



EUROPEAN COMMISSION  
DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION

# **Country-specific recommendations 2019**

## **Research and Innovation analysis**

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## Chapeau Communication- R&I references

**Page 1** “The weaknesses in global growth reinforce the need to continuously tackle the structural challenges of the EU economies. A stronger reform implementation and prioritisation of reforms are crucial to strengthen the resilience and growth potential of our economies in view of the mounting economic risks and uncertainty. **This includes increasing the impact and scale of innovation** and ensuring the quality and labour market relevance of skills (...)”

**Page 2** “While not all investment needs can be addressed by EU funds, these provide considerable opportunities to addressing the concrete investment gaps identified in the country-specific recommendations. With the more effective policy link between the European Semester and EU funding for 2021-2027 as set out in the Commission’s proposals for the next EU multiannual financial framework, EU financial programmes like InvestEU, Connecting Europe Facility, **Horizon Europe** and Cohesion Policy Funds provide significant opportunities.”

**Page 2** “While the fundamentals have significantly improved in recent years, we need to continue improving the resilience and growth potential of the European economy (...) **Promoting and protecting investment in** education and skills, quality infrastructure and **innovation** will simultaneously strengthen the growth potential of our economies and support aggregate demand. (...)”

**Page 4** “The overall objective of the recommendations is to encourage the Member States to increase their growth potential by modernising their economies and further strengthen their resilience. Given the expected slowdown, all Member States should prioritise reforms aiming at sustainable and inclusive growth. Moreover, **the increasingly digitalised and globalised economies require smarter investments in relevant** infrastructure, **innovation**, education and skills (...)”

**Page 12** “Efficient public administrations and continued efforts to lower administrative burden support the competitiveness of European firms. **Administrative burden remains a drag on investment, innovation and company growth. In particular smaller and highly innovative companies struggle most with burden and inefficiencies of public administration.** Recommendations for burden reduction and improving various aspects of efficiency and quality of public administration, notably to improve the efficiency of public procurement, are issued this year for example to Belgium, Cyprus, Croatia, the Czech Republic, Hungary, Latvia, Poland, Portugal, Romania, Slovakia, Slovenia, and Spain (...)”

**Page 13** “Skills shortages and mismatches can be major investment obstacles. In this perspective, **investment in people is a key complement to investment in innovation, research** and infrastructure, offering positive returns in terms of human capital, a more employable labour force and stronger social cohesion (...)”

**Page 13** “**Strengthening research and innovation activities are key for Europe’s growth. In many Member States and regions there is significant scope to reinforce the cooperation ties between businesses (notably small and medium-sized enterprises), academia, research and public sector actors, e.g. in Bulgaria, , Estonia, Latvia, Lithuania and Romania. Public support to breakthrough innovations and to the creation and scale up of high growth firms, alongside sound framework conditions for business**

**research and development creates market opportunities and raises the innovation capacity of the economy.”**

**Page 13** “Capital investment needs vary across Member States. Fixed capital investments are needed in sectors, regions and countries for the upgrading of production capacities. This applies in particular to laggard regions to continue their catching up process. In addition, **advanced regions and sectors such as the automobile sector need investments to speed up technological changes to face new challenges. Investments in intangible capital are particularly necessary across the board to facilitate the adoption of new technologies.”**

## Austria

### *Recital 16*

While productivity is high in Austria, productivity growth has been lacklustre over recent years despite Austria's considerable efforts, such as by investing in research and development and improving the framework for start-ups. The remaining levers to support productivity growth relate to the digitalisation of businesses, company growth and competition in services. Austria has significant access barriers and restrictive rules on the exercise of business services and regulated professions. These include specific shareholding requirements, extensive reserved activities and interdisciplinary restrictions<sup>1</sup>. Continued efforts to reduce burdens and the planned evaluation of Austria's Trade Licence Act (*Gewerbeordnung*) are important instruments to address this issue.

### *Recital 17*

More competition in the service sector would help address Austria's challenges in spreading digital technologies and business models, notably among micro, small and medium-sized enterprises. Digitalisation of these enterprises is particularly important in Austria as they form the backbone of the Austrian economy. Initiatives such as 'KMU Digital' and 'AT: net' and the implementation of the Digital Roadmap Austria are key. A further issue concerns the scaling-up of companies and in particular of highly innovative companies. Later stage funding, such as in the forms of venture capital and access to public capital markets for scale-ups, is a bottleneck. High-growth companies are crucial for the diffusion of new technologies and business models, including digital ones, and thus for productivity growth.

### ***Investment CSR***

*Focus investment-related economic policy on research and development, innovation, digitalisation, and sustainability, taking into account regional disparities. Support productivity growth by stimulating digitalisation of businesses and company growth and by reducing regulatory barriers in the service sector.*

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<sup>1</sup> Recommendations to address these issues were made in January 2017 in COM(2016) 820 and SWD (2016)436.

## Belgium

### *Recital 16*

Skills mismatches and low job mobility hamper job and productivity growth (...) Tertiary education attainment is high, but there are too few graduates in science, technology, engineering and mathematics (STEM). In 2016, Belgium ranked 26th in the EU for tertiary graduates in STEM education with a low rate of new entrants to related tertiary education fields, in particular for women. The overall implementation of the “STEM Action Plan 2012-2020” in Flanders shows progress, but the number of STEM secondary graduates in technical and vocational paths has stagnated since 2010. The French Community has no STEM policy strategy and still needs to implement its recently adopted “Strategy for Digital Education” plan for schools. Shortages of professionals with an entrepreneurship knowledge in science, technology, engineering and mathematics holds back the development of start-ups. The overall level of digital skills is good, but not improving. The National Reform Programme highlights the agreement between Flanders and Wallonia to improve inter-regional labour mobility.

### *Recital 17*

Research and development is concentrated in a few industries and there is insufficient diffusion of innovation to the rest of the economy, ultimately weighting on productivity growth. Public research appears to be below the Union average in the Regions and Communities other than Flanders. In terms of Research, Development and Innovation, there are also regional and sub-regional disparities. The National Pact for Strategic Investment identifies the reinforcement of digitisation as a promising avenue to boost productivity and the innovation capacity of Belgium. Doing so requires investments in digital infrastructure, including taking effective steps for the successful roll out of 5G, and human capital and entrepreneurial spirit as well as an accelerated take-up of digital technology, in particular by those firms that have been lagging behind so far.

### ***Investment CSR***

*Focus investment-related economic policy on sustainable transport, including upgrading rail infrastructure, the low carbon and energy transition and research and innovation, in particular in digitalisation, taking into account regional disparities. Tackle the growing mobility challenges, by reinforcing incentives and removing barriers to increase the supply and demand of collective and low emission transport.*

## Bulgaria

### *Recital 15*

Despite an increase in the public research budget in 2018, research and development spending remains very low in both private and public sector. Private research and development investment is dominated by large multinational companies and concentrated in the capital region. The slow pace of implementing reforms and high fragmentation in the research, development and innovation system hampers the contribution of research and development investment to productivity and growth. The large number of universities and research institutes continue to perform poorly in high quality scientific research. Science-business links remains very weak and the availability of human capital in the research and development system is a source of significant concern. Clusters and their potential in Bulgaria are underdeveloped as they often lack a critical mass. Further reforms, combined with efficient governance and more effective public investment can maximise the impact on productivity and improve the competitiveness of the economy. In addition, increasing the digitisation of companies and introducing new business models are critical for the country's productivity.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, transport, notably on its sustainability, water, waste and energy infrastructure and energy efficiency, taking into account regional disparities, and improving the business environment.*

## Croatia

### *Recital 17*

Research and innovation capacities and the uptake of advanced technologies need investment to strengthen innovation performance and foster productivity growth, which is being hampered by fragmented and inefficient research and innovation policies. Croatia's 2016-2020 'smart specialisation' strategy (RIS3) aims to foster innovation, overcome fragmentation in the system and ensure that research and development activities are organised around key economic priorities, but its implementation is expected to accelerate further. Investment could support collaboration between universities and businesses, to enable the transfer of technology and commercialisation of research outcomes and could strengthen governance.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, sustainable urban and railway transport, energy efficiency, renewables and environmental infrastructure, taking into account regional disparities. Increase the administration's capacity to design and implement public projects and policies.*

## Cyprus

### *Recital 16*

Cyprus remains a moderate innovator, with innovation performance having declined since 2010. Public and private research and development expenditure levels are among the lowest in the Union, thus hindering the capacity of the research centres and the business sector to innovate. The interaction between academia and businesses is also very limited. Increasing the capacity of the business sector to innovate and boosting access to finance and investments that focus on well-defined areas of smart specialisation are crucial to improve Cyprus's competitiveness and that of its small and medium-sized enterprises in particular.

### *Recital 18*

Implementation of the action plan for growth has led to some progress in entrepreneurship and access to finance for small and medium-sized enterprises. However, financial support measures for small and medium-sized enterprises are still based mainly on grants. Alternative sources of finance such as venture capital, equity funding and crowdfunding remain marginal for Cypriot businesses. Better coordination of business support could improve uptake. Privatisation efforts to attract productivity-enhancing foreign investments are in many cases on hold, and only a few privatisation projects are gradually advancing.

### ***Investment CSR***

*Focus investment-related economic policy on sustainable transport, environment, in particular waste and water management, energy efficiency and renewable energy, digitalisation, including digital skills, and research and innovation, taking into account territorial disparities within the Member State. Adopt legislation to simplify the procedures for strategic investors to obtain necessary permits and licences. Improve access to finance for small and medium-sized enterprises, and resume the implementation of privatisation projects.*

## Czech Republic

### *Recital 16*

The Czech Republic has not yet created a fully functioning innovation ecosystem based on domestic research and development. The country remains a moderate innovator at EU level, despite an increase in research and development intensity. This performance may be linked to public investment lacking a fully coherent strategy to increase the modest research performance and improve cooperation between the private sector and academia. Productivity gains are mostly driven by large foreign companies, while domestic firms lag behind in terms of value added generation. Moreover, total factor productivity, an indicator of how efficiently capital and labour are being used in production, has been growing at a relatively slow pace. An increased focus on domestic innovation could boost productivity across the entire business spectrum, including for small and medium-sized enterprises.

### ***Investment CSR***

*Focus investment-related economic policy on transport, notably on its sustainability, digital infrastructure, and low carbon and energy transition, including energy efficiency, taking into account regional disparities. Reduce the administrative burden on investment and enable more quality-based competition in public procurement. Remove the barriers hampering the development of a fully functioning innovation ecosystem.*

## Denmark

### *Recital 6*

Denmark's research and innovation system is characterised by high levels of investment, a strong human resources base and scientific excellence. However, the research and innovation landscape in Denmark is concentrated in a relatively small number of players such as large firms and foundations mostly in the pharmaceutical and biotechnology sectors, which makes the research and innovation system potentially vulnerable to external shocks. Therefore, there appears to be room for improvement in investing in the scale-up of highly innovative companies.

### ***Investment CSR***

*Focus investment-related economic policy on education and skills, research and innovation to broaden the innovation base to include more companies, and on sustainable transport to tackle road congestion.*

## Estonia

### *Recital 14*

With low levels of investment in research and development, especially from the private sector, Estonia's productivity has been lagging behind. While in 2017 public expenditure on research and development was slightly below the EU average, business investment was only 0.61% of GDP — about half the EU average. There is a low proportion of companies, in particular among small and medium-sized enterprises, reporting research and innovation activities. Non-research and development innovation expenditure is declining and the collaboration between science and businesses is weak. Some of these factors are dragging down the country's innovation performance and productivity. More targeted investment in research, development and innovation, including in the digitalisation and automation of firms would increase Estonia's productivity and competitiveness. Better prioritisation of research topics in areas of relevance for the economy would do likewise. The Estonian authorities have designed and implemented several measures to address the shortcomings in the research and innovation system but their impact remains limited to date.

### ***Investment CSR***

*Focus investment-related economic policy on sustainable transport and energy infrastructure, including interconnections, on fostering research and innovation, and on resource and energy efficiency, taking into account regional disparities.*

## Finland

### *Recital 14*

While public spending on research and development is now stabilising, Finland experienced the sharpest decline of all EU Member States since 2009 in private-sector investment in research and development. Despite an improvement in the macroeconomic situation in recent years, private-sector investment in research and development has not recovered yet. A higher intensity of investment in research and development is a key factor enabling structural change to favour knowledge-intensive sectors of the economy and strengthen long-term growth potential. In addition, cooperation between higher education institutions and the business sector remains one of the key bottlenecks to stimulating innovations and bringing them to the market.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, low carbon and energy transition and sustainable transport, taking into account regional disparities.*

## France

### *Recital 21*

Despite recent initiatives, France has not been able to reduce its gap with the Union's innovation leaders according to the European Innovation Scoreboard. Investment in research and development has remained stable and new companies have difficulty growing. Overall, France is not on track to meet its total research and development intensity target of 3% for 2020 and the level of research and development investment from the business sector is still far below the 2% target. Public expenditure on research and development is above the Union average and includes a wide range of direct and indirect support schemes to business research and innovation efforts, including the research and development tax credit scheme (Crédit d'Impôt Recherche), which is one of the most generous among OECD countries. However, the overall performance of the research and development and innovation ecosystem does not yet match the large amount of public support. While the existing tools, including the Crédit d'Impôt Recherche, were recently evaluated, a comprehensive evaluation of the overall policy mix would help feed the implementation of future policy. The Innovation Council ('Conseil de l'innovation'), set up in July 2018, is tasked with supervising the simplification measures, which include better coordination between regional and national support to innovation. Closer links between science and business, notably through knowledge transfer schemes, could also help spread innovation, as France continues to score below the Union average for public research and development financed by businesses. Support to competitiveness clusters ('pôles de compétitivité') has been renewed for a fourth phase (2019-2022) and priority will be given to clusters organisations well connected with others structures at local level, focused on national industrial priorities and with a track record in EU projects. The Innovation and Industry Fund ('Fonds pour l'innovation et l'industrie'), financed through privatisations, will also help to provide funding for artificial intelligence. Timely development of related technologies, such as the Internet of things, 5G networks, high performance computing and, more generally, the data economy, will be one of the keys to the success of these initiatives. Major differences among regions also exist in terms of regional investment in research and development and innovation performance. Several rural regions or regions in industrial transition rank below the EU average. The outermost regions are at the low end of the scale.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation (while improving the efficiency of public support schemes, including knowledge transfer schemes), renewable energy, energy efficiency and interconnections with the rest of the Union, and on digital infrastructure, taking into account territorial disparities.*

## Germany

### *Recital 9*

Germany has made progress in recent years in increasing its research and development intensity, mainly as a result of an increase in research and development spending by large companies, especially in medium-high tech manufacturing sectors and in particular the automotive sector. The research and development intensity of small and medium sized businesses is significantly below the EU average and continues to fall behind. Small and medium-sized businesses tend to benefit less from cooperation with public research institutes than large companies. These two factors harm business innovation, which are on a long-term downward trend. Additional investment in research and development are essential not only to increase innovation capacity across the economy and boost productivity, but also to facilitate the transition to a low-carbon and circular economy, notably in relation to sustainable transport, green energy technologies, eco-innovation and recycling, and to further increase the performance of the public research sector and its contribution to these goals.

### ***Investment CSR***

*While respecting the medium-term budgetary objective, use fiscal and structural policies to achieve a sustained upward trend in private and public investment, notably at regional and municipal level. Focus investment-related economic policy on education; research and innovation; digitalisation and very-high capacity broadband; sustainable transport as well as energy networks and affordable housing, taking into account regional disparities. Shift taxes away from labour to sources more supportive for inclusive and sustainable growth. Strengthen competition in business services and regulated professions.*

## Greece

### *Recital 18*

The digital transformation of the economy and society remains challenging, with low access to high-speed broadband networks and digital skills well below the EU average. Greece particularly needs to invest in information and communication technology, also to make up for the investment slump during the crisis. Insufficient higher speed broadband connectivity creates major bottlenecks for dynamic export oriented businesses. The investment in innovation and people's skills is insufficient to promote productivity growth, and the lack of digital skills among the population at large is preventing them from finding employment and hindering the development of innovative businesses.

### *Recital 19*

Renewed 'smart specialisation' strategies at national and regional level, and additional measures to address the most pressing weaknesses of the research and innovation system, are needed to stimulate market-oriented investment in research and development, which remains low and weighs on Greece's growth potential. Advances in scientific excellence are hindered by the low intensity of public research and development, a lack of a performance-based funding system and weak sciencebusiness links. Higher investment is also needed to boost the low levels of technological development, reflected in the very low number of patents compared with other Member States, and to fully tap into the potential of start-ups and scale-ups.

### ***Investment CSR***

*Focus investment-related economic policy on sustainable transport and logistics, environmental protection, energy efficiency, renewable energy and interconnection projects, digital technologies, research and development, education, skills, employability, health, and the renewal of urban areas, taking into account regional disparities and the need to ensure social inclusion.*

## Hungary

### *Recital 13*

Increasing research and innovation capacities could improve Hungary's modest innovation performance and increase productivity. The low level of intellectual asset accumulation is reflected in the low number of patent, trademark and design applications, the small number of innovative businesses and the low level of internationalisation by small and medium-sized enterprises. Smaller firms are especially reluctant to innovate, hindering their involvement in global value chains. Business R&D is concentrated in a few large, mainly foreign-owned companies and benefits from generous government support. Supporting science-business cooperation would contribute to better innovation performance and technology transfer. The quality of public science is suffering from inefficient R&D policies and underfunding as public sector R&D expenditure is well below the EU average. Recent policy measures, aiming to cut funding and limiting independency of academic and research fora are creating uncertainty in academic and research forums, which may result in the emigration of top research talent and risk a persistent decline in research quality.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, low carbon energy and transport, waste infrastructure and energy and resource efficiency, taking into account regional disparities. Improve competition in public procurement.*

## Ireland

### *Recital 17*

Fostering the innovation-driven productivity of domestic firms is crucial to support more robust and resilient productivity growth in the country. Business research and development expenditure continues to increase but it remains below the EU average and highly concentrated in the foreign-owned firms. There is scope to gear innovation policies to better support Irish small and medium enterprises. Indirect support (i.e. tax credits) remains the main instrument of public support for research and development in Ireland (accounting for 80% of total public support). Stronger linkages between multinationals and domestic firms could help to improve the diffusion of innovation throughout the economy. In addition, closer cooperation between firms and public research centres would also increase the innovation potential.

### *Recital 18*

Although the low levels of public research and development continue to cause concern (1.05% of GDP compared to an EU average of 2%), the recently adopted Future Jobs Ireland 2019 programme provides a promising framework to stimulate innovation and technological change and improve the productivity of small and medium enterprises. However, its full implementation will depend on a significant increase in public expenditure on research and innovation and the translation of the recently adopted programme into concrete policy measures. As it stands, this ambitious list of measures still lacks important details and precise implementation dates. For instance, for actions to be taken in 2019, no measures have been identified to increase the availability of long-term equity investment to support indigenous companies in scaling their business; the policy mix to incentivise small and medium enterprises to invest in new technologies combines tax credit and non-tax incentives to encourage small and medium enterprises to invest in innovation, but the relative magnitude of these measures remains unknown. While the strategy recognises the importance of broadband infrastructure for productivity, no specific actions and deliverables are planned to address the gap between Ireland and other EU countries when it comes to rolling out future-proof broadband networks in line with EU 2025 Gigabit Society targets.

### ***Investment CSR***

*Focus investment-related economic policy on low carbon and energy transition, the reduction of greenhouse gas emissions, sustainable transport, water, digital infrastructure and affordable and social housing, taking into account regional disparities. Implement measures, including those in the Future Jobs strategy, to diversify the economy and improve the productivity of Irish firms – small and medium enterprises in particular - by using more direct funding instruments to stimulate research and innovation and by reducing regulatory barriers to entrepreneurship.*

## Italy

### *Recital 21*

The adoption by smaller firms of strategies to increase productivity, such as product, process and organisational innovation, remains limited, particularly in southern Italy. Investment in intangibles has been considerably below the Union average since the early 2000s. Business expenditure on research and development is almost half the average level of the euro area. Public support for business expenditure on research and development remains low, although it is improving thanks to the increased role of tax incentives. Public expenditure on research and development is also below the euro area average. Low innovation could also slow down the transition to a green economy. Improving Italy's innovation performance requires further investment in intangibles, as well as a stronger focus on technology transfer, taking into account regional weaknesses and the size of the firms. Public support for business expenditure on research and development can be improved through a balanced mix of direct and indirect measures and an in-depth assessment of the existing temporary tax incentives, to make the most efficient ones permanent. Measures to support knowledge (such as technological clusters) and cooperation among firms help smaller firms in particular to tackle these difficulties and increase their low productivity.

### *Recital 24*

Increasing the efficiency of Italy's public administration and its responsiveness to business would have a positive impact on the business environment, investment and the ability of firms to exploit innovation opportunities (...)

### *Recital 26*

Improvements to the business environment would facilitate entrepreneurship, and better framework conditions for competition would favour a more efficient allocation of resources and productivity gains (...)

### *Recital 30*

(...) Diversifying financing sources would better protect firms' investment from shocks in the banking sector, while supporting innovation and growth.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, and the quality of infrastructure, taking into account regional disparities. Improve the effectiveness of public administration, including by investing in the skills of public employees, by accelerating digitalisation, and by increasing the efficiency and quality of local public services. Address restrictions to competition, particularly in the retail sector and in business services, also through a new annual competition law.*

## Latvia

### *Recital 16*

Latvia invests little in research and development and its investment gap in innovation is important. In 2017, Latvia's share of expenditure on research and development was among the lowest in the European Union and has been rather stable over the past decade. Moreover, research funding relies almost entirely on European Union Funds. As a result, Latvia is a moderate innovator with some strong points, such as its information, communications and technology infrastructure but its performance lags behind in human resources, in public-private sector cooperation and in investment in intellectual property.

### ***Investment CSR***

*Focus investment-related economic policy on innovation, provision of affordable housing, transport notably on its sustainability, resource efficiency and energy efficiency, energy interconnections and on digital infrastructure, taking into account regional disparities.*

## Lithuania

### *Recital 11*

(...) The Lithuanian economy has potential to benefit from investment in skills upgrading, including digital skills, innovation and better integration of the disadvantaged into the labour market (for example persons with disabilities, and older, unemployed or inactive adults). In a broader context, strengthening the capacity of the social partners is important to foster their engagement.

### *Recital 14*

Investment as a share of GDP in Lithuania remains below both the averages in the EU and in other Baltic countries. The level of innovation and the technology absorption capacity of businesses in Lithuania is low. Higher investment levels in research and innovation are needed, especially in the private sector. This would boost productivity, which, despite a recent pick-up, remains well below the EU level. The shortage of information and communication technology specialists points to the need to invest in digital skills which support competitiveness, innovation and Lithuania's capacity to absorb technology, and foster the shift toward more knowledge-based and higher value added economy.

### *Recital 19*

Lithuania has no single strategy for research and innovation. The landscape is characterised by fragmented policies and a proliferation of support schemes that lack synergies. The existence of several implementing agencies that do not take a concerted approach to supporting the research and innovation policy mix adds to a complex governance system that appears to restrict users' access to the panoply of available instruments. This state of affairs is particularly harmful for science-business cooperation and hampers innovative activity. The new division of responsibility for research and innovation policy between the Ministry of Economics and Innovation and the Ministry of Education and Science is not yet conducive to a coherent policy framework with synergetic support schemes, as would be available through a one-stop shop for potential beneficiaries.

### ***Investment CSR***

*Focus investment-related economic policy on innovation, energy and resource efficiency, sustainable transport and energy interconnections, taking into account regional disparities. Stimulate productivity growth by improving the efficiency of public investment. Develop a coherent policy framework to support science-business cooperation and consolidate research and innovation implementing agencies.*

# Luxembourg

## *Recital 10*

Luxembourg's economic model features strong performances consistent with robust and sustained creation of qualified employment. This is supported by high productivity levels, largely reflecting efficiency gains from participation in global markets, in particular in the financial sector. However, productivity growth has stagnated in recent years, hampered by low levels of business investment in innovation and digital integration. Luxembourg's strategy to diversify its economy, by developing key knowledge-intensive sectors in a transition to a data-driven economy, exhibits strong potential to stimulate high value-added investment and boost productivity growth. In that context, public investment remains high and focused on those sectors, including a strong Information and Communication Technology sector. However, this significant public investment has not spilled over, nor has it helped to stimulate private investment in innovation and digitalisation. Increased investment in research and innovation, as well as in digital integration, especially in firms and specifically in small and medium-sized enterprises, is important for improving productivity growth and further diversifying Luxembourg's economy. Developing a coherent and integrated national framework for research and innovation policies and support instruments, including prioritisation based on robust assessment of expected economic impacts, is essential to enabling Luxembourg to exploit the full potential of its innovation eco-system.

## ***Investment CSR***

*Focus economic policy related to investment on fostering digitalisation and innovation, stimulating skills development, improving sustainable transport, and increasing housing supply, including by increasing incentives and lifting barriers to build.*

## Malta

### *Recital 11*

The proportion of innovative enterprises is still lagging behind. Research and innovation performance need to be strengthened by smart specialisation so that this may contribute to growth in productivity. Malta has not yet set up the formulation of a coherent, comprehensive and long-term competitiveness strategy for moving the domestic economy up the value chain. Given Malta's specialisation in fast-growing services and its aspirations for block chain technology, it is critical to invest even more in administrative and supervisory capacity. In addition, increasing Malta's innovation performance will require further investments in intangible assets including research and development, addressing skills deficits and gaps and facilitating science-business links, all within more effective governance of the research and innovation system.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, natural resources management, resource and energy efficiency, sustainable transport, reducing traffic congestion and inclusive education and training.*

## Netherlands

### *Recital 15*

Technical and digital skills and qualified professionals are crucial for the Dutch economy's capacity to innovate and for productivity growth. This points to the need to invest more in training, including training in digital skills, and to promote flexible upskilling and reskilling opportunities. Improving society's capacity to innovate also requires investments to support education in science, technology, engineering and mathematics. Moreover, increased investment in skills, education and training is crucial to improving access to the labour market and the employability of those at the margins of the labour market, while fostering equal opportunities and active inclusion.

### *Recital 16*

While the research and development investment intensity for the Netherlands rose to over 2%, it is still well below the 2.5% national target and the level of top performers. In terms of productivity, the Netherlands is one of the best performing countries in many sectors. Continued productivity growth is therefore highly dependent on innovation. Additional investment in research and development, and innovation, especially in the private sector, would support this.

### ***Investment CSR***

*While respecting the medium-term budgetary objective, use fiscal and structural policies to support an upward trend in investment. Focus investment-related economic policy on research and development in particular in the private sector, on renewable energy, energy efficiency and greenhouse gas emissions reduction strategies and on addressing transport bottlenecks.*

## Poland

### *Recital 14*

Poland's long-term economic prospects depend on developing the economy's capacity to innovate. However, Poland still ranks low in terms of innovation, with low-tech sectors representing an important share in the country's economic structure and with an important regional disparities in innovation performance. While some measures have been taken to improve science-business cooperation, a number of financial and non-financial obstacles persist. In particular, complex administrative procedures and limited skills of academics in managing joint public-private research and development projects remain key barriers. The clusters and formalised corporate networks, especially between small and medium-sized enterprises and large firms, play a limited role in diffusing innovative solutions. The 2018 higher education reform improves some aspects of the Polish scientific landscape, but only partially addresses important issues such as the fragmentation of the research sector, researchers' wages or the internationalisation of Polish science. Gross domestic expenditure on research and development remained at about half of the Union average in 2017, with important regional disparities.

### ***Investment CSR***

*Strengthen the innovative capacity of the economy, including by supporting research institutions and their closer collaboration with business. Focus investment-related economic policy on innovation, transport, notably on its sustainability, digital and energy infrastructure, healthcare and cleaner energy, taking into account regional disparities. Improve the regulatory environment, in particular by strengthening the role of consultations of social partners and public consultations in the legislative process.*

## Portugal

### *Recital 16*

Measures to increase enrolment in higher education, such as a significant increase in scholarships, are ongoing as part of efforts to increase the number of higher education graduates. Among 30-34 year olds in Portugal, 33.5% have completed higher education, which is still below the EU average of 40.7%. The persistency of these low shares, in particular for graduates in information and communication technologies, the natural sciences, mathematics and statistics may have negative consequences for Portugal's productivity growth and capacity to innovate. While the government is trying to address the issue by increasing the number of study places in these fields and implementing a review of the higher education system, more efforts are needed.

### *Recital 20*

The conditions for firms to access finance have been improving over the last few years and the proportion of firms reporting access to finance as main constraint to investment is now in line with the EU average. The Portuguese authorities launched and strengthened several initiatives in this area, such as the Capitalizar programme and other programmes targeting specific types of companies or sectors. However, Portuguese firms still heavily rely on their own resources to finance investment, and a significant amount of bank loans ends up in firms with very low productivity. The low level of capital invested per worker represents a major obstacle to upgrade the productive structure of the Portuguese economy. In this context, it is important that productive investment increases while being gradually rechannelled towards firms with growth potential and in sectors with high productivity profiles. Although other sources of financing, such as venture and equity capital, have been increasing over the last few years, they remain markedly lower than the EU average.

### *Recital 22*

Investment in research and development has recently picked up again but remains insufficient to upgrade the Portuguese national research and innovation system. After years of decline, the share of spending on research and development in relation to GDP increased recently and in 2017, business research and development intensity slightly surpassed the public research and development intensity. Little progress has been made to upgrade Portugal's economic structure to higher shares of value-added in high-tech manufacturing and in knowledge-intensive services. Promoting investment in intangible assets, including research and development but also managerial skills, financial literacy and digital skills to enable firms to grow, increase their innovation capacity and enter export markets offers Portugal significant potential to boost investment and productivity growth.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, railway transport and port infrastructure, low carbon and energy transition and extending energy interconnections, taking into account regional disparities.*

### ***Other CSR***

*Adopt measures to address labour market segmentation. Improve the skills level of the population, in particular their digital literacy, including by making adult learning more relevant to the needs of the labour market. Increase the number of higher education graduates, particularly in science and information technology. Improve the effectiveness and adequacy of the social safety net.*

## Romania

### *Recital 20*

Romania's overall innovative capacity remains low and its future competitiveness is challenged by the large productivity and innovation gap between foreign-owned and domestic firms. Romania's investment in research and development is the lowest in the EU (0.5% of GDP) and public research and development expenditure further declined from 0.32% of GDP in 2011 to 0.21% of GDP in 2017, impeding any capacity building. As a consequence, the quality of the public science base remains very low and science-business links underdeveloped. As the number of tertiary graduates in science, technology, engineering and mathematics has also further declined, skills shortages pose a great challenge to the innovative potential of the Romanian economy. Digitalisation is a key challenge if Romanian innovation and competitiveness are to improve. Romania scores poorly on many components of the Digital Economy and Social Index, including digital public services, digital skills of the overall population and digitalisation of businesses.

### ***Investment CSR***

*Focus investment-related economic policy on transport, notably on its sustainability, low carbon energy and energy efficiency, environmental infrastructure as well as innovation, taking into account regional disparities. Improve preparation and prioritisation of large projects and accelerate their implementation. Improve the efficiency of public procurement and ensure full and sustainable implementation of the national public procurement strategy.*

## Slovakia

### *Recital 16*

A fragmented research system undermines the effectiveness of public research and development investment in raising scientific research quality and does not attract private funding. Research and innovation policy suffers from ineffective coordination among ministries and other actors, leading to delays and failures of major reforms. The suboptimal transformation process of the Slovak Academy of Sciences raised concerns about the continuity of its operations, which led to the collapse of the whole process. A lack or failure of targeted measures, together with limited engagement by research institutions and limited research capacity, all contribute to low private research and development expenditure. Overall, business research and development remains one of the lowest in the EU and is centred on medium/high-tech manufacturing, areas dominated by multinational firms. Measures to stimulate knowledge transfer, strengthen innovative capacities in industry and improve cooperation between businesses and academia are advancing slowly.

### *Recital 18*

A heavy administrative and regulatory burden may negatively affect investment and innovation, especially for small and medium-sized enterprises. Despite government efforts, administrative burden is not being reduced enough and the Slovak business environment is losing ground in international comparisons. Quality of legislation and lack of predictability are a concern for businesses (...)

### ***Investment CSR***

*Focus investment-related economic policy on healthcare, research and innovation, transport, notably on its sustainability, digital infrastructure, energy efficiency, competitiveness of small and medium-sized enterprises, and social housing, taking into account regional disparities. Increase the use of quality-related and lifecycle cost criteria in public procurement operations.*

## Slovenia

### *Recital 17*

The research, development and innovation ecosystem requires improvements to become fully functioning and support measures often lack coherence. Limited support for business education and technology transfer, and, more generally, weak cooperation between science and business, hinders the creation and scaling up of innovative companies. Most small and medium-sized enterprises in Slovenia have a low innovation capacity and the share of innovative companies in Slovenia is indeed decreasing and below the EU average. Slovenia's slow digital transformation limits productivity growth. There are discrepancies in the innovation performance between Slovenia's eastern and western regions, which hinder cooperation and networking. Slovenia is reversing its progress towards the 2020 research and development spending target at the same time as an increase in investment into research, development and innovation would strengthen the country's growth potential. Slovenia attracts a low share of international students at all levels of post-secondary education, especially at the doctoral level while international mobility of researchers and mobility between academia and industry remain limited.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, low carbon and energy transition, sustainable transport, in particular rail, and environmental infrastructure, taking into account regional disparities.*

## Spain

### *Recital 16*

Spain's innovation performance and productivity growth are hampered by subdued levels of investment in research and development and by skills mismatches. Research and development expenditure in the business sector in Spain is only half the level of the Union average, particularly for large firms, with significant regional disparities. That divergence is reinforced by the low and falling execution rate of the public budget for research and development. Skills shortages and mismatches are another important barrier to the development and use of advanced technologies, in particular by small and medium-sized firms. Employment in high technology sectors and knowledge intensive services is well below the Union average in many Spanish regions. While regional innovation strategies for smart specialisation are being developed and the governance of national research and innovation policy is being streamlined, national-regional coordination in the design, implementation and evaluation of policy remains weak. Improving Spain's innovation performance requires significant investments to foster entrepreneurship and start-ups and help them grow and to promote the competitiveness of all firms and their adaptation – including through digitalisation- to higher added-value activities with the aim of expanding their presence in international markets. It also requires a stronger focus on public-private partnerships, cooperation between academia and business and technology transfer, particularly in favour of small and medium-sized companies, a strengthened governance of research and innovation policy across government levels, and a closer alignment of research and development infrastructure and projects to regional and national innovation strategies.

### *Recital 17*

Although improving, the early school leaving rate remains very high in Spain, with significant regional disparities. There is scope to improve educational outcomes which vary greatly across regions. Both factors negatively affect the long-term potential for productivity growth. Efforts to reform the education system have stalled. Firms report difficulty in finding the skills needed to embrace innovation, notably as regards specialists in information and communication technologies. Spain approved measures to upgrade the dual vocational education and training system, which could play a key role in providing the skills and qualifications required to absorb innovation, but enrolment in those systems remains moderate. Spain's rate of tertiary education attainment is above the EU average but tertiary graduates face difficulties in finding adequate jobs. Developing human capital through all levels of education and training, including higher education and vocational training, and greater cooperation between education and business with a view to mitigating existing skills mismatches, could boost labour market access of young graduates. It could also provide firms with the skills and qualifications required to enhance their innovation capacity and to take full advantage of the growth potential offered by digitalisation. Retraining workers in digital skills would also allow Spanish companies to remain competitive in an increasingly digitised economy. All those actions would contribute to the reduction of regional disparities.

### ***Investment CSR***

*Focus investment-related economic policy on fostering innovation, resource and energy efficiency, upgrading rail freight infrastructure and extending energy interconnections with*

*the rest of the Union, taking into account regional disparities. Enhance the effectiveness of policies supporting research and innovation.*

## Sweden

### *Recital 9*

Maintaining investments in transport infrastructure can contribute to improved labour mobility, regional cohesion and housing market and foster Sweden's long-term productivity growth. The government has announced considerable investments in transport infrastructure through the national plan for infrastructure 2018-2029 to upgrade the different transport modes (in particular railway and road). The plan contains major investments to develop the railway system, promoting the switch in goods transport from roads to railways, thus also helping to reduce emissions. Maintaining high levels of investment in research and development, favourable framework conditions and a broader innovation base are key to securing Sweden's position as innovation leader. Sweden's innovation model has traditionally relied on a limited number of large, globally active, technology companies. It would be important to create an environment that also nurtures the innovation potential of SMEs and startups. Sweden's innovation capacity could also be further improved by increased collaboration between academia and SMEs.

### ***Investment CSR***

*Focus investment related economic policy on education and skills, maintaining investment in sustainable transport to upgrade the different transport modes, in particular railways, and research and innovation, taking into account regional disparities.*

## United Kingdom

### *Recital 9*

The United Kingdom has long been the G7 economy with the lowest capital investment as a share of GDP. Investment also fell particularly sharply in the financial crisis, and a post-crisis recovery in private investment has stalled. The United Kingdom's research and development investment intensity has been around 1.7% of GDP for the past decade, below the EU average. Research and development investment is concentrated in a limited number of companies and regions. These broad-based shortfalls in both physical and human capital are a root cause of the United Kingdom's relatively low and stagnant labour productivity.

### ***Investment CSR***

*Focus investment-related economic policy on research and innovation, housing, training and improving skills, sustainable transport and low carbon and energy transition, taking into account regional diversity.*