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*2017 Global  
Innovation 1000*

&

Will Stronger Borders  
Weaken Innovation?

## *Introduction*

*Will Stronger Borders Weaken Innovation?*

*Innovation 1000 update*

***For the 13<sup>th</sup> year, Strategy& studied innovation trends and spending at the world's 1000 largest publicly listed corporate R&D spenders***



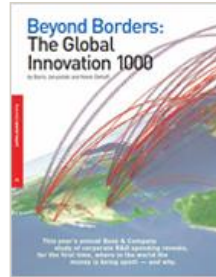
**2005:**  
**Money isn't everything**



**2006:**  
**Smart spenders**



**2007:**  
**The customer connection**



**2008:**  
**Beyond borders**



**2009:**  
**Profits down, spending steady**



**2010:**  
**How top innovators keep winning**



**2011:**  
**Why culture is key**



**2012:**  
**Making ideas work**



**2013:**  
**Navigating the digital future**



**2014:**  
**Proven paths to innovation success**



**2015:**  
**Innovation's new world order**



**2016:**  
**Software as a catalyst**



**2017:**  
**Will Stronger Borders Weaken Innovation?**

## *The study has become a recognized contributor in better understanding what drives success in R&D and innovation*

- The Global Innovation 1000 study has received significant media and academic attention:
  - Called “*the most comprehensive assessment of the relationship between R&D investment and corporate performance*” by the **The Economist** in 2009
  - Given “*2006 Special Achievement Award for Advancing Innovation*” by **Innovate Forum**
  - Awarded Best of Visions award from the **PDMA** in 2009
  - In 2011 and 2014, awarded Silver & Gold Medals, respectively, for original research by the **American Society of Business Press Editors** (“*the Azbee*”)
  - Cited in more than 240 publications spanning 34 countries on 6 continents



*Introduction*

***Will Stronger Borders Weaken Innovation?***

*Innovation 1000 update*

## ***Executive Summary – Will Stronger Borders Weaken Innovation?***

- Companies are concerned about the effects of economic nationalism and some are already seeing the effects on their businesses
- The **US, China, and the UK** are viewed as **having the greatest movement to economic nationalism** and are the same countries **whose R&D programs are most at risk**. Canada, Germany, and France will most likely gain from broad economic nationalism in R&D
  - **US's talent flow is most at risk** for disruption if policy in granting student and work visas becomes restrictive. Immigrants in the US hold a large share of jobs in the high-tech, science and engineering sectors as well as making up a large share of enrollment in engineering programs
  - **UK's talent flow** is also at risk in the same way the US's is. Weaker R&D programs in the UK could also have a ripple effect across the region
  - **China's corporate R&D** spending had experienced double-digit growth rates for many years, but in 2017 the country saw a 3.3% decline in corporate R&D spending for the first time. 81% of China's R&D spend in 2015 was performed by companies headquartered in other countries. The combination of these trends for China makes the country **vulnerable to potential disruptions of R&D investment coming from abroad**
- A little over **one half of companies expect a moderate to significant impact to their R&D** and innovation efforts and **almost half of the companies in North America and the rest of the world plan to make changes to their R&D programs** over the next two years
- **High performers are more likely to anticipate changes**, and they are also **more likely to take action**. **Middling and under performers were the most doubtful that economic nationalism would require changes** in their R&D efforts. Interestingly, under performers were most likely to take action that could be harmful to their overall R&D efforts
- Economic nationalism would result in the **replacement of today's integrated and interdependent network with more self-sufficient, fully-functioning R&D nodes**. Companies will need to look for ways to manage the higher costs they will incur with this model

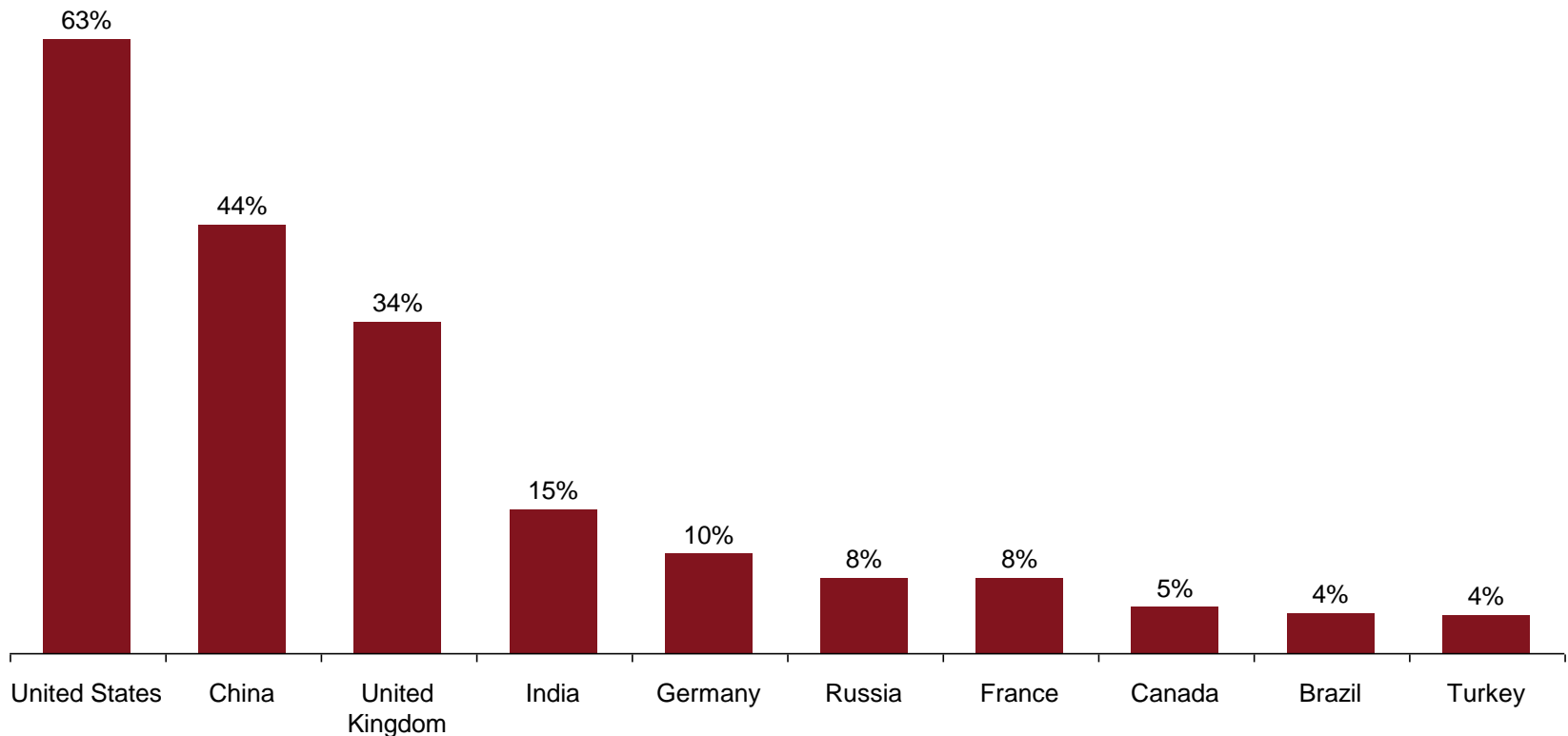
## ***Executive Summary – Update on Top 1000 companies***

- In 2017 total **R&D spending** by the Global Innovation 1000 increased **3.2% to \$701.6B, exceeding \$700B for the first time**
- **R&D intensity spiked to its all-time study high of 4.5%**, with revenue for the 1000 companies falling by 2.5% - driven by the 14.5% decline in Chemicals & Energy revenue
- **Software and internet industry continues to experience high year-over-year growth**, up 16.1% this year while Healthcare, the second fastest growth industry for R&D spending grew 5.9%
- **Healthcare companies are on track to become the biggest R&D spenders by 2018**
- **Computing and electronics, Healthcare, and Auto** contributed **61.3% of R&D spending in 2017**, almost the same as in 2016
- Regionally, **Japanese firms grew R&D spend for the first time in 5 years**, US continued its upward growth and China, who enjoyed years of double-digit R&D growth, saw a 3.3% decline in R&D spending for the first time in the study\*
- **Amazon moved from number 3 in 2016 to become the largest R&D spender in 2017**. It is one of nine high-tech companies on the top 20 list, and one of 13 companies headquartered in the United States
- For the first time, **Alphabet surpassed Apple as the Most Innovative company and Alibaba joins the ranking** for the first time
- Companies selected by survey respondents as **the most innovative companies continue to outperform** the top 20 R&D spenders

\*Use of local currency would result in different YoY changes

***Survey participants believe the US, China & the UK are most likely to adopt economic nationalism-related policies that will affect R&D***

**Countries with greatest expectation of movement towards economic nationalism-related policies that would affect R&D activities**



Q21. Which three countries do you expect to have the greatest movement toward more economic nationalism-related policies that would affect corporate R&D activities?

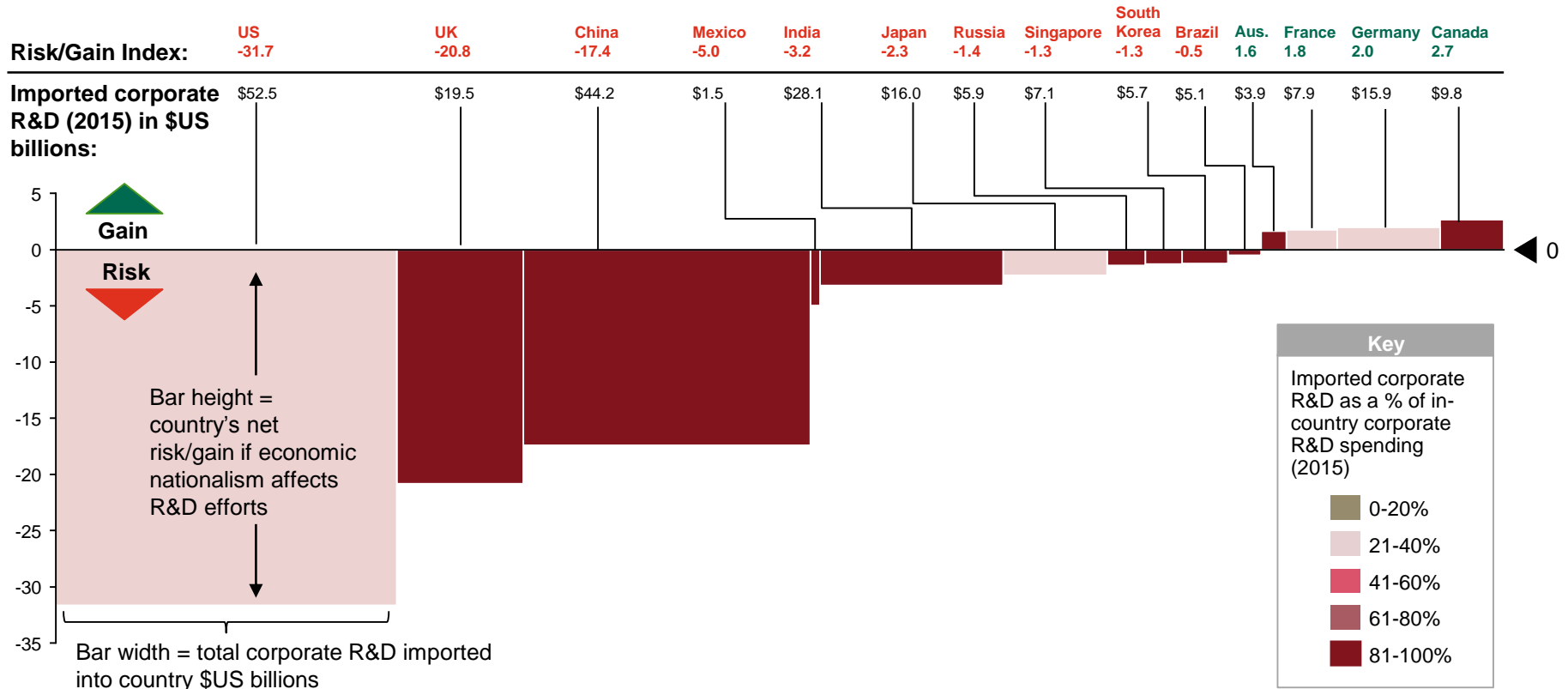
N=562, N= total number of survey respondents

\*China includes Hong Kong for all China data points



# US, UK & China are most at risk, while Canada, Germany & France will most likely gain from broad economic nationalism

## The Net Risk Index



Q22. Which three countries do you believe will be the most put at economic risk if more economic nationalism-related policies affecting R&D efforts are widely adopted?  
 Q22a Which three countries do you believe will be the most helped economically if more economic nationalism-related policies affecting R&D efforts are widely adopted?  
 N=562

Source: 2017 and 2015 Global Innovation 1000 study

# *Economic nationalism risk disrupting talent flows to US & UK, while China is vulnerable to interruption of external R&D fund flows*

## Top 3 countries at risk ▼



### United States

- The US's talent flow is potentially at risk if there is a move towards restrictive policy in granting student and work visas
- Immigrants in the US hold a large share of jobs in high-tech, science, and engineering sectors
- Enrollment in US engineering programs are predominantly made up of immigrants (81% electrical engineering and 79% computer science)\*



### United Kingdom

- The UK's talent flow is also vulnerable if there are barriers to recruiting engineers from other EU countries
- Britain is already experiencing an existing shortage of skilled workers
- Weaker R&D programs in the UK could have a ripple effect across the region



### China

- Corporate R&D spending in China experienced double digit growth rates for many years, but in 2017 the country saw a 3.3% decline in R&D spending for the first time in the study
- 80% of R&D spending in China in 2015 was done by companies headquartered in other countries (mainly from the US)
- These trends for China makes the country vulnerable to potential disruptions of R&D investment coming from abroad

## Top 3 countries to gain ▲



### Canada

- Canada is looking to attract international innovation talent to its university system as the US tightens visa and immigration programs
- Is an attractive alternative for multinationals like Microsoft who opened a new R&D center in downtown Vancouver in 2016 with 750 R&D positions



### Germany

- Germany has repeatedly reiterated its pro-globalization policy stance
- The country was ranked as the second country that is most likely to gain from a move towards economic nationalism by survey respondents



### France

- Newly elected president Emmanuel Macron ran on a platform stressing the importance of innovation for the French economy
- France was ranked as the third country mostly likely to gain from broad economic nationalism by survey respondents

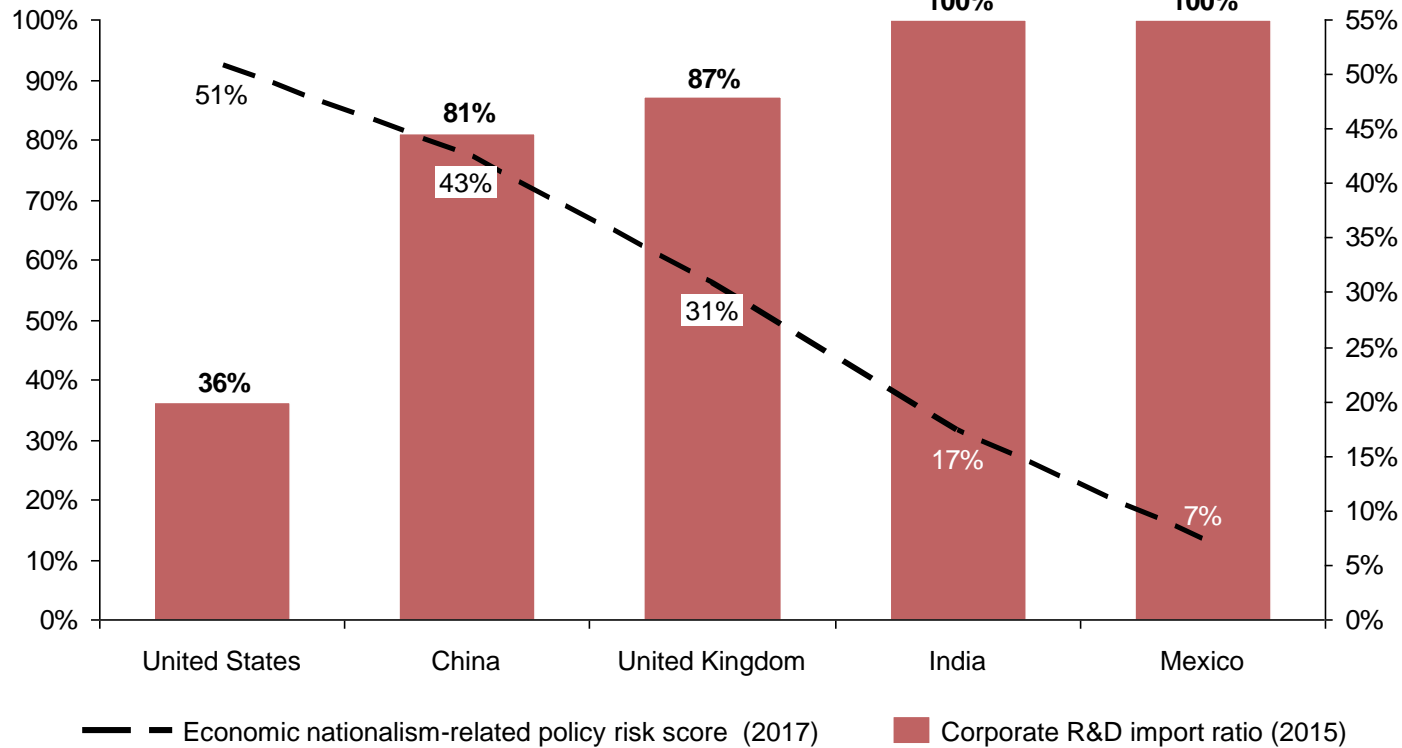
Source: 2017 Global Innovation 1000 study, National Foundation for American Policy

# *Executives may not be considering R&D flows in assessing who is most at risk from economic nationalism-related policies*

## Economic nationalism-related policy risk score vs. corporate R&D import ratio

Corporate R&D imported as a % of all corporate R&D performed in country (2015)

Which three countries do you believe will be the most put at economic risk if more economic nationalism-related policies affecting R&D efforts are widely adopted? (2017) <sup>1)</sup>

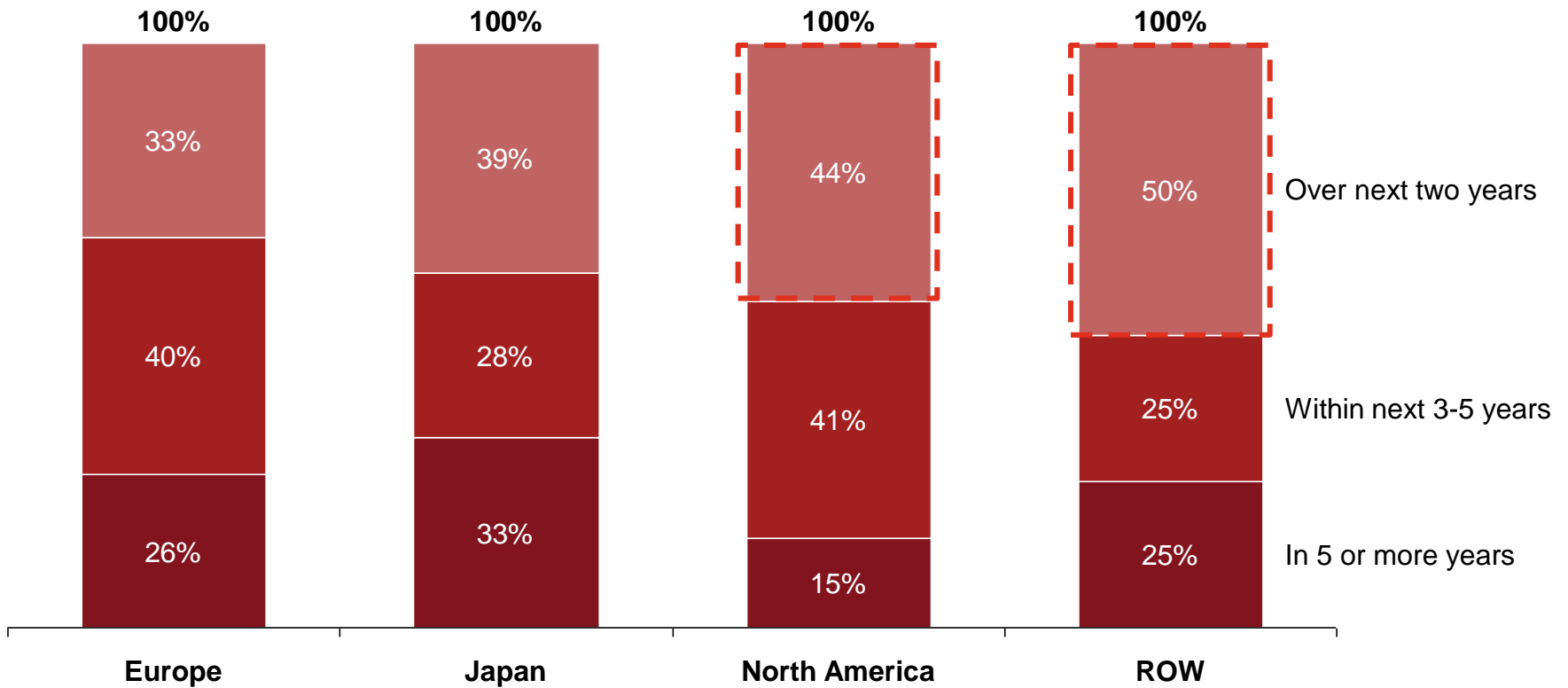


Source: 2015 and 2017 Global Innovation 1000 Studies

<sup>1)</sup> N=562

***North American companies are most likely to take action in response to economic nationalism in the next two years***

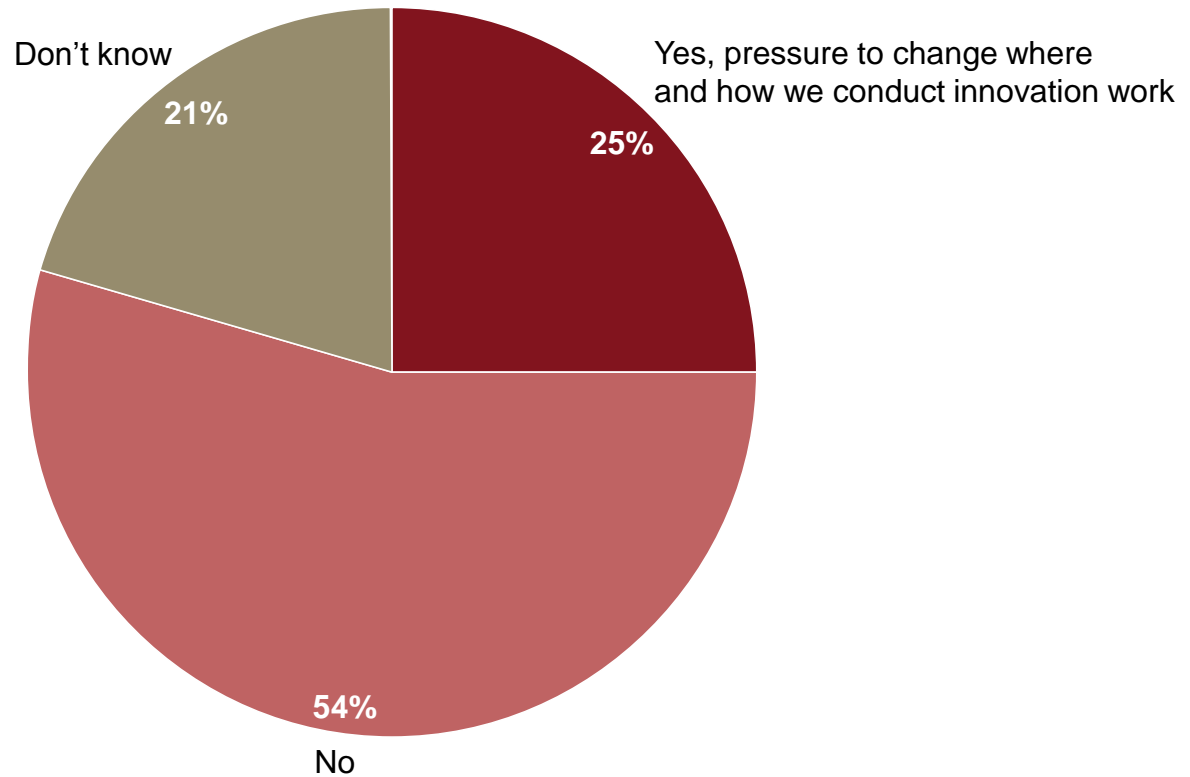
**When companies are likely to change its R&D efforts if there is a move towards economic nationalism**



Q18. What changes would your company likely consider making to its R&D/innovation efforts if there is a move toward greater economic nationalism? And when?  
 N=379 ( China region and Respondents with "No opinion" are not included)  
 Note: Due to rounding, not all columns will add up to 100%

***One-fourth of companies have already experienced some pressure to change how or where they conduct innovation***

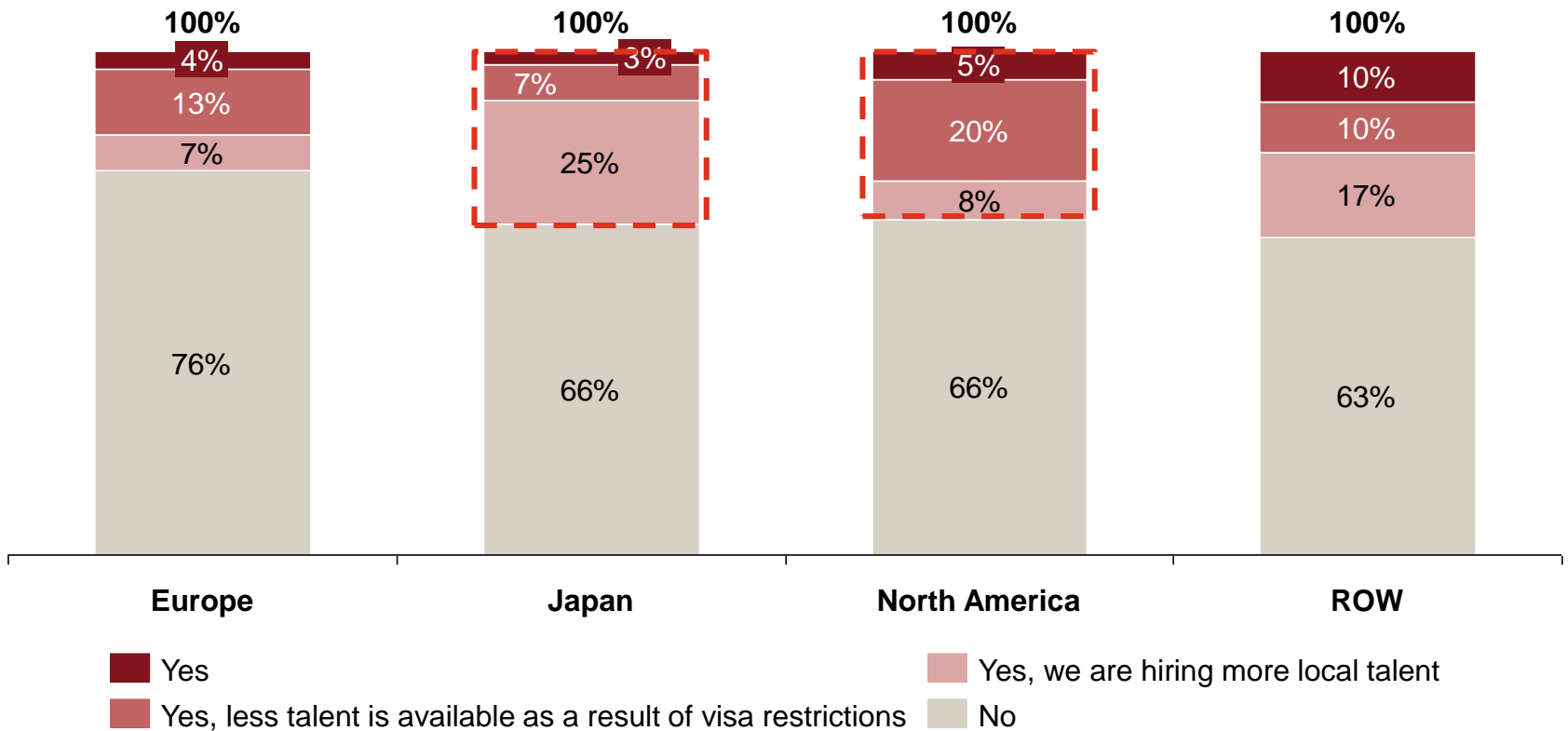
**Pressure to change approach to innovation/R&D**



Q17. Has your company experienced pressure to change any element of its approach to innovation/R&D work as a result of economic nationalism in Your company's headquarters: and Any other country?  
N=562

***Japanese and North American companies are already experiencing hiring challenges as a result of economic nationalism...***

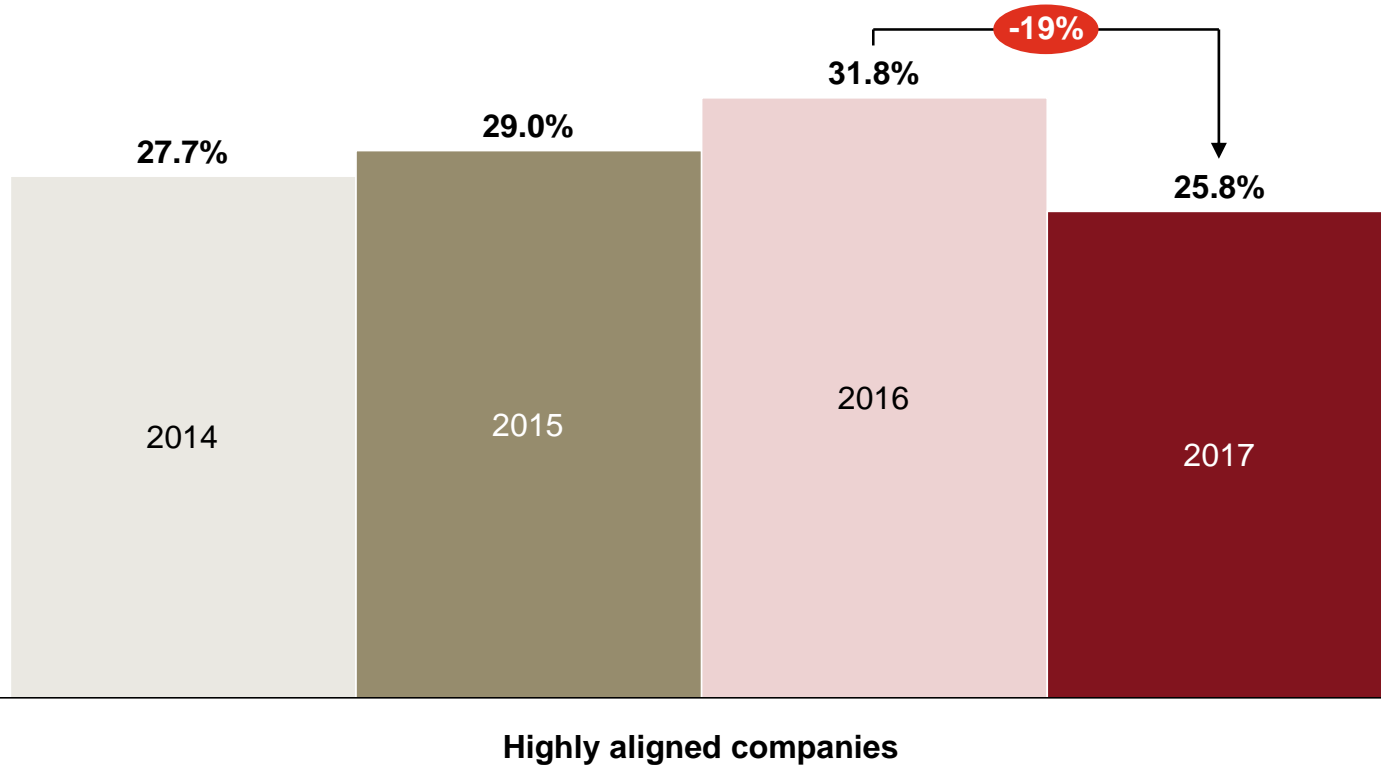
**Effects of economic nationalism on visas/work initiatives on R&D employees (by region)**



Q20. As a consequence of economic nationalism, has your company experienced any new or greater visa restrictions or work limitations on R&D employees?  
 N=557 ( China region is not considered)

***Uncertainty in economic policy may be the cause of the unprecedented drop in alignment of business & innovation strategies***

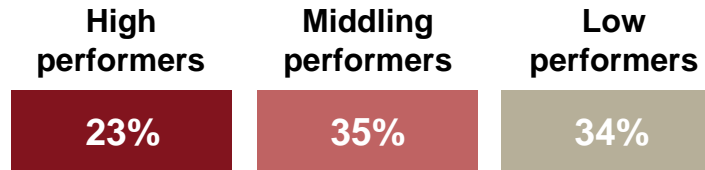
**Alignment of innovation strategy with business strategy (2014-2017)**



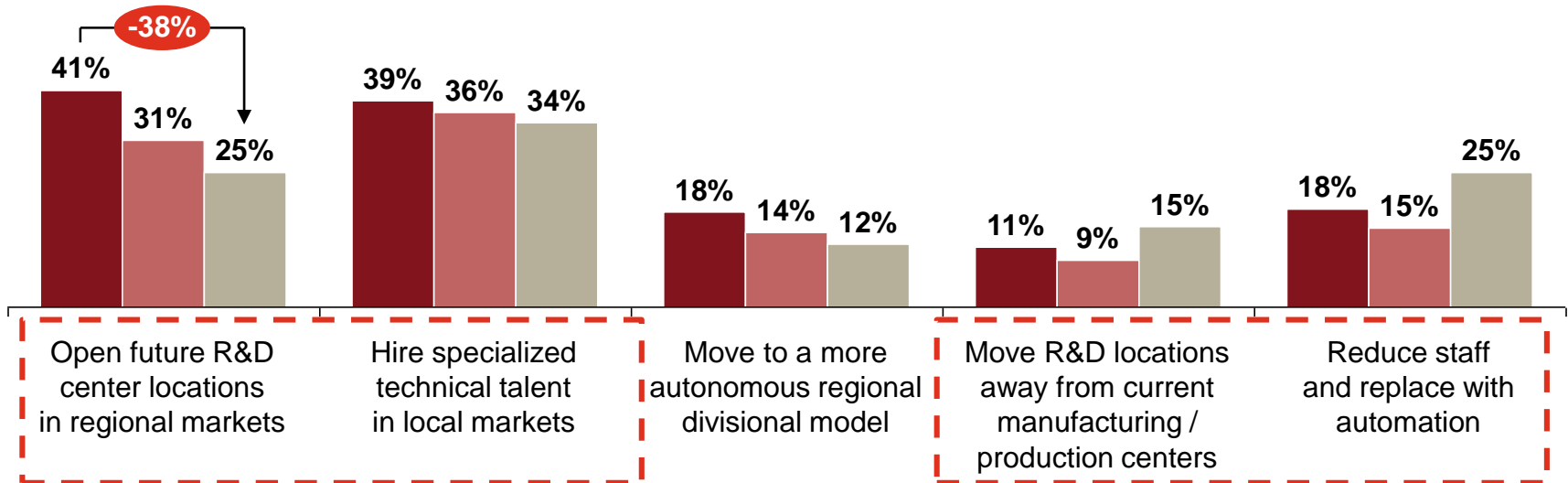
Q10. How closely aligned is your company's innovation strategy (or approach to innovation) with its overall business strategy?  
N=562

# High performer companies are more likely to anticipate changes, and they are also more likely to take action in response

## Likelihood of making a change in R&D/Innovation efforts if there is a move towards greater economic nationalism by perception of revenue growth



I do not believe there will be any changes as a result of economic nationalism



Q18. What changes would your company likely consider making to its R&D/innovation efforts if there is a move toward greater economic nationalism? And when?

Q11. How do you believe your company is performing relative to its key competitors?

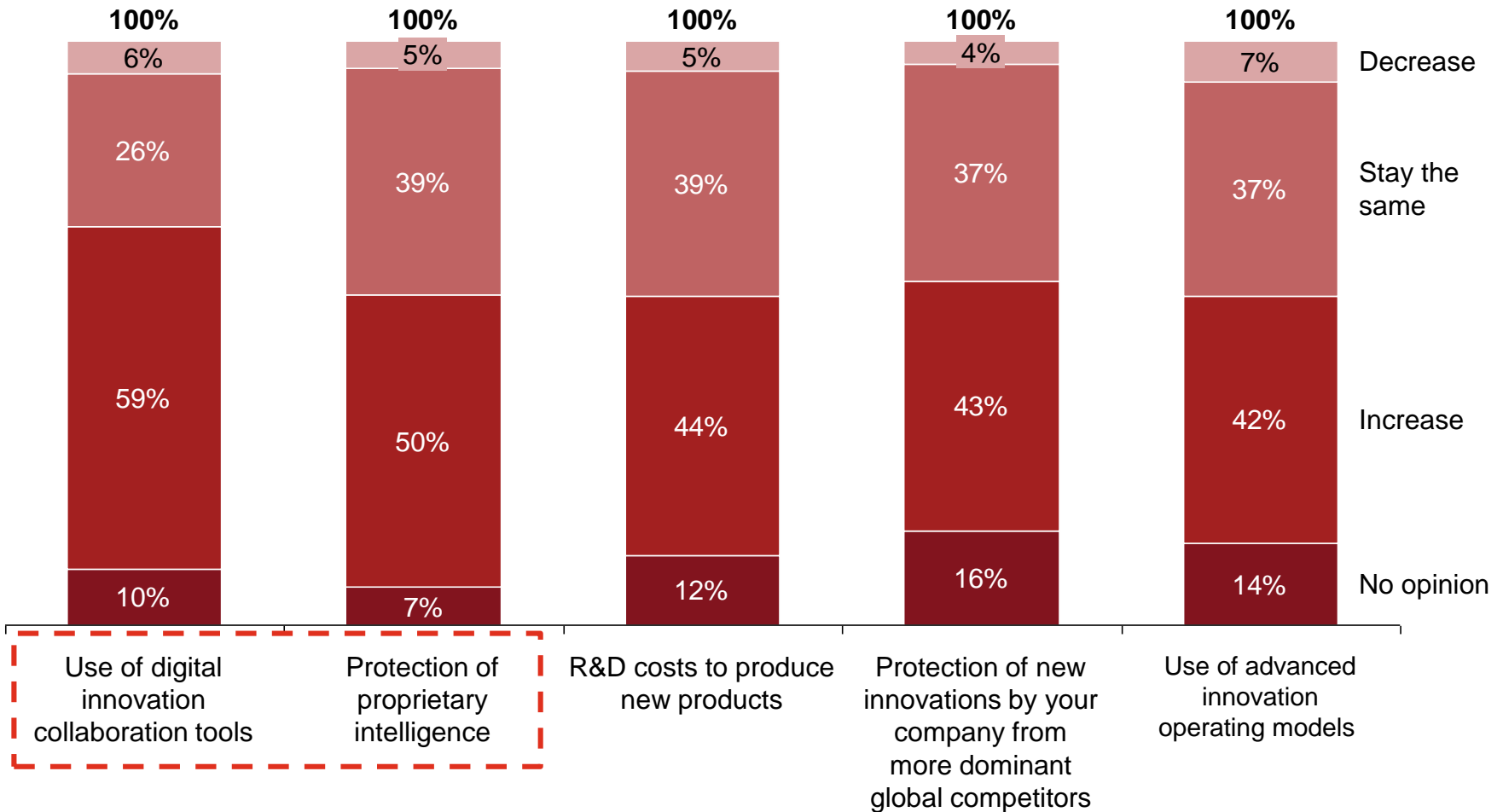
N=562





***As a result of economic nationalism, companies are going to be more digitally collaborative and protective of proprietary intelligence***

**Effects of economic nationalism on aspects of your innovation program**



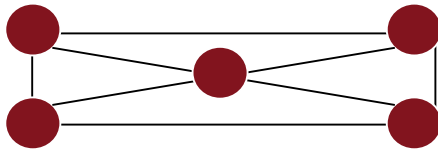
Q19. How do you expect the following aspects of your innovation program to change with increased economic nationalism ?

N=562, For "Protection of proprietary intelligence", N=412 (As the question was not asked in Japanese survey)

# ***Broad economic nationalism would undermine today's global interdependent network model, creating more self sufficient nodes***

## **Integrated and interdependent network**

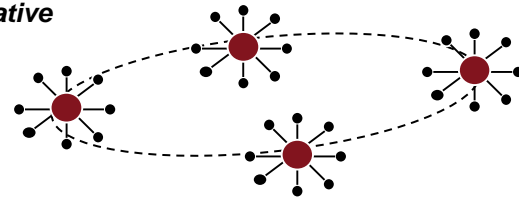
### ***Illustrative***



- The global innovation model involves the free flow of information, money, and talent across borders
- Today's global innovation model would need to evolve if there is a move towards economic nationalism
- In the 2015 Global Innovation 1000 study, we found that more and more companies look for talent outside their headquarters country and set up R&D centers close to their target markets
- Distributed elements of the global innovation model are connected by a central R&D organization while maintaining a fluid network

## **Self-sufficient, fully-functioning R&D nodes**

### ***Illustrative***



- Today's global innovation model would need to evolve to a set of more self-sufficient R&D nodes
- Companies will need to look for ways to manage the higher costs they will incur with this model
- Leaders will need develop contingency plans:
  - Realignment of business and innovation strategies
  - Determine how a more autonomous and redundant R&D network would operate
  - How to prepare R&D centers to be more self-sufficient – deeper local talent
  - Ensure access to the digital tools required to ensure communication and efficiency

*Introduction*

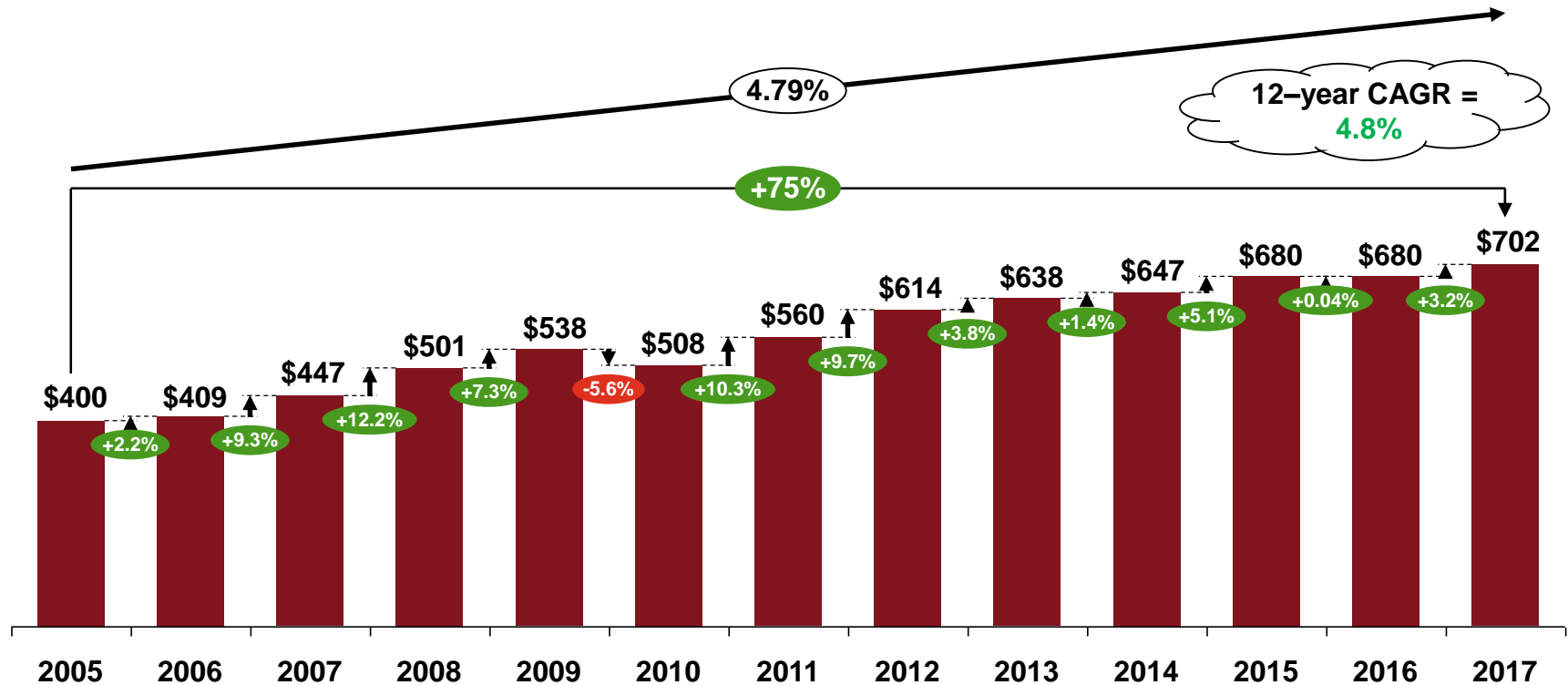
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# *Innovation 1000's R&D spend exceeded \$700B for 1st time in 2017*

## Global Innovation 1000 R&D Spending

2005–2017, \$US Billion

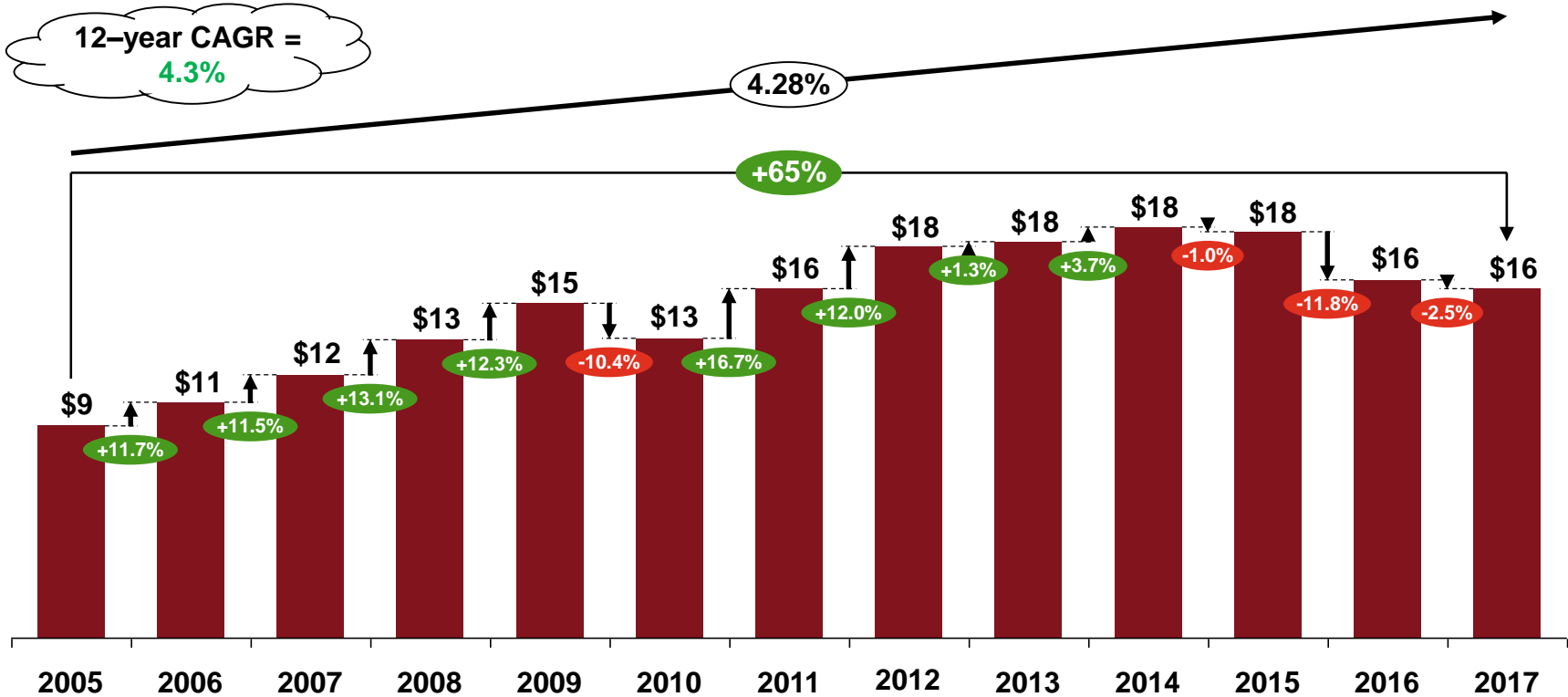


Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

# Total revenue of the Innovation 1000 fell by 2.5% in 2017

## Global Innovation 1000 Revenue

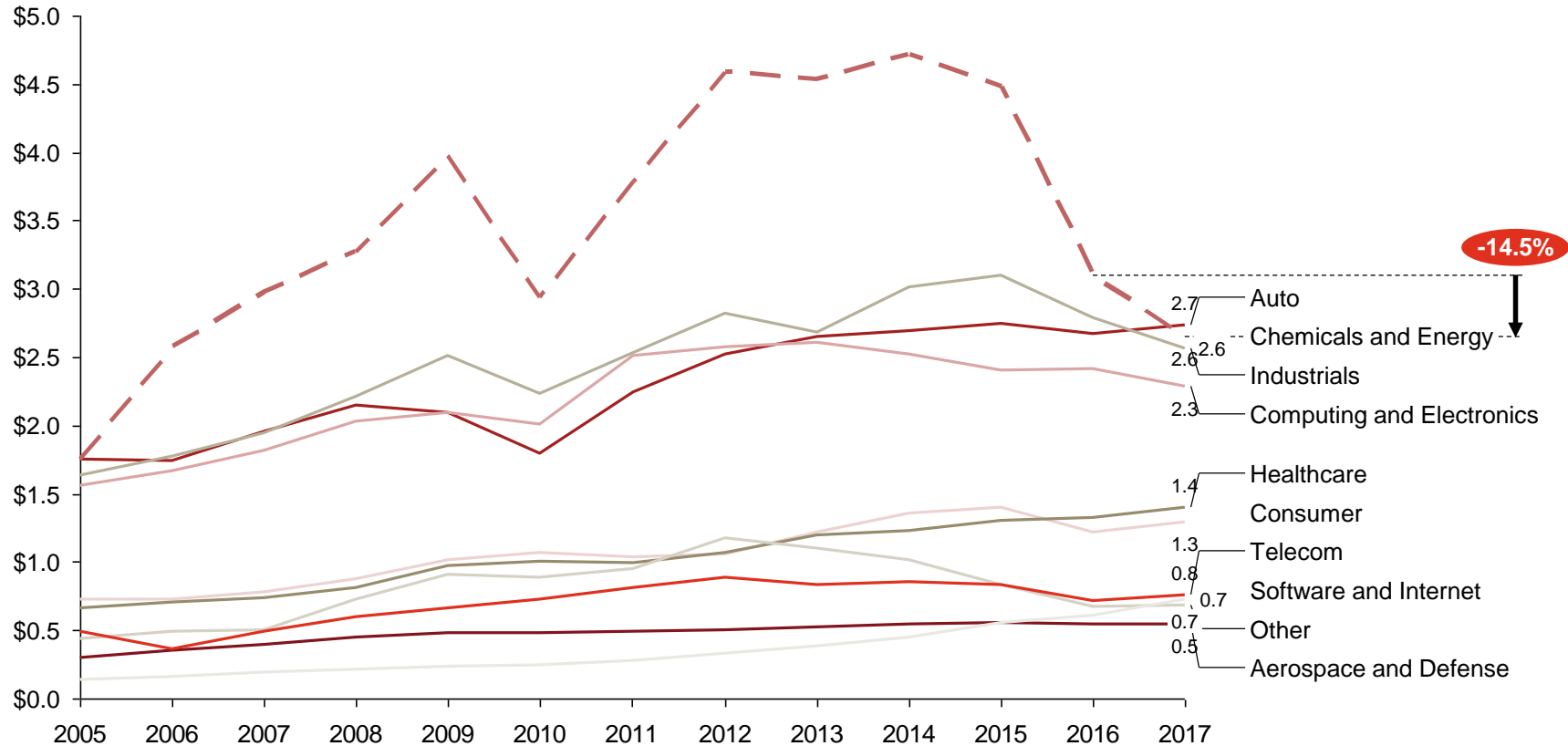
2005–2017, \$US Trillion



Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

***This was primarily due to falling revenue from lower oil prices in the Chemicals and Energy industry***

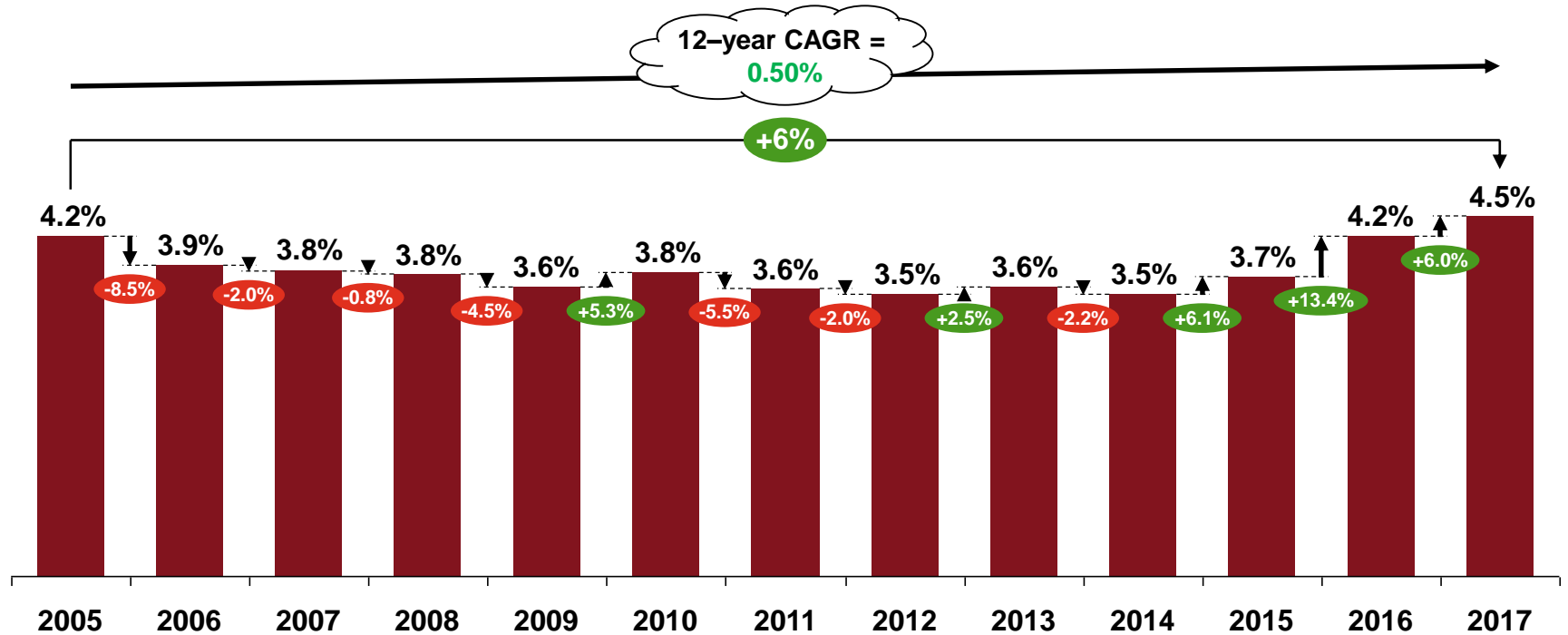
## Revenue by Industry 2005–2017, \$US Trillion



Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

# R&D intensity hit an all-time study high of 4.5%

## Global Innovation 1000 R&D Intensity 2005–2017

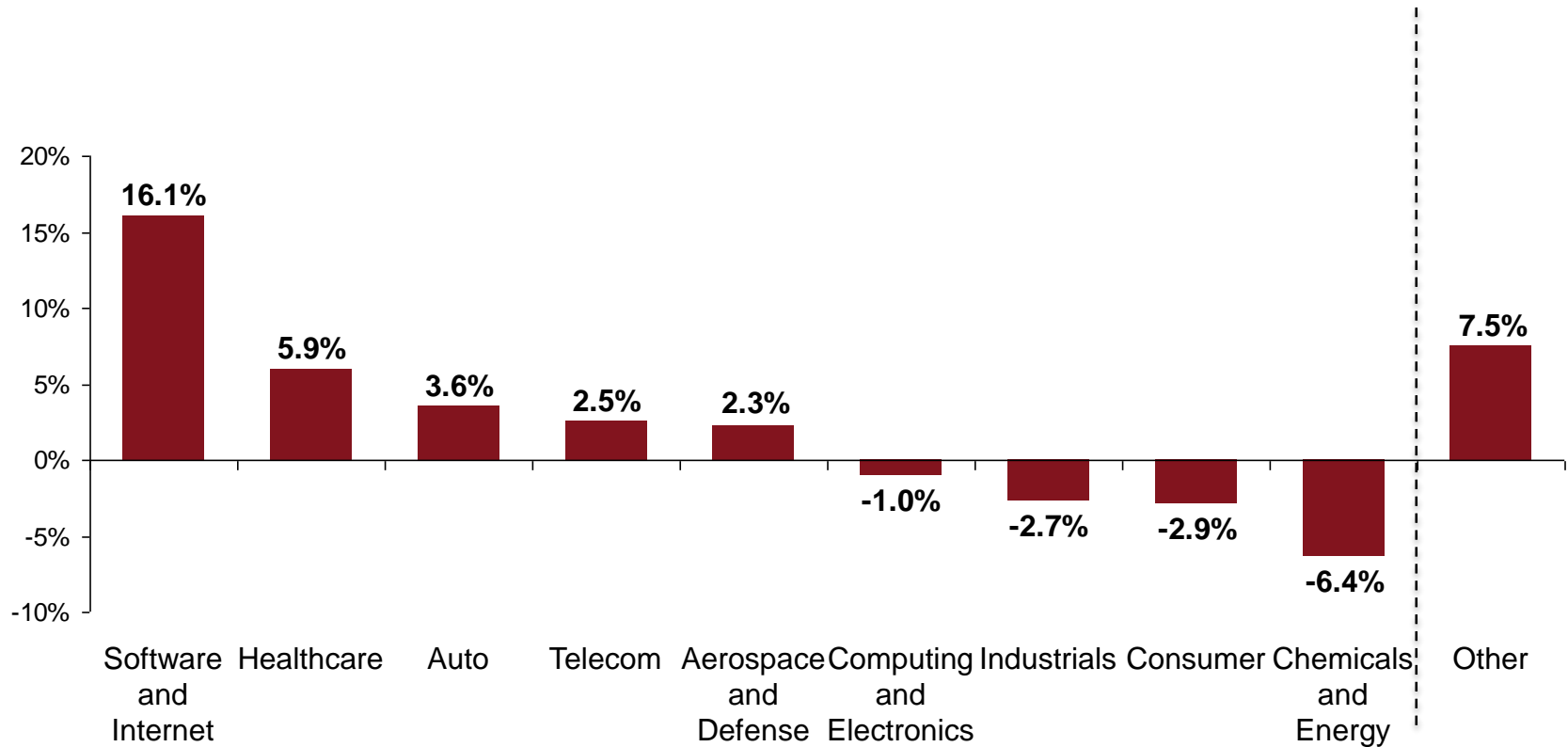


Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

# *Software & Internet continues to display the fastest growth in R&D spending of any industry at over 16%*

## Change in R&D Spending by Industry

2016–2017

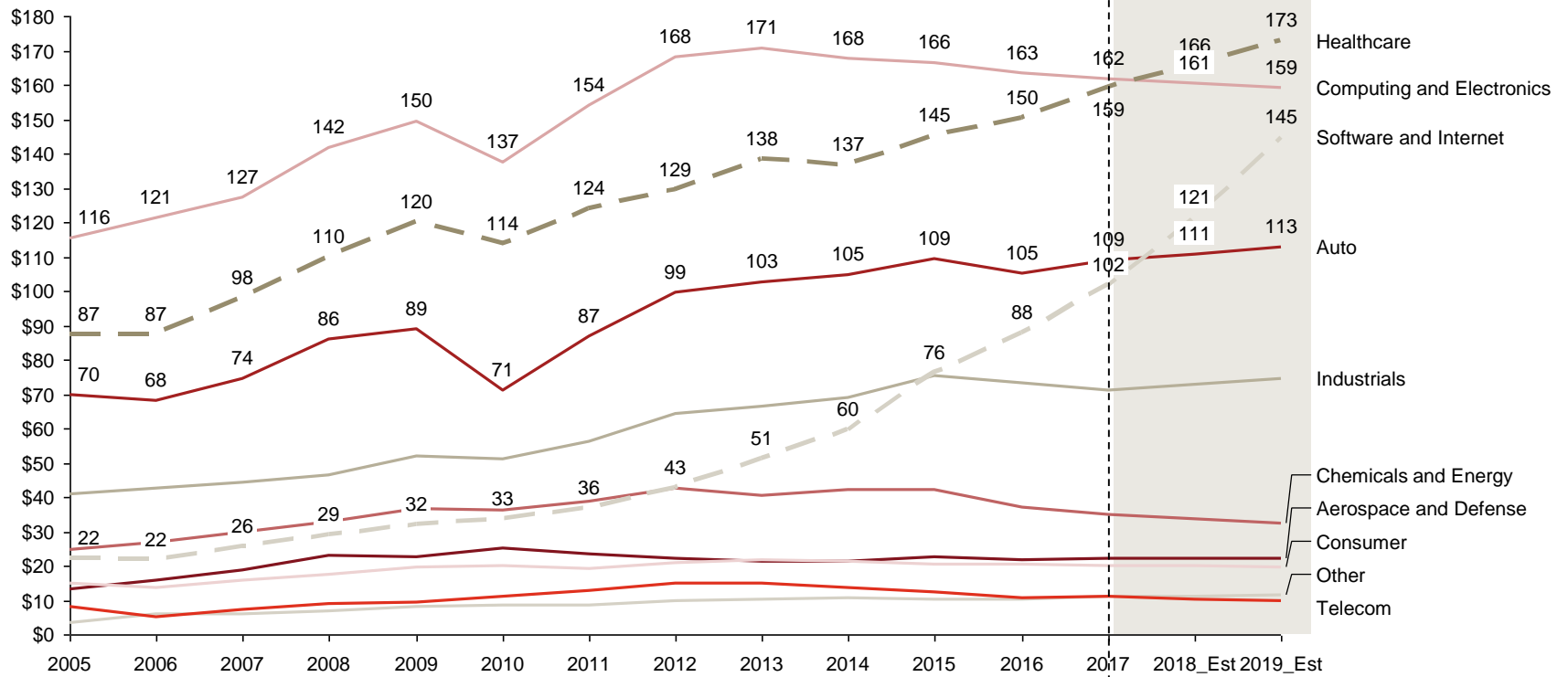


Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study



# By 2018, Healthcare will surpass Computing & Electronics to become highest R&D spending industry

**R&D Spending by Industry, estimates**  
\$US, Billion



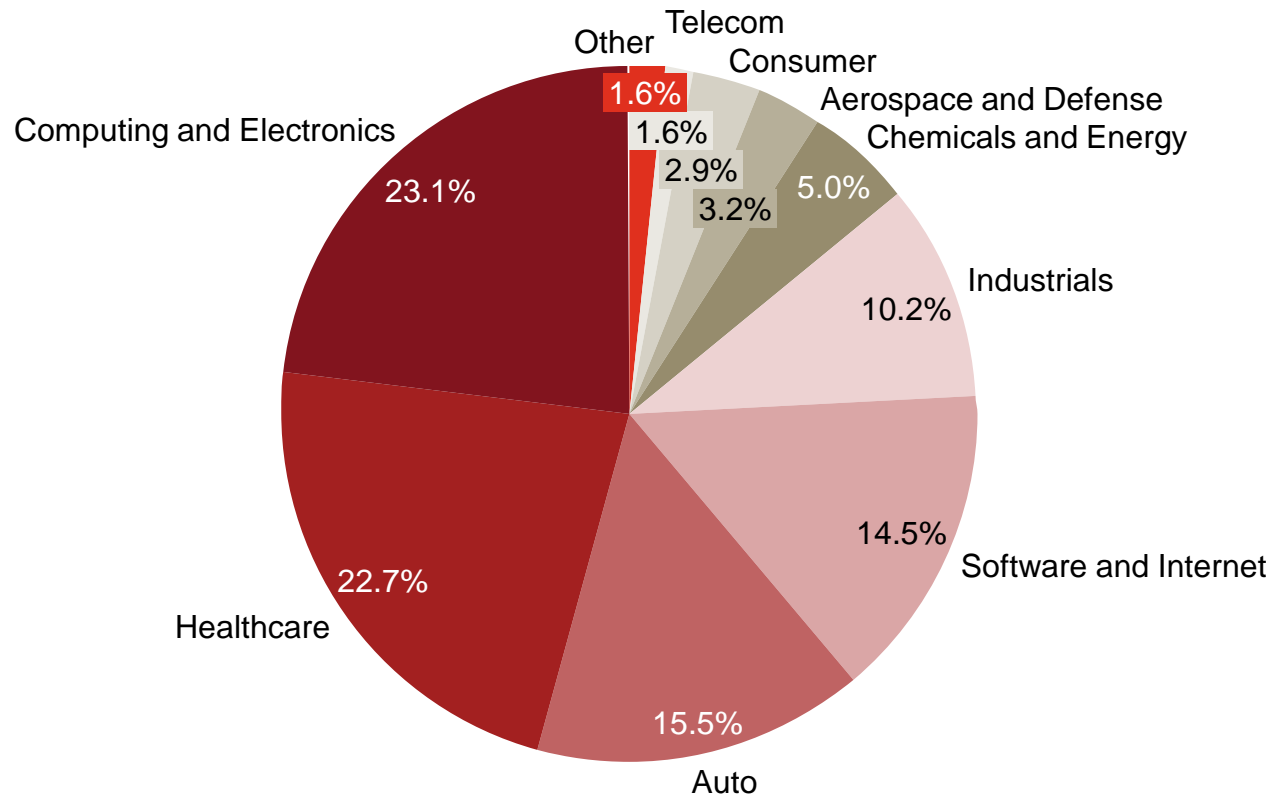
\* CAGR Value is calculated for last 5 years span from 2012 to 2017

Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

***Computing & Electronics, Healthcare, and Auto contributed 61.3% of R&D spending in 2017, almost the same as in 2016***

**2017 R&D Spending by Industry**

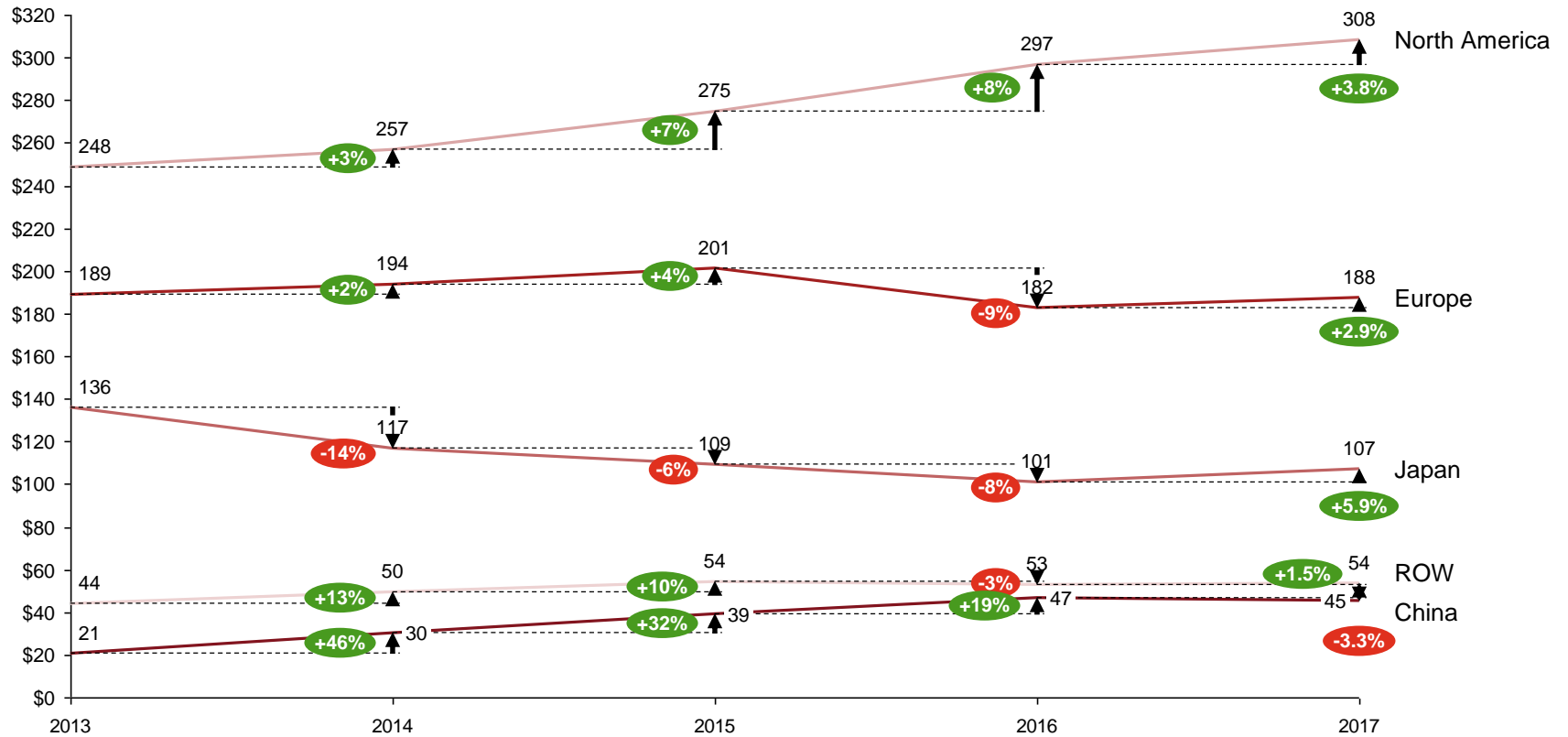
Total = \$701.6 US Billions



Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

# Japanese firms demonstrated first increase in spending in years, while Chinese firms had the first recorded decline

## R&D Spending by Region 2013–2017, \$US Billion



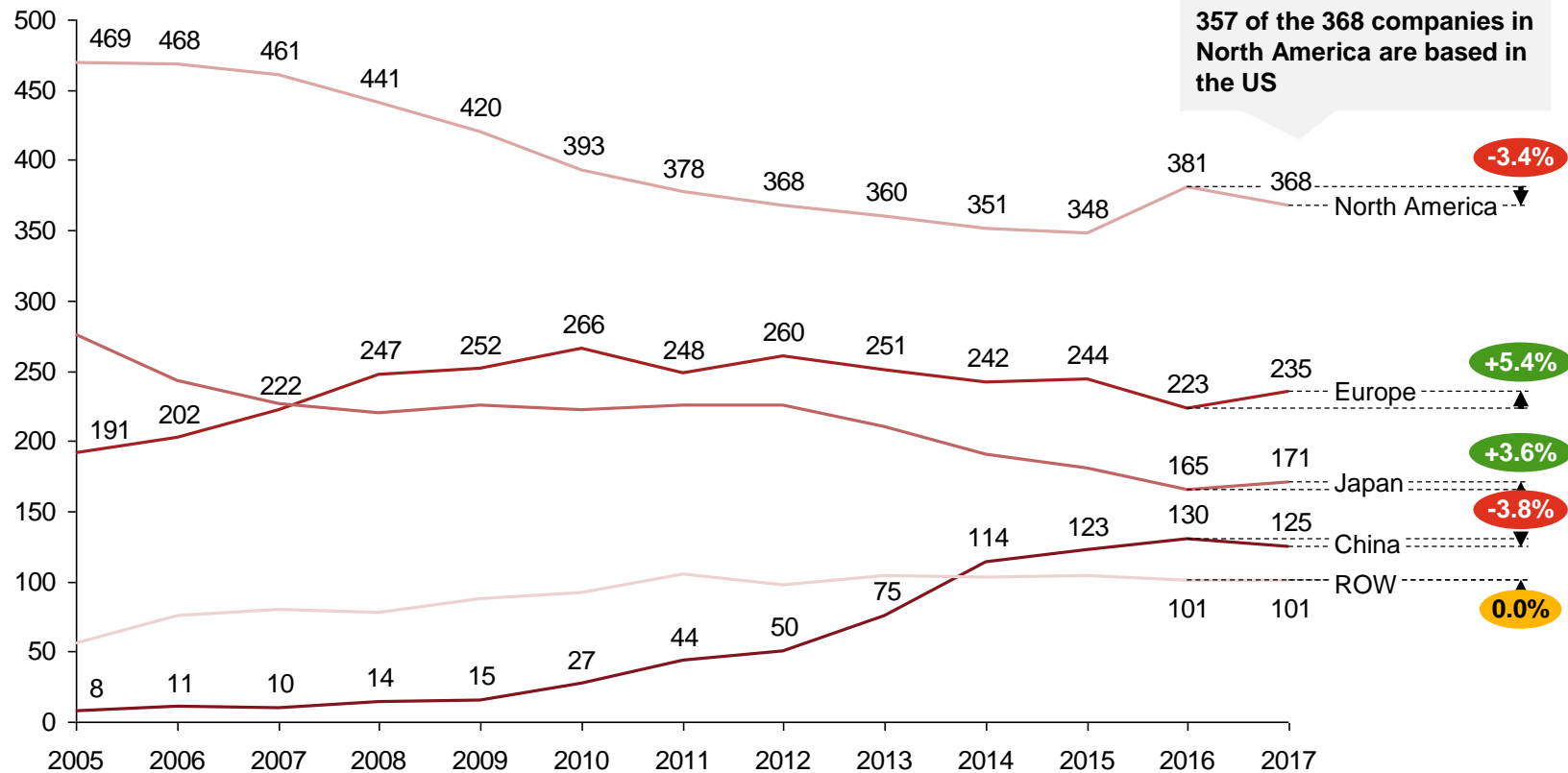
Notes: 1) Whenever China is called out in region data it always includes Hong Kong 2) \*Use of local currency would result in different YoY changes

Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

***Europe and Japan increased the number of companies in the Top 1000 – for Japan, this is the first time in five years while China saw a decrease in number of companies for the first time***

**Number of Companies in the Top 1000 by Region**

2005–2017



Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

# *This is the first time the top spender is a high tech firm; Honda and Facebook join the Top 20 Spender ranking*

## Top 20 R&D Spenders

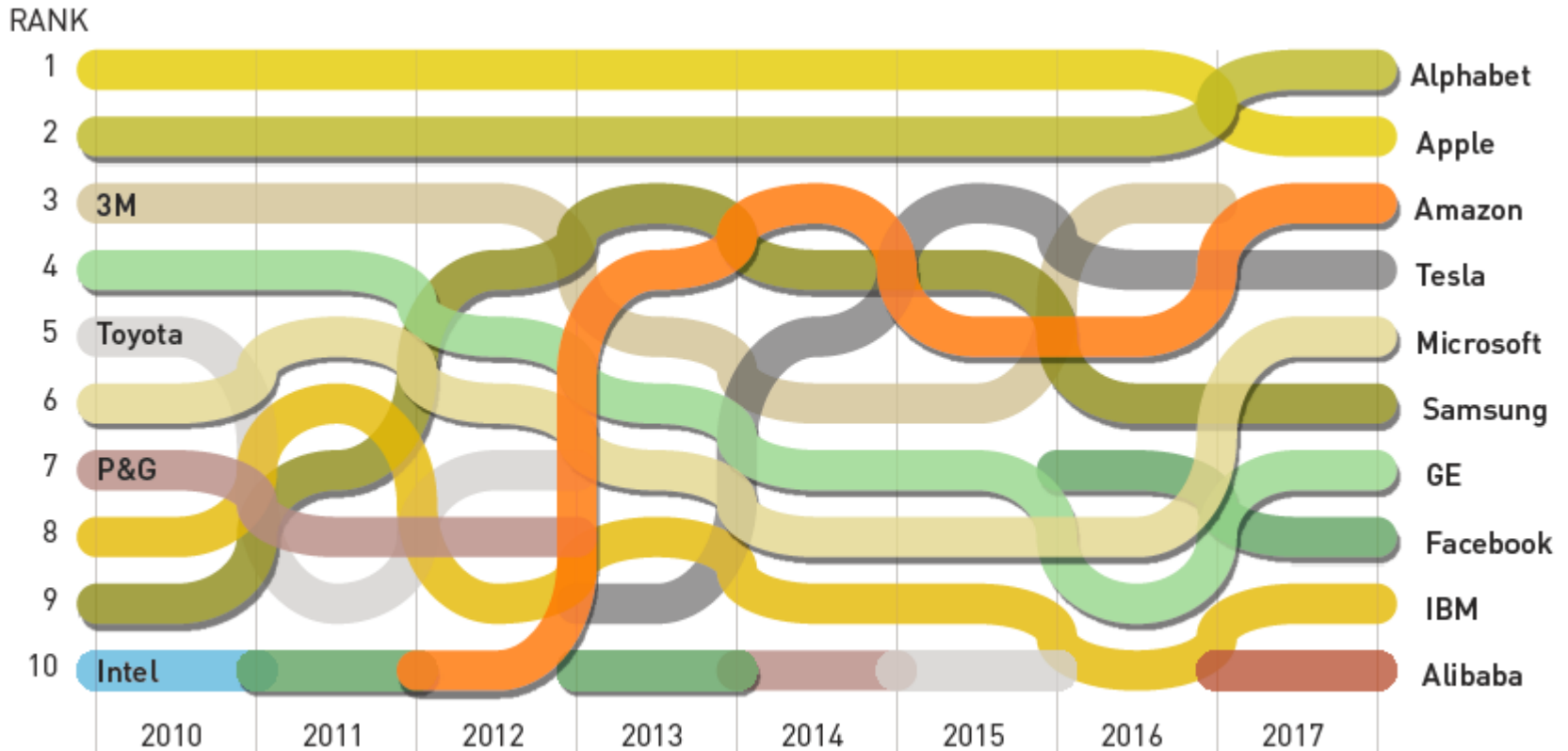
Rank in 2017	Rank in 2016	Change	Company	Geography	Industry	R&D spending (US\$ Billions)	Revenue (US\$ Billions)	R&D Intensity
1	3	+2	Amazon.com, Inc.	North America	Software and Internet	16.1	136.0	11.8%
2	4	+2	Alphabet Inc.	North America	Software and Internet	13.9	90.3	15.5%
3	5	+2	Intel Corporation	North America	Computing and Electronics	12.7	59.4	21.5%
4	2	-2	Samsung Electronics Co., Ltd.	South Korea	Computing and Electronics	12.7	167.7	7.6%
5	1	-4	Volkswagen AG	Europe	Auto	12.1	229.4	5.3%
6	6	NA	Microsoft Corporation	North America	Software and Internet	12.0	85.3	14.1%
7	7	NA	Roche Holding AG	Europe	Healthcare	11.4	51.8	21.9%
8	14	+6	Merck & Co., Inc.	North America	Healthcare	10.1	39.8	25.4%
9	11	+2	Apple Inc.	North America	Computing and Electronics	10.0	215.6	4.7%
10	8	-2	Novartis AG	Europe	Healthcare	9.6	49.4	19.4%
11	10	-1	Toyota Motor Corporation	Japan	Auto	9.3	247.5	3.8%
12	9	-3	Johnson & Johnson	North America	Healthcare	9.1	71.9	12.7%
13	13	NA	General Motors Company	North America	Auto	8.1	166.4	4.9%
14	12	-2	Pfizer Inc.	North America	Healthcare	7.9	52.8	14.9%
15	15	NA	Ford Motor Company	North America	Auto	7.3	151.8	4.8%
16	16	NA	Daimler AG	Europe	Auto	6.9	161.8	4.2%
17	20	+3	Oracle Corporation	North America	Software and Internet	6.8	37.7	18.1%
18	17	-1	Cisco Systems, Inc.	North America	Computing and Electronics	6.3	49.2	12.8%
19	23	+4	Honda Motor Co., Ltd. <span>New</span>	Japan	Auto	6.2	125.6	4.9%
20	27	+7	Facebook, Inc. <span>New</span>	North America	Software and Internet	5.9	27.6	21.4%
<b>Total</b>						<b>194.5</b>	<b>2217.0</b>	<b>8.8%</b>

Companies in red have been among the top 20 R&D spenders every year since 2005

Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 study

***For the first time, Alphabet surpasses Apple as the Most Innovative Company; Alibaba is first Chinese firm to join Top 10 list***

**10 Most Innovative Companies**



Source: Strategy& 2017 Global Innovation 1000 analysis

Q23. In your opinion, what are the three most innovative companies in the world? Please choose from the drop-down menu or choose "Other" to write in your recommendation.

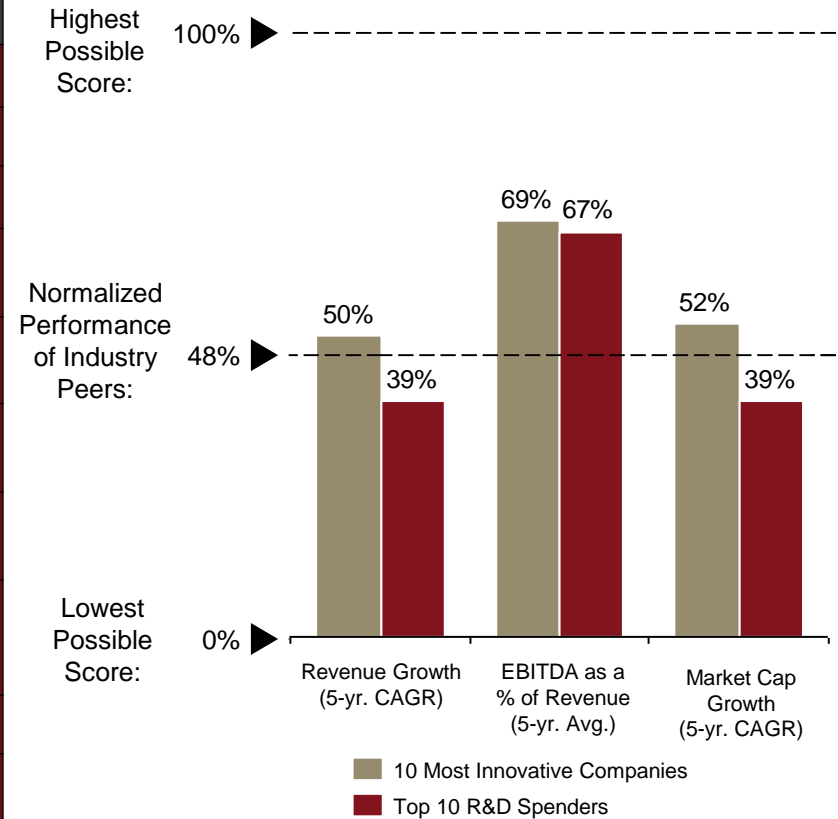
N=562

\*In 2015, Google announced a corporate restructuring forming an umbrella company called Alphabet

# Once again, the 10 Most Innovative Companies outperform the Top 10 R&D Spenders on financial metrics

## 10 Most Innovative Companies vs. Top 10 R&D Spenders\*

Rank	10 Most Innovative Companies	2017 R&D spend (US\$ Bn)	R&D intensity	Top 10 R&D Spenders	2017 R&D spend (US\$ Bn)	R&D intensity
1	Alphabet Inc.	13.9	15.5%	Amazon.com, Inc.	16.1	11.8%
2	Apple Inc.	10.0	4.7%	Alphabet Inc.	13.9	15.5%
3	Amazon.com, Inc.	16.1	11.8%	Intel Corporation	12.7	21.5%
4	Tesla, Inc.	0.8	11.9%	Samsung Electronics Co., Ltd.	12.7	7.6%
5	Microsoft Corporation	12.0	14.1%	Volkswagen Aktiengesellschaft	12.1	5.3%
6	Samsung Electronics Co., Ltd.	12.7	7.6%	Microsoft Corporation	12.0	14.1%
7	General Electric Company	4.8	4.0%	Roche Holding AG	11.4	21.9%
8	International Business Machines Corporation	5.8	7.2%	Merck & Co., Inc.	10.1	25.4%
9	Facebook, Inc.	5.9	21.4%	Apple Inc.	10.0	4.7%
10	Alibaba Group Holding Limited	2.5	10.8%	Novartis AG	9.6	19.4%



Source: Bloomberg data, Capital IQ data, 2017 Global Innovation 1000 Study

\* Facebook and Alibaba do not have market cap data spanning back 5 years

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**For the complete study and more  
information on the annual  
Strategy& Global Innovation 1000 study**

**Please visit:**

**<http://www.strategyand.pwc.com/innovation1000>**

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