



European
Commission



SCIENCE, RESEARCH AND INNOVATION PERFORMANCE OF THE EU 2018

Key findings

Science, Research and Innovation Performance of the EU 2018

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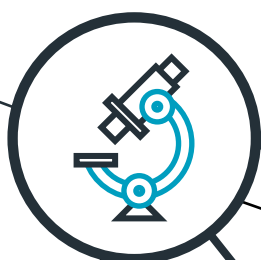
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RESEARCH AND INNOVATION AS DRIVERS OF ECONOMIC AND SOCIAL PROSPERITY

Europe's prosperity relies on its ability to create and diffuse innovations. After a decade of fire-fighting, Europe now needs to lay the foundations that will ensure continued economic and social progress.

The bottom right corner of the page features a series of white lines forming a network of interconnected nodes and edges, resembling a stylized map or a data visualization. The lines are thin and white, set against the solid blue background.



Innovation is a fundamental driver of economic and social prosperity. It boosts economic growth, creates new and better jobs, enables social mobility, fights climate change and improves the overall quality of life. Raising prosperity levels has always been closely associated with the capacity of the economies to create and diffuse innovations. The steam engine was behind the Industrial Revolution of the 18th century. Electricity and the spread of mass production techniques led to massive economic development in the 19th and 20th centuries and an unparalleled pace of scientific and technological discoveries, e.g. in health and genomics. Now digitalisation is a crucial engine of greater societal progress.

Europe's economic and social model relies on its ability to boost productivity which, in turn, is heavily dependent on the capacity of its economy to innovate. While economic growth has returned to Europe after nearly a decade of economic crisis, sluggish productivity growth and weak diffusion of innovation are holding back more resilient economic growth. This stagnation in productivity is occurring despite the rise of many breakthrough technologies such as the Internet of Things, robotics and artificial intelligence. This *productivity paradox* can be largely explained by the profound changes the dynamics of innovation have undergone over the past decades.

CHANGING DYNAMICS IN INNOVATION

The eruption of digital technologies has led to significant changes in innovation creation and diffusion, creating vast opportunities, but also significant risks.

Changing demographics, climate change, the rise of globalisation and notably digitalisation and the emergence of disruptive digital technologies have drastically changed the nature and impact of innovation, and the way that it is created and diffused. More precisely, during the last decade there

has been a **very rapid** rise of new champions in areas such as digital applications. Companies like Uber or Facebook, or consumer internet firms like Amazon or Alibaba have redefined the concept of market creation, bringing together supply and demand in just one click.

Table 1. Top 100 global companies (1-15) by market capitalisation, 2017 and 2009

Company	Industry	Country	31 March 2017		31 March 2009		Change in rank between 31 March 2009 and 31 March 2017
			Rank	Market Capitalisation (US\$bn)	Rank	Market Capitalisation (US\$bn)	
Apple Inc	Technology	United States	1	754	33	94	+32
Alphabet Inc-Cl A	Technology	United States	2	579	22	110	+20
Microsoft Corp	Technology	United States	3	509	6	163	+3
Amazon.Com Inc	Consumer Services	United States	4	423	:	31	-
Berkshire Hathaway Inc-Cl A	Financial	United States	5	411	12	134	+7
Facebook Inc-A	Technology	United States	6	411	-	-	-
Exxon Mobil Corp	Oil & Gas	United States	7	340	1	337	-6
Johnson & Johnson	Health Care	United States	8	338	8	145	0
JPMorgan Chase & Co	Financial	United States	9	314	28	100	+19
Wells Fargo & Co	Financial	United States	10	279	55	60	+45
Tencent Holdings Ltd	Technology	China	11	272	-	13	-
Alibaba Group Holding-Sp Adr	Consumer Services	China	12	269	-	-	-
General Electric Co	Industrials	United States	13	260	24	107	+11
Samsung Electronics Co Ltd	Consumer Goods	South Korea	14	259	53	61	+39
AT&T Inc	Telecommunications	United States	15	256	7	149	-8

Source: Bloomberg and PwC analysis
Stat. link: <http://europa.eu/vM76MR>

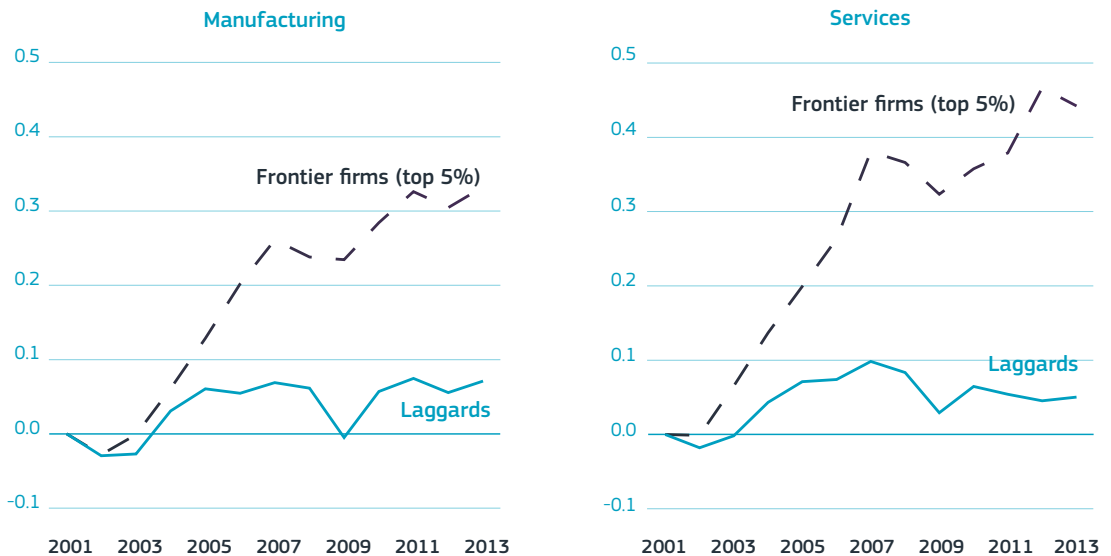
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Today's innovation dynamics are characterised by staggering speed, complexity and network effects. Digitally enabled innovations are at the crossroads of many technologies and sit on radically new business models. Productivity growth is increasingly concentrated in a handful of leading firms.

Moreover, digitally enabled innovations are increasingly at the crossroads of various technologies, rather than the fruit of off-the-shelf technology deployment. This makes the innovation process **more and more complex**, requiring the design of new business models and new managerial and organisational skills to fully reap their potential benefits.

In addition, the emergence of strong network effects, i.e. when a product or a service gains additional value as more people use it, coupled with the increased complexity of innovation, has led to an increasing **concentration of innovation benefits** in a group of superstar companies. This is hindering the rapid and effective diffusion of innovation across companies and sectors, whose boundaries are being redefined. This has implications for productivity growth and inequality. Since the beginning of this century, there has been a strong divergence in productivity growth between a handful of productivity growth leaders, whose productivity growth has remained robust, and the vast majority of the companies in the economy, whose productivity growth has been sluggish.

Figure 1. Labour productivity gap between global frontier firms and other firms¹, 2001-2013



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Source: Andrews et al. 2016

Note: ¹The global frontier is measured by the average of log labour productivity for the top 5% of companies with the highest productivity levels within each 2-digit industry. Laggards capture the average log productivity of all the other firms. Unweighted averages across 2-digit industries are shown for manufacturing and services, normalised to 0 in the starting year. The vertical axes represent log differences from the starting year: for instance, the frontier in manufacturing has a value of about 0.3 in the final year, which corresponds to approximately 30% higher in productivity in 2013 compared to 2001.

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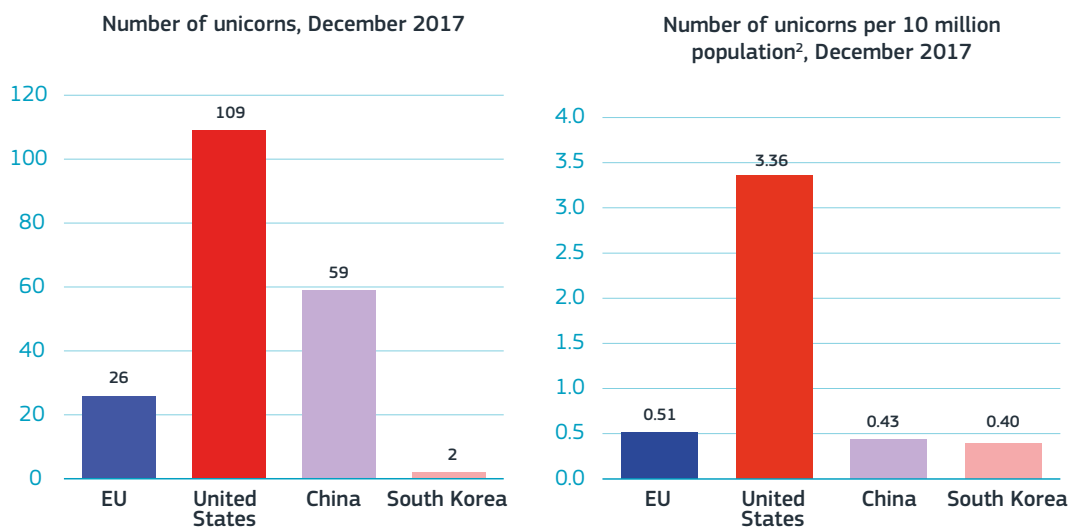
Unfortunately, Europe has missed out on many of the opportunities created by digital innovations and it trails, not only vis-à-vis the United States but increasingly also vis-à-vis China, in transformational entrepreneurship.

Digitalisation and the rise of the platform economy have been unbalanced. Despite an early and more than respectable start in developing its digital infrastructure, Europe has lagged behind significantly in riding the wave of digital innovations offered by the platform economy. As a result, Europe is missing

out on the technology champions of the new millennium while the United States, and increasingly China, are largely dominating these innovations, which are transforming the global economy, redefining industries and creating job opportunities.

European companies, such as Spotify, BlaBlaCar or Transferwise, are exceptions in the new constellation of firms that have deeply disrupted our economies. While these innovations have been very relevant, at the moment Europe seems to be just on the cusp of what digital technologies can provide.

Figure 2. Private unicorns¹



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Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: CBinsights, OECD, Eurostat

Notes: ¹A unicorn is a private company with a post-money (i.e. "after funding") valuation of more than US\$ 1 bn.

²Population data refer to 2016.

Stat. link: <http://europa.eu/!du68BP>

A new wave of breakthrough and deep-tech innovation is on its way. It is bringing the digital and physical spheres closer together and returning to its scientific and technological roots. Disruptive changes will come faster than ever and will bring about unprecedented uncertainty. Stronger outreach to citizens and involvement of the public and end-users will make innovations more powerful.

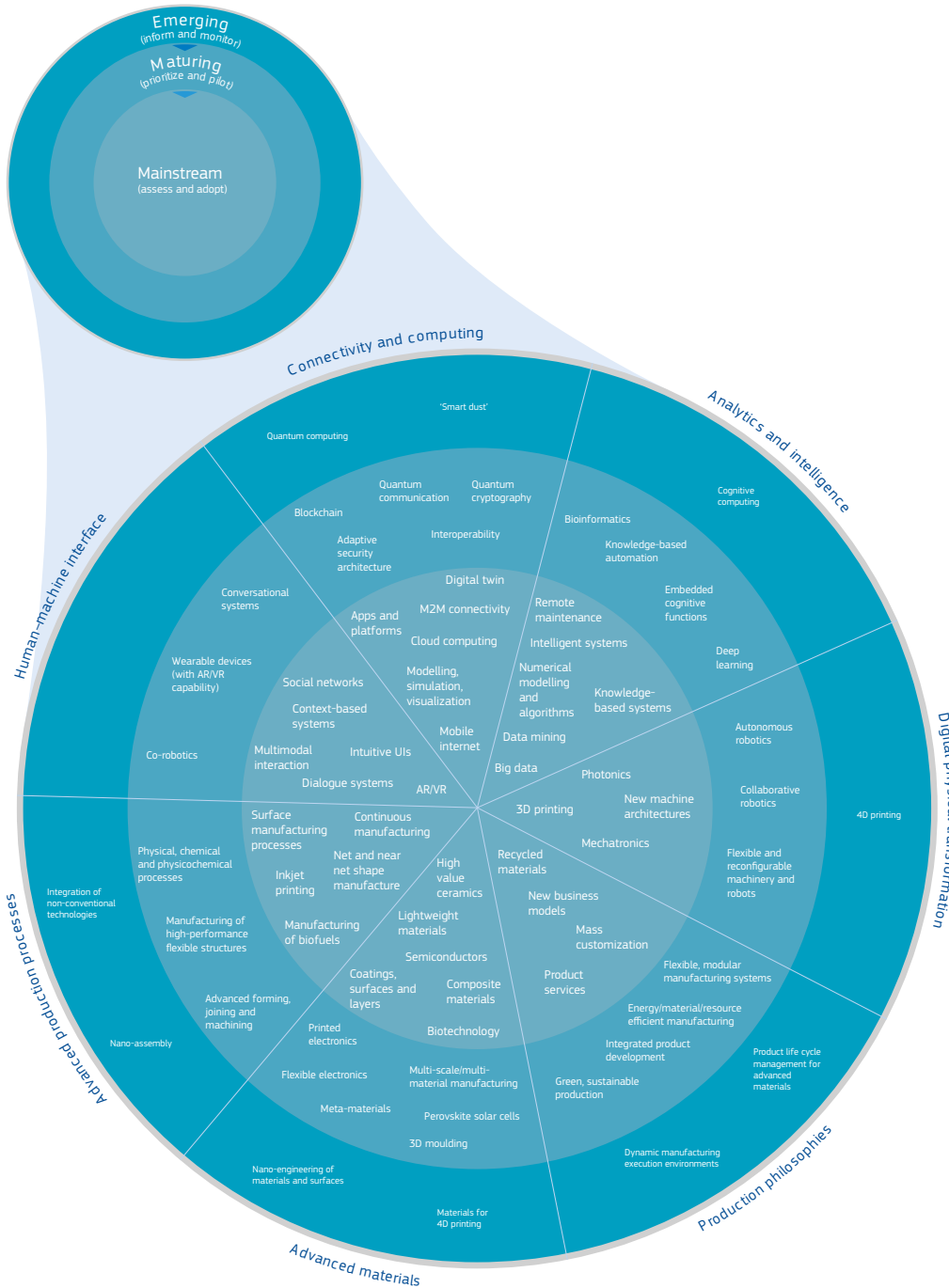
A new wave of innovations, centred on the convergence of the digital and physical spheres, is about to come of age. These forthcoming innovations will be based on technologies that bring together science, technology and engineering in areas such as connectivity and computing, analytics and intelligence, the digital-physical transformation, 3D and 4D printing, new production philosophies, advanced materials, advanced production processes, and human-machine interfaces. These ‘deep-tech based’ innovations will lead to more technically complex consumer and industrial applications with a stronger scientific and engineering foundation than the purely digital applications of the past decade.

Innovation needs a much deeper engagement with citizens; it can benefit greatly from involving end-users and the public. User-centred open innovation is more successful and more sustainable.

Innovation needs to be more and more relatable to citizens, as it is increasingly disrupting their lives. It needs to be explained in plain language to capture the public imagination so that citizens jump on board regarding co-design and co-creation. At the EU level, actions can help to maximise the transformative potential of science and innovation by setting directions towards an impact and within a timeframe, beyond individual topics or projects. According to the special Eurobarometer on ‘Public Perceptions of Science, Research and Innovation’¹, at least half of the respondents expected that in 15 years, science and technological development would have a positive impact on their lives, notably in relation to health (65%), education and skills (60%) and transport (59%). Respondents in Nordic countries, Ireland, Malta and Spain were more optimistic, while people in Austria, Germany, Greece and Italy were less so.

1 http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_419_en.pdf

Figure 3. The next wave of innovation will be based on science, technology and engineering



Science, Research and Innovation performance of the EU 2018

Source: World Economic Forum 2017. Technology and Innovation for the Future of Production: Accelerating Value Creation

Stat. link: http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf (page 7)

RIDING THE NEW INNOVATION WAVE

Riding this new wave of breakthrough and deep-tech innovations, and ensuring a broad-based distribution of its benefits, will require Europe to become more effective in its innovation investments, to improve access to risk and patient capital, to adopt innovation-friendly regulation, to have in place modern education and training systems that provide the right set of required skills and to set up strong knowledge and innovation diffusion mechanisms.

While there is certainty that the new wave of innovation will continue to profoundly transform our economies and societies, there is growing uncertainty about the mechanisms that these innovations will adopt. Some of the quintessential factors that will enable companies and people to contribute to and benefit from the next wave of innovations will be:

Investment in science, innovation and other intangible assets

Upcoming innovations will require enhanced and sustained investments in science and innovation in sufficient scale, scope and time to ensure the development and diffusion of new breakthrough innovations. Investments will need to cover the whole science-innovation spectrum, from basic research to breakthrough innovation, as well as education and skills, information and communication technologies and managerial and organisational capital.

Risk and patient capital

The increased complexity and 'deep-tech' nature of the coming wave of innovations, with much more scientific and market uncertainty, requires more risk and patient capital to finance innovation activities than ever before. There will also be a need to expand the existing stock of expertise to understand the complexity of upcoming innovations and accurately assess their risks and rewards in order to adequately channel financial resources towards them.

Innovation-friendly regulation by applying the innovation principle

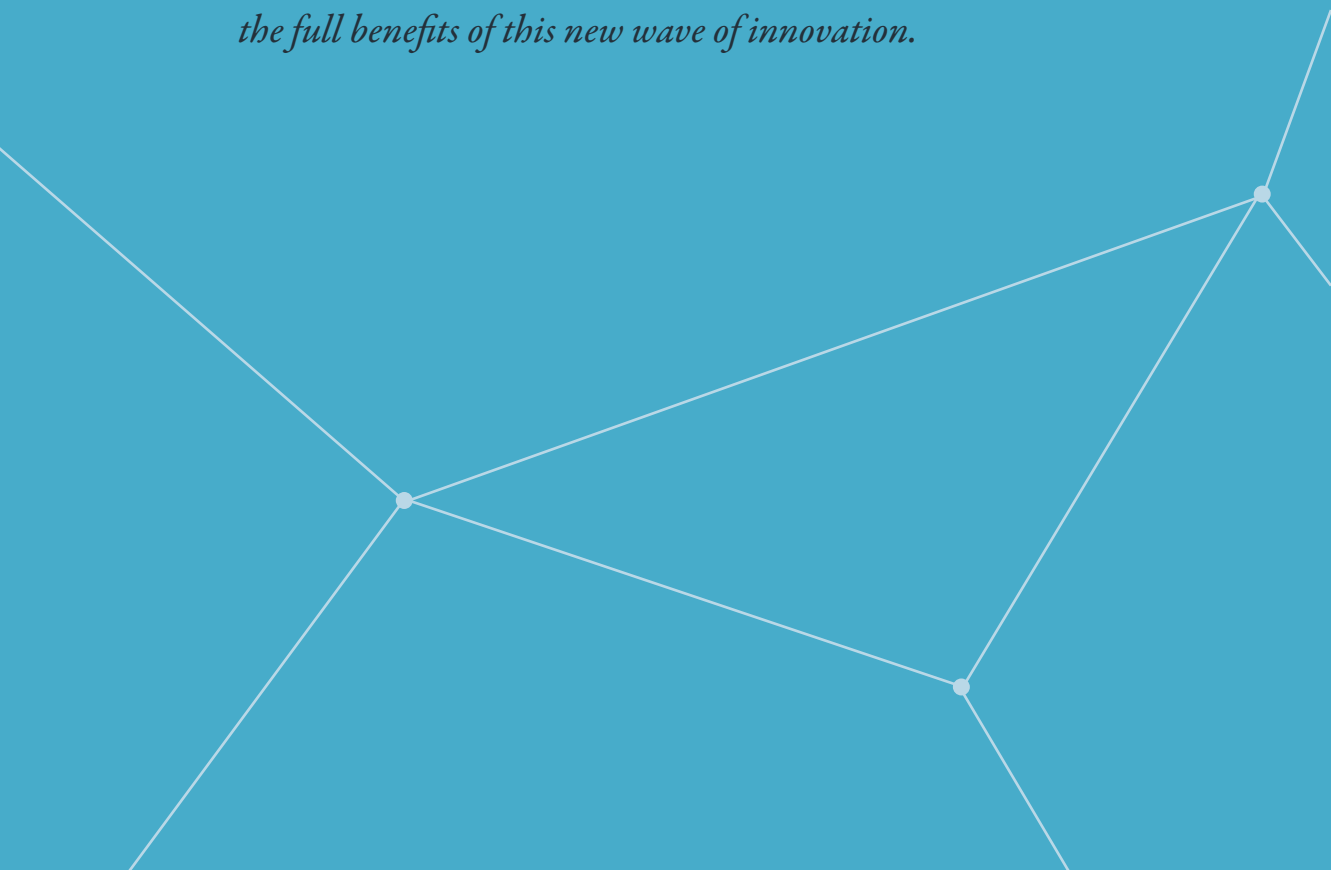
There is permanent tension between fast-moving technological progress and slower-pace legislative processes. Ensuring fit-for-purpose, future-proof regulation that fosters innovation creation and diffusion, while maximising social benefits, requires the application of innovation-friendly regulation. Regulation must act as a catalyser of innovation rather than a barrier to it. It should look into modalities that unlock the innovation potential in Europe, including access to reliable data to ensure the efficient development of artificial intelligence and machine-learning innovations.

An enabling business environment to encourage risk-taking and develop and attract the best talent for innovation creation and diffusion

Innovation will require efficient functioning markets that will allow for risk-taking and the (re) allocation of resources towards innovative activities that can be scaled up, thereby avoiding resources being sunk in unproductive activities. In addition, open science and open innovation systems will facilitate stronger knowledge flows across innovation stakeholders, while incentivising the development and attraction of the best talent.

BUILDING ON SUCCESS, ADDRESSING PERSISTENT CHALLENGES

Europe needs to overcome many impediments if it is to reap the full benefits of this new wave of innovation.

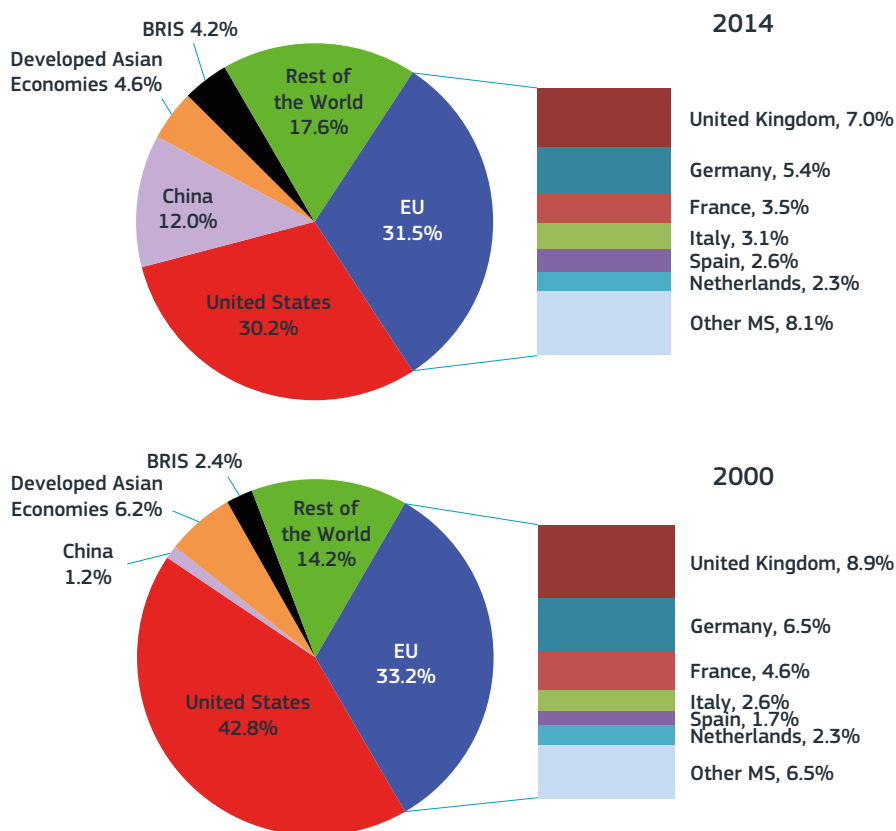
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Europe is a research and scientific powerhouse and a hub of technological progress

Europe remains a global research and innovation powerhouse. It leads in public investment in R&D and in its stock of researchers and is a front runner in scientific pro-

duction, including high-quality scientific publications². More precisely, the EU accounts for one fifth of the world's R&D investment, a quarter of global public R&D investment, one third of all high-quality scientific publications and employs more than 1.8 million researchers.

Figure 4. World share of top 10% highly cited scientific publications¹, 2000 (citation window: 2000-2002) and 2014 (citation window: 2014-2016)



Science, Research and Innovation performance of the EU 2018

Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: CWTS based on Web of Science database

Note: ¹Scientific publications within the 10% most-cited scientific publications worldwide as % of total scientific publications of the country; fractional counting method.

Stat. link: <http://europa.eu/Nw74Fu>

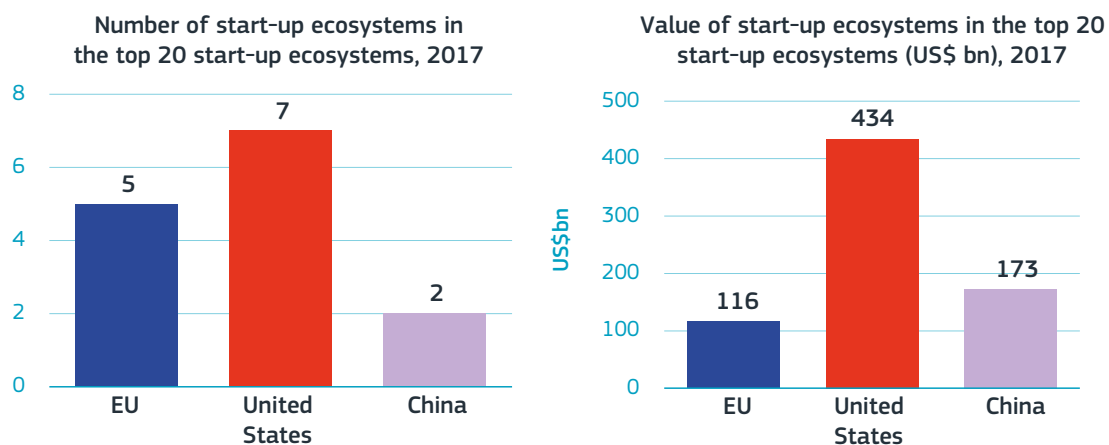
² High-quality scientific publications refer to scientific publications within the top 10% most cited scientific publications worldwide.

However, Europe is neither efficiently nor effectively transforming its scientific leadership into leadership in innovation and innovation-driven entrepreneurship

Europe is failing to transform its high scientific excellence into leadership in innovation and entrepreneurship. Europe is strong in incremental innovation and medium-tech (e.g. transport, health or energy sectors) innovation. However, its

position is being eroded in several of the emerging technologies that are leading to breakthrough innovations, and enabling transformational entrepreneurship. According to the Global Startup Ecosystem Report (2017), Europe has five in the top 20 start-up entrepreneurial ecosystems. However, their value was nearly one quarter of the seven American ones that rank in this list, and lower than those of China.

Figure 5. Start-up ecosystems



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Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: Global Startup Ecosystem Report, 2017

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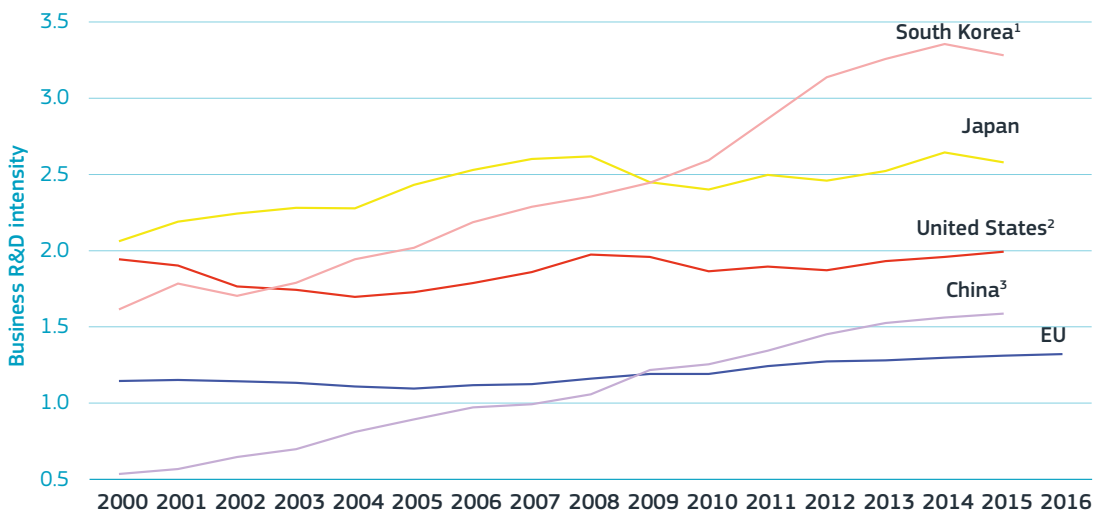
Several factors explain Europe's inability to translate its lead in scientific excellence into a lead in innovation and innovation-led entrepreneurship.

Some of the factors that rank highly on this list of roadblocks to the support of stronger innovation creation and diffusion are: low business investment in R&D and other intangible assets, a fragmented European market that hinders firms' abilities to quickly scale up innovations, rigidities in the functioning of markets that deter stronger innovation diffusion across sectors, fragmented or uncertain regulatory frameworks, less entrepreneurial universities and an uneven geographical spread of innovation.

Europe under-invests in research and innovation and other intangible assets

Europe's investment in private sector R&D is less than one fifth of global business R&D investment and has been shrinking over time due to the rising share of other economies, notably China. In fact, business R&D intensity³ stood at 1.3 % in 2016 in comparison to almost 2 % in the United States and almost 3.5 % in South Korea.

Figure 6. Evolution of business R&D intensity, 2000-2016



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Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: Eurostat, OECD

Notes: ¹KR: There is a break in series between 2007 and the previous years. ²US: Business enterprise expenditure on R&D (BERD) does not contain most or all capital expenditure. ³CN: There is a break in series between 2009 and the previous years.

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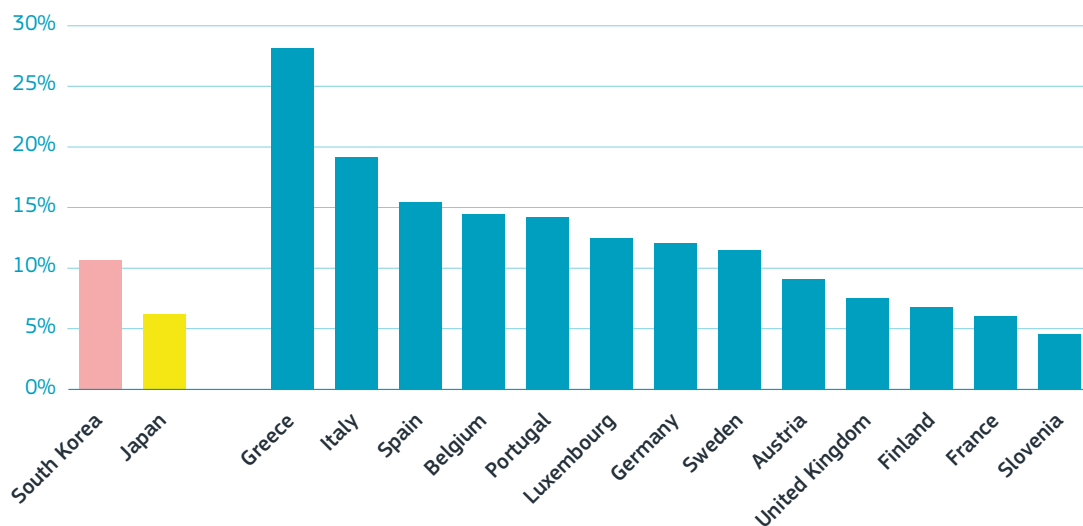
³ Business R&D intensity is defined as business enterprise expenditure on R&D as a percentage of GDP.

A fragmented and rigid European market hinders the timely scale-up of innovation and tends to lock in resources in uncompetitive and zombie firms

Despite clear progress towards a Single Market that stimulates competition, trade and efficiency, Europe's market remains fragmented and key sectors, such as services and digital face constraints in their expansion. EU initiatives, such as the Digital Single Market strategy, which aims to unlock digital opportunities for people and business, or the Capital Markets

Union, which is aiming to build up an integrated capital market in the EU by 2019, are crucial to surmount these constrictions. Nonetheless, the ability of European firms to quickly scale up their innovations and compete in the global innovation race is clearly limited by the size and persistent rigidities of markets. This is hindering speedier and stronger innovation diffusion across all sectors of the European economy and impeding a better allocation of resources towards more innovative and productive firms. As a result, significant resources are sunk into unproductive and 'zombie' companies in Europe.

Figure 7. % share of capital sunk into zombie firms¹, 2013



Science, Research and Innovation performance of the EU 2018

Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: OECD (Adalet McGowan, Andrews and Millot, 2017)

Note: ¹Zombie firms are firms aged ≥ 10 years and with an interest coverage ratio < 1 over three consecutive years. The sample excludes firms that are larger than 100 times the 99th percentile of the size distribution in terms of capital stock or number of employees.

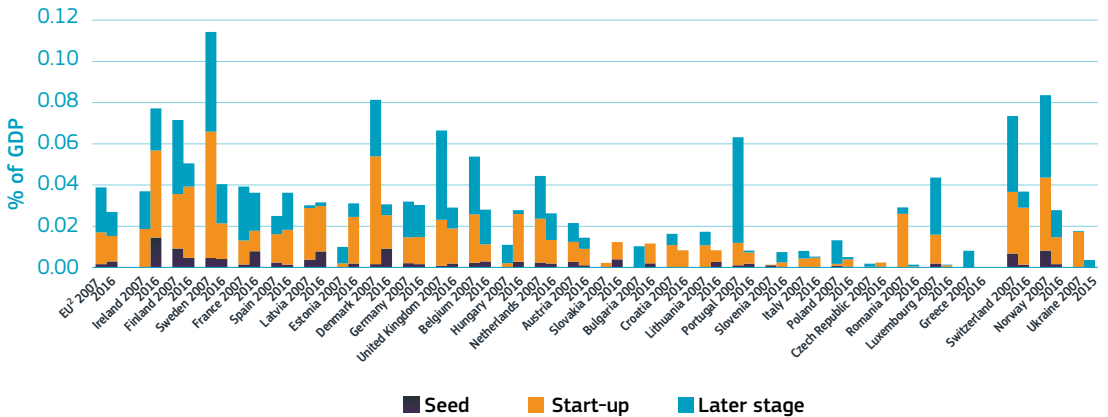
Stat. link: <http://europa.eu/!GT86fQ>

Low access to risk and patient capital hamper innovation and scale-up

Patient, risk-taking capital is crucial for the support of innovation, notably when innovation is disruptive and deep-tech based. These innovations face increased technological, regulatory and commer-

cial uncertainty, even though they can yield larger economic gains. Europe's venture capital market remains largely underdeveloped in comparison to the United States at all phases of the innovation process: from inception, to development and scale-up, from seed-capital, early- and later-stage development funds to mezzanine bridges.

Figure 8. Venture capital (market statistics) by stage as % of GDP, 2007 and 2016¹



Science, Research and Innovation performance of the EU 2018

Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: Invest Europe, Eurostat

Notes: ¹UA: 2015. ²EU does not include CY, MT.

Stat. link: <http://europa.eu/Nf33WR>

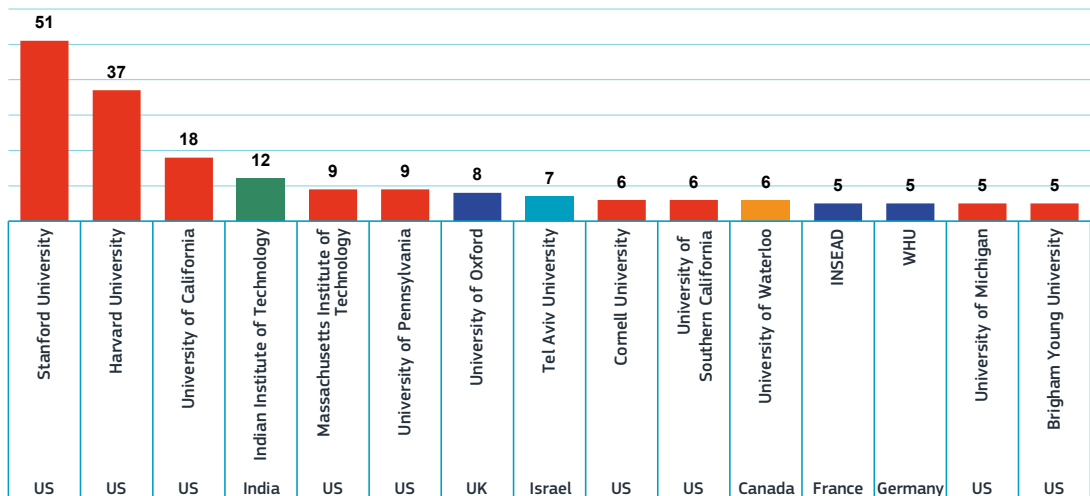
Universities⁴ in Europe should become leading innovation actors. While excellent in research and training, they remain less entrepreneurial than those in the United States

Modern universities are a crucial backbone of the economy as they lay the foundations for the creation and diffusion of innovation. They spawn the skills needed to contribute to and benefit from innovation, the scientific and technological excellence that fuels it, the entrepreneurship that turns knowledge into growth and jobs, and the diffusion of knowledge in the economy. Universities in

Europe have always played a crucial role in stimulating innovation.

In responding to the new wave of digitally enabled and deep-tech innovations, the role of universities continues to be centre stage. Universities will need to modernise their methods of teaching and training people and they must promote trans-disciplinary and entrepreneurial curricula in order to attract talent, researchers and students from across the globe. In a nutshell, European universities should strive to become the world's most entrepreneurial, and there is scope for public intervention to incentivise this process.

Figure 9. Universities producing the most unicorn¹ founders



Science, Research and Innovation performance of the EU 2018

Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

Data: Sage

Notes: ¹A unicorn is a private company with a post-money (i.e. "after funding") valuation at more than US\$ 1 bn. ²All data are up to date as of January 2017.

Stat. link: <http://europa.eu/!YC37rj>

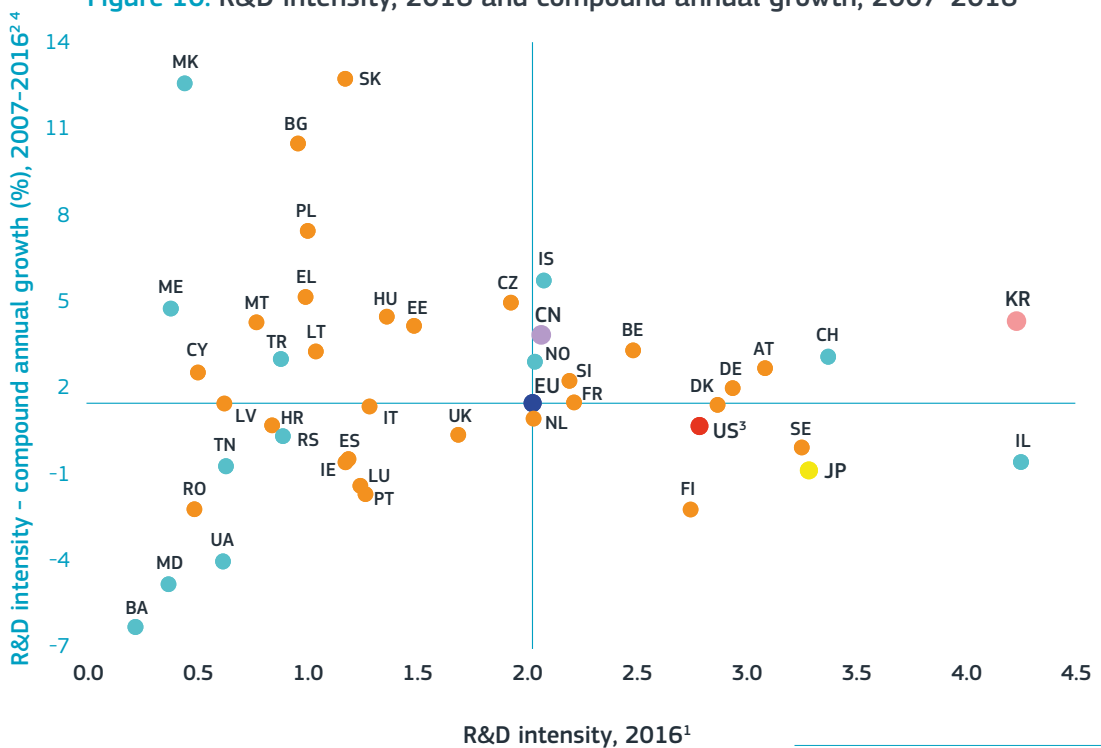
⁴ The definition of universities in this context is ample and includes different types of higher education institutions.

Innovation talents throughout the European Union should be further mobilised

The innovation potential of all Member States and regions in Europe should be further mobilised to fulfil Europe's innovation potential. At the moment, the innovation capacity across Europe remains uneven. This affects long-term economic and social upward convergence. However, in recent years,

several lagging innovators, although not all, made significant strides to bridge the innovation divide in terms of R&D⁵. In fact, the overall picture in relation to the innovation divide has become more nuanced than in the past. In other words, the geography of the innovation divide is progressively changing, although more policy efforts are needed to ensure stronger innovation convergence, especially from those countries that remain behind.

Figure 10. R&D intensity, 2016 and compound annual growth, 2007-2016



Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies
Data: Eurostat, OECD, UNESCO

Notes: ¹BG, CZ, EE, FR, HR, LV, LT, HU, MT, RO, SI, SK, CH, ME, MK, TR, BA, MD, UA, TN, IL, US, JP, CN, KR: 2015. ²BG, CZ, EE, FR, HR, LV, LT, HU, MT, PL, RO, SK, MK, TR, MD, UA, TN, IL, US, CN, KR: 2007-2015; SI, CH, JP: 2008-2015; EL, PT, SI: 2008-2016; RS: 2009-2016; ME: 2011-2015; BA: 2012-2015; IS: 2013-2016. ³US: R&D expenditure does not include most or all capital expenditure. ⁴FR, LU, NL, RO, SI, UK, JP, CN: Breaks in series occur between 2007 and 2016; when there is a break in series the growth calculation takes into account annual growth before the break in series and annual growth after the break in series.
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5 R&D investment intensity values for BG, CZ, EE, HR, LV, LT, HU, MT, PL, RO, SI and SK refer to 2015 rather than 2016. Provisional R&D expenditure data are available for these Member States for 2016. However, in many cases these data show a relatively important decrease. An investigation into the causes of this decline is under way. Early indications suggest that changes to the programming period of the European Structural and Investment Fund, a main source of funding for R&D in these Member States, may largely explain this situation. These decreases should, therefore, be considered as temporary with the expectation of a full recovery in the coming years. As a result, R&D investment intensities for these Member States in 2016 may not accurately reflect R&D trends.

POLICY IMPLICATIONS





POLICY IMPLICATIONS⁶

Given the risks and opportunities at stake, Europe needs to act now and earn its pole position in the next wave of market-creating innovations.

The new wave of innovation ahead of us opens up a window of opportunity for Europe to catch up and be at the forefront of innovation. Europe's strength in science is an important asset, but it will not be enough if Europe does not put in place the right enabling conditions and business climate for stronger and more impactful, breakthrough and deep-tech innovation activity.

Overcoming Europe's limitations to reap the full benefits of the new wave of innovation needs a concerted effort across stakeholders, including research institutions, regulators, businesses and governments at regional, national and EU level.

Addressing Europe's innovation challenges requires a coordinated effort from all stakeholders in all Member States at different levels. Research

institutions, businesses, regional and national governments and European institutions need to upgrade their efforts to boost investment in innovation and other intangible assets, such as education and skills development and ICT, and build a backdrop that incentivises the development and uptake of innovation. This coordinated joint effort should be supported by adequate reforms and by policy support for those reforms.

While much effort has been made to date, reinforced policy efforts are needed to establish a framework for stronger and more impactful innovation creation and diffusion, against the backdrop of today's rapidly changing innovation dynamics and enhanced uncertainty.

In recent years, Europe has adopted many measures to strengthen its innovation capacity. Building on these efforts, a package of important measures should be adopted to modernise and boost Europe's ability to reap the economic and social benefits of the new wave of innovations.

⁶ The views expressed in this publication are the sole responsibility of the author and do not necessarily reflect the views of the European Commission.

Against the backdrop of the deep process of transformation in the nature and dynamics of innovation, and bearing in mind that robust evidence is still not always at hand, the analysis in the SRIP report on Europe's R&I performance leads to a set of policy implications. Europe needs to:

1 Boost its investment in intangible assets

Enhancing public investment in R&I and other intangible assets can help bridge Europe's current investment gap compared to other economies. Active labour market policies aimed at developing the skills needed for a changing economy will contribute not only to spurring innovation but also to mitigating the risks associated with potential job losses which might be brought about by task automation. While Member States benefit from different fiscal spaces for public investment, those able to do so should invest more in intangible assets. In addition, this will bring spillover benefits to other countries. Member States that have experienced low or even declining public R&I investments should make it a priority to cement the basis of future growth on such investments. In addition, the leveraging of business R&D investment, an area in which Europe particularly lags behind, is critical. The right framework conditions must be in place for private companies to innovate.

2 Urgently rethink public support for R&I, notably for market-creating breakthrough innovations

Europe lacks sufficient investment in market-creating breakthrough innovations, where private capital shies away. Supporting bottom-up transformative innovative projects can bridge this gap. In addition, public R&D investment will benefit from moving away from supporting specific fields towards more comprehensive mission-oriented policy approaches that maximise the impacts of public R&D and galvanise private investment. Policy experimentation in these fields can help obtain more robust evidence about the impacts of these changes in public R&D funding.

3 Improve the conditions for speeding up knowledge creation and diffusion by opening up national science and innovation systems

Supporting investment in R&I and other intangible assets improves the economy's absorptive capacity and its ability to diffuse knowledge.

Measures to open up science and innovation systems within Europe, and to the world, will support faster and stronger knowledge flows. Initiatives to build up the conditions for open science - thanks to the opportunities offered by digital technologies, and for open innovation, including through stronger science-business links - are critically important.

4 Ensure innovation-friendly regulations and innovation-demand policies that support transformative innovation and innovation diffusion across sectors

It is crucial to develop innovation-friendly regulations that facilitate the smoother adoption of innovations, notably in relation to the myriad of opportunities that digital technologies offer, across all sectors of the economy and specifically in relation to highly regulated sectors such as education, health and transportation. In addition, innovation-demand policies, such as public procurement or the empowerment of consumers to develop consumer-based innovations will be critical. These actions will speed up the diffusion of the benefits of innovation.

5 Rethink competition policy in a digitised economy

While sufficient evidence is still unavailable, it appears that changes in the dynamics of innovation are leading to a higher concentration of innovation benefits and to the creation of potential monopolies or dominant positions in relation to the access and use of key new resources, such as data, notably big data. This may have implications for ensuring a level playing field with equal opportunities for transformative innovations.

6 Complete the internal market in all sectors to support the rapid scale-up of European innovation

Europe's ability to scale up innovations is being hindered by an incomplete internal market, notably in strategic areas such as digital and services. Achieving an internal market in all areas is crucial to give innovations 'born in Europe' the opportunity to scale up and become global players.

7 Boost sufficient access to risk capital in Europe to support innovation

Risk and patient capital, while recovering, remain very low in comparison to the United States. Public efforts to invest and leverage private risk capital are crucial. Initiatives like the Capital Markets Union or the creation of a pan-European Venture Capital 'Fund of Funds' aiming at making European capital markets deeper, broader, better integrated and with greater capacity to leverage business resources will help bridge this gap.

8 Strengthen the pace of structural reforms and improve framework conditions for the creation, growth and orderly exit of firms, to unlock resources from unproductive companies

Continuing structural reforms that allow markets to react better and faster to the changes that innovations bring to the markets and which facilitate the entry, as well as the orderly exit of firms, will help reallocate resources towards the most innovative and productive companies, avoiding the negative lock-in of resources in unproductive and zombie companies.

9 Raise R&I capacity across the EU

Bridging the innovation divide in Europe in order to build the foundations of sustained growth across all Member States and regions will require renewed efforts to sustain investments in R&I and other intangible assets. It will also require the design, implementation and evaluation of the necessary accompanying reforms to boost the quality, efficiency and institutional capacity in R&I. The mobilisation of national and European resources towards these activities will bring scientific excellence and impactful innovation performance.

10 Europe must capitalise on the increasingly global innovation landscape by opening up its science and innovation to the world

As the global R&I landscape has changed profoundly with the rise of new innovation poles, Europe needs to ensure that it capitalises on all the new knowledge that is created around the world by building strong R&I partnerships and supporting the strengthening of R&I capacity in other countries, so that global knowledge can quickly expand and more countries can contribute to and benefit from global progress.

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