markets.

Consolidated net sales

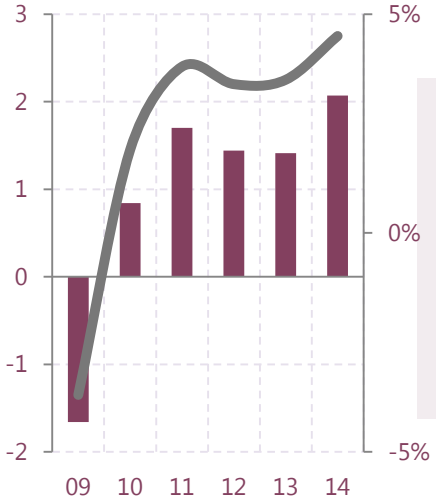
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

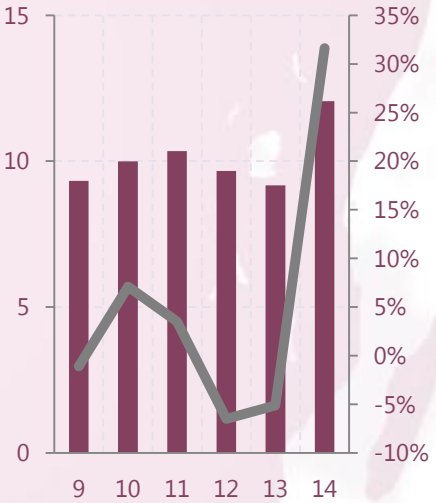
units: billion euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Electronic Devices & Components revenues

units: billion euros; change in %



Source: company information

Electronic Devices & Components revenues.

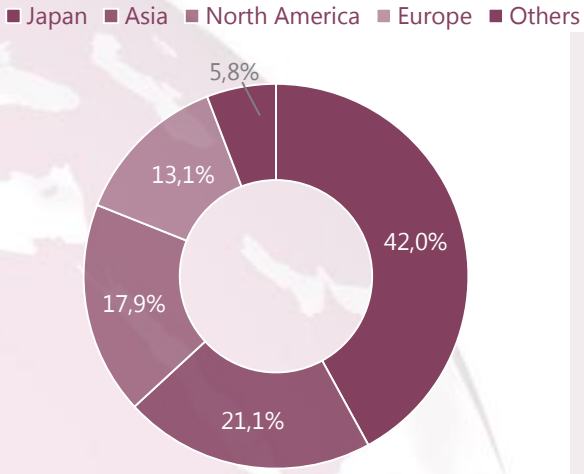
R&D and R&D ratio

units: billion euros; % of total sales

Toshiba's research and development expenditure and ratio.

Sales by region

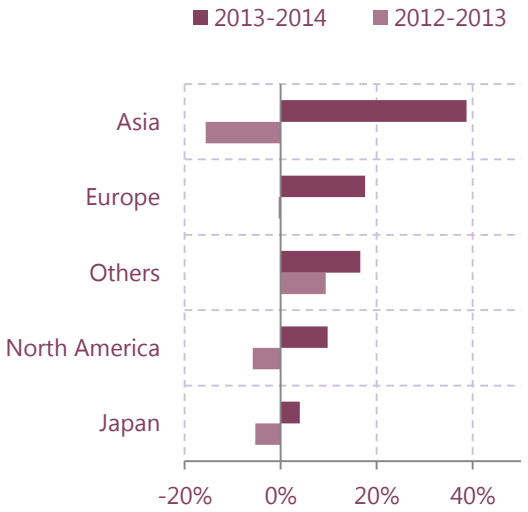
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

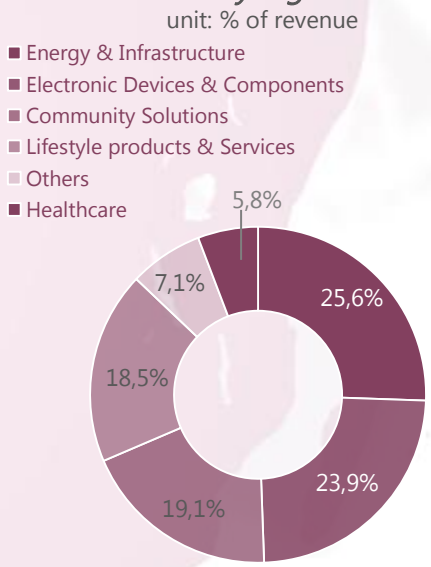
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

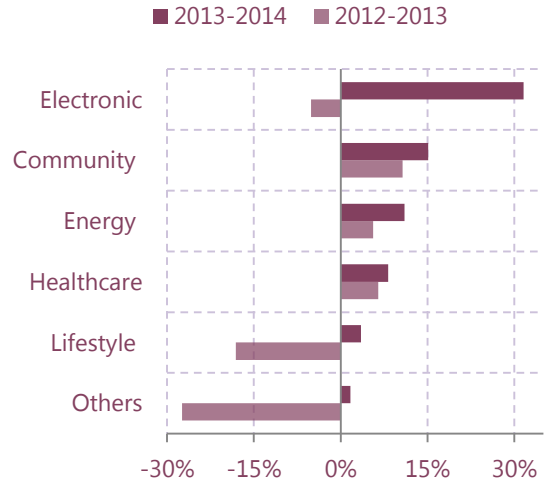
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

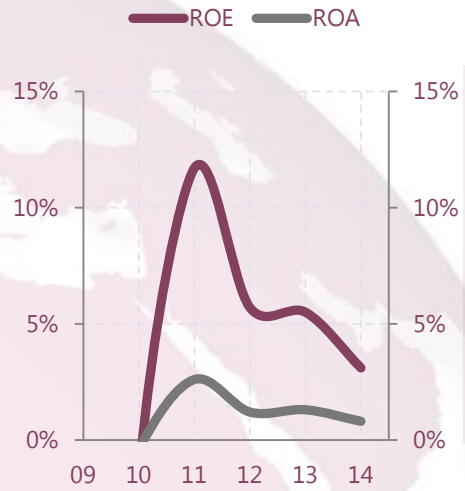


Annual sales change by operating segment, expressed as a percentage.

Source: company information

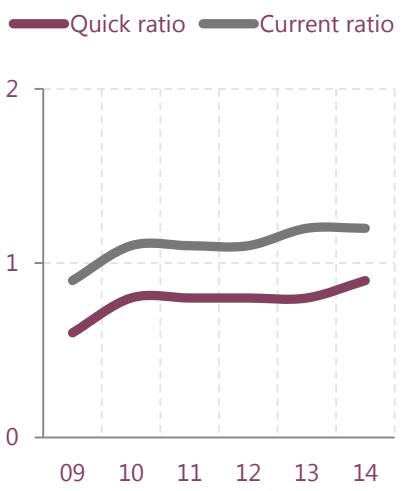
Profitability ratios

unit: %



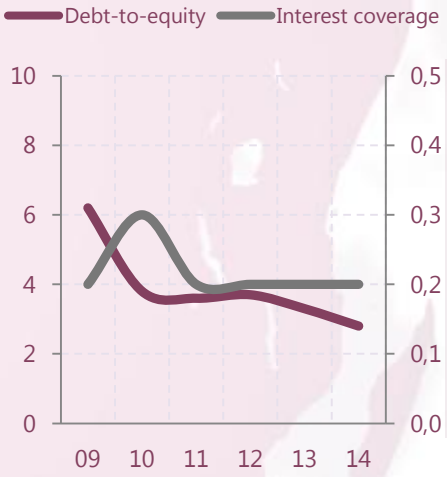
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

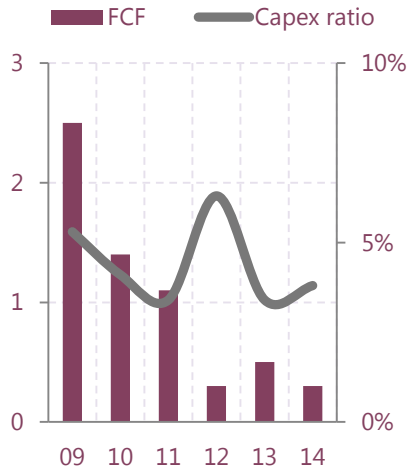
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

Units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	45.34	-11.7%	-1.66	-3.7%	-2.45	-5.4%
2010	43.67	-3.7%	0.84	1.9%	-0.14	-0.3%
2011	44.67	2.3%	1.70	3.8%	0.98	2.2%
2012	42.70	-4.4%	1.44	3.4%	0.50	1.2%
2013	40.80	-4.5%	1.41	3.5%	0.55	1.4%
2014	46.32	13.5%	2.07	4.5%	0.36	0.8%

units: billion euros; % change; operating income and net income as % of sales

Year	Electronic Devices & Components revenues	Annual % change	R&D expenses	R&D ratio
2009	9.32	-1.1%	2.54	5.6%
2010	9.99	7.1%	2.21	5.1%
2011	10.34	3.5%	2.27	5.1%
2012	9.66	-6.5%	2.28	5.3%
2013	9.17	-5.1%	2.17	5.3%
2014	12.06	31.6%	2.35	5.1%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Energy & Infrastructure	12.91	25.6%	1.8%	11.63	26.1%	11.0%	11.01	5.6%
Community Solutions	9.67	19.1%	3.8%	8.40	18.9%	15.1%	7.58	10.7%
Healthcare Systems & Services	2.93	5.8%	7.0%	2.70	6.1%	8.2%	2.54	6.5%
Electronic Devices & Components	12.06	23.9%	14.1%	9.17	20.6%	31.6%	9.66	-5.1%
Lifestyle Products & Services	9.36	18.5%	-3.9%	9.05	20.3%	3.5%	11.05	-18.1%
Others	3.59	7.1%	1.7%	9.55	8.0%	1.1%	4.90	-27.4%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Japan	19.47	42.0%	18.71	45.9%	4.0%	19.77	-5.3%
Asia	9.83	21.2%	7.09	17.4%	38.7%	8.40	-15.6%
North America	8.28	17.9%	7.54	18.5%	9.8%	8.00	-5.8%
Europe	6.08	13.1%	5.17	12.7%	17.6%	5.20	-0.4%
Others	2.66	5.7%	2.28	5.6%	16.6%	2.09	9.4%

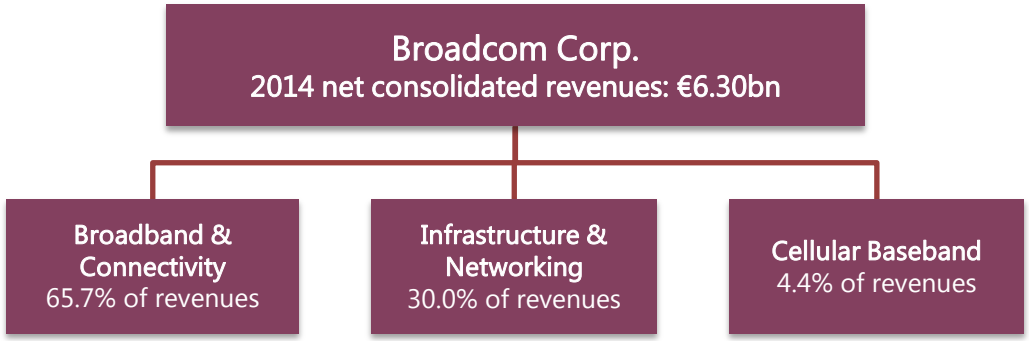
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	38.9	33.4	5.4	6.2	-45.3%	-6.3%	0.2	-6.9
2010	38.8	30.8	8.0	3.8	-1.7%	-0.4%	0.3	3.3
2011	38.3	29.9	8.4	3.6	11.7%	2.6%	0.2	7.4
2012	41.0	32.2	8.8	3.7	5.7%	1.2%	0.2	6.4
2013	43.5	33.4	10.1	3.3	5.5%	1.3%	0.2	6.1
2014	44.5	32.7	11.8	2.8	3.1%	0.8%	0.2	8.6

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	19.4	21.9	0.6	0.9	-0.1	2.4	5.3%	2.5
2010	19.7	17.7	0.8	1.1	3.2	1.8	4.1%	1.4
2011	19.9	17.8	0.8	1.1	2.7	1.5	3.4%	1.1
2012	21.4	19.0	0.8	1.1	2.4	2.7	6.3%	0.3
2013	22.5	19.5	0.8	1.2	0.9	1.4	3.4%	0.5
2014	22.9	18.5	0.9	1.2	2.0	1.8	3.8%	0.3

units: billion euros; percentage, ratio



Fiscal year ended March 31, 2014

Headquarters

Irvine, California, United States

2014 key figures (consolidated)

Net sales	€6.30bn
Operating margin	8.2%
Net margin	9.5%
R&D ratio	28.1%
Staff	10,650

- Broadcom is a California-based fabless semiconductor designer. The firm specialises in wired and wireless communications technology and owns the largest system-on-chip portfolio in the semiconductor industry.
- External growth is a key component of Broadcom's development, which has been involved in 54 M&A processes since 1991. Avago acquired Broadcom in May 2015 for €27.7bn.
- In fiscal year 2014, Broadcom decided to stop its Cellular Baseband business unit after recording losses in the 2009-2014 period with a negative CAGR of -26.5%.

Revenue by region (2014)

Hong Kong	31.2%
Singapore, Taiwan , Thailand and Japan	29.0%
China	24.1%
Other	9.1%
United States	4.3%
Europe	2.3%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
Broadband &Connectivity	65.7%	19.6%	Design and sale of set-top box solutions, broadband modem solutions and connectivity technologies.
Infrastructure & Networking	30.0%	27.1%	Creation and market of Ethernet switches, processors, Ethernet controllers and other infrastructure and networking technologies.
Cellular Baseband	4.4%	-92.1%	Design of baseband processors. This business unit was shut down in June 2014.

Improving IoT core technologies to take advantage of the IoT market

By 2020, the company aims to become a leader in both wired and wireless technologies. In order to achieve this objective, the group has continued developing new solutions to connect objects over wider range. This will allow Broadcom to tap into the IoT by providing greater connectivity range and speed to connected devices. The company is also working to improve energy efficiency in smart devices, thereby solving the IoT major challenge. Broadcom aims to benefit from innovative ideas in the community through "Get Wiced", a developing platform that eases people's access to the IoT. Broadcom considers software as a future key component of its industry.

February 2014	Broadcom unveils the world's first 5G Wi-Fi MIMO System on Chip. It features doubled wireless performance through widened coverage areas while increasing power efficiency.
March 2014	Broadcom discloses an end-to-end wireless charging chipset that creates drop-and-go charging platforms. It provides device makers with wireless charging features on a relatively quick time-to-market timeline. This wireless charging solution may be implemented anywhere, providing business owners such as restaurants and stores the opportunity to get customers' attention when they charge their phones.
August 2014	Broadcom shows its Wireless Internet Connectivity for Embedded Devices (WICED) technology, built to speed up the development of an IoT eco-system. This technology provides to developers a range of solutions concerning technology standards, security and product development.
February 2015	Broadcom introduces Diamond, a smartwatch design platform addressing battery issues and reducing power consumption, development costs and size. Broadcom achieves such progress by miniaturizing the circuit board size by about 40% and adding features and software that optimize energy consumption.
May 2015	Broadcom benefits from the late update of the Android Wear Software, which opens to Wi-Fi. It means that phones and smart devices can be connected in long distances together as long as they are both connected to data.

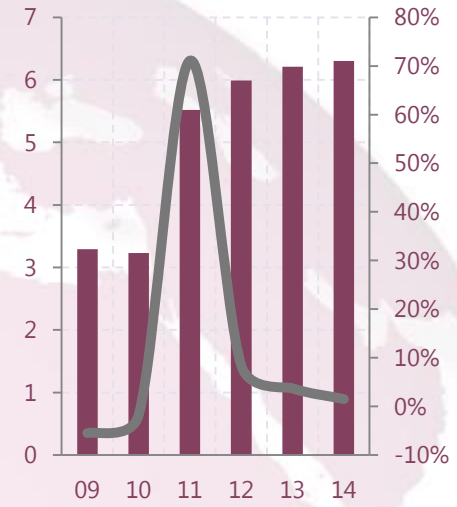
Merging and acquiring at the DNA of Broadcom

Broadcom undertook its first M&A process in 1997, only 6 years after its creation, and has been involved in 54 M&A processes since then. By such M&As, the firm enlarges its patent portfolio as well as its know-how in emerging technologies and creating synergies from hiring employees of acquired companies. Broadcom benefits from this strategy by reducing the time-to-market and costs development of new technologies. The company is set to pursue external growth, as competitors consolidates to create conglomerates.

February 2012	Broadcom acquires California-based NetLogic Microsystems for €2.8bn to get router processors know-how and its patent portfolio.
April 2012	Broadcom takes control over Israel-based Broadlight for €150mn to strengthen its fibre broadband portfolio.
May 2014	Broadcom is sold to Taiwan-based Avago for €27.7bn. It is the largest acquisition deal in the industry's history and creates the third largest semiconductor company in terms of revenues.

Consolidated net sales

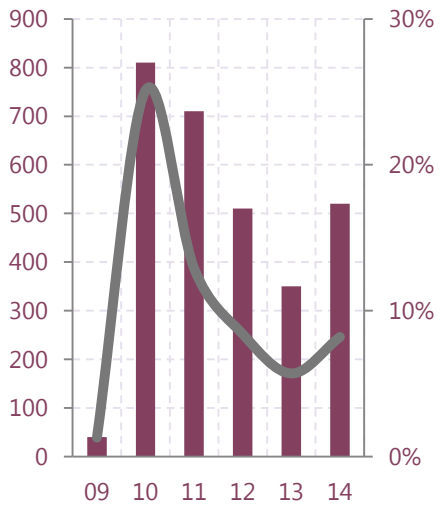
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

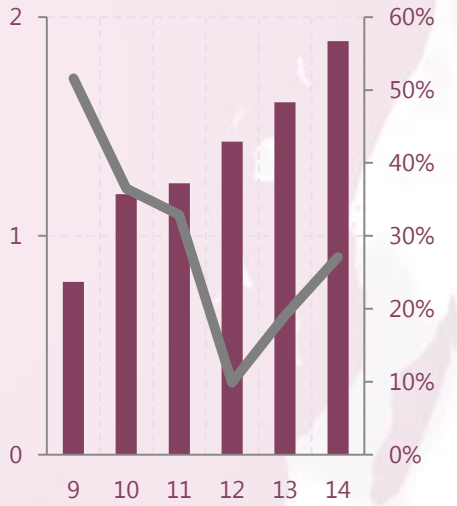
units: million euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Infrastructure and Network revenues and margin

units: billion euros; operating margin in %



Source: company information

Infrastructure and Network revenues and margin.

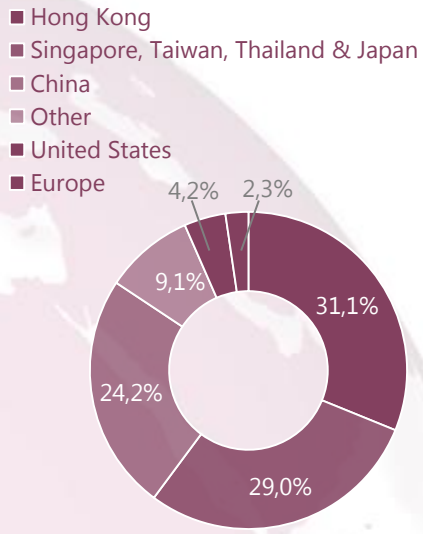
R&D and R&D ratio

units: billion euros; % of total sales

Broadcom's research and development expenditure and ratio.

Sales by region

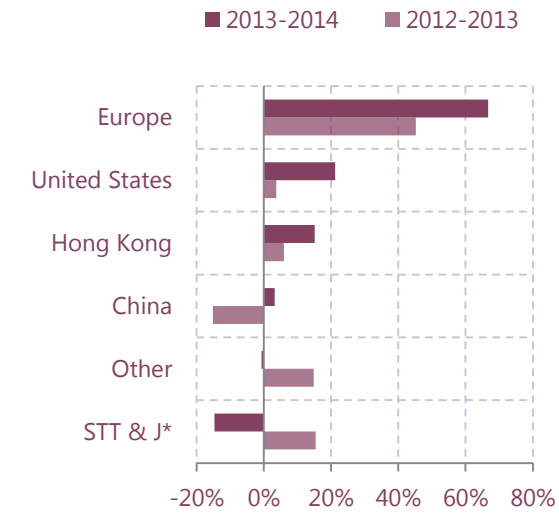
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

unit: change in %

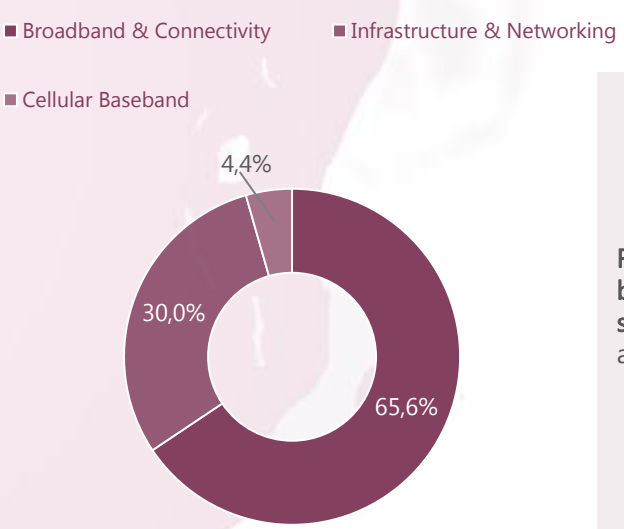


*Singapore, Taiwan, Thailand & Japan

Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

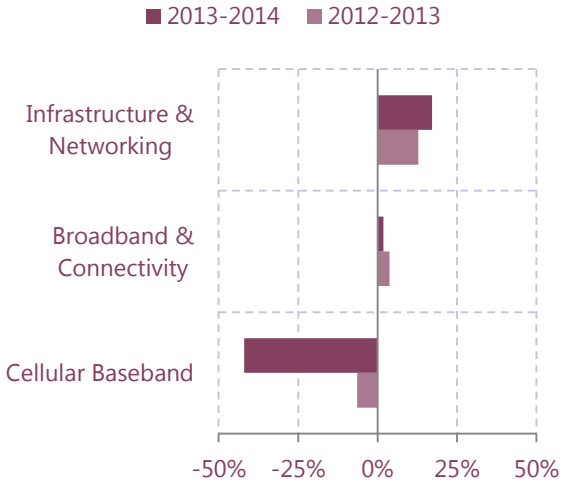
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

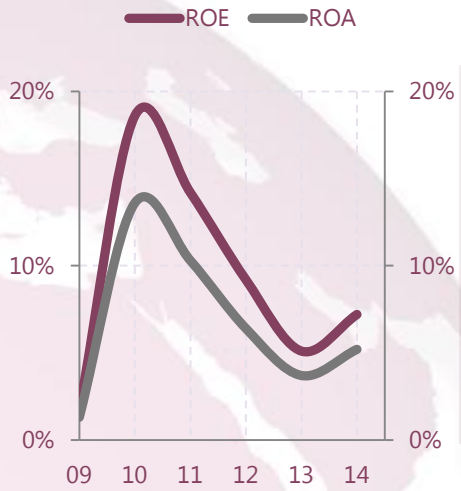


Annual sales change by operating segment, expressed as a percentage.

Source: company information

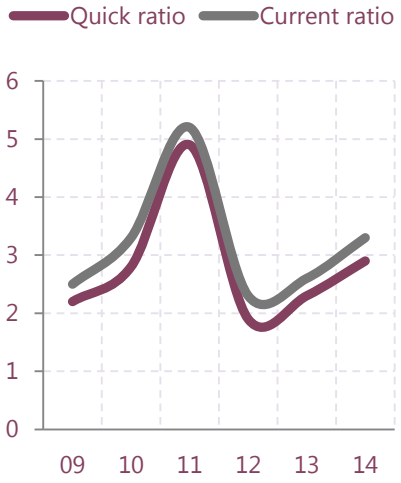
Profitability ratios

unit: %



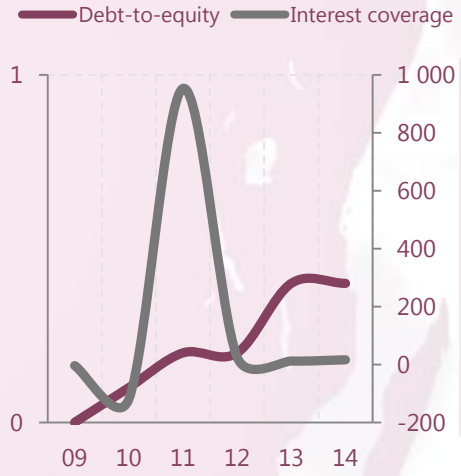
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

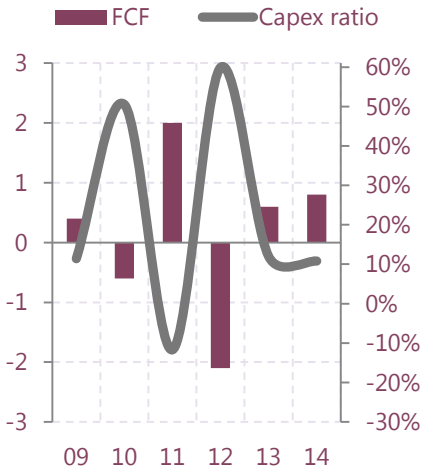
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

Units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	3.29	-5.5%	0.04	1.3%	0.05	1.5%
2010	3.23	-1.8%	0.81	25.1%	0.81	25.1%
2011	5.52	71.1%	0.71	12.9%	0.69	12.5%
2012	5.99	8.4%	0.51	8.4%	0.54	9.0%
2013	6.21	3.7%	0.35	5.7%	0.32	5.1%
2014	6.30	1.5%	0.52	8.2%	0.49	7.7%

units: billion euros; % change; operating income and net income as % of sales

Year	Infrastructure and Network revenues	Infrastructure and Network operating margin	R&D expenses	R&D ratio
2009	0.79	51.6%	1.15	34.9%
2010	1.19	36.5%	1.32	40.8%
2011	1.24	32.9%	1.49	27.0%
2012	1.43	9.9%	1.73	29.0%
2013	1.61	19.1%	1.86	30.0%
2014	1.89	27.1%	1.77	28.1%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Broadband & Connectivity	4.14	65.7%	19.6%	4.06	66.1%	1.9%	3.91	3.8%
Infrastructure & Networking	1.89	30.0%	27.1%	1.61	26.2%	17.2%	1.43	12.8%
Cellular Baseband	0.28	4.4%	-92.1%	0.47	7.7%	-42.0%	0.51	-6.4%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Hong Kong	1.47	31.2%	1.28	27.5%	15.1%	1.20	6.0%
Singapore, Taiwan, Thailand & Japan	1.37	29.0%	1.60	34.5%	-14.7%	1.39	15.4%
China	1.14	24.1%	1.10	23.7%	3.2%	1.30	-15.2%
Other	0.43	9.1%	0.43	9.3%	-0.7%	0.38	14.8%
United States	0.20	4.3%	0.17	3.6%	21.2%	0.16	3.7%
Europe	0.11	2.3%	0.06	1.4%	66.7%	0.04	45.2%

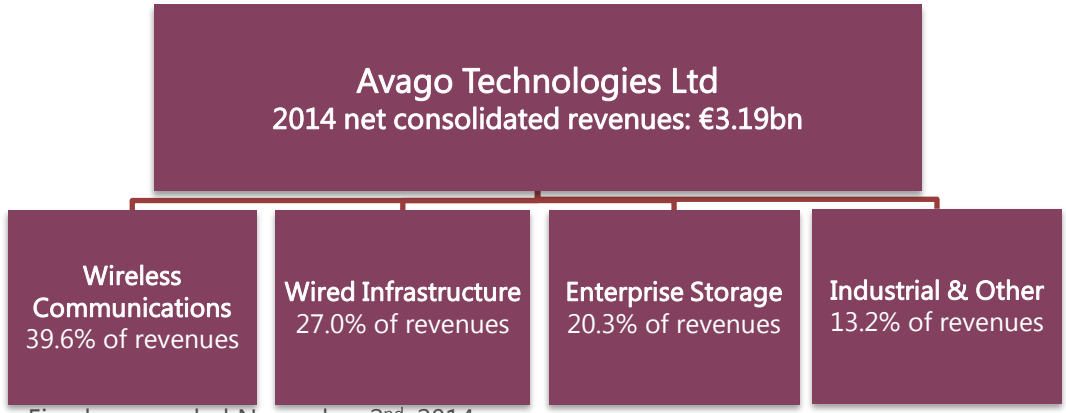
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	3.8	-	2.9	-	1.7%	1.3%	-0.01	-4.0
2010	5.9	0.5	4.4	0.1	18.6%	13.6%	-0.01	-120.2
2011	6.8	0.9	4.9	0.2	14.2%	10.3%	0.0	953.0
2012	8.4	1.3	5.9	0.2	9.2%	6.4%	0.0	25.0
2013	8.6	2.3	6.3	0.4	5.1%	3.7%	0.0	11.8
2014	9.3	2.6	6.8	0.4	7.2%	5.2%	0.0	16.1

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	2.2	0.9	2.2	2.5	0.7	0.4	11.4%	0.4
2010	3.1	1.0	2.8	3.3	1.0	1.6	50.5%	-0.6
2011	4.3	0.8	4.9	5.2	1.4	-0.7	-11.7%	2.0
2012	2.8	1.3	1.9	2.3	1.4	3.6	59.9%	-2.1
2013	2.9	1.1	2.3	2.6	1.3	0.7	12.0%	0.6
2014	3.8	1.2	2.9	3.3	1.4	.0.7	10.8%	0.8

units: billion euros; percentage, ratio



Fiscal year ended November 2nd, 2014

Headquarters

San José, California, United States

2014 key figures (consolidated)

Net sales	€3.19bn
Operating margin	10.3%
Net margin	12.7%
R&D ratio	12.6%
Staff	8,400

- Avago was founded in 1961 as a HP branch. It designs, develops and supplies semiconductor devices with a focus in III-V type compounds. The group also designs and processes Complementary Metal Oxyde Semiconductors (CMOS). In 2015, the firm acquired Broadcom for €27.7bn to build an industry leader.
- Avago operates in four divisions: Wireless Communications, Wired Infrastructure, Enterprise Storage and Industrial & Other. In fiscal year 2014, Avago's ten main clients centralised 57% of the company's revenues, with Foxconn Technology Group making 20% of total sales.
- The Asian region gathers 42% of its workforce and 53.1% of its revenues. Avago's presence in Asia allows the firm to be near customer's plants and at the centre of worldwide electronics manufacturing companies.

Revenue by region (2014)

China	49.3%
Other	35.5%
United States	11.4%
Singapore	3.8%

SEGMENT	% OF SALES	SEGMENT MARGIN	DESCRIPTION
Wireless Communications	39.6%	34.0%	Design and supply of radio frequency semiconductor devices targeting the wireless communications industry.
Wired Infrastructure	27.0%	24.9%	Creation and manufacture of transceivers for the storage and ethernet networking markets, as well as optical laser and receiver components for metro and long-haul telecommunication markets.
Enterprise Storage	20.3%	33.7%	Engineering and sale of LSI storage products, real channel based system-on-chip, and peripheral component interconnect express switches and bridges, which are primary connected inside computing systems.
Industrial & Other	13.2%	43.8%	Design and sale of a wide range of products for the general industrial and automotive markets such as optical encoders or LED assemblies.

Merging and acquiring to strengthen market position and improve bargaining power

Avago's external growth is driven by its mergers and acquisitions, with a focus on its core businesses. In fact, the company liquidates the least growing strategic business units of the acquired companies to keep only the fastest growing strategic business units and to reduce the financial impact of acquisitions. Further than upscaling, this M&A strategy aims at giving more bargaining power to Avago in order to easily implement the company's chips into electronic devices. In 2015, the company closed the largest deal of the industry's history by buying competitor Broadcom for €27.7bn, hence strengthening its Mobile Communication and Storage segments.

March 2013	Avago acquires Texas-based Javelin Semiconductor, to maintain its position in a relatively high performance radio frequency components for the smartphone market, financial details were not disclosed.
April 2013	Avago acquires Israel-based CyOptics for €300 million, in order to strengthen Avago's fibre optic product portfolio and let the company target metro, long-haul markets and data centre segments.
May 2014	Avago acquires LSI Corporation for €4.9bn, and becomes a leader in the enterprise storage market. This deal soars Avago scale and provides the firm with a larger portfolio to better target mobile data traffic customers.
	Avago sells its former LSI's Flash business Unit, SandForce, to Seagate for €340 million, and liquidates PCI Express flash card business for €90million.
June 2014	Avago buys US-based PLX Technology for €230 million and bolsters its portfolio for the enterprise storage and networking businesses.
October 2014	Avago sells to Intel its former LSI's division, AXXIA Networking Business, for €490 million.
February 2015	Avago acquires Emulex for €450 million, to strengthen its position in the memory business and broaden its suits of software storage solutions portfolio, for enterprise and data centre markets.
May 2015	Avago acquires US-based Broadcom for €27.7bn, building up the world's third largest semiconductor player of the industry, and benefits from Broadcom's expertise in both wired and wireless communications. Furthermore, Avago will take advantage from Broadcom's customer portfolio, with customers such as Apple and Samsung, in the mobile communication business which represents 40% of Avago's sales.

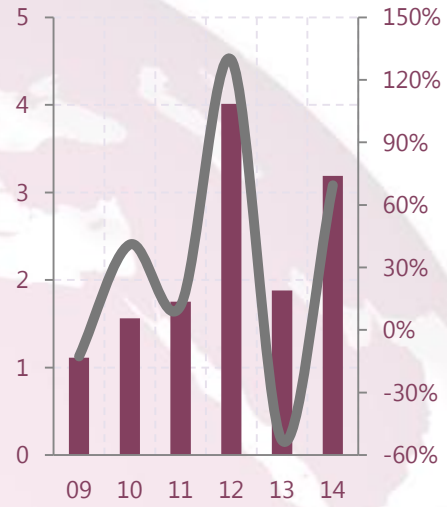
Boosting R&D to strengthen mobile and storage operations

Avago focuses on R&D investments to create innovative solutions for its business units. During the 2009-2014 period its average R&D ratio reached 12.6%. This strategy is backed up by a strong patent portfolio, with Avago owning almost 4,000 patents all over the world. Avago developed a broad product portfolio to reduce business risks by not relying on a limited number of business units. In the future, Avago will work to reinforce its Mobile Communications and Storage enterprise business units.

March 2013	Avago samples the world's first 100G CFP2 SR10 optical receiver, providing the industry's highest aggregate bandwidth, doubling port density and implementing the latest generation of Ethernet to data centres.
	Avago introduces the 150G/168G MicroPod and MiniPod fiber optic solutions, providing higher signal integrity, performance and thermal management to data centres, supercomputers and servers.
July 2013	Avago launches its 32 GB serializer/deserializer, a pair of blocks used in high speed communications to handle limited output and input, with 28nm CMOS, proving robustness of its technology and its ability to meet market demand for heightened data rates at low power.
October 2014	Avago sells to Intel its former LSI's division, AXXIA Networking Business for €490 million and shows its ability to remove the least growing business units acquired.
March 2015	Avago launches its 100G QSFP28 SR4 and CFP4 LR4 transceiver module devices, which promote the shift from data centres to 100G speed hence, meeting growing demand for larger bandwidth from data centres.
April 2015	Avago releases its TOSA and ROSA devices, targeting data centre applications by offering relatively higher performance and cost effective improvement solutions.
May 2015	Avago markets a new industrial fibre optic product for renewable energy, industrial motor, data centres, and transportation applications.

Consolidated net sales

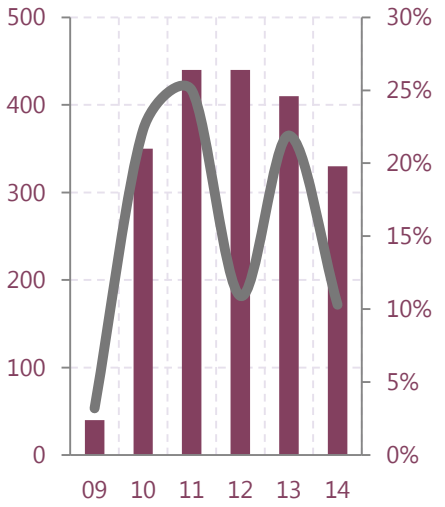
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

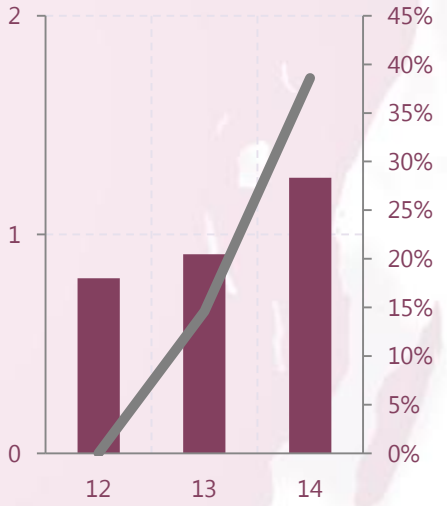
units: million euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

*Wireless Communications segment revenues and annual change**

units: billion euros; change in %



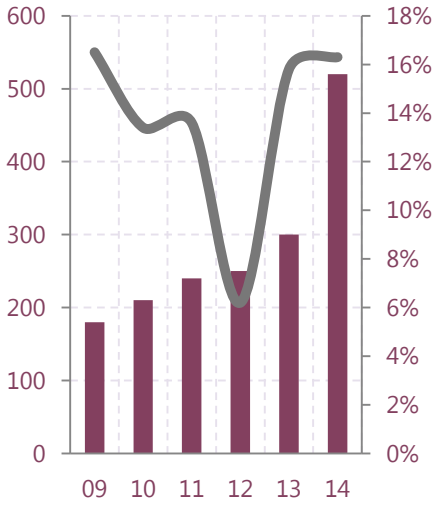
Source: company information

*data available only from restructuration on2012

Wireless Communications' segment revenues and annual change.

R&D and R&D ratio

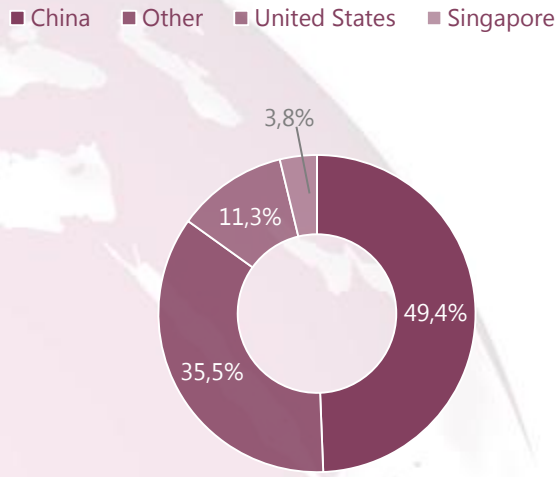
units: million euros; % of total sales



Avago's research and development expenditure and ratio.

Sales by region

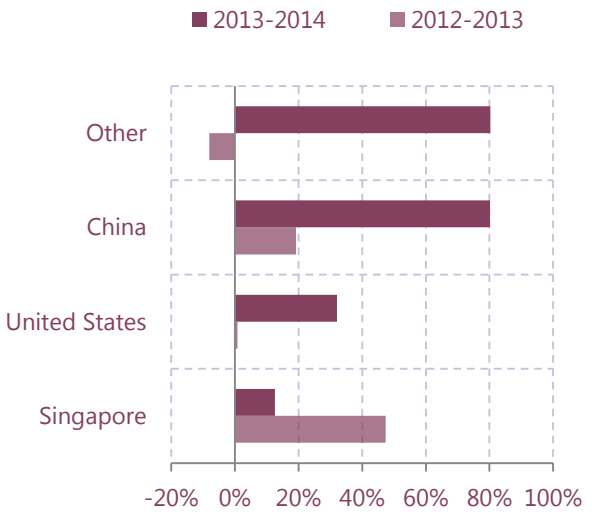
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

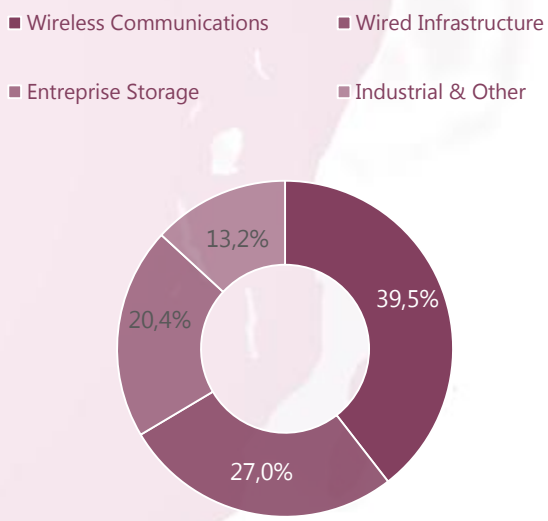
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

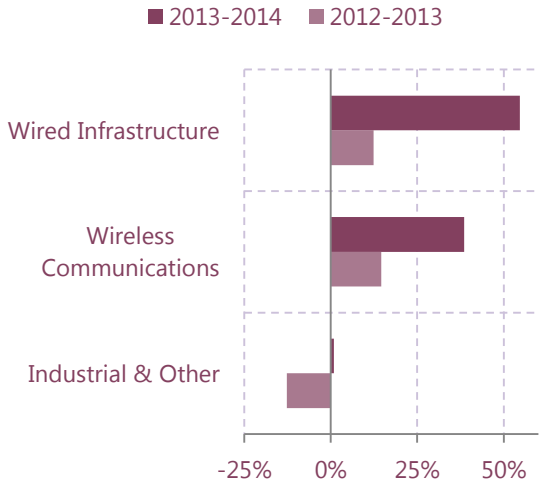
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

*Sales performance by segment**

unit: change in %



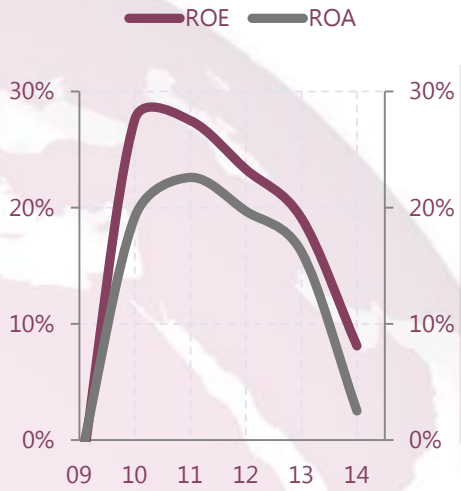
Annual sales change by operating segment, expressed as a percentage.

Source: company information

*Enterprise Storage business unit was incorporated in 2014.

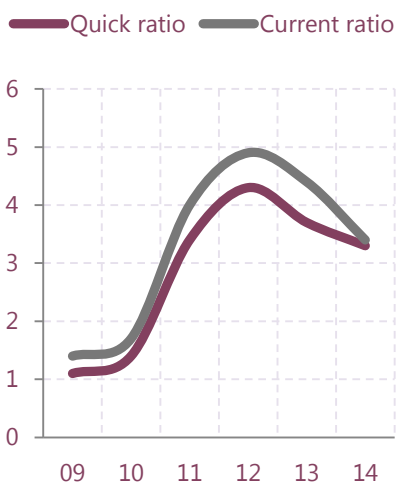
Profitability ratios

unit: %



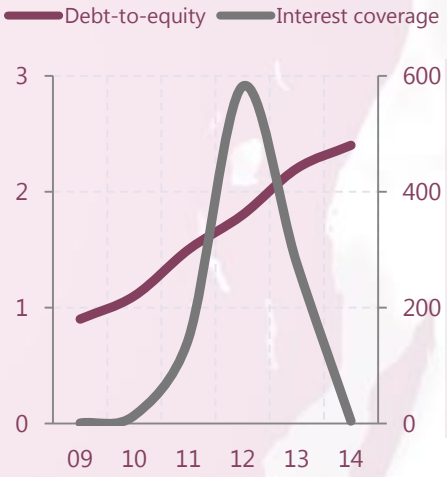
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

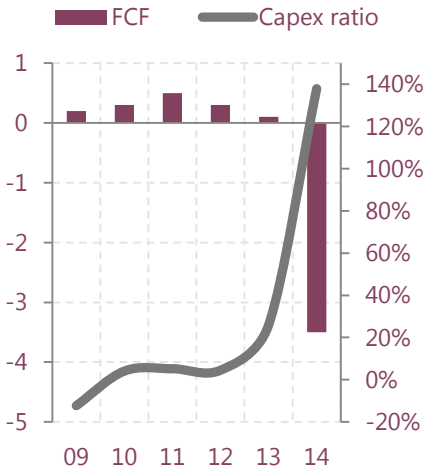
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

Units: billion euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	1.11	-12.7%	0.04	3.2%	-0.03	-3.0%
2010	1.56	41.0%	0.35	22.3%	0.31	19.8%
2011	1.75	11.6%	0.44	25.0%	0.41	23.6%
2012	4.01	129.6%	0.44	10.9%	0.42	10.5%
2013	1.88	-53.0%	0.41	21.9%	0.41	21.9%
2014	3.19	69.4%	0.33	10.3%	0.20	6.2%

units: billion euros; % change; operating income and net income as % of sales

Year	Wireless Communications revenues	Wireless Communications annual change	R&D expenses	R&D ratio
2009	-	-	0.18	16.5%
2010	-	-	0.21	13.4%
2011	-	-	0.24	13.6%
2012	0.80	-	0.25	6.2%
2013	0.91	14.6%	0.30	15.8%
2014	1.26	38.6%	0.52	16.3%

units: billion euros; % change

Segment	2014 sales	% of total sales	Segment margin (%)	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Wireless Communications	1.26	39.6%	39.0%	0.91	48.4%	38.6%	0.80	14.6%
Wired Infrastructure	0.86	27.0%	24.9%	0.56	29.5%	54.7%	0.49	12.4%
Enterprise Storage	0.65	20.3%	33.7%	-	-	-	-	-
Industrial & Other	0.42	13.2%	43..8%	0.42	22.1%	0.9%	0.48	-12.7%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
China	1.57	49.3%	0.87	46.4%	80.2%	0.73	19.2%
United States	0.36	11.4%	0.28	14.6%	32.1%	0.28	-0.8%
Singapore	0.12	3.8%	0.11	5.7%	12.6%	0.07	47.4%
Other	1.13	35.5%	0.63	33.4%	80.3%	0.68	-8.1%

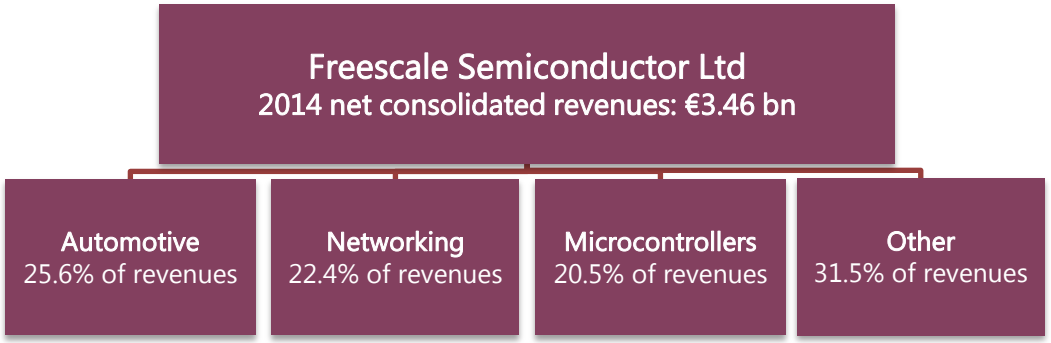
units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	1.5	0.7	0.8	0.9	-4.2%	-2.2%	0.1	0.6
2010	1.6	0.5	1.1	1.1	27.6%	19.2%	0.0	13.7
2011	1.8	0.3	1.5	1.5	27.5%	22.6%	0.0	146.0
2012	2.1	0.3	1.8	1.8	23.3%	19.7%	0.0	582.0
2013	2.6	0.4	2.2	2.2	19.1%	16.2%	0.0	276.0
2014	7.8	5.4	2.4	2.4	8.1%	2.5%	0.1	4.0

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	0.7	0.5	1.1	1.4	0.1	-0.1	-12.3%	0.2
2010	0.8	0.5	1.4	1.7	0.4	0.1	4.1%	0.3
2011	1.0	0.3	3.4	4.0	0.5	0.1	5.2%	0.5
2012	1.3	0.3	4.3	4.9	0.5	0.2	4.5%	0.3
2013	1.4	0.3	3.7	4.4	0.5	0.5	25.9%	0.1
2014	2.9	0.8	3.3	3.4	0.9	4.4	137.9%	-3.5

units: billion euros; percentage, ratio



Fiscal year ended 31 December, 2014

Headquarters

Austin, Texas, United States

2014 key figures (consolidated)

Net sales	€3.46bn
Operating margin	15.7%
Net margin	5.4%
Capex ratio	7.2%
R&D ratio	18.3%
Staff	17,300

- Freescale is a US based company that is a global provider of embedded processing solutions. The group was founded in 2006. Freescale mainly operates through five business units. In 2014, the group's revenues grew by 10.7% and recorded positive net income for the first time since 2009.
- In 2014, Freescale's three biggest clients gathered a total of 35% of net revenues. The company's main end-markets include automotive safety, hybrid and all electric vehicles, wireless infrastructure, energy management, portable medical devices, consumer appliances and smart mobile devices.
- In March of fiscal year 2015, Freescale was bought by Netherland-based company NXP for €8.97bn.

Revenue by region (2014)

Malaysia	27.4%
Switzerland	23.5%
Hong Kong	21.5%
United States	21.4%
Japan	5.5%
Other	0.6%

SEGMENT	Sales	% of total sales	DESCRIPTION
Micro Controllers	0.71	20.5%	Design and production of embedded control system processors, memory and peripherals on a chip.
Digital Networking	0.78	22.4%	Creation and manufacture of multicore communication processors and wireless infrastructure processors for the networking and communication markets.
Automotive MCU's	0.89	25.6%	Development of microcontroller units to improve advanced driver assistance systems, infotainment and electrified powertrain for the automotive industry.
Analog & Sensors	0.60	17.2%	Design and supply of analog, mixed-signal analog and sensor products capturing, managing and transmitting data from the real-world environment for use in embedded processing applications in the automotive, industrial and consumer markets.
Radio Frequency	0.41	12.0%	Creation and supply of radio frequency products for the wireless infrastructure industry.
Other	0.08	2.3%	All other non-reportable segments.

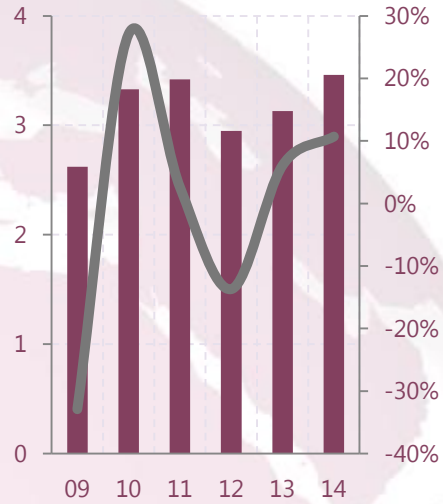
Focusing on security and connectivity issues to tap into the Internet of Tomorrow market

Freescale combines its embedded processors with sensors, analog, radio frequency devices, software applications and design tools to allow its customers to reduce products time to market. Freescale is trying to meet the growing need for connectivity by entering the IoT segment. To achieve this goal, Freescale provides solutions for smart networks, the automotive industry, smart homes, wearables and smart health devices. The company's general purpose is to improve applications' security and ease IoT access to customers by developing semiconductor applications, such as Intelligent Sensing Framework. In the coming years, Freescale aims at becoming a leading provider of secured, embedded processing solutions for the Internet of Tomorrow.

February 2015	Freescale upgrades its Kinetis KV5x MCU to allow migration of electrical motors to digital-based control systems by providing secure networking capabilities and energy consumption improvement. This innovation brings the IoT to many devices from home appliances to industrial machinery.
April 2015	Freescale extends wireless capabilities of its Kinetis MCU's, by implementing a more powerful transceiver, in order to improve its home automation and industrial control application offer. This innovation improves the firm's IoT value proposal.
	Freescale markets the FXTH8715 products family. It is the industry's most accurate, wirelessly communicating, tire pressure sensing solution, delivering among others upgraded driver safety and improved fuel efficiency, predictive analysis of tires condition.
May 2015	Freescale introduces its Intelligent Sensing Framework, simplifying the expansion of sensor-based solutions for connected home, wearables, medical and industrial applications by easing the incorporation of multiple sensor data streams into a device or application.
	Freescale upgrades its i.MX6 devices, improving memory utilization by 50%, doubling graphics performance and reinforcing security features. These devices are designed for automotive instruments, medical equipment, media streaming applications, among others in line with IoT strategy.
June 2015	Freescale launches two SoCs valve controllers for safety management of hydraulic and pneumatic control systems, enabling predictive analysis of required maintenance when connected to a network. These SoCs also provide secure access for connected objects.

Consolidated net sales

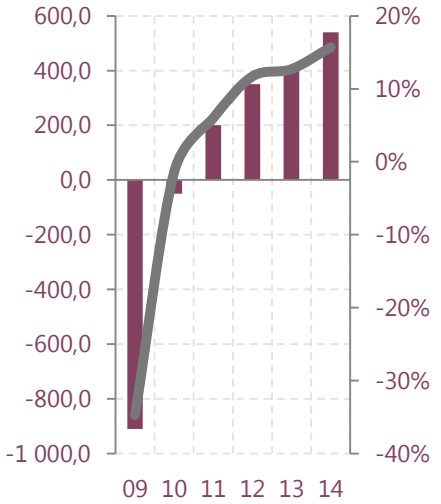
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

units: million euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

*Wireless Communications revenues and annual change**

units: million euros; change in %

Wireless Communications revenues and annual change.

R&D and R&D ratio

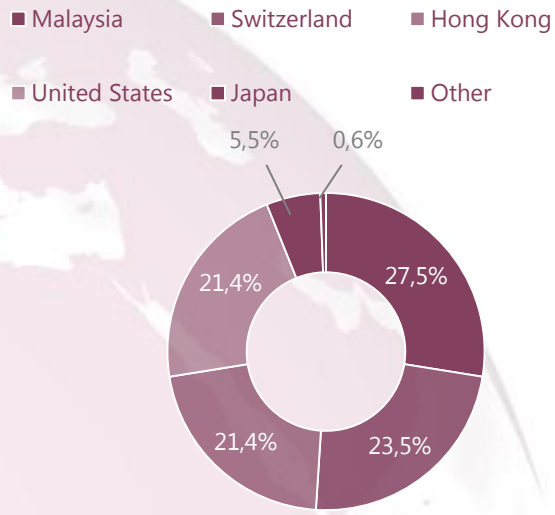
units: million euros; % of total sales

Freescale's research and development expenditure and ratio.

Source: company information
*data available only from restructuration in 2010

Sales by region

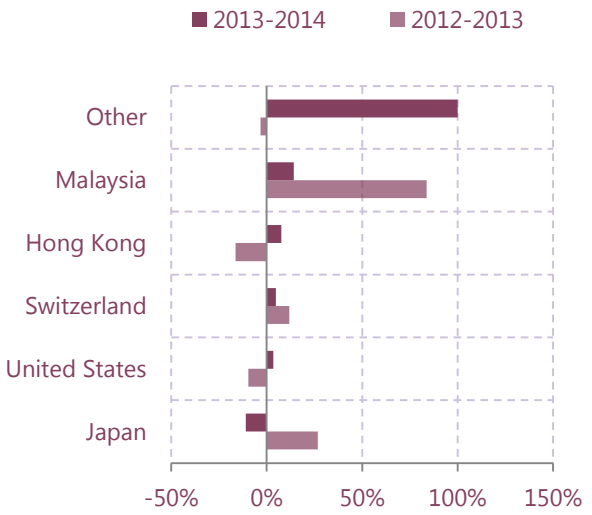
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales performance by region

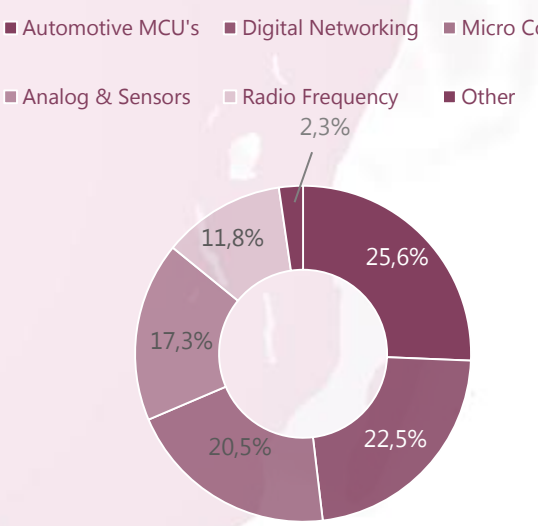
unit: change in %



Annual change of revenues by regional market, expressed as a percentage.

Sales by segment

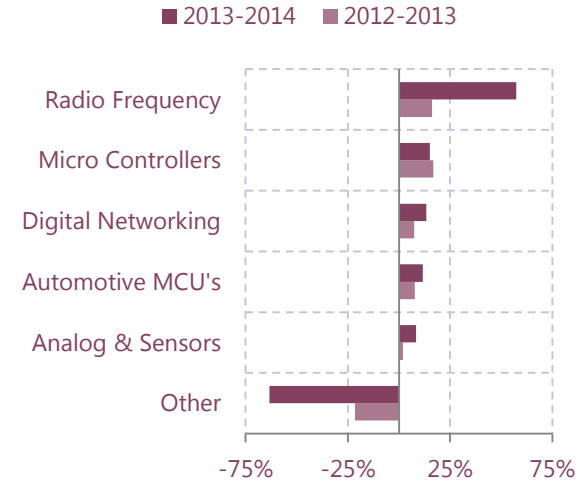
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales performance by segment

unit: change in %

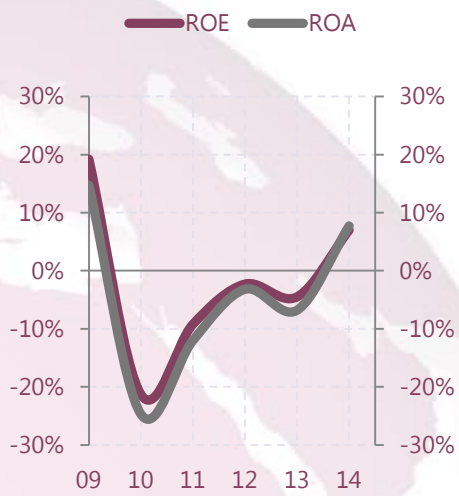


Annual sales change by operating segment, expressed as a percentage.

Source: company information

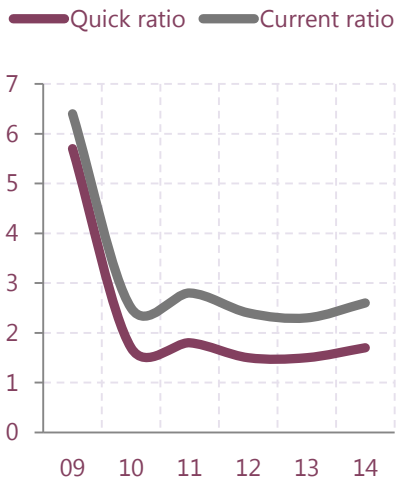
Profitability ratios

unit: %



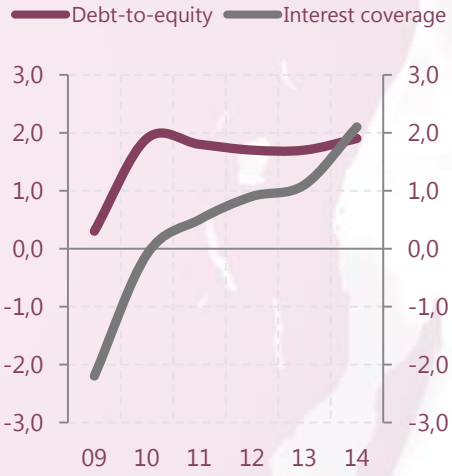
Return-on-equity (ROE) is the percentage ratio between operating income and total equity. **Return-on-assets** is the percentage ratio between operating income and total assets. Both ratios measure the efficiency at which the company uses its equity and assets to generate profits.

Liquidity ratios



Current ratio (current assets divided by current liabilities) indicates whether the company has enough resources to pay its short term debt (12 months). **Quick ratio** (current assets net from inventories, divided by current liabilities) measures the company's immediate capacity to repay its short term debt.

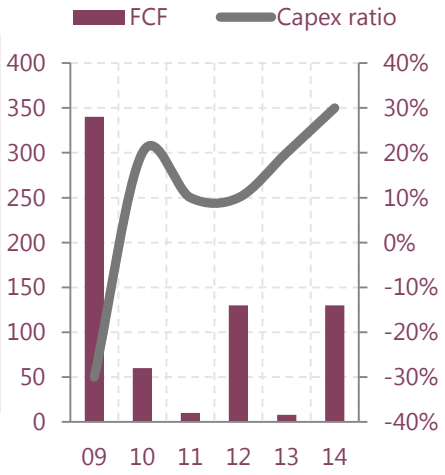
Solvency ratios



Debt-to-equity is the ratio between total liabilities and total equity and reflects the company's relative amount of debt. **Interest coverage** (net interest expenses divided by operating income) reflects the company's debt burden, i.e. its ability to pay interest on outstanding debt. The lower this ratio, the more the company is burdened by interest expenses.

Free cash flow and capital expenditure

Units: million euros; %



Capex ratio is the percentage ratio between capital expenditures and net sales. **Free cash flow** (cash from operating activities minus capital expenditures) reflects the company's capacity to generate cash net of capital investments.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	2.62	-32.9%	-0.91	-34.7%	0.56	21.3%
2010	3.33	27.1%	-0.05	-1.4%	-0.79	-23.6%
2011	3.42	2.6%	0.20	6.0%	-0.31	-9.0%
2012	2.95	-13.7%	0.35	11.7%	-0.08	-2.6%
2013	3.13	6.1%	0.40	12.7%	-0.16	-5.0%
2014	3.46	10.7%	0.54	15.7%	0.19	5.4%

units: billion euros; % change; operating income and net income as % of sales

Year	Automotive revenues	Automotive annual change	R&D expenses	R&D ratio
2009	-	-	0.62	23.7%
2010	0.76	-	0.58	17.5%
2011	0.80	5.8%	0.60	17.4%
2012	0.74	-7.6%	0.55	18.8%
2013	0.79	7.1%	0.56	18.0%
2014	0.89	12.3%	0.63	18.3%

units: billion euros; % change

Segment	2014 sales	% of total sales	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Micro Controllers	0.71	20.5%	0.62	19.7%	15.1%	0.53	16.8%
Digital Networking	0.78	22.4%	0.68	21.9%	13.4%	0.64	7.4%
Automotive MCU's	0.89	25.6%	0.79	25.4%	11.6%	0.74	7.8%
Analog & Sensors	0.60	17.2%	0.55	17.6%	8.3%	0.54	1.9%
Radio Frequency	0.41	12.0%	0.26	8.4%	57.4%	0.23	16.2%
Other	0.08	2.3%	0.22	7.0%	-63.3%	0.28	-21.6%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Malaysia	0.95	27.4%	0.52	16.5%	83.7%	0.45	14.2%
Switzerland	0.81	23.5%	0.73	23.3%	11.9%	0.69	4.8%
Hong Kong	0.74	21.5%	0.89	28.5%	-16.4%	0.83	7.6%
United States	0.74	21.4%	0.82	26.2%	-9.7%	0.79	3.4%
Japan	0.19	5.5%	0.15	4.8%	26.7%	0.17	-11.0%
Other	0.02	0.6%	0.02	0.7%	-3.3%	0.01	100.0%

units: billion euros; % change; operating income as % of sales

Year	Total assets	Total liabilities	Total equity	Debt ratio	ROE	ROA	Interest expenses	Interest coverage ratio
2009	3.8	0.9	2.9	0.3	19.2%	14.7%	0.4	-2.2
2010	3.2	6.9	3.7	1.9	-21.3%	-24.7%	0.4	-0.1
2011	2.6	5.9	3.4	1.8	-9.2%	-12.0%	0.4	0.5
2012	2.4	5.8	3.4	1.7	-2.3%	-3.2%	0.4	0.9
2013	2.3	5.7	3.4	1.7	-4.5%	-6.8%	0.4	1.1
2014	2.5	5.1	2.7	1.9	7.0%	7.7%	0.3	2.1

units: billion euros; percentage, ratio

Year	Current assets	Current liabilities	Quick ratio	Current ratio	Operating cash flow	Capital expenditure	Capex ratio	Free cash flow
2009	4.3	0.7	5.7	6.4	0.1	-0.3	-10.7%	0.3
2010	1.9	0.8	1.7	2.5	0.3	0.2	7.2%	0.1
2011	1.7	0.6	1.8	2.8	0.1	0.1	1.9%	0.0
2012	1.5	0.7	1.5	2.4	0.3	0.1	4.5%	0.1
2013	1.5	0.6	1.5	2.3	0.2	0.2	5.0%	0.1
2014	1.6	0.6	1.7	2.6	0.4	0.3	7.2%	0.1

units: billion euros; percentage, ratio

SK Hynix Inc.
2014 net consolidated sales: €12.21bn

- **Dynamic Random Access Memory** — 77.7% of revenues
- **No-AND Flash** — 19.4% of revenues
- **Other** — 2.9% of revenues

Fiscal year ended December 31, 2014

Headquarters: Icheon-si, South Korea

- SK Hynix designs, manufactures and provides memory chips such as DRAM and NAND Flash, including computing, consumer, graphics, and mobile memories, CMOS Image Sensor, EOL products and technical support.
- Sk Hynix is deeply rooted in Asia both in terms of production facilities and customer markets. In the coming years, the company seeks to improve its products' quality to strengthen its position in the NAND business.

Recent events

- February 2015: SK Hynix implements the first 8Gb LPDDR4 in a smartphone. This core memory solution is set to provide high quality functions and empower high end smartphone.
- February 2015: SK Hynix and Toshiba sign a joint development agreement for Nanoimprint Litography (NIL), a production process contributing to increase cost competitiveness.
- October 2014: SK Hynix develops the world's highest density 16Gb Non-Volatile Dual In-line Memory Module (NVDIMM) and strengthens its position in the server memory market.

Strategic focuses

Focusing on quality and the NAND business

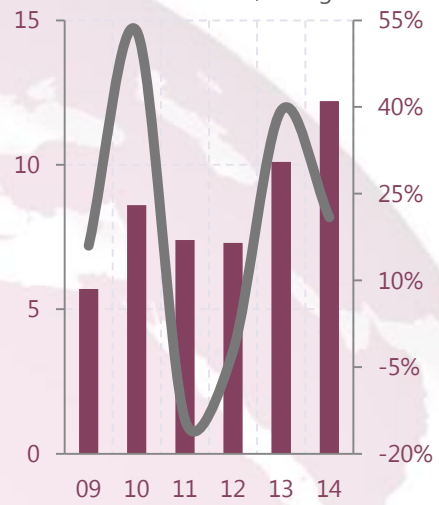
The corporation will pursue investing in R&D, which reached up to one billion euros in 2014, to enhance the quality of its memory chips. This R&D strategy is coupled with the intention to build partnerships with other semiconductor companies and develop new skills, especially in the NAND Business. SK Hynix is working to improve the profitability of this segment.

Enlarging its footprint in Asia

The company has operations in Asian countries such as China, Taiwan and South Korea; In 2014, 56.2% of the company's revenues came from this region. In August 2014, SK Hynix hosted the CMOS Image Sensors showcase in China and exposed its strategy to expand strategic cooperation within the country, which is the world's first consuming market of CMOS Image Sensors. In the future, SK Hynix expects to become a leading company in this field.

Consolidated net sales

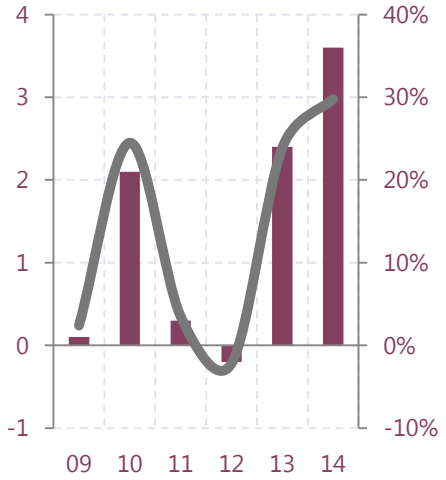
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

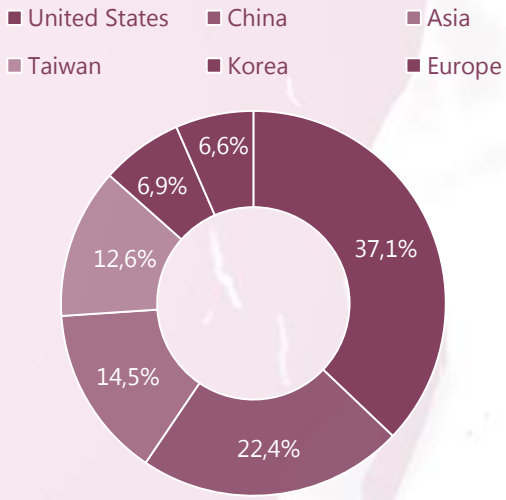
units: billion euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Sales by region

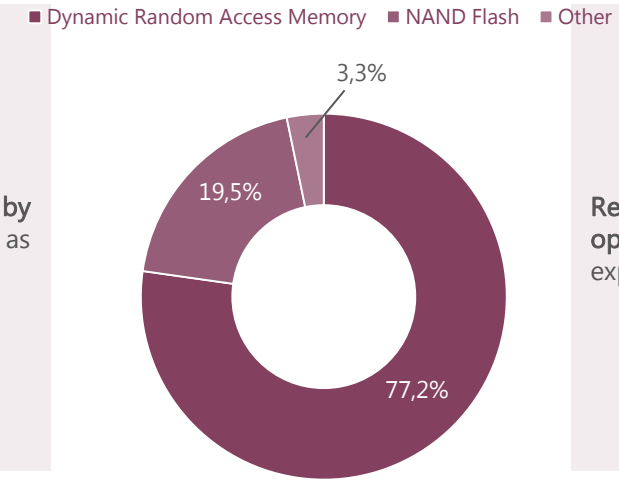
unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Sales by segment

unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	5.64	16.0%	0.14	2.4%	-0.24	-4.2%
2010	8.63	53.1%	2.11	24.5%	1.87	21.7%
2011	7.41	-14.1%	0.26	3.5%	-0.04	-0.5%
2012	7.25	-2.2%	-0.16	-2.2%	-0.11	-1.6%
2013	10.10	39.4%	2.41	23.9%	2.05	20.3%
2014	12.21	20.9%	3.64	29.8%	2.99	24.5%

units: billion euros; % change; operating income and net income as % of sales

Segment	2014 sales	% of total sales	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
DRAM	9.49	77.7%	7.28	72.1%	30.4%	5.16	41.1%
NAND FLASH	2.37	19.4%	2.42	23.9%	-2.1%	1.80	34.0%
Other	0.35	2.9%	0.40	4.0%	-12.2%	0.28	41.7%

units: billion euros; % change; operating income as % of sales

Region	2014 sales	% of total sales 2014	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Korea	0.84	6.9%	0.79	7.8%	6.8%	0.55	43.3%
China	2.73	22.3%	2.17	21.4%	25.9%	1.36	59.8%
Taiwan	1.54	12.6%	1.26	12.5%	22.1%	-	-
Asia	1.77	14.5%	1.42	14.0%	25.0%	2.03	-30.4%
United States	4.53	37.1%	3.70	36.7%	22.5%	2.73	35.6%
Europe	0.80	6.6%	0.77	7.6%	4.1%	0.58	33.3%

units: billion euros; % change; operating income as % of sales

NXP Semiconductors NV
2014 net consolidated sales: €4.22bn

- **High Perfomance Mixed Signal** — 76.7% of revenues
- **Standard Products** — 23.3% of revenues

Fiscal year ended December 31, 2014

Headquarters: Eindhoven, Netherlands

- NXP was founded in 2006 in Eindhoven and operates under two business units. The High Performance Mixed Signal which offers mixed signal solutions with applications in automotive and identification. The Standard Products segment delivers standard semiconductor components, mainly produced in-house.
- In 2014, NXP revenue grew by 17.3%, due to good results in Identification and Automotive business units, raising its net income to €400 million. NXP delivered the best financial results in its history, with an operating margin of 18.6%.

Recent events

- March 2015: NXP merges with America-based competitor Freescale, for €29.9bn.
- January 2015: NXP launches NCF29A1 for smart car access enabling Passive Keyless Entry.
- November 2014: NXP acquires Quintic's assets and IP on Wearables and Bluetooth Low Energy integrated chip to build up security and connectivity solutions for IoT applications.
- October 2014: NXP launches LPC82x microcontrollers enhancing connectivity, sensing and IoT design capacities of its products.

Strategic focuses

External growth to become a major connected automobile player

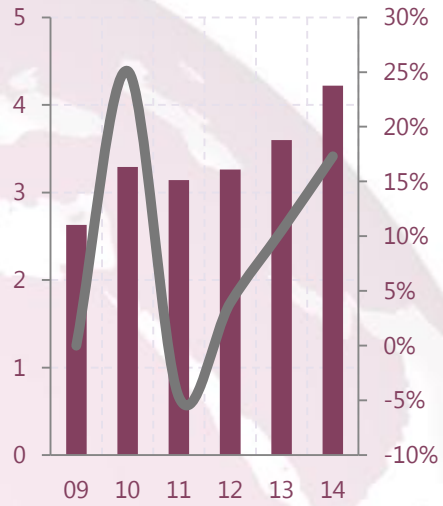
NXP is the foremost manufacturer of infotainment semiconductor and keyless ignition systems. Freescale controls digital networking chips, radio frequency devices and sensors production. Combined, the merged companies' sales are worth up to €7.7bn. This merger expands NXP's market share in chips for cars and raises the company's scale, allowing greater economies of scale. By combining their skills, they will be able to provide relatively high-end solutions for the growing demand for chips for connected cars.

Balance customer base and geographic operations to spread risks

None of NXP's customers represent more than 10% of revenue. The company has leaders in their respective industries such as, among others, Bosch, Continental, HTC, Apple, Cisco. This allows NXP to improve its competitive advantage. Furthermore, NXP operates in more than 25 countries and owns manufacturing facilities in Asia, Europe and the United States.

Consolidated net sales

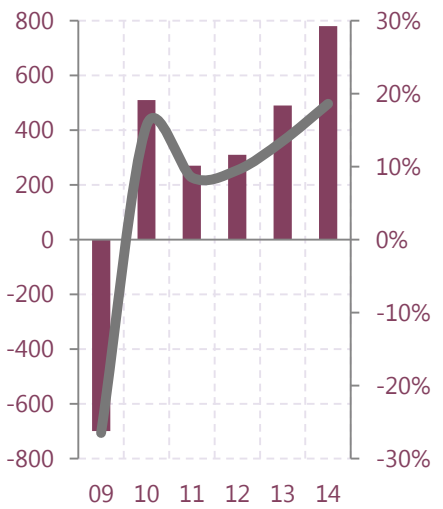
units: billion euros; change in %



Consolidated sales, net of returns and discounts. Growth in consolidated sales is typically due to an increase in sales volume or an increase in unit prices. Conversely, a decrease in consolidated sales typically reflects a drop in sales volume or a drop in unit prices.

Consolidated operating income and margin

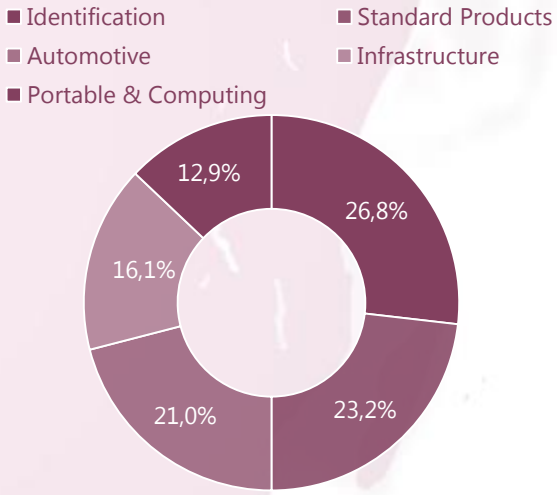
units: million euros; change in %



Operating margin is the ratio between operating income and net sales and measures profitability (the relationship between revenue and costs). An increase can reflect revenue growing faster than costs. Conversely, a decrease can reflect revenue falling further than costs.

Sales by segment

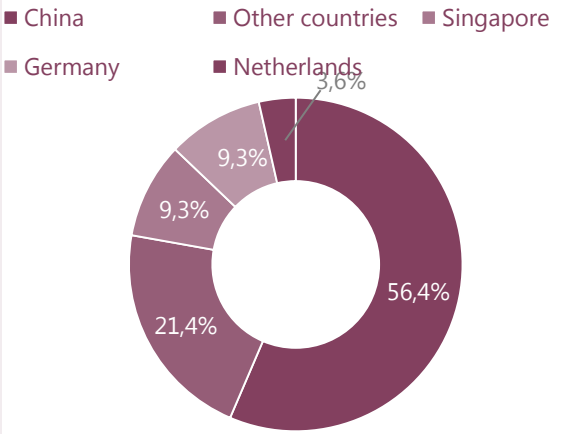
unit: % of revenue



Revenue breakdown by operating segment, expressed as a percentage.

Sales by region

unit: % of revenue



Revenue breakdown by regional market, expressed as a percentage.

Source: company information

Year	Consolidated net sales	Annual % change	Consolidated operating income	Consolidated operating margin	Net income	Net margin
2009	2.63	-	-0.70	-26.5%	-0.11	-4.3%
2010	3.29	25.1%	0.51	15.6%	0.22	6.8%
2011	3.14	-4.7%	0.27	8.5%	0.29	9.3%
2012	3.26	3.9%	0.31	9.5%	-0.09	-2.6%
2013	3.60	10.5%	0.49	13.5%	0.26	7.2%
2014	4.22	17.3%	0.78	18.6%	0.40	9.5%

units: billion euros; % change; operating income and net income as % of sales

Year	ROE	ROA	FCF	Capital ratio	R&D expense	R&D ratio
2009	-14.7%	-1.7%	-0.34	-7.6%	0.57	21.7%
2010	19.1%	4.2%	0.07	6.1%	0.42	12.9%
2011	28.7%	5.9%	-0.02	4.8%	0.47	15.1%
2012	-11.0%	-1.8%	0.36	5.6%	0.47	14.4%
2013	22.5%	5.4%	0.49	5.0%	0.48	13.3%
2014	67.3%	7.8%	0.81	6.9%	0.15	3.5%

units: billion euros; % change; operating income as % of sales

Segment		2014 sales	% of total sales	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
Standard Products		0.95	23.3%	0.86	24.5%	11.0%	0.87	-2.0%
High Performance Mixed Signal	Identification	1.10	26.8%	0.97	27.7%	13.3%	0.74	31.5%
	Automotive	0.86	20.9%	0.76	21.8%	12.3%	0.70	8.5%
	Infrastructure & Industrial	0.66	16.1%	0.55	15.6%	21.1%	0.47	15.0%
	Portable & Computing	0.53	13.0%	0.36	24.5%	45.9%	0.87	17.0%

units: billion euros; % change

Region	2014 sales	% of total sales	2013 sales	2013 % share	2013-2014 change	2012 sales	2012-2013 change
China	2.06	56.4%	1.53	50.4%	34.6%	1.27	20.5%
Other countries	0.78	21.4%	0.76	24.9%	2.9%	0.77	-1.8%
Singapore	0.34	9.3%	0.31	10.4%	7.4%	0.33	-3.4%
Germany	0.34	9.3%	0.32	10.7%	3.7%	0.33	-2.9%
Netherlands	0.13	3.6%	0.11	3.6%	16.4%	0.07	55.3%

units: billion euros; % change

Global

6. Statistical Appendix

World GDP, consumer spending and semiconductor industry revenues growth (2002-2015E) units: change in real spending and GDP in %			
Year	World GDP growth	World consumer spending growth	
2002	1.86%	2.25%	-6.0%
2003	2.70%	2.53%	17.7%
2004	3.92%	3.47%	29.3%
2005	3.47%	3.46%	7.1%
2006	3.80%	3.41%	9.2%
2007	3.65%	3.23%	3.8%
2008	1.11%	1.11%	-5.0%
2009	-2.38%	-0.52%	-10.0%
2010	4.11%	2.93%	33.0%
2011	2.66%	2.66%	2%
2012	2.17%	1.85%	-1.0%
2013	2.27%	2.68%	4.8%
2014	2.34%	2.16%	9.8%
2015F	2.85%	2.83%	-

Source: Xerfi Global estimations and forecasts with national statistics bodies, GSA and PWC

Rate of urbanisation in selected regions
unit: urban population over total population in %

Year	World	Asia	Africa
1950	29.4%	17.5%	14%
1970	36.6%	23.7%	24%
2011	52.1%	45.0%	40%
2030	59.9%	55.5%	48%

Source: Xerfi Global; primary data obtained from the US Energy Information Administration; *Average price between January and April 2015

Number of connected devices (2014 – 2020 forecast)
unit: millions

Year	Internet of Things	TV	Tablets	Smartphones	PCs
2014	5400	1000	1000	4100	3200
2020	30000	3300	5500	6000	5000

Source: Xerfi Global with IDC

Regional breakdown of volume of global consumer IP traffic (2014-2019)
unit: petabytes per month

Year	Asia	North America	Europe	Latin America	Middle East and Africa
2014	16,433	16,611	10,339	3,412	948
2015F	19,735	19,976	12,637	4,338	1,459
2016F	24,012	23,922	15,823	5,456	2,258
2017F	29,678	28,409	20,285	6,877	3,491
2018F	36,104	35,019	25,955	8,649	5,293
2019F	44,885	41,712	33,367	10,839	7,607

Source: Xerfi Global with IDC

Internet of Things' market size by segment (2014 – 2020 forecast)
unit: billion euros

Year	Industrial/Manufacturing	Construction/Infrastructure	Retail	Energy & utilities	Healthcare & life sciences	Automotive	Consumer electronics
2014	396.48	67.2	58.8	50.4	436.8	714	966
2020	747.6	747.6	747.6	747.6	1121.4	1495.2	1869

Source: Xerfi Global with IDC

Global airline industry: operating spending and fuel costs units: billion euros	
Year	Semiconductor sales
1987	26.73
1988	36.45
1989	39.69
1990	41.31
1991	44.55
1992	48.6
1993	62.37
1994	82.62
1995	116.64
1996	106.92
1997	110.97
1998	102.06
1999	120.69
2000	165.24
2001	112.59
2002	114.21
2003	134.46
2004	172.53
2005	183.87
2006	200.88
2007	207.36
2008	201.69
2009	183.06
2010	241.38
2011	243
2012	236.52
2013	247.86
2014	272.16

Source: Xerfi Global with WSTS

Major currencies' exchange rate against the euro (2009-2015*) unit: index (units of foreign currency for 1 euro), January 2009 = 100				
Year	CHF	GPB	JPY	USD
January 2009	100.0	100.0	100.0	100.0
June 2009	107.2	98.6	94.5	88.4
January 2010	104.0	101.1	92.8	91.9
June 2010	110.9	108.5	108.4	107.9
January 2011	108.4	116.9	99.1	108.5
June 2011	103.5	123.5	92.0	103.4
January 2012	110.3	123.3	102.6	120.5
June 2012	113.9	124.3	105.7	120.6
January 2013	110.3	121.5	99.6	101.2
June 2013	107.8	121.2	100.4	93.3
January 2014	111.1	121.3	97.3	84.6
June 2014	114.2	122.6	97.4	86.3
January 2015	119.7	136.5	113.9	87.1
April 2015	127.3	143.9	122.8	92.9

Source: Xerfi Global with INSEE data; *2015 data until April

Exabytes per month of mobile data traffic (2014-2019)
unit: exabytes per month

Year	Exabytes per month
2014	2.5
2015	4.2
2016	6.8
2017	10.7
2018	16.1
2019	24.3

Source: Xerfi Global with CISCO

Global data volume created (2014-2019)
unit: petabytes per month

Year	2010
2014	47,743
2015	58,145
2016	71,470
2017	88,740
2018	111,019
2019	138,410

Source: Xerfi Global with CISCO

Top 10 global semiconductor foundries (2014) unit: billion euros	
Foundry	**Billion euros**
TSMC	20.64
UMC	3.78
Globalfoundries	3.61
Samsung	1.97
SMIC	1.61
Other	6.81

Source: Xerfi Global with Gartner

Global semiconductor foundry market (2010-2014) unit: billion euros	
Year	**Billion euros**
2010	22.98
2011	24.39
2012	28.35
2013	33.08
2014	38.41

Source: Xerfi Global with Gartner

Breakdown of estimated potential savings of 300-mm fab
unit: % savings

Process	%
Ultrapure water	5%
Others	6%
Process-cooling water	8%
Bulk gas	10%
Air-conditioning	21%
Plant management	50%

Source: Xerfi Global with iSupply

Estimated potential savings in specific management processes
unit: % savings

Process	%
Thin film	31%
Diffusion	19%
Etch	15%
Implant	12%
Lithography	10%
Polish	8%
Clean tech	5%

Source: Xerfi Global with iSupply

Breakdown of CAGR forecasted by component (2014-2020)
unit: % compound annual growth rate

Component	%
MPUs and MCUs	4.40%
Logic	4.60%
Discrete semiconductors	4.80%
Analog Ics	5.00%
Memories	5.40%
Optical semiconductors	6.60%
Sensor and actuators	10.40%

Source: Xerfi Global with Gartner

Source: Xerfi Global with CEA
s in selected countries (2014)
unit: % of households in the country

Country	% households
Norway	92.00%
Sweden	91.00%
Denmark	90.00%
UK	85.00%
Finland	84.00%
France	76.00%
Israel	71.00%
USA	71.00%
Poland	67.00%
Czech Rep.	66.00%
Spain	64.00%
Russia	46.00%
China	23.00%

Source: Xerfi Global with IDC

Global retail consumer electronics (2007-2015) unit: billion euros	
Year	Billion euros
2007	617.61
2008	660.39
2009	599.72
2010	679.06
2011	749.84
2012	824.52
2013	863.41
2014	880.67
2015F	911.5

Source: Xerfi Global with iSupply

Mobile' share of semiconductor sales (1997 – 2018F) unit: % share		
Year	Wireless communications	Others*
1998	10%	90%
2014	24%	76%
2018F	32%	68%

Source: Xerfi Global with iSupply; *Data processing, wired communications, consumer electronics, automotive electronics, and industrial electronics

Mobile' share of semiconductor sales (1997 – 2018F) unit: % share	
Applications	%
Mobile	62%
Field-programmable gate array	11%
Graphics-processing unit	9%
Central processing unit (CPU)	18%

Leading-edge foundry volumes by application (2013)
wired communications, consumer electronics, automotive electronics, and industrial electronics

Estimated semiconductor content per car by car type (2013) unit: euros	
Car type	**Euros**
Luxury	1,000
Hybrid electric	600
Midrange in developed market	350
Compact in development market	100
Compact in emerging market	50

Source: Xerfi Global with iSupply

Type of semiconductor content in average car (2013) unit: %	
Type of semiconductor	**%**
Application processors	33%
Analog integrated circuits	33%
Discrete power devices	17%
Sensors	17%

Source: Xerfi Global with iSupply

Global semiconductor sales and forecast by component (2013-2019)
unit: billion euros

Country	Memories	MPUs and MCUs	Logic	Analog Ics	Discrete semiconductors	Optical semiconductors	Sensors and actuators
2013	54.94	48.38	70.52	32.8	14.76	22.96	6.56
2014	64.78	51.66	73.8	36.9	17.22	24.6	7.38
2015E	70.52	54.94	79.54	41	18.86	27.06	8.2
2016F	71.34	54.12	79.54	41.82	18.86	27.06	8.2
2017F	73.8	55.76	82	41.82	18.86	28.7	9.02
2018F	78.72	59.86	86.92	43.46	19.68	31.16	10.66
2019F	84.46	63.96	92.66	46.74	21.32	33.62	11.48

Source: Xerfi Global with Gartner

Estimated semiconductor content per car by car type (2013) unit: euros		
Region	2014	2020
China	56.50%	60.50%
Americas	11.70%	11.40%
Europe	9.60%	9%
Japan	6.40%	5.40%
Rest of the world	15.80%	13.70%

Source: Xerfi Global with Gartner

Bonding wire shipment share by type (2011 – 2015F)
unit: % share

Year	Gold wire	Palladium-coated copper	Copper	Silver
2011	77.00%	13.00%	9.00%	1.00%
2012	60.00%	24.00%	13.00%	4.00%
2013	50.00%	28.00%	16.00%	6.00%
2014	44.00%	31.00%	17.00%	8.00%
2015F	40.00%	34.00%	17.00%	9.00%

Source: Xerfi Global with SEMI data and forecast

Global retail consumer electronics (2007-2015) unit: million of square inches	
Year	Milloin of square inches
2000	5,552
2001	3,940
2002	4,681
2003	5,147
2004	6,263
2005	6,645
2006	7,994
2007	8,660
2008	8,137
2009	6,707
2010	9,370
2011	9,043
2012	9,031
2013	9,067
2014	10,097

Source: Xerfi Global with SEMI

Worldwide fab capacity* (2014) unit: % share	
Year	Wireless communications
Taiwan	21.00%
Japan	21.00%
South Korea	20.00%
Americas	15.00%
China	9.00%
Europe & Middle East	8.00%
South East Asia	6.00%

Source: Xerfi Global with Semi; *Excluding discretes

Global semiconductor equipment spending, 2008-2015E
unit: billion euros

Year	Billion euros
2008	22.96
2009	12.38
2010	31.06
2011	31.04
2012	33.86
2013	28.73
2014	29.95
2015E	35.64

Source: Xerfi Global with SEMI

Global equipment spending, by region , 2014-2015E
units: billion euros

Year	2014	2015E
RoW	2.17	2.44
Europe	2.65	3.92
Japan	4.14	4.41
China	4.66	5.14
North America	8.31	7.5
South Korea	6.41	8.01
Taiwan	9.63	12.34

Source: Xerfi Global with Semi

Global installed semiconductor capacity by wafer size, 2010, 2012, 2017
unit: % share in total capacity

Year	2010	2012	2017
300 mm	51%	56%	70%
200 mm	37%	32%	21%
< 200 mm	12%	13%	9%
450mm	-	-	0.1%

Source: Xerfi Global with SEMI and IC insights

Global wafer capacity in 200mm equivalents, 2001-12

unit: wafer additions in million, annual % change

Year	Million	% growth
2001	7.00	9%
2002	-1.50	-2%
2003	2.70	3%
2004	7.70	9%
2005	9.90	10%
2006	16.20	16%
2007	18.80	16%
2008	13.90	10%
2009	-8.10	-5%
2010	8.90	6%
2011	12.00	8%
2012	7.00	4%

Source: Xerfi Global with SEMI

Global volume fabs* in operation by wafer size (2004-18)

unit: wafer size in mm

Year	300mm	200mm	150mm	Less than 150mm
2004	19	193	233	303
2008	66	193	256	285
2014	101	185	231	237
2018	112	184	218	190

Source: Xerfi Global with Semi; *Excluding discretes

Largest exporters of ICs* and micro-assemblies, 2000 unit: billion euros	
Year	Billion euros
France	4.26
UK	6.14
Germany	6.65
China	8.59
South Korea	8.74
Philippines	9.06
Malaysia	10.16
Taiwan	10.48
Japan	17.14
Singapore	18.31
USA	31.45

Calculations: Xerfi Global, primary source: ITC calculations based on COMTRADE statistics; *ICs stands for Integrated Circuits

Largest exporters of ICs* and micro-assemblies, 2014 units: billion euros	
Year	2014
Philippines	9.14
Germany	10.41
Japan	19.19
Malaysia	23.34
USA	25.93
South Korea	38.77
China	46.05
Taiwan	54.29
Hong Kong, China	58.27
Singapore	62.97

Calculations: Xerfi Global, primary source: ITC calculations based on COMTRADE statistics; *ICs stands for Integrated Circuits

7. Sources

Intel	www.intel.com
Samsung	www.samsung.com
Qualcomm	www.qualcomm.com
Micron	www.micron.com
SK Hynix	www.skhynix.copm
Texas Instruments	www.texasinstruments.com
Toshiba	www.toshiba.com
Broadcom	www.broadcom.com
NXP	www.nxp.com
Freescale	www.freescale.com
Avago	www.avago.com

Financial Times	www.ft.com
International Trade Center	www.intracen.org
World Bank	www.worldbank.org
United Nations	www.un.org
INTRACEN	http://www.intracen.org/
World Trade Organization	www.wto.org
World Economic Forum	www.weforum.com
World Secmiconductor Trade Statistics	www/wsts.org
Gartner	www.gartner.com
Global Semiconductor Alliance	www.gsaglobal.org
Semiconductor Equipment and Materials International	www.semi.org
IDC	www.idc.com
CISCO	www.cisco.com
Smartdata Collective	www.smartdatacollective.com
Statista	www.statista.com
INSEE	www.insee.fr
USITC	www.usitc.com
iSupply	www.isupplyco.com
CEA	www-leti.cea.fr

8. Annexes

Intel	2014 fiscal year ended December 27, 2014. Currency: 1USD = 0.7476 EUR
Samsung	2014 fiscal year ended December 31, 2014. Currency: 1KRW = 0.000712 EUR
Qualcomm	2014 fiscal year ended September 28, 2014. Currency: 1USD = 0.7476 EUR
Micron	2014 fiscal year ended August 29, 2014. Currency: 1USD = 0.7476 EUR
SK Hynix	2014 fiscal year ended December 31, 2014. Currency: 1KRW = 0.000712 EUR
Texas Instruments	2014 fiscal year ended December 31, 2014. Currency: 1USD = 0.7476 EUR
Toshiba	2014 fiscal year ended March 31, 2014. Currency: 1JPY = 0.0071 EUR
Broadcom	2014 fiscal year ended December 31, 2014. Currency: 1USD = 1.2400 EUR
NXP	2014 fiscal year ended December 31, 2015. Currency: 1USD = 0.7476 EUR
Freescale	2014 fiscal year ended December 31, 2014. Currency: 1 USD= 0.7476 EUR
Avago	2014 fiscal year ended November 2, 2014. Currency: 1USD = 0.7476 EUR

CATEGORY	ENGLISH		FRENCH	
	ITEM	DEFINITION	ITEM	DEFINITION
Basic financial analysis	CAGR	Acronym for Compound Annual Growth Rate.	TCAM	Acronyme de Taux de Croissance Annuel Moyen, ou CAGR en anglais.
	Capex	Short for "Capital Expenditure"), an item of the cash-flow statement used as a proxy for investment in property, plant and equipment (PPE). Generally entails physical assets used to maintain or increase operation capacities.	CAPEX	Abréviation de "Capital Expenditure", un élément du tableau de trésorerie mesurant l'investissement dans les immobilisations corporelles. Il sert à évaluer l'effort consenti pour maintenir ou développer les capacités de production.
	Free cash flow	The cash that a company is able to generate after subtracting expenses needed to maintain its asset base.	Cash flow disponible	Le Free Cash Flow, ou Cash Flow disponible en français, correspond à la trésorerie générée par une entreprise après déduction des dotations aux immobilisaitons.
	Goodwill	Goodwill is the difference between the purchase of the fair value of assets and liabilities acquired by a company.	Goodwill	Aussi appelé écart d'acquisition ou survaleur, le goodwill est la différence entre le prix d'acquisition et la juste valeur d'éléments du passif et de l'actif acquis par l'entreprise.
	Gross profit	Gross profit is the result of the difference between total sales and the cost of making products or providing services. Payroll and interest costs as well as taxes are not taken into account.	Marge brute	La marge brute correspond à la différence entre le chiffre d'affaires et le coût de fabrication du produit ou de la fourniture de services. Les salaires, les intérêts, les taxes, etc. n'entrent pas dans le calcul de la marge brute.
	Impairment charge	Impairment charges occur when a company has found that the value of its goodwill has been overestimated and needs to be revised.	Perte de valeur	Une perte de valeur se produit lorsqu'une entreprise est amenée à revoir à la baisse la valeur de son goodwill.
	Liabilities	Liabilities encompass all obligations arising from a company's past operations and which will result in an outflow of resources in the future. Liabilities are divided into short term and long liabilities, and represent the debt a company owes to its creditors.	Passif	Le passif comprend toutes les obligations contractées par une entreprise dans l'exercice passé de ses activités et qui se matérialiseront par des décaissements à terme. Le passif peut être courant ou non-courant, et représente l'ensemble des créances d'une entreprise.
	Net debt	Net debt is calculated by substracting a company's cash from its total debt.	Endettement net	L'endettement net se calcule en déduisant le cash disponible d'une entreprise du montal total de ses dettes.
	Net profit/ net margin	Net profit refers to a company's total earnings. It is the result of the difference between net sales and all operating and non-operating expenses such as taxes, interests, depreciation and amortisation expenditures.	Résultat net	Le résultat net est le bénéfice net d'une entreprise. Il correspond à la différence entre le chiffre d'affaires et toutes les dépenses opérationnelles et non-opérationnelles comme les impôts, les intérêts, les charges de dépréciation et d'amortissement.
	Operating profit/operating margin	Operating profit refers to the earnings generated by the normal business operations of a company. Operating profit is the result of the difference between sales and total operating expenses. Operating margin is expressed in % and is computed by dividing operating profit by net sales.	Résultat opérationnel/marge opérationnelle	Le résultat opérationnel désigne le bénéfice dégagé par une entreprise grâce à l'exercice de ses activités traditionnelles. Le résultat opérationnel est obtenu en déduisant les dépenses d'exploitation du chiffre d'affaires. La marge opérationnelle, exprimée en %, est obtenue en divisant le résultat opérationnel par le chiffre d'affaires.

CATEGORY	ENGLISH		FRENCH	
	ITEM	DEFINITION	ITEM	DEFINITION
Basic financial analysis	R&D expenditure	Expenses associated with the research and development process of creating new products or services; it is often used as a proxy for innovation.	Dépenses de R&D	Dépenses associées au processus de recherche et de développement de nouveaux produits et de nouveaux services. C'est un indicateur de la capacité d'innovation d'une entreprise
	Return on assets	Return on assets is calculated by dividing a company's net income by its total assets. It measures the ability of the company to generate profits from its assets.	Retour sur actif	Le retour sur actif est calculé en divisant le résultat net d'une entreprise par le total de son actif. Il mesure la capacité d'une entreprise à créer de la richesse à partir de ce dont elle dipose.
	Return on equity	Return on equity is calculed by dividing a company's net income by its shareholder equity. It measures the ability of a company to generate profits from its investment funds.	Retour sur fonds propres	Le retour sur fonds propre est calculé en divisant le résultat net d'une entreprise par le total de ses fonds propres. Il mesure la capacité d'une entreprise à créer de la richesse à partir des capitaux apportés par ses actionnaires.
	Sales	Earnings made from the sales of goods and services, excluding VAT and other taxes. Reflects, total volumes sold, selling prices, exchange rates and product mixes.	Chiffre d'affaires	Le chiffre d'affaires correspond au total des ventes hors taxes de biens et de services. Il est le reflet des volumes écoulés, mais aussi du prix de vente moyen, des taux de change et des variations du mix produit.
	Working capital	Working capital is the difference between currents assets and current liabilities. When positive, working capitals means a company would able to pay its short term debt.	Fonds de roulement	Le fonds de roulement est la différence avec l'actif courant et le passif courant. Un fonds de roulement positif signale que l'entreprise pourrait honorer ses créances à court terme avec ses actifs à court terme.
Macroeconomic concepts	Assets	Assets encompass all the economic resources owned by a company. They are commonly divided into short term (cash, trade receivables, etc.) and long term assets	Actif	L'actif regroupe toutes les ressources économiques détenues par une entreprise. I
	BRICs	Acronym referring to Brazil, Russia, India and China, a group of countries with similar characteristics in terms of economic development. These countries report dynamic growth rates across all major industries, and also enjoy a very large population.	BRICs	Acronyme désignant le Brésil, la Russie, l'Inde et la Chine, un groupe de pays présentant des similarités en termes de développement économique. Ces pays affichent des taux de croissance très dynamiques dans tous les principaux marchés,
	Business climate	Business climate refers to the general economic sentiment. It is measured by various indicators based on questionnaires sent to survey participants from firms representative of the economy.	Climat des affaires	Le climat des affaires désigne le sentiment écononomique dominant. Il est mesuré par des indicateurs établis sur la base de questionnaires envoyés à des professionnels représentatifs des grands secteurs d'activité.
	Consumer price index	An indicator which measures changes in prices of consumers goods and services bought by households.	Indice des prix à la consommation	Un indicateur qui mesure les variations de prix pour les biens et les services achetés par les ménages.
	Consumer sentiment	Consumer sentiment refers to the degree of optimism of households as regards the state of the economy. Consumer sentiment is often used as a proxy for future spending.	Moral des ménages	Le moral des ménages désigne la perception de la situation économique qu'ont les ménages. Cet indicateur est souvent utilisé pour évaluer les futures dépenses des ménages.
	Consumer spending	Spending by households on durable and nondurable products or services. Often used as a proxy for short-term demand in an economy.	Dépenses des ménages	Dépenses des ménages en biens et services durables et non-durables. Cet indicateur est souvent utilisé pour évaluer la demande à court terme.