

# KPMG Global Semiconductor Outlook

## Muted optimism and higher uncertainty

December 2013



**KPMG**

*cutting through complexity*



## Introduction

We are pleased to present the results of KPMG's latest Global Semiconductor survey. The ninth edition of our annual study reflects the expectations of senior leaders from the world's leading semiconductor companies about profitability, revenue trends, application markets, technology evolution, geographic growth, and other factors influencing the global semiconductor industry over the next three years.

**G**ur bellwether Semiconductor Industry Business Confidence Index, and responses to most survey questions, highlight muted optimism and a greater degree of uncertainty than we saw in last year's results.

Expectations for a robust recovery highlighted in our 2012 survey have been largely replaced with a moderately optimistic outlook that indicates continued improved profitability trends, but lower levels of anticipated revenue growth (reflecting both the industry's broader application and geographic markets, and a slowing growth rate of mobile devices).

Mobility and consumer electronics remain the leading applications driving semiconductor industry revenue growth, but expectations increased for favorable results from automotive, energy consumption, medical, and other promising applications including wireless sensors enabling the "Internet of things."

Industry leaders shared consistent views about the sector's profitability, revenue, and employment growth. Although

optimism remains relatively intact and the results are significantly above those experienced in the fourth quarter of 2008, we saw reductions at the upper ends of growth predictions and higher percentages of respondents calling for modest improvements.

In this year's survey, we'd also like to acknowledge the contributions of Ron Steger, who is retiring from KPMG after 37 years. Ron has served most recently as leader of KPMG's Global Semiconductor practice, and was instrumental in developing the practice and this survey.

Starting in 2014, our semiconductor practice will be led by Packy Kelly, who has been serving as national colead of KPMG's Venture Capital practice.

We thank Ron for his many accomplishments and contributions, and wish him the best on his retirement.

We hope you find this report's insights useful, and welcome any feedback you would like to offer.



**Gary Matuszak**

Global Chair

KPMG's Technology, Media & Telecommunications Practice



**Ronald Steger**

Partner in Charge

KPMG's Global Semiconductor Practice – 2013



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## Executive Summary

As the global semiconductor industry's application markets broaden, its reduced dependence on computing, wireless handsets, and consumer electronics is leading to more diverse revenue sources and lower likelihood of feast or famine cycles.

**KPMG's Semiconductor Industry Business Confidence Index** expresses, in a single figure, responses to a standard set of questions about executives' outlook on the following:

- Total company semiconductor revenue growth for the next fiscal year
- Global workforce growth for the next 12 months
- Change in R&D spending for the next fiscal year over the current year
- Capital spending for the next fiscal year

An index value above 50 can be interpreted as an optimistic outlook on the business environment for the next 12 months; conversely, an index value below 50 reflects a pessimistic view.

Since it was introduced in 2006, the index has been a remarkably reliable barometer of future financial and operational trends in the semiconductor industry.



In the short term, the industry's expectations for a sustained recovery have been replaced with uncertainty about revenue growth, and to a lesser extent profitability, in 2014—but optimism continues about its longer-term prospects.

The KPMG Semiconductor Business Confidence Index (described below) remained flat at 57, reflecting a positive view of the sector's revenue and profitability growth, but also suggesting the momentum executives forecast a year ago has become less robust. (In the 2012 survey, the index increased from 46 to 57, indicating expectations of strong industry growth.)

In the current survey, respondents were less bullish about prospects for revenue growth in 2014, with the percentage of industry leaders expecting revenue growth rates of more than 10 percent falling by a third.

While expectations for revenue growth are muted, the industry continues to make research and development investments, with 52 percent of respondents forecasting increases of more than 5 percent in 2014.

Looking at application markets expected to drive semiconductor revenue over the next year, industry leaders expect mobile technologies and consumer products to remain the most important segments.

Highlighting an optimistic indicator about the industry's growing diversity, executives also cited end markets beyond mobile and consumer, including automotive and medical devices, as sources of favorable revenue growth. Within the medical technology area, imaging and scanning was cited most often as the greatest revenue opportunity three years from today.

Asked about the industry's expectations about employment growth, executives forecast moderate workforce expansion in 2014. China and the United States remain the top markets for headcount growth, with noticeable increases for India and Korea. Although expansion expectations are stable, there is a significant decline in the executives predicting headcount increases greater than 10 percent.

Reflecting the industry's reduced dependence on the United States and Europe for customer and revenue growth, China increased in importance as an end market for semiconductor revenue growth in this year's survey, and we saw increased expectations for improved results in other Asian regions including Taiwan, India, Japan, and Korea.

Semiconductor executives also see the industry's technology roadmap accelerating, although a shift was identified indicating that 450mm production will have a greater impact on the sector than production at a sub-20 nanometer technology node. Executives believe the industry's transition to 450mm wafers will occur by 2018, with the percentage calling for the transition in either 2017 or 2018 doubling to 45 percent over last year's results.

**“ As computing declines in relative importance for the semiconductor industry, the companies that had the foresight to identify and invest in emerging application markets such as automotive and medical will be well-positioned to enjoy competitive advantages. ”**

— Ronald Steger, Partner in Charge,  
KPMG's Global Semiconductor Practice – 2013

## Semiconductor Industry Business Confidence Index: 2009-2013



An index value of 50 indicates a neutral perception about the industry and its prospects. Index values above/below 50 indicate a positive/negative perception.

## Survey Highlights

Page	Content
6	<b>Profitability expectations rising</b> Reflecting the moderately optimistic tone in other financial categories, this year's results show a moderate but noticeable increase (78 percent, compared with 71 percent) in the percentage of industry executives expecting the industry's profitability to increase over the next year, with more than a third (34 percent) of respondents calling for gains between 6 percent and 10 percent.
9	<b>Revenue growth moderately muted</b> Although expectations of robust growth are notably more muted in this year's results, executives remain modestly optimistic about their companies' semiconductor revenue growth over the next year. Overall expectations about revenue growth increased slightly (77 percent this year, compared with 75 percent next year), but there was a noticeable decline (16 percent, compared with 24 percent) in the percentage of respondents calling for growth in excess of 10 percent.
10	<b>Application markets expanding</b> Reflecting increased adoption of semiconductor content in a broader array of application markets, respondents forecast a wider range of revenue drivers for their companies. In addition to traditional growth drivers including mobile technologies and consumer electronics, industry leaders expect promising growth from automotive, energy, and medical applications.
14	<b>Broader geographic growth</b> China and the United States remain the most promising growth markets in this year's results, with the survey also highlighting more optimistic attitudes about growth in Taiwan, Europe, India, Japan, and Korea. The higher mean scores for Asian markets, and a reduced gap between Asia and the U.S. and China, reflect the region's growing importance as an end market as well as a production center.
15	<b>Capital spending increases</b> While the overall percentage of respondents calling for a capital spending increase rose (79 percent this year, compared with 73 percent in last year's results), there was a notable shift in respondents calling for increases between 1 percent and 10 percent. The percentage of respondents forecasting capital spending increases of more than 10 percent fell by half.
16	<b>Workforce expansion</b> Forecasts of headcount growth were slightly less optimistic in this year's survey. The number of executives planning to expand their global workforce remained about the same, but expectations about the scope of hiring increases were notably more modest. China and the United States continue to be seen as the top markets for hiring over the next 12 months, with employment growth also expected in India and Korea.

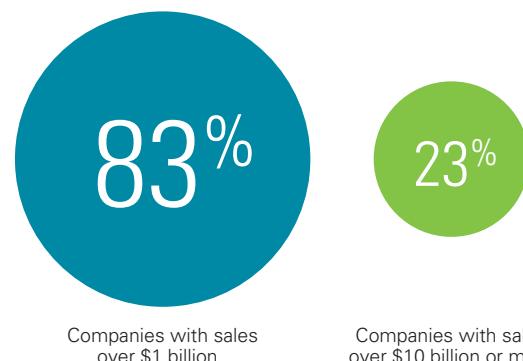
## Demographics

A Web-based survey conducted by Forbes Insights on behalf of KPMG in September 2013 received responses from 193 senior executives. Nearly three-quarters (71 percent) of the respondents were C-level leaders or directors from the top global semiconductor companies. Eighty-three percent of the respondents represent companies with sales of over \$1 billion, and 23 percent reported sales of \$10 billion or more, confirming that the survey's results clearly reflect the sentiment of the industry's leading companies.

The majority (68 percent) represents integrated device manufacturers (IDMs) and fabless companies, 22 percent came from foundries, and 10 percent are associated with companies in other categories.

On a geographic basis, 39 percent of the respondents represented companies headquartered in the United States. Chinese companies, at 20 percent, represented the second-highest location of respondents.

## Respondents Sales Figures



**17 R&D spending consistent** Overall expectations for R&D are slightly improved from last year's results, with the percentage of semiconductor executives calling for an increase between 6 percent and 10 percent rising from 29 percent to 34 percent.

**18 Technology roadmap** Nearly half of the executives say production of 450mm wafers will have a more significant impact on the industry than production at a sub-20 nanometer technology node, and the majority of company leaders believe the transition to 450mm wafers will take place between 2015 and 2018.

**19 Mobile payments promising** Mobile payments continue to be viewed as a promising application market, with 62 percent of respondents predicting mobile will offer the predominant method of payment for most transactions within two years (compared to 55 percent last year).

**20 Mergers and acquisitions** Semiconductor leaders expect a higher rate of change in global industry M&A activity over the next fiscal year, with 73 percent calling for an increase in the number of transactions compared to 66 percent in 2012.

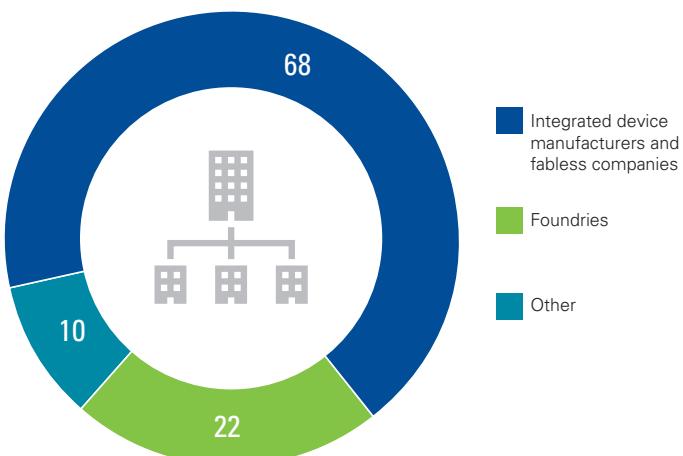
**“** Mid-to-short-term, we see mobility as the catalyst that continues to drive our industry due to its pervasiveness and end to end impact to the network. Beyond that, we see so many exciting opportunities, from wearables and immersive gaming with low-cost, low-power sensors to the eventual development and implementation of data racks on a chip made possible through silicon photonics and nanotech manufacturing.

As president of the GSA, this industry never stops amazing me!

And thanks to KPMG for their continued thought leadership role in the semiconductor industry in this the 9th year of their annual global survey. **”**

— Jodi Shelton, President,  
Global Semiconductor Alliance (GSA)

**Companies Represented in Survey**



**Geographic Location of Respondents**



### Profitability expectations rising

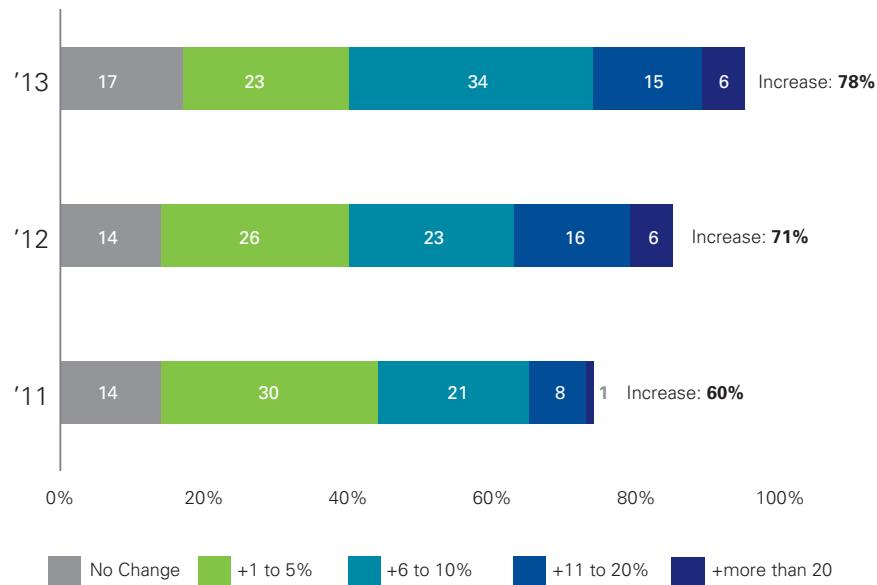
Many continue to say the annual profitability of the industry is expected to increase over the next year. The biggest increase is in the 6–10 percent range.

#### What is your estimate for the change in the annual profitability of the global semiconductor industry over the next year?

Reflecting the moderately optimistic tone in other financial categories, this year's results show a moderate increase (78 percent, compared with 71 percent last year) in the percentage of industry executives expecting the industry's profitability to rise over the next year.

More than a third (34 percent) of respondents forecast profitability to increase between 6 percent and 10 percent.

Expectations for a decline in industry profitability fell from 16 percent last year to 6 percent this year. This trend reflects a secular shift for the industry away from its traditional dependence on computing end markets (and an associated revenue cycle tied to IT product trends and refresh cycles). With a broader product and industry base, the semiconductor industry's revenue trends are more likely to be aligned with broader economic conditions than purely technical advances.

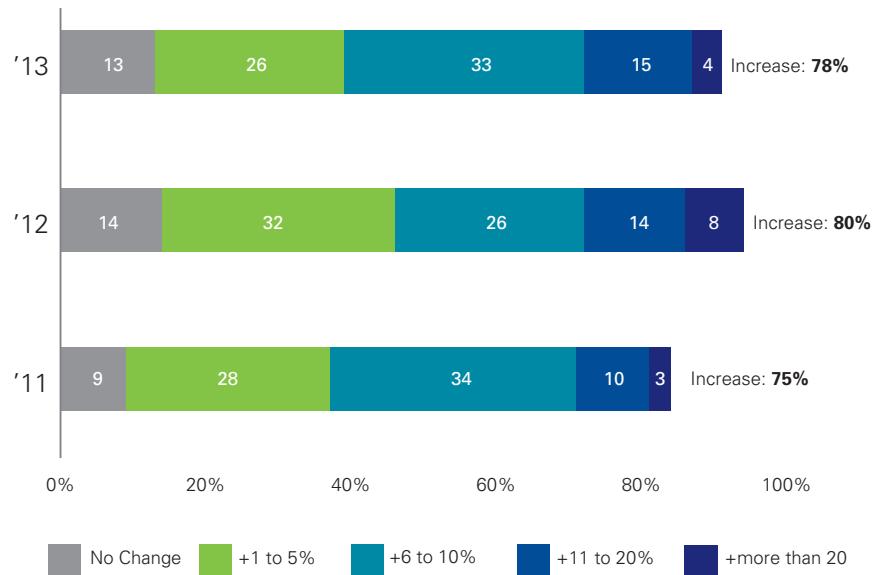


## Similarly, many continue to expect the annual profitability of the global semiconductor industry to increase over the next three years

### What is your estimate for the change in the annual profitability of the global semiconductor industry three years from today?

Looking at a three-year horizon, 78 percent of respondents called for industry profitability to increase, compared with 80 percent in last year's survey.

Executives' optimism about three-year profitability has moderated, with a notable increase coming in growth expectations in the 6-10 percent range, and a 50 percent reduction of those forecasting increases of more than 20 percent.





## Revenue growth moderately muted

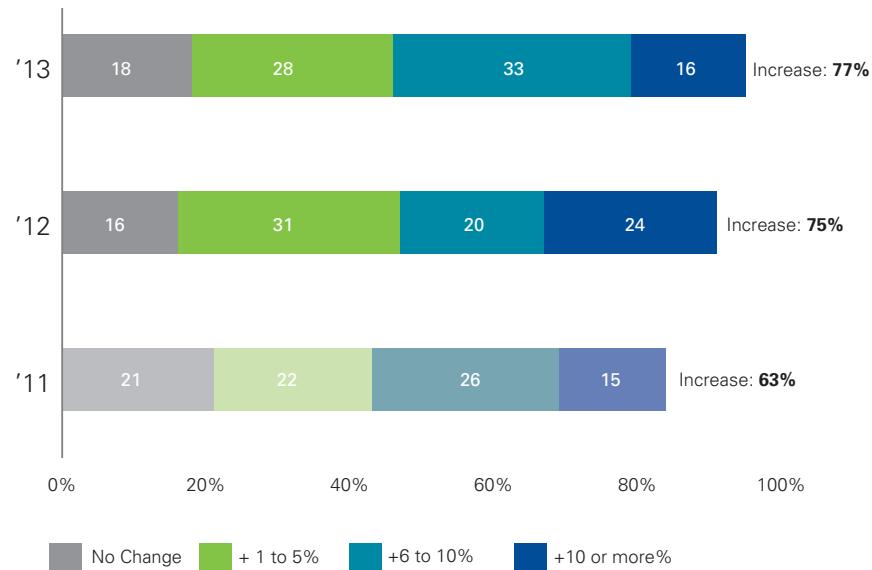
Many continue to expect their company's semiconductor revenue growth to increase over the next year, although at more modest levels

### What is your outlook for your company's semiconductor revenue growth in the next fiscal year?

Although expectations of robust growth are notably more muted in this year's results, executives remain modestly optimistic about their companies' semiconductor revenue prospects over the next year.

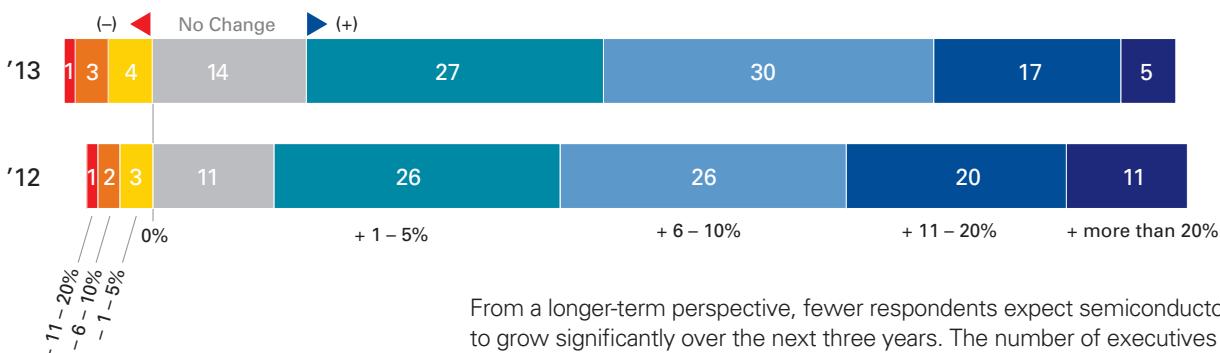
Overall expectations about revenue growth increased slightly (77 percent this year, compared with 75 percent last year), but there was a noticeable decline in the percentage of respondents calling for growth in excess of 10 percent (16 percent, compared with 24 percent last year).

This decline appears to be linked to several factors, including the slowing growth rates of wireless handsets in many markets increasing the difficulty of meaningful sales expansion. Mobility demand remains favorable, but the larger customer base is dampening the attractive growth trends semiconductor companies have enjoyed from mobile products in recent years.



### Most continue to say semiconductor revenue growth will increase over the next three years

### What is your outlook for your company's semiconductor revenue growth three years from today?



From a longer-term perspective, fewer respondents expect semiconductor revenue to grow significantly over the next three years. The number of executives calling for results to remain flat increased, as did the percentage of respondents forecasting growth increases between 1 percent and 10 percent. Expectations for growth of more than 10 percent declined by almost 40 percent.

Additionally, the number of executives calling for revenue to decline rose from 6 percent to 8 percent.

## Applications markets expanding

Wireless handsets/mobile technologies and consumer application markets most important semiconductor revenue drivers over the next year and the next three years

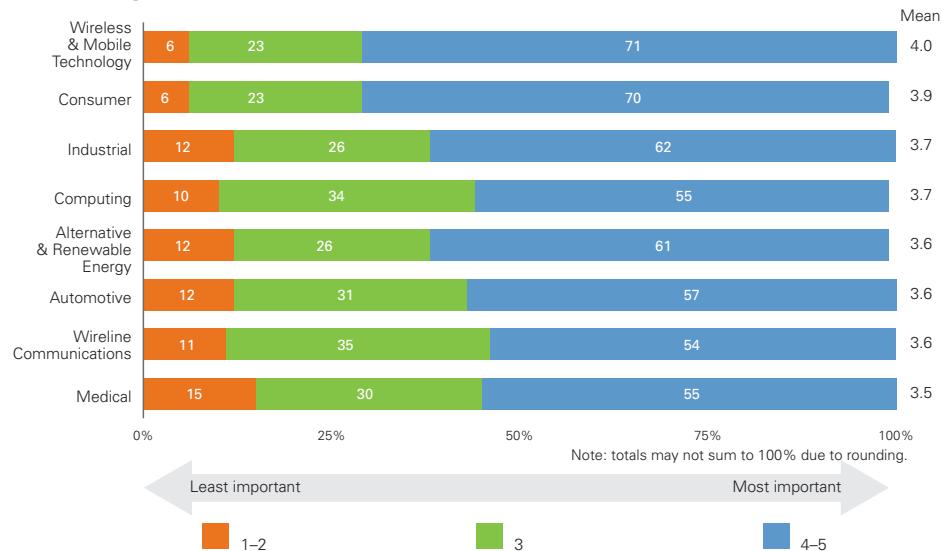
Reflecting increased adoption of semiconductor content in a broader array of application markets, respondents forecast a wider range of revenue drivers for their companies.

Mobile technologies and consumer electronics are expected to remain leading application markets over the next year, but this year's results demonstrate significant growth potential from a broader range of categories and a slight decrease in the industry's traditional reliance on computing markets to drive revenue.

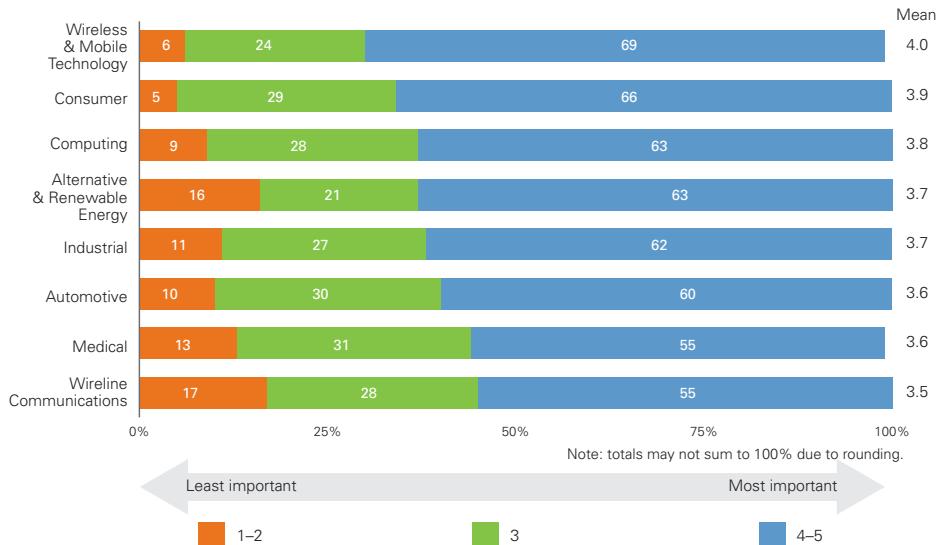
For instance, with growth in “connected car” applications increasing semiconductor content in automobiles by an average 8 to 10 percent annually, executives citing the automotive category as “very important” to generating revenue growth increased significantly this year to 57 percent (compared with 46 percent in 2012 and 32 percent in 2011).

Similarly, expectations over the next year for renewable energy and battery technologies increased notably, reflecting growing demand for solar power and for power management technologies to increase the efficiency of mobile devices and to enable broader use of wireless sensors and receivers as the “Internet of things” concept gains traction.

**How important are each of the following application markets in driving your company's semiconductor revenue stream over the next fiscal year?**



## How important are each of the following application markets in driving your company's semiconductor revenue stream **three years from today**?



Medical technologies, cited by 55 percent of respondents, are expected to provide attractive growth opportunities in coming years as the acceptance of wearable (and ingestible) health measurement, diagnostic, and management devices increases. With communications markets reaching maturity, the percentage of respondents continuing to identify mobility as a leading market driver was, compared with recent surveys, lower than expected.

Looking at a three-year horizon, the industry expects a more equal distribution of revenue contributions from its leading application markets. Mobility and consumer are expected to remain important, with other leading applications also making significant contributions.



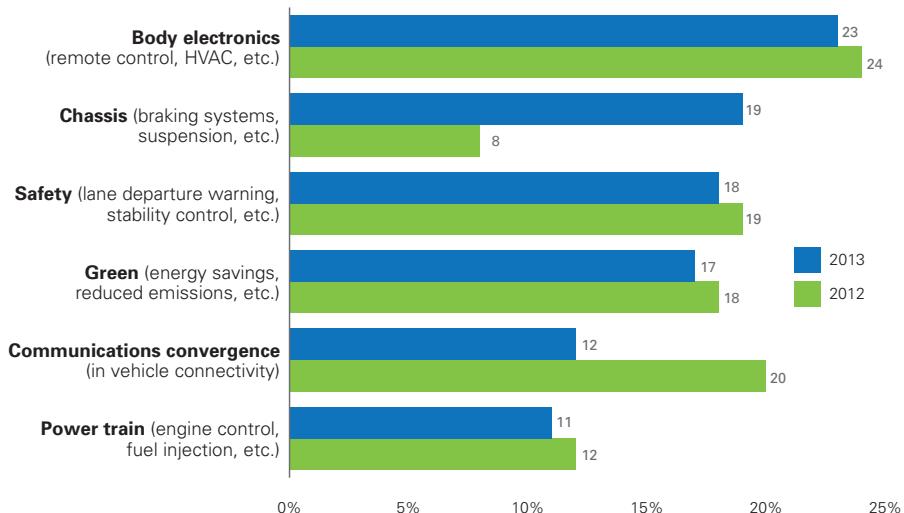
### Applications markets expanding *continued*

Similar to 2012, of all auto areas, about one-quarter say body electronics will provide the most semiconductor revenue three years from today

Growth in semiconductor content in cars, and higher automotive sales trends in the United States and Europe, are increasing optimism among semiconductor executives.

Over the next three years, respondents expect body electronics, chassis, safety and energy-related technologies to provide the most semiconductor-related revenue in automotive applications.

#### Which of the following areas, related to the automobile, will provide the most semiconductor revenue three years from today?

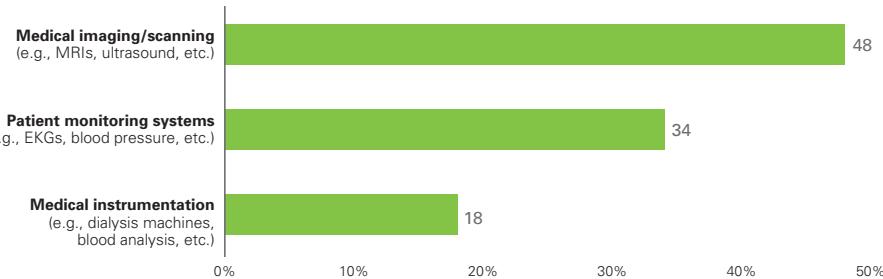


**In the medical technology area, about half say medical imaging/scanning will create the greatest revenue opportunity three years from now.**



Nearly half of the respondents believe medical imaging and scanning will provide the greatest revenue opportunity in three years, followed by patient monitoring systems.

**Which of the following medical technology areas do you think will create the greatest revenue opportunity in the next three years?**



**“** The survey results point to the steady increase in the adoption of medical and wearable devices in a relatively short time horizon, and the tremendous potential opportunities for revenue growth these applications offer to semiconductor companies as new applications gain momentum. **”**

— Gary Matuszak, Global Chair, KPMG's Technology, Media & Telecommunications Practice

### Broader geographic growth

Majority continue to say China and the United States will be the most important geographies for semiconductor revenue growth three years from now

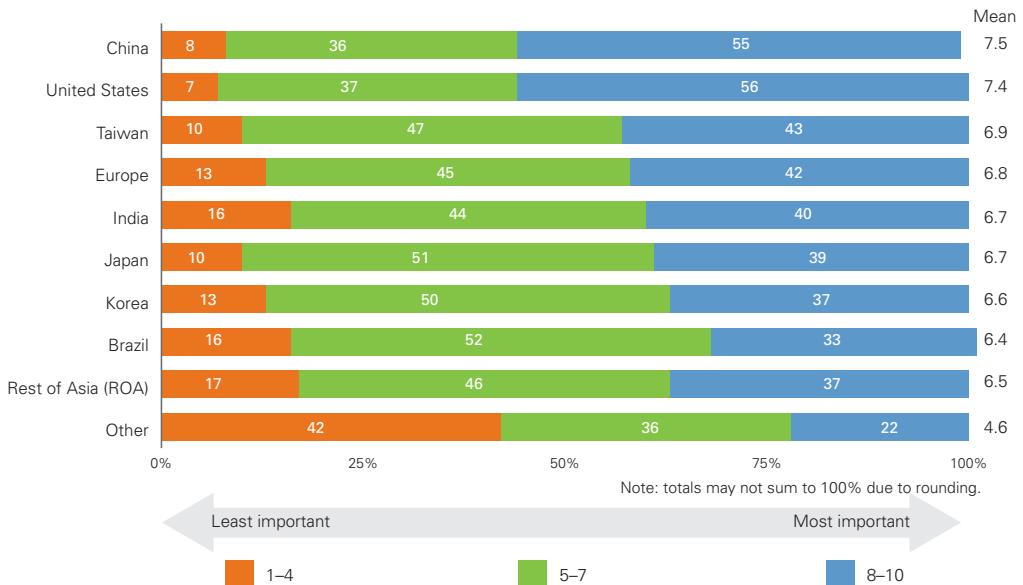
**Please rate the importance of the following geographic areas in terms of semiconductor revenue growth for your company three years from today.**

Looking at promising geographic regions over the next three years, semiconductor executives indicated expectations for revenue growth in a broader range of geographic markets.

China and United States remain the most promising growth markets in this year's results, with the two nations virtually tied as the most important market in the opinion of respondents.

According to published reports, the Chinese government is planning efforts to promote the domestic semiconductor industry, including R&D grants, tax and visa relief, and anti-monopoly enforcement measures. The proposal would provide additional evidence of China's growing importance as a market for products with semiconductor content, as well as a further expansion of semiconductors into a broader array of products.

This year's survey also highlighted more optimistic attitudes about growth in Taiwan, Europe, India, Japan and Korea, reflecting expectations of broad revenue growth beyond the industry's historical dependence on the U.S. and China as end markets.





## Capital spending increases

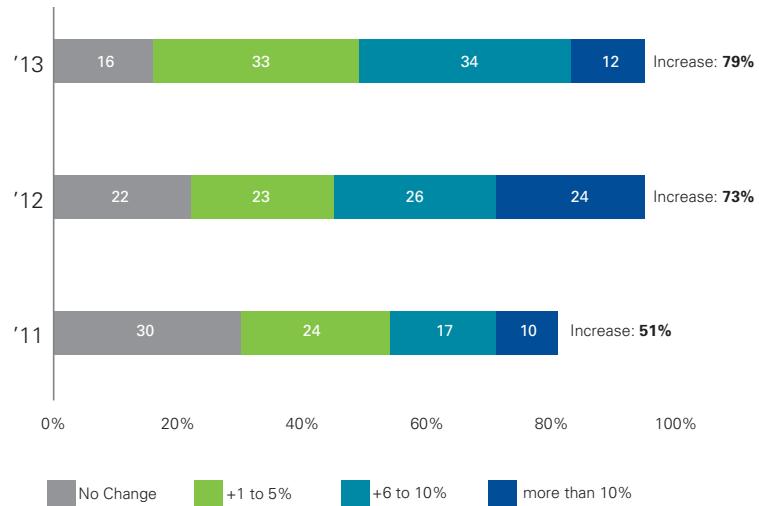
Most continue to say their company's semiconductor-related capital spending will increase for the next fiscal year, but at a lower rate

### What is your outlook for semiconductor-related capital spending by your company for the next fiscal year compared with your company's current year spending?

Similar to the semiconductor industry's expectations about revenue growth, executives provided a more muted forecast for the sector's capital spending plans over the next year.

While the overall percentage of respondents calling for a capital spending increase rose (79 percent this year, compared with 73 percent in last year's results), there was a notable decline in the percentage of respondents forecasting capital spending increases of more than 10 percent (12 percent, compared with 24 percent).

The percentage of executives expecting capital spending cuts was nearly the same as last year's survey.



### Workforce expansion

Significant majority continue to expect their company's global semiconductor workforce to expand during the next fiscal year

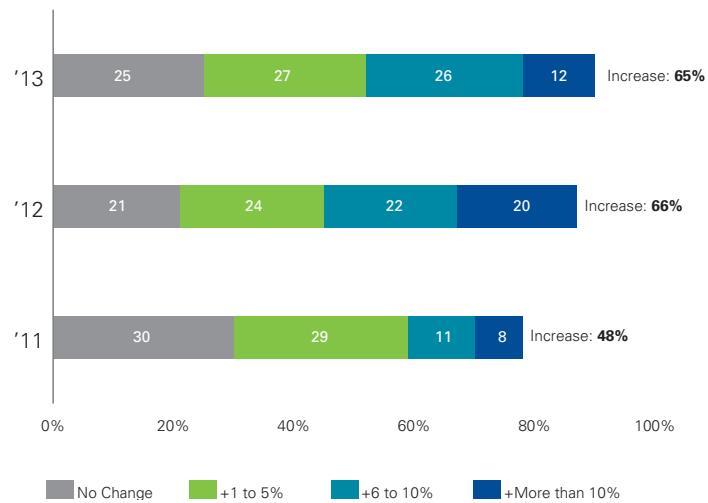
#### During the next fiscal year, do you expect your company's global semiconductor workforce to expand or contract?

Reflecting respondents' expectations for revenue growth and broader geographic diversity, forecasts of headcount growth were slightly less optimistic in this year's survey.

The number of executives planning to expand their global workforce remained about the same this year, but expectations about the scope of hiring increases are notably more modest.

Executives calling for either no headcount expansion or increases of less than 10 percent increased, while those expecting headcount growth of more than 10 percent declined appreciably from 20 percent to 12 percent.

The number of respondents expecting headcount decreases fell slightly this year to 11 percent, compared with 13 percent in last year's results.

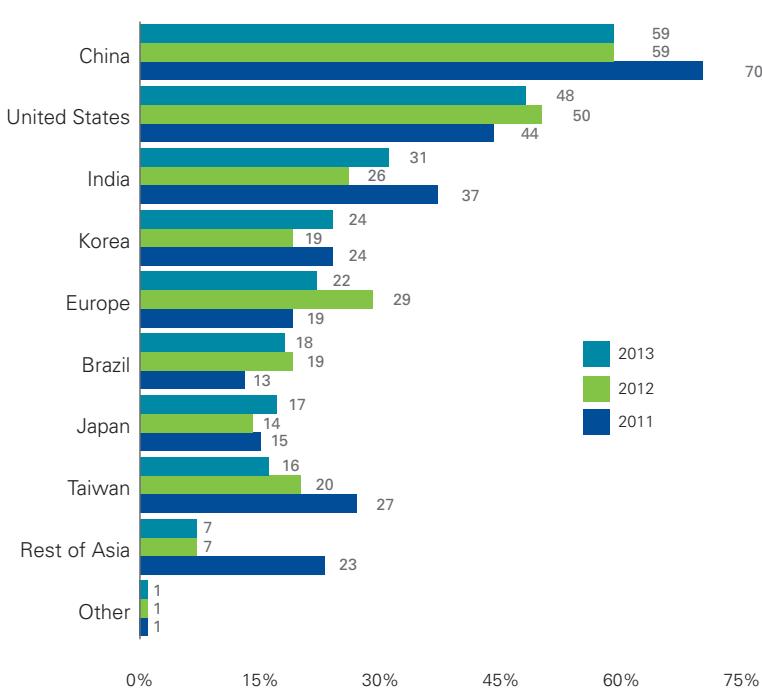


China and the United States continue to be seen as top markets for headcount growth over the next 12 months.

#### Please indicate the top three markets for headcount growth in the semiconductor industry during the next 12 months.

As with geographic markets for revenue growth, China and the United States continue to be seen as the top markets for hiring over the next 12 months. Reflecting the semiconductor industry's broader geographic diversity, India and Korea increased their rankings as locations for headcount growth, compared with previous surveys.

The shift away from headcount growth in Europe likely reflects the growing importance of India and Korea, as well as challenges in recruiting qualified talent in European countries. A November 2013 report on U.K. hiring trends prepared by the Recruitment and Employment Confederation (REC) and KPMG, for instance, cited engineering as the most difficult sector for finding employees.



## R&D spending consistent

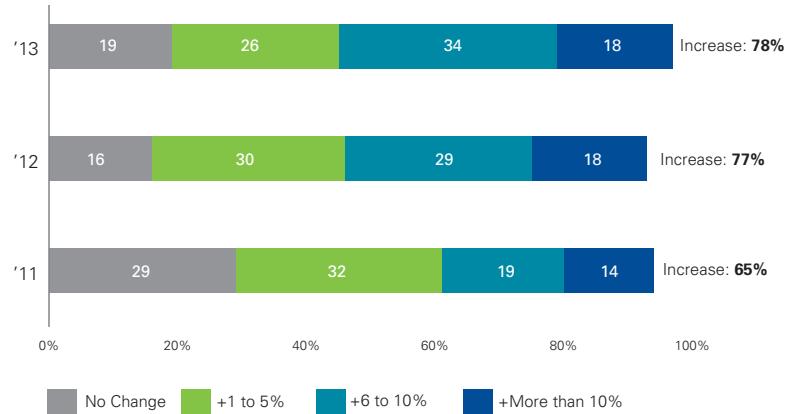
Similar to 2012, many expect semiconductor-related R&D spending to increase in the next fiscal year over the current year

### What is your expectation for the change in semiconductor R&D spending by your company for the next fiscal year over the current year?

Recognizing the importance of research and development to their business models, semiconductor executives expect R&D investment levels to increase over the next fiscal year.

Overall expectations for R&D spending remain consistent with last year's results, which in turn marked a notable increase from the 2011 survey. Executives calling for an increase between 6 percent and 10 percent rose this year, and investment levels of more than 10 percent remained consistent between the 2013 and 2012 surveys.

Five percent of the respondents expect their companies' R&D spending to decrease, compared with 6 percent last year.



**“**As application and geographic markets evolve and expand, semiconductor companies understand that increasing levels of R&D are the key to the expansion of market share and the success of their business models, and that increasing levels of R&D investments are almost mandatory. **”**

— Packy Kelly, Partner in Charge,  
KPMG's Global Semiconductor Practice – 2014

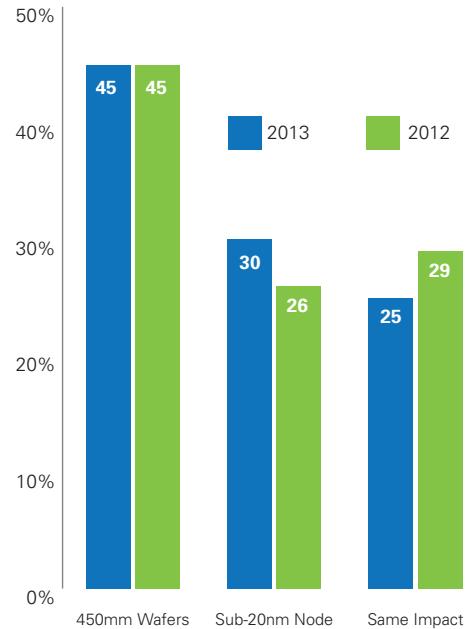
### Technology Roadmap

As in 2012, nearly half say 450mm wafer production will have a greater impact on the industry than production at a sub-20nm technology node

#### Thinking about the future of production technology, which will have a greater impact on the semiconductor industry: production at a sub-20nm technology node or the production of 450mm wafers?

Asked about the industry's technology roadmap, nearly half of the executives (45 percent) say production of 450mm wafers will have a more significant impact on the industry than production at a sub-20 nanometer technology node.

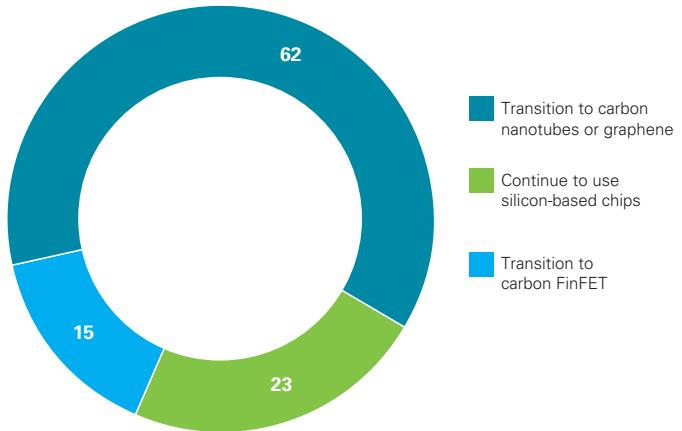
The majority of executives (63 percent) continue to believe the transition to 450mm wafers will take place between 2015 and 2018, with 45 percent expecting the transition in 2017 or 2018.



To achieve semiconductor production at sub-14nm, significant majority say semiconductor industry will transition to carbon nanotubes or graphene

**In order to achieve semiconductor production at the sub-14nm node the semiconductor industry will most likely...**

To achieve semiconductor production at a sub-14nm node, nearly two-thirds of the executives (62 percent) believe the semiconductor industry will transition to carbon nanotubes or graphene as replacements for silicon-based chips as it is becoming apparent that the ability of silicon to scale to 10 nanometers and below is diminishing.

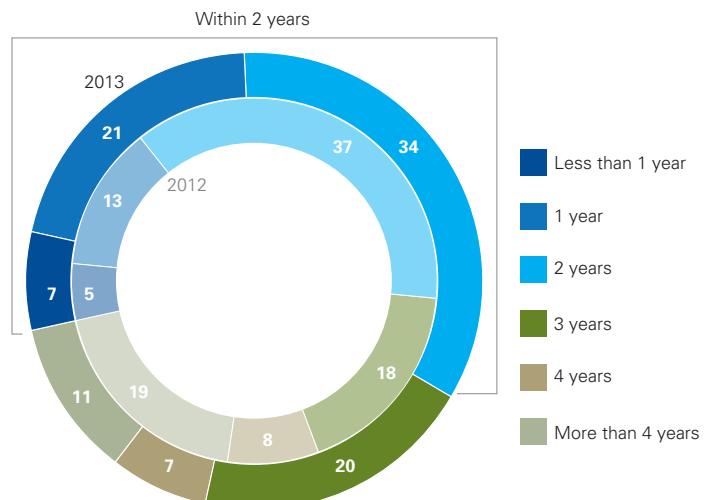


## Mobile payments promising

Up somewhat from 2012, significant majority say mobile payments will become the predominant method of payment within two years

**When will mobile payments become the predominant method of payment and accepted by consumers?**

Another application market generating enthusiasm among the semiconductor leaders is mobile payments, which 62 percent of respondents expect to become the predominant method of payment for most transactions within two years (compared with 55 percent in last year's results).



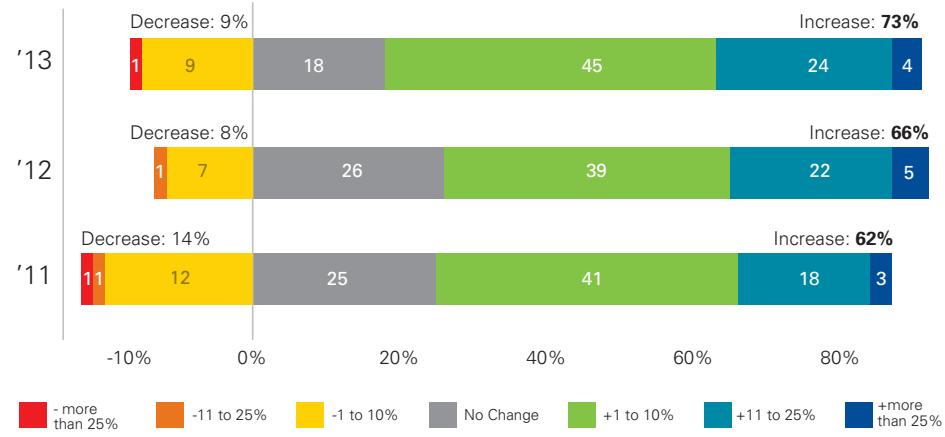
### Mergers and acquisitions

Up from 2012, many say the expected rate of change in global M&A deals will increase

#### What is your prediction for the expected rate of change in the number of global M&A deals in the next fiscal year, based on the previous three-year average?

Semiconductor leaders expect a higher rate of change in global industry M&A activity over the next fiscal year, with 73 percent calling for an increase in the number of transactions (compared with 66 percent last year) and is reflective of the increasing transaction trend seen in the second half of 2013 led by the proposed merger of Tokyo Electron and Applied Materials.

The increasing costs of developing advanced production capabilities and application market shifts are likely to be among the factors prompting higher M&A activity within the global semiconductor industry.



## About the authors

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**Gary Matuszak** is the global chair of KPMG's Technology, Media & Telecommunications industries, and is the chair of KPMG's Global Technology Innovation Center. Mr. Matuszak works with global technology companies ranging from the FORTUNE 500 to pre-IPO start-ups, and represents KPMG in a number of organizations affecting the industry.

Mr. Matuszak has influenced the development of key industry positions on several issues that impact the technology sector. He is a frequent speaker on technology industry trends, including technology innovation, China's emerging role, cloud provider and user perspectives, and industry outlooks. He has devoted virtually his entire career to serving the technology industry.

**Ronald Steger** began his career with KPMG in 1976, and was admitted into the partnership in 1986. Mr. Steger is a U.S. SEC reviewing partner, one of the firm's senior-most technical positions. Mr. Steger has extensive experience serving clients in the technology industry. He currently serves as the leader of KPMG's Global Semiconductor practice, and is the former national industry director for Electronics.

Mr. Steger presents to various trade associations and client conferences related to the global semiconductor industry, and is a frequent speaker and panelist with KPMG's Audit Committee Institute. He has served in KPMG's offices in New York, Munich, Silicon Valley, Austin, and Orange County.

**Packy Kelly** is an Audit partner based in KPMG's Silicon Valley office and previously served as the national colead for the Venture Capital practice before his recent appointment of global practice leader for semiconductors. He has more than 22 years of experience providing auditing and accounting services. Packy's professional experience includes serving major technology companies and working on several IPOs. Packy serves on the national industry leadership team and is frequently a spokesperson for the firm on trends impacting venture capital investment.

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## About KPMG

KPMG is a global network of professional firms providing Audit, Tax and Advisory services. We operate in 156 countries and have 152,000 people working in member firms around the world. The independent member firms of the KPMG network are affiliated with KPMG International Cooperative ("KPMG International"), a Swiss entity. Each KPMG firm is a legally distinct and separate entity and describes itself as such.

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