

Three foundations

A competitive, sustainable,
inclusive Europe

EUROPEAN INVESTMENT BANK

Three foundations

A competitive, sustainable,
inclusive Europe

Three foundations – A competitive, sustainable, inclusive Europe

Thematic Study

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The mission of the EIB's Economics Department is to provide economic analyses and studies to support the Bank in its operations and in its positioning, strategy and policy. The department, a team of 40, is led by Debora Revoltella, Director of Economics.

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Contents

Summary	5
Introduction	8
Staying competitive amid a technological revolution	11
Growing well-being within ecological limits	22
Ensuring that Europe works for everyone	32
Conclusions	49
About the European Investment Bank	54

Summary

For 60 years, the project of European unity has promoted peace, social progress and impressive stability. Yet none of these gains can be taken for granted. Today, Europe faces disruptive technological change, increasing global competition and the destructive forces of climate change. These unprecedented trends threaten to critically undermine the European model of social cohesion and social sustainability. This situation calls for a deep and rapid transformation of our economic system, which will be critical to Europe's future prosperity and cohesion, its global role and its ecosystems.

Europe needs renewal. Business as usual is no longer an option. Fast-changing technologies offer strategic opportunities if we are able to seize them. The goal of decarbonisation also represents a historic opportunity and mission. Decarbonisation can mobilise efforts across Europe to renew its economy, not only to achieve sustainability but also to drive innovation and digitalisation, and to restore Europe's competitive position. At the same time, this transition will test Europe's social model. This model needs to adapt quickly to ensure a just transition in which everyone has the skills and support they need to contribute and benefit.

Competitiveness, sustainability and social inclusion have to be addressed together, holistically. Instead of merely adapting to change, we need to be pro-active through timely reform and investment that sets us on a pathway towards a society that is productive, environmentally sustainable and inclusive, by design.

How to stay competitive amid a technological revolution

To be at the innovation frontier, Europe must close the gap in research and development (R&D), investments in intangible assets and digitalisation. Europe is not on track to meet its R&D investment targets for 2020 and is underinvesting in comparison to its peers. Most of the gap is in corporate R&D. Europe is failing to generate new market leaders in technologically strategic sectors. Relatively few European Union firms are active or leading innovators and dynamism remains low, with few young firms emerging and growing. Relative to the United States, EU firms also underinvest in the broader category of intangible assets – like software, data and training – that are vital for digitalisation. EU manufacturers have kept up with their US counterparts in adopting digital technologies, but the EU service sector lags behind. Digitalisation is associated with improved performance, and most firms say past investments in digital technologies were too low. That slow uptake could make the digital gap so wide that it becomes permanent, and EU companies could find it difficult to challenge the dominance of foreign firms.

Europe needs a more enabling environment for competitiveness. Market size, the regulatory environment, uncertainty and skills are important issues in Europe. They are often associated with persistent frictions and impediments to the full realisation of the EU single market and the efficient reallocation of resources. Investment in infrastructure in the European Union is falling, with negative implications for growth. Substantial increases in infrastructure investment are needed in certain sectors, like transport and digital services.

Europe needs a pro-active policy to enhance skills, particularly as a complement to digitalisation. A lack of skills is now the most-reported barrier to investment in Europe. This lack of skills has particular implications for innovation and digitalisation, with firms citing lack of staff with the right skills as the main barrier to adopting digital technologies.

Europe's innovators need a more supportive financial system. Young, small and innovative firms face greater constraints accessing bank finance, while equity financing in Europe is comparatively underdeveloped. A lack of finance undermines resilience, innovation and growth in new technology sectors. Fast-growing firms face constraints in the form of finance, skills and regulations, while uncertainty may be a key deterrent to growth. More than ten years after the financial crisis, the financial sector remains fragmented, with limited private sector risk-sharing.

The current wave of technological change brings both opportunities and risks for social inclusion. Efforts to adapt to the technological transformation might enhance the European market's dynamism and efficiency. Digitalisation is expected to lead to a "hollowing-out" of the labour market, however. Early investment in appropriate skills could help steer firms away from labour-saving automation towards job creation through the development of new products and services.

How to improve well-being within ecological limits

Sustainability requires a comprehensive shift from linear to circular models. The European economy, like many others, is pushing up against the boundaries of what the Earth can sustain. This is most evident in the climate crisis. The decarbonisation scenarios presented by the European Commission involve a wide range of actions covering multiple economic sectors. Decarbonisation will require substantial extra investment by businesses and households. So far, progress has been made by picking the low-hanging fruit, with little effect on the way businesses operate and Europeans live. Going forward, a common European vision and support will be essential.

Europe needs a mission-oriented approach to achieving key breakthroughs for decarbonisation. The zero-carbon transition has far-reaching implications for Europe's competitiveness, from energy and resource dependence to technological leadership. Europe's energy trade balance will improve drastically, but it could become more dependent on other raw materials. Meanwhile, rapid technological change is aiding the transition, but innovation needs to accelerate. Leadership in innovation will determine who reaps the most benefits, in terms of competitiveness, from the energy transition, with China already quickly emerging as a world leader in clean tech.

The transition to a zero-carbon economy needs to be a just transition. The transition is likely to be positive for growth and jobs, overall, but the impact will vary for different regions, underlining the importance of EU support for regional adaptation and diversification. Energy costs are projected to rise significantly, but at a slower rate than income after 2030. Nonetheless, energy costs are not borne equally across income groups: low-income households are likely to face a greater need to adjust, with less capacity to do so. Energy poverty is not just a risk: it is a reality for many people in Europe, and it must be addressed in any successful transition.

How to ensure Europe works for everyone

The European Union has been a motor of social and economic convergence, but new axes of regional divergence need to be addressed. Structural change and the agglomeration effects of cities seem to be creating a regional "middle-income trap". This concentration of growth in metropolitan areas has an upside for global competitiveness, but it also comes at a cost.

Persistent or rising income inequality within EU countries is a concern. Income inequality has risen since the 1980s. European tax and welfare systems have moderated, but not eliminated, this rise. Persistent inequalities in income also exist along gender lines, while the enormous burden of unpaid household and care work is not equally shared and will grow as populations age. Work-life balance in the European Union is deteriorating, with negative implications for well-being and productivity.

For younger generations in Europe, progress on social mobility may have stalled, with negative implications for competitiveness. Inequality of opportunity is partly driven by inequality of income and wealth, but labour market conditions and high-quality public goods and services can have a dramatic impact on the equality of chances. At the EU level, employment has reached record levels, but significant differences between EU countries remain, spurring a wave of migration within the European Union and increasing competition for top skills. The quality and accessibility of basic services in the European Union is far from equal, and a crisis-related decline in social capital expenditure is a severe concern, especially in the context of ageing and urbanisation.

Europe must invest in greater social inclusion to create a competitive and sustainable economy. Universal public services and work-life balance matter for productivity. So do equality of opportunity and, by extension, inequalities of income and wealth. Such fairness also matters for solidarity and consent, without which collective responses to common challenges become impossible. Redistributive social policy is important, particularly in reducing inequality of opportunity, but there is a need to think beyond just laissez-faire and income redistribution. We need to focus more on getting the institutional conditions right to make markets more inclusive, sustainable and competitive from the start. Europe is still a global leader in social inclusion, but our social model must be updated to meet new challenges.

We must be ambitious and make up for lost time

We have a unique chance to transform the European economy, an opportunity we cannot afford to miss. Delays in addressing the climate crisis could come at a terrible cost. Yet this crisis is also an unprecedented opportunity to renew the European economy and restore its ability to compete. Regaining ground in innovation and the digital transformation is essential for Europe's future, but like decarbonisation could also create stark winners and losers. Europe's social model needs to adapt quickly. We need to heal the divide between people and territories. We need to ensure that everyone has the support necessary to fully contribute to – and enjoy the benefits of – these historic transitions. We need a single concerted, holistic response. Competitiveness, sustainability and inclusion have to be addressed together, as complementary parts of the whole, along with the trade-offs and synergies between them.

We must create a society that is productive, sustainable and inclusive *by design*

This means getting the conditions right for rapid and inclusive transformation. It means deep strategic thinking, with prioritisation and frontloading of policies. We need to get the whole ecosystem right for innovation and competitiveness, including removal of barriers to social mobility. Decarbonisation now requires society-wide transformation in which businesses and households all have the institutional conditions, guidance and support they need.

We must work together as Europeans

Scale and coordination matter. Innovative firms need a deeper single market. The transformation of our energy and transports systems requires collaboration across the continent. Rapid innovation and the scaling-up of key strategic technologies need to be driven by the concerted, coordinated efforts of EU countries. Meanwhile, a deeper single market for labour is needed to create and extend opportunities and to better match workers' skills to market needs. Policy action is needed to ensure that EU savings get to where they are needed across the continent to finance the tremendous investment required.

We must invest

The investment decisions we make now will determine success or failure in the decades ahead. We face urgent, structural needs for accelerated investment. High-quality investment in skills lies at the core of our ability to thrive in a digitalising, decarbonising world, and to do so in a way that leaves no one behind. Investment in R&D and the adoption of new technologies by business is the motor of both these transitions. Meanwhile, Europe's infrastructure – energy, digital, environmental, transport, social – is ageing as fast as its population. It needs to be expanded and transformed to meet the challenges ahead. We need to be pro-active yet also rigorous to ensure that sound and timely investment takes place to meet these wide-ranging needs. The European Investment Bank, as the Union's dedicated investment promotion institution, has the experience and capacity to be the cornerstone of these efforts.

Introduction

The European project has been a success. Following the catastrophe of war, Europe's prevailing social model helped to achieve a remarkable recovery. With globally competitive, expanding economies, complemented by unparalleled social safety nets, this European model offered people a vision of inclusive prosperity, fostering solidarity across borders. It brought countries and people together. It enabled an extension of solidarity to former communist countries, sharing benefits of progressive economic convergence and rising quality of life.

However, as the world economy has become more open and globalised, Europe's ability to generate growing prosperity has been increasingly challenged. Many regions have struggled to adapt in the face of structural change and deindustrialisation. While the European Union has been a "convergence machine" in helping new members catch up, inequality *within* countries has grown, starting as early as the 1980s. In the 1990s, Europe was late in catching the first wave of information technology. Since the global financial crisis, Europe has entered a period of overall weak and uneven growth that has placed great strains on Europe's social fabric, excluding millions from the labour market and bringing certain macroeconomic imbalances within the European economy to the point of crisis.

European solidarity and common vision has suffered. Appetite for further projects of collective action and political integration has dwindled. This has happened, moreover, at an inopportune moment, with Europe already running out of time to respond to a number of accelerating global megatrends:

- **The digital revolution:** How can Europe seize the opportunities arising from automation, artificial intelligence and other emerging digital technologies? How can we maximise positive social impacts and mitigate negative ones?
- **Intensifying global competition:** How can Europe respond to increased global competition, with new high-tech economies like China, shifting geopolitics, and renewed potential for conflicts over issues such as resource access and cybersecurity?
- **Environmental breakdown:** How can we revolutionise our economic system so that it works in harmony with the environment, helping to avert catastrophic climate change and the destruction of our land and water ecosystems?
- **Ageing demographics:** With the populations of many EU countries set to shrink and the numbers of older people growing, how can Europe adapt its welfare systems to accommodate slower growth and rising social commitments?

These are not challenges that any European country can hope to address adequately on its own. This is "the European paradox": ambitious supranational collective action has become imperative, but at a moment when the appetite for such cooperation has faltered.

These trends present not only threats, but also immense opportunities that risk slipping through our hands. Europe's response to these challenges must embrace technological change to enhance productivity, quality of life and global competitiveness. It must also rebuild upon new, ecologically sustainable foundations that could contribute to making Europe both more competitive and a better place to live. Finally, Europe must address social sustainability to ensure that creating a competitive and ecologically sustainable economy does not mean further social exclusion that could undermine the whole endeavour. It needs to renew the social compact that helped to make Europe so successful.

This report examines these three intricately-linked issues: economic, ecological and social.

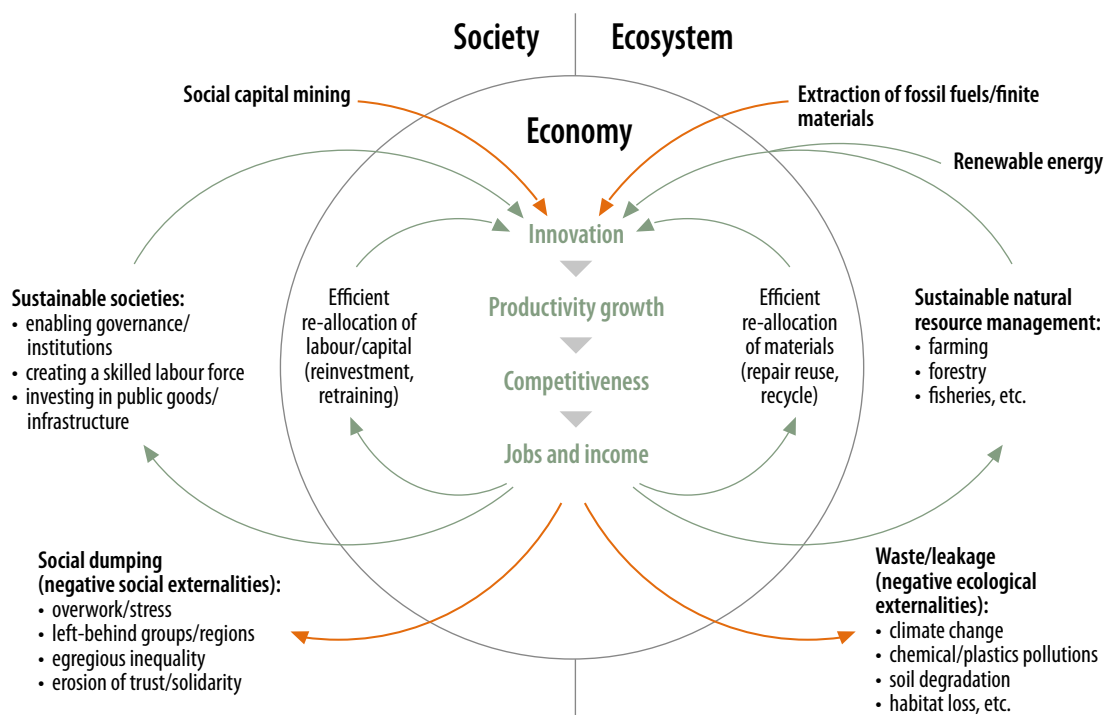
What is competitiveness?

Europe must invest in long-term, productivity-driven competitiveness, and this is the focus of this report. Long-term competitiveness involves innovation. It also involves the spread of new technologies, knowledge and skills throughout the economy and requires the emergence of innovative firms capable of taking a global lead. It requires resources to flow as efficiently as possible towards the most productive usage. It depends, moreover, on a broad enabling environment where mission-driven and forward-looking public policy plays a critical role. Productivity growth at the firm level then supports trade and participation in the higher-value segments of global value chains, which in turn supports employment and growing prosperity.

What is ecological sustainability?

Europe's prosperity has been built on a carbon-intensive and materially wasteful model that is no longer viable. Sustainability means we have to switch to a new model. The European economy must decarbonise, striving for net-zero emissions by 2050, given the irreversible momentum of climate change already under way. At the same time, our economy has to move away from linear extraction-to-pollution material pathways, to achieve a circular economy. The economy must become circular in a broad sense: not just minimising waste and maximising materials, but also minimising fossil fuel use and moving to sustainable, regenerative interactions between human production systems and global ecosystems. In this way, it can provide a basis for the economic well-being of all.

Figure 1
Environmental and social sustainability - a double circle



What is social sustainability?

If ecological sustainability requires a transition from linear pathways to circular ones, then so does social sustainability. Firms in a market economy are dependent on households and the State for labour and skills; for supportive regulation and the institutions that underpin market activity; for public goods such as basic infrastructure and research; and for the relative stability and predictability that make long-term investment possible.

These inputs and enabling conditions cannot be taken for granted. They depend on active public policy and elements such as a degree of social mobility and public trust in institutions. In turn, this social compact is strongly influenced by the availability of resources for policy implementation, working conditions and the degree of income inequality. Lastly, social sustainability is affected by the long-term trends of demographic change and migration, which, if well managed, may create opportunities, but may also threaten the sustainability of government policies and popular consent.

The risk for Europe is a (further) drift towards a more linear social model. “Linear” here means a market economy that takes advantage of the legacy of past investment, mining social capital such as trust, skills and other public goods, without investing in their renewal. Linear means prioritising immediate private gain without regard to negative social consequences such as excessive inequalities, left-behind regions, a lack of social mobility, overwork and the erosion of popular consent.

A positive vision for Europe

In the end, we are not faced with three challenges – economic, ecological and social – but one. Economic competitiveness, ecological sustainability and social inclusion must be seen as three elements of the same process: if one is left out, the whole process is likely to fail. This is why this report addresses all three with a particular focus on the complex, multidimensional interlinkages between them. It draws on a wide range of research, with particular reference to insights from the EIB’s *Investment Report 2018/2019* and the EIB Group Survey on Investment and Investment Finance (EIBIS), which queries 12 500 European firms.

The vital role of long-term, patient investment is a key theme that emerges from this report. The critical role of collaboration across Europe, to achieve a socially and ecologically sustainable and competitive economy, is another. This report concludes by discussing the nature and scale of the investment strategy needed. It also emphasises the opportunities and potential for European cooperation. It is only by working together as Europeans that we will be able to face the massive challenges ahead.

Staying competitive amid a technological revolution

To sustain and enhance its prosperity, Europe needs to excel in high value-added activities within globalised systems of production. It must achieve a leading presence in strategic technologies and sectors, and accelerate the spread of innovations throughout the rest of the economy.

Up to now, Europe has been successful in certain sectors: automotive, pharmaceuticals and aerospace. These sectors have been a cornerstone of the economy. But Europe has also fallen behind in areas such as consumer electronics, digital services and the widespread adoption of key enabling technologies like artificial intelligence. Most European business champions were created during an earlier phase of industrialisation, and many of them are linked to carbon-intensive technologies. No truly European giant has emerged in digital services.

Looking forward, Europe is not well placed to benefit from the spread of digital technologies. Big data analytics, the internet of things, advanced robotics, machine learning and other applications of artificial intelligence will have a dramatic effect on modes of production and consumption, not just creating new industries but having a far-reaching impact across all sectors. Decarbonisation, meanwhile, will necessitate changing patterns of consumption and production with severe implications for some traditional sectors and the regions that have depended on them.

These shifts are happening against the backdrop of an increasingly competitive global environment in which past successes count for little. Continuing globalisation implies new opportunities through specialisation and trade, but also greater pressure on firms and industries to keep up with global peers. As with the first wave of globalisation, shifts in demand for skills and the location of different activities can have implications for inclusion, potentially driving greater inequality. Alternatively, recent moves towards greater protectionism could result in slower growth and intensified state-backed efforts to dominate in strategic technologies and industries.

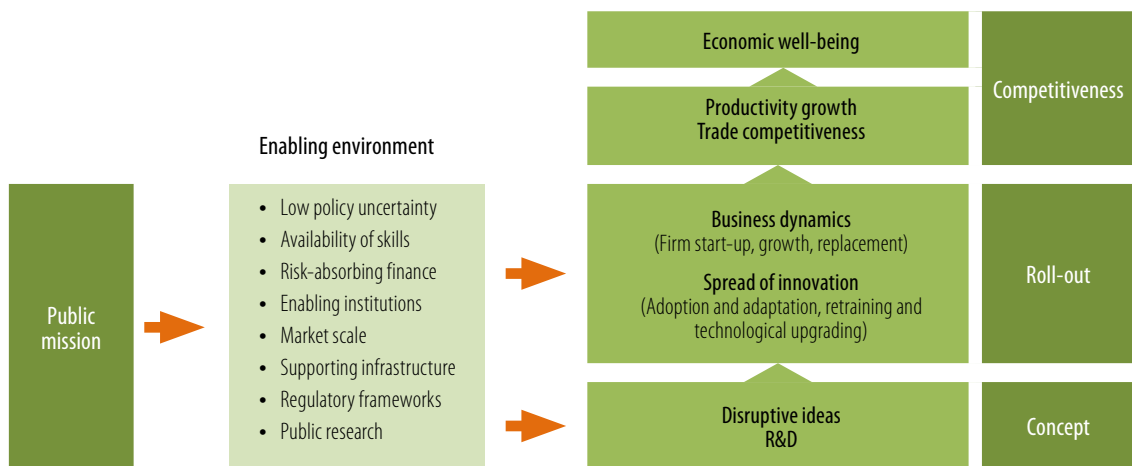
New technologies will thus have a dramatic effect on European society, but the nature of those changes – whether jobs are created or lost, or whether regions catch up or get left behind – depends to a great extent on whether European firms and industries are able to adapt fully and quickly to changing demands and to seize new opportunities. It depends on Europe's ability to compete.

A framework for understanding competitiveness

Competitiveness is ultimately about productivity. In the long term, it is about being able to compete in activities that generate a high return, moving up the value chain where possible. Such productivity then underpins trade performance, providing the basis of European prosperity, now and in the future.

Productivity growth depends on a broad process of innovation, the adoption of innovation, and a reallocation of resources within the economy to increase efficiency. This process starts, in a sense, with research and the development of new ideas, products and processes that lie at the origin of technological change. But R&D is only the start; just as important is the larger process of innovation adoption and adaptation by firms. The latter takes place through new investment in tangible assets, such as more advanced machinery and equipment, and in intangible assets such as software, data, brands and employee skills. It also takes place through the dynamic process by which new, innovative firms are created and are able to grow, replacing less competitive firms, allowing labour and capital resources to move to more productive uses. As a result, the productivity level of the whole economy rises.

Figure 2
A holistic approach to competitiveness



The broad innovation process depends on an enabling environment. An enabling environment has many elements: the availability of finance adapted to the needs of innovative and high-growth-potential companies; regulatory frameworks that do not impose unnecessary barriers but instead set standards and help create markets for new technologies; critical infrastructure that allows new technologies to be deployed at scale; public investment in skills; public support for basic research and pre-commercial R&D; and the political stability and regulatory predictability that is essential for long-term investment.

Public policy plays a critical, mission-setting role. It clearly has a vital role to play in creating an enabling environment, but it should not be merely a neutral bystander, or reactive. Experience has shown how the State can be active in setting the direction of innovation through a mission-driven approach, and needs to do so.¹ Whether on decarbonisation, digitalisation, or other societal challenges, European institutions and Member States need to set ambitious EU-wide goals to push innovation boundaries, to incentivise risk-taking, and to make sure all the enabling conditions are in place.

Investment in research and development

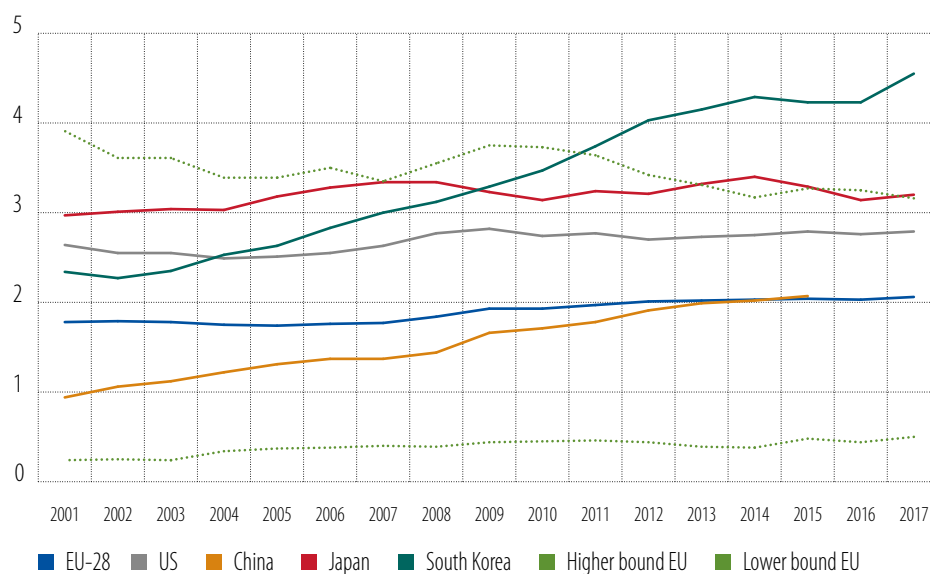
Global expenditure on research and development has more than doubled in the last two decades, reflecting its growing importance for competitiveness. Global R&D spending rose from USD 722 billion in 2000 to USD 1.9 trillion by 2015. While R&D expenditure rose in all major economies, China accounted for more than 30% of the global increase, overtaking the European Union and approaching the United States in its share of global R&D spending.²

¹ European Commission, DG Research and Innovation, “A renewed European Agenda for Research and Innovation - Europe’s chance to shape its future”, (COM (2018) 306).

² EIB Investment Report 2018/2019.

Europe is suffering from an R&D gap. In terms of R&D as a share of gross domestic product (GDP), European spending has remained stagnant at 2%, clearly behind the United States and Japan and recently overtaken by China. Within Europe there is great diversity, with R&D spending in some EU countries reaching levels similar to Japan and the United States. Nonetheless, even for the rest of the European Union, convergence implies a shift into more knowledge and R&D-intensive activities. When compared to the European Union's 2020 target of R&D spending equal to 3% of GDP, Europe is facing an investment gap of some EUR 110 billion per year, with the shortfall mostly in business R&D (Figure 3).

Figure 3
R&D investment in the European Union and selected countries, 2001-2017 (% GDP)

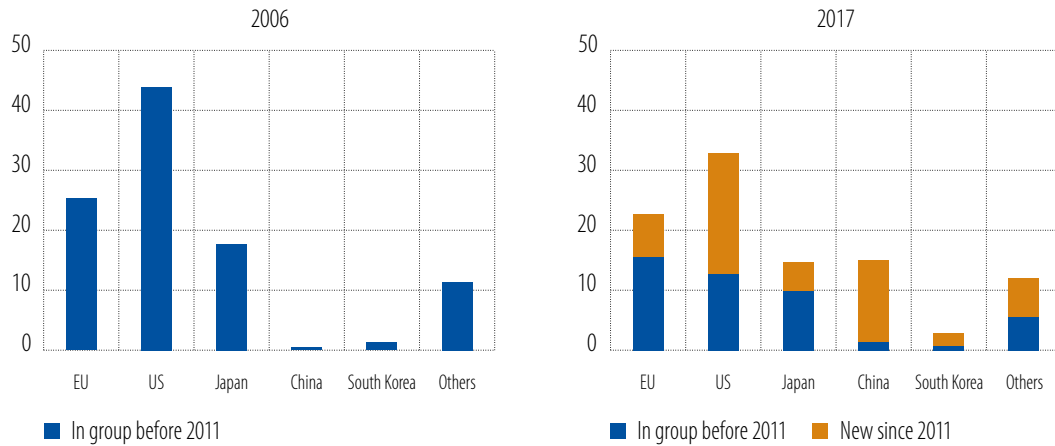


Source: Eurostat.

Relatively few EU firms are active or leading innovators. In line with aggregate figures, EIB Investment Survey data reveals that only 27% of EU firms invest non-negligible amounts in R&D, compared with 45% in the United States. Only 8% of EU firms can be categorised as “leading innovators” that invest significantly in R&D and introduce products new to their market, against 16% in the United States. The gap is even larger for young firms, which are more likely to be a leading innovator in the United States and slightly less likely to be one in the European Union. However, EU firms are twice as likely to focus on adopting existing innovations (24% vs 12%), with this figure rising to 31% in new Member States, signalling a process of catching-up.

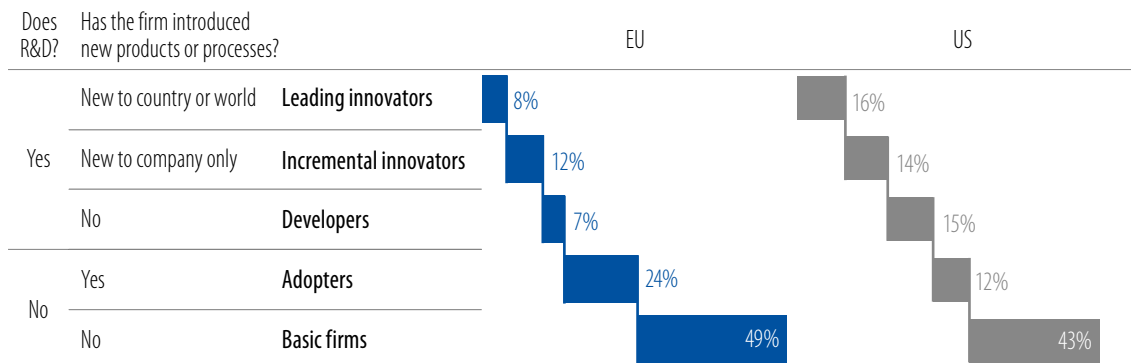
The European Union is losing ground among the world’s top firms for R&D spending. Just 2 500 firms account for around 90% of global business R&D spending. Among these, China’s presence has grown dramatically. Moreover, the share of new entrants to the group is notably low in Europe, compared to the United States, illustrating Europe’s reliance on long-established companies and suggesting that innovative firms in Europe face challenges in scaling-up. The European Union accounts for 48% of top firms’ R&D investment in the automotive sector, 26% in pharma and biotech, and only 13% in the tech sector, which covers electronics and digital products and services.

Figure 4
Distribution of global top R&D companies (%)



Note: Top 1 338 firms by R&D spending for 2006 and top 2 500 for 2017. Source: EIB calculations based on the EU Industrial R&D Investment Scoreboard.

Figure 5
Innovation profiles in the European Union and the United States



Source: EIBIS 2018.

The adoption of digital technologies

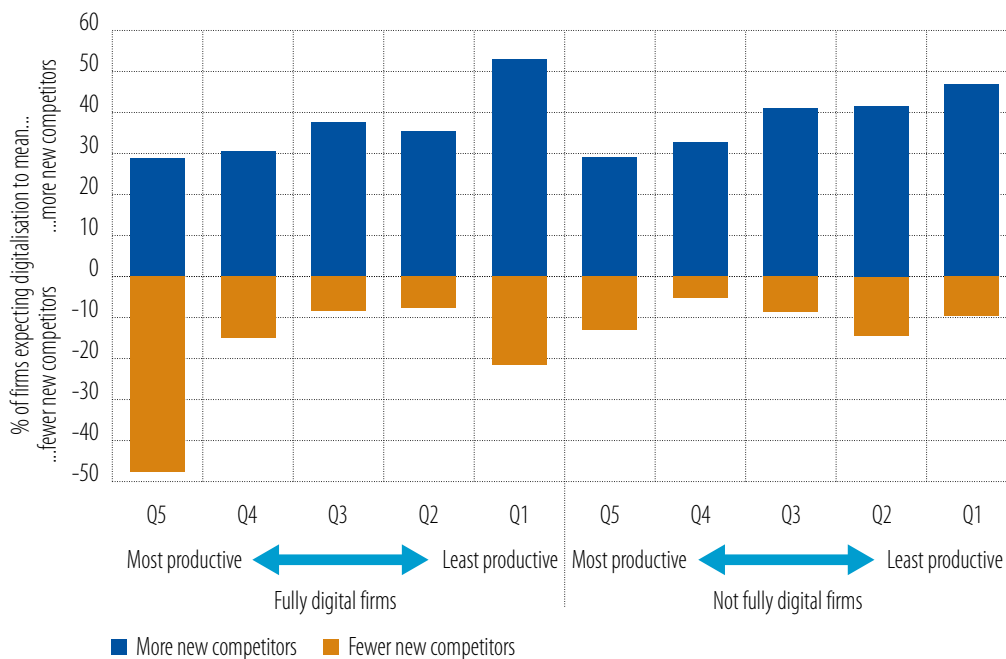
Looking beyond R&D, EU firms also appear to underinvest in the broader category of intangible assets, and even in machinery and equipment, relative to their US counterparts. Investment in intangible assets such as employee skills, organisational processes, and digital assets is recognised as playing a very important role in the spread of innovation, complementing R&D. The EIBIS survey reveals that firms in the European Union invest proportionately less in intangibles, compared with US firms (36% vs 45%). The spread of digital and other new technologies in industry is fostered through investment in new, state-of-the-art machinery and equipment. In this respect, it is of concern that since 2012 a large gap in machinery and equipment investment (one percentage point of GDP) has opened up between the United States and the European Union.

EU manufacturing firms are at par with their US counterparts in the adoption of digital technologies, but the EU service sector lags behind. “State-of-the-art” increasingly means digital. In manufacturing, investment is still centred on tangible machinery and equipment, but the integration of digital technologies, such as advanced robotics, is becoming ubiquitous at the technological frontier. In services, the shift of the model is often more dramatic, from offline to online, with a step change in opportunities to apply productivity-enhancing technology. Accordingly, the rate of adoption of some form of digital technology in services is high: 83% in the United States, while the EU service sector lags somewhat with 74%. In the manufacturing sector, 60% of firms on both sides of the Atlantic have adopted digital technologies.

Digitalisation is associated with improved firm performance. Survey evidence shows that firms that adopt digital technologies tend to be more productive, to invest more and to engage more in innovation activities. Firms credit recent digitalisation with enhanced sales in both the European Union and United States, estimating that it has increased sales by 10% on average.

On balance, firms consider their past investments in digital technologies to have been too low. Firms reporting “too low” digital investment exceed those that report it as “too high” by 50 percentage points in manufacturing and 30 percentage points in services. The goal of enhancing the productivity, quality and flexibility of production processes is the main motor behind the adoption of digital technologies, particularly in manufacturing. While EU firms seem particularly motivated by efficiency gains, US firms tend to focus more on using new technologies to create new market opportunities.

Figure 6
Will digitalisation increase competition?



Note: Firms are grouped by quintile in terms of total factor productivity. Source: EIBIS Digital and Skills, 2018.

Europe’s slow start in digitalisation could create permanent gaps, with market dominance hard to challenge. Meanwhile, survey data supports the hypothesis that the most advanced digital firms face weaker competitive pressure, in both the European Union and the United States. On the one hand, firms that have adopted digital technologies are achieving higher mark-ups on average than non-digital firms. On the other, while most firms expect the spread of digital technologies to increase competition, the most productive digital adopters actually expect the threat from new competitors to decrease (Figure 6). This concentration of market power underlines how technological change poses risks to social inclusion, as well as to European competitiveness, if Europe is not able to generate its own superstars.

Is Europe providing an enabling environment for competitiveness?

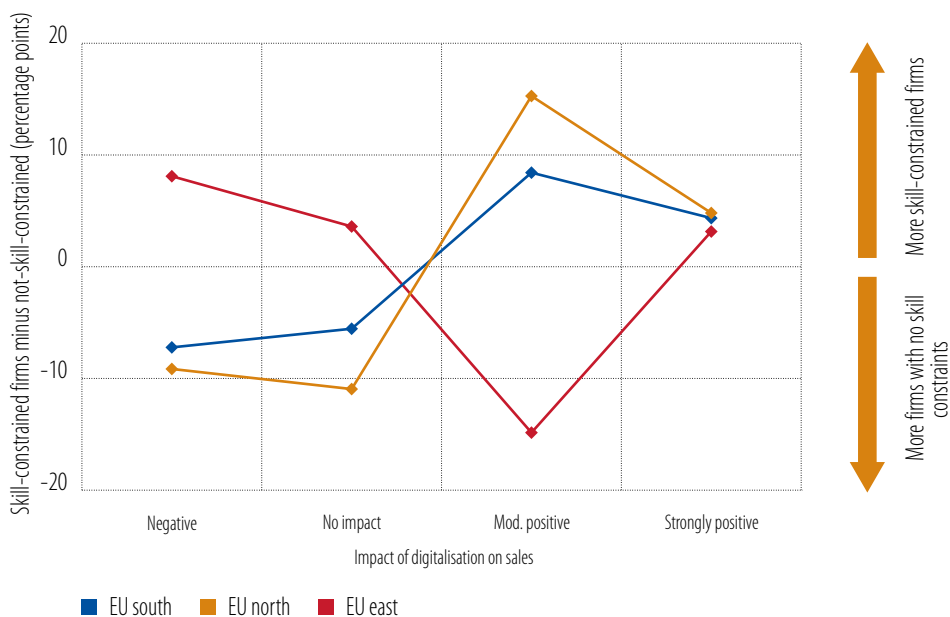
Innovation in Europe is constrained on a number of levels. These constraints include the quality of the regulatory and institutional environment, market size and openness, policy predictability, public investment in basic research and infrastructure, and the availability of labour with appropriate skills.

Market size, the regulatory environment and uncertainty are important issues in the European context. Market size is an important factor in the ability of innovative firms to scale up. The incompleteness of the single market, particularly with regard to digital services and services more generally, is a crucial constraining factor. Business and labour market regulations are seen as obstacles to investment by almost two thirds of European firms. However, regulations also play an important role in establishing framework conditions for markets (including the single market), in the roll-out of new technologies, and in avoiding negative environmental and social consequences that would impede economic performance, as well as impact general well-being. Effective regulation and public administration, without unnecessary barriers, is therefore key. An even more important barrier to investment, reported by 71% of firms, is uncertainty. Uncertainty reflects a lack of macroeconomic and regulatory predictability and political stability.

Skills are the most-reported barrier to investment in Europe, with particular implications for innovation and digitalisation. In 2018, 77% of firms reported availability of skills to be a barrier to investment. For firms carrying out R&D or adopting innovations, this rises to 82% and 79% respectively, a relationship that proves highly significant using a regression analysis.

Lack of staff with the right skills is the main barrier to the adoption of digital technologies. When firms are asked to specify the main barrier to investment in digital technologies, 40% of those interviewed in the European Union cite the availability of staff with the right skills, far above any other category. Looking forward, 60% of firms expect digitalisation to increase demand for staff with higher-level skills. Firms adopting advanced digital technologies also report unfilled vacancies more often than other firms.

Figure 7
Impact of digitalisation affects firms' experience of skill constraints



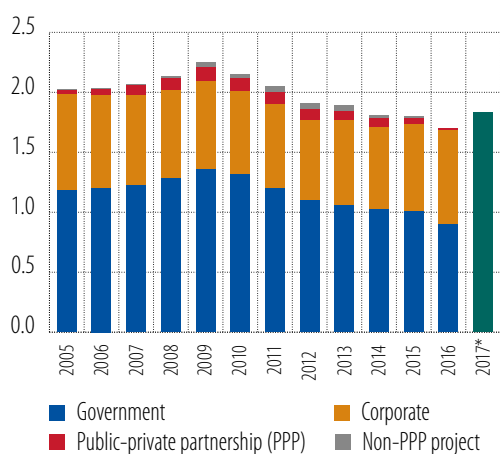
Source: EIBIS 2018.

Lack of appropriate skills is not only a result of digitalisation, but also a barrier to the successful adoption of digital technologies. While lack of staff with the right skills is reported by firms across the European Union to be the main barrier to investment in digital technologies, there are telling regional differences. In Northern and Southern Europe, firms are significantly more likely to see skills availability as a barrier to digitalisation if they have recently invested in digital technology, and also if they credit this investment with an increase in sales. This suggests that skill constraints start to bite particularly when digitalisation is successful and the firm is growing. In Central and Eastern Europe, however, the reverse is true: skill constraints are reported more frequently by non-digital firms, and among firms that credit past digitalisation with a zero or negative impact on sales.³ In this region, the availability of skills appears to be not just a constraint on the growth of digital adopters, but a factor deterring adoption or undermining its success.

EU investment in infrastructure is falling, with negative implications for growth. Infrastructure investment has been declining since 2010, with the latest data suggesting a stabilisation at around 75% of its pre-financial crisis level. This fall has not been driven by a saturation of investment needs. One in three large municipalities in Europe said that infrastructure investment was below local needs, while infrastructure investment fell most in regions where infrastructure quality was already relatively low. An analysis of the effect of regional improvements in transport, digital and education infrastructure suggests that firms have been able to grow more, in response to positive global demand shocks, in regions where infrastructure quality is better.

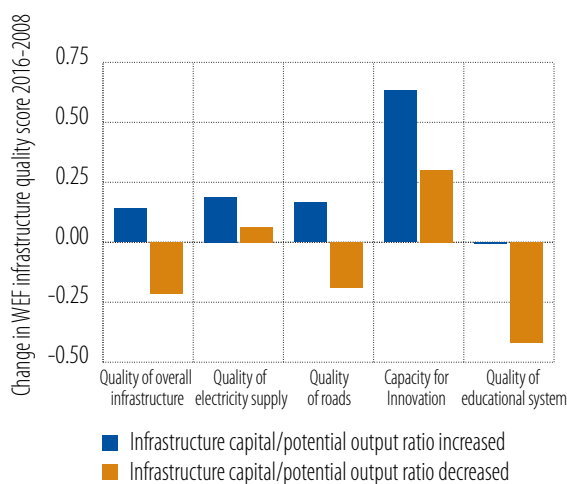
Substantial increases in infrastructure investment are needed in certain sectors. For example, returning to pre-crisis (2006-10) levels of investment in transport infrastructure would imply an annual increase in investment (over the 2017 level) of EUR 32.5 billion. Clearing the accumulated backlog since 2010 within a decade would increase this figure to around EUR 50 billion. In the telecommunications sector, meeting the European Commission’s “European Gigabit Society” target by 2025 is estimated to require around EUR 70 billion of investment a year, some EUR 20 billion a year more than the forecast level of market-driven capital expenditure.⁴

Figure 8
EU infrastructure investment
by institutional sector (% of GDP)



Note: Based on Eurostat, Projectware, EPEC data. Data for 2017 are provisional. Data are missing for Belgium, Croatia, Lithuania, Poland, Romania and the United Kingdom. Source: EIB Infrastructure Database.

Figure 9
Change in infrastructure stock and
perceived infrastructure quality



Source: Eurostat capital stock data and World Economic Forum competitiveness data. Comparison 2016 vs 2008.

³ In this report, unless otherwise defined, Northern Europe comprises Austria, Belgium, Denmark, Germany, France, Finland, Ireland, Luxembourg, Netherlands, Sweden and the United Kingdom; Eastern Europe comprises Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia; and Southern Europe comprises Cyprus, Italy, Greece, Malta, Portugal and Spain.

⁴ European Commission, “Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society”, COM (2016) 587.

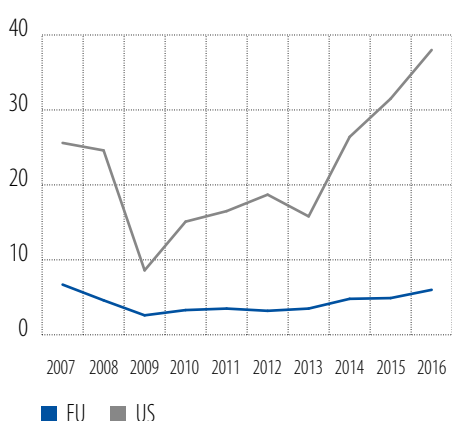
Is Europe’s financial sector supportive of innovation?

Young, small and innovative firms face greater constraints accessing bank finance. The number of finance-constrained firms in the European Union has fallen to only 5%, but firms that are young, small, innovative or that invest heavily in intangibles, are proportionally more affected. This reflects the fact that bank finance continues to play a very dominant role in European economies (particularly in comparison with the United States) and the fact that bank lending is less adept at meeting the needs of such firms than equity finance. Collateral requirements and financing costs are the main sources of dissatisfaction, notably for young firms and those investing heavily in intangibles. The financial constraints faced by innovative firms stand in contrast to their relatively strong performance and financial health.

Equity financing in Europe is comparatively underdeveloped, undermining resilience to shocks, innovation and growth in new technology sectors. Private equity, venture capital and listed equity funding all lag behind the United States and the most advanced Asian countries on several fronts, leaving European firms more dependent on bank lending and weakening the economy’s resilience to financial shocks. A greater role for equity would promote risk-sharing across the private sector and the improved allocation of capital across the European Union. Expanding risk-taking and helping to avoid the growth-stage trap in a firm’s development would promote innovation and European competitiveness in new emerging technologies.

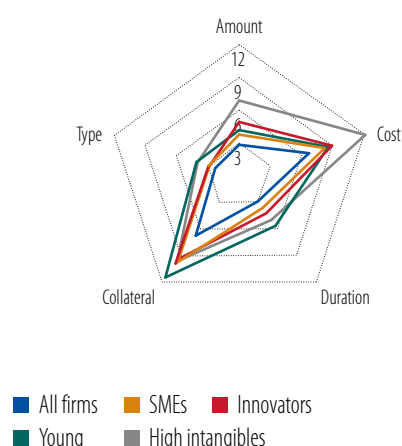
High-growth enterprises face elevated constraints in terms of finance, skills and regulations, while uncertainty may be a key deterrent of growth. In Europe, from 2003 to 2016 the fastest-growing 8% of firms – mostly small businesses in high-tech and knowledge-intensive industries – created 43% of new jobs. Regardless of profitability, these high-growth enterprises are more likely to be finance-constrained. These firms typically have high leverage levels and risk profiles, making them less attractive to banks and more likely to apply for equity financing. Growing fast, they are significantly more likely to identify skills and regulations as barriers to further investment, relative to other firms. By contrast, among firms with similar profitability but not (yet) high growth, uncertainty stands out as a more frequent complaint.⁵

Figure 10
Venture capital funds raised in the European Union and the United States
 (EUR billion)



Source: European Commission, DG Research and Innovation (COM(2018) 306). Data: Invest Europe, NCVA, Pictbook.

Figure 11
Share of firms dissatisfied with different loan conditions, by firm type (%)

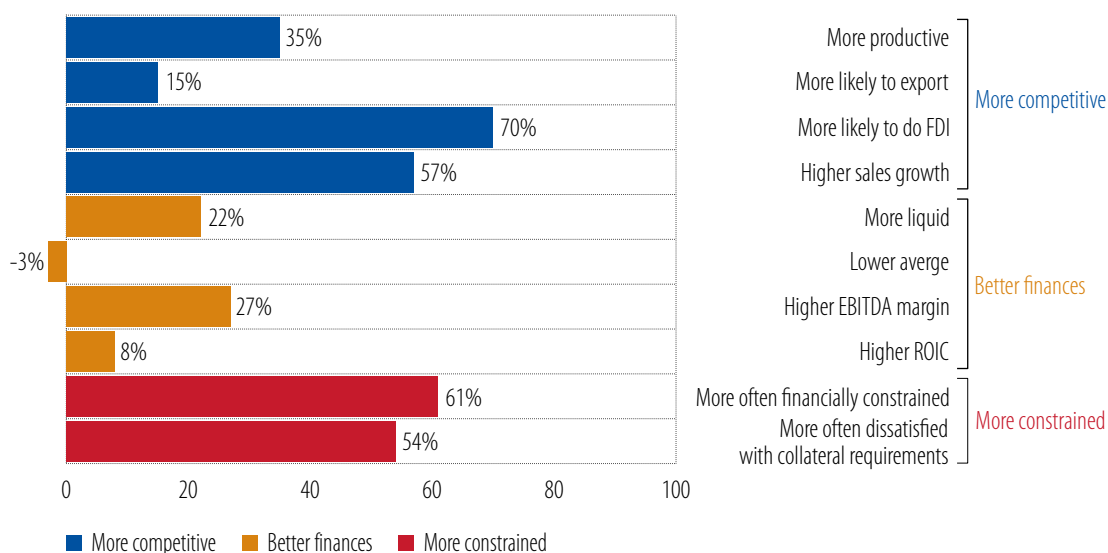


Source: EIBIS 2018.

⁵ Annalisa Ferrando, A., Pal, R. and Durante, E., “Financing and obstacles for high growth enterprises: the European case”, EIB Working Papers 2019(03).

Figure 12
Innovative firms: more competitive, better finances, more constrained

Firms that registered a patent in the last five years, compared to others:



Source: EIBIS 2018.

Note: FDI= foreign direct investment; EBITDA= earnings before interest, tax, depreciation and amortisation; ROIC= return on invested capital.

Is competitiveness bad for inclusion?

The current wave of technological advances brings both opportunities and risks. By enabling further growth in productivity, this wave has the potential to raise economic well-being throughout society. The fast development and widespread adoption of new technologies will be essential in the transition to a carbon-neutral and circular economy, as long as change is steered away from resource- and waste-intensive paths and towards needed solutions. On the other hand, the acceleration of digitalisation and automation could have dramatic effects on inequality and social inclusion. Rapid technological change poses a challenge for some industrial sectors and types of employment, potentially aggravating unemployment and economic exclusion in some regions and for some categories of workers. At the same time, evidence exists that disruptive technologies are leading to national and global concentrations of market power that have implications for both economic inequality and Europe’s ability to compete successfully on the global stage.

Digitalisation is already leading to a hollowing-out of the labour market. Every wave of automation has given rise to fears of technological unemployment – the fear that robots will take our jobs. The evidence thus far, however, is that employment levels have been maintained through shifts to new branches of production, as in the historical decline of employment in agriculture and manufacturing and the rise of services. But such transitions are not without implications. The shift to services has been shown to have been accompanied by a polarisation in the demand for skills, with a shift from medium-skilled manufacturing jobs to low-skilled jobs in services, leading to a widening gap in labour incomes.⁶

⁶ OECD, “Achieving inclusive growth in the face of digital transformation and the future of work”, OECD report to G-20 Finance Ministers, 19 March 2018. Autor, D. and Salomons, A. (2017); “Robocalypse Now: Does Productivity Growth Threaten Employment?”, *European Central Bank Conference Proceedings*, June 2017.

EIBIS data supports this expectation for the current wave of digitalisation in the European Union and the United States, revealing higher employment growth for the highest and lowest-wage positions at the expense of jobs in the middle of the wage spectrum. The result is labour market polarisation in which middle-income workers potentially face displacement into lower-skilled and lower-wage employment.

Figure 13
Change in employment over the wage spectrum



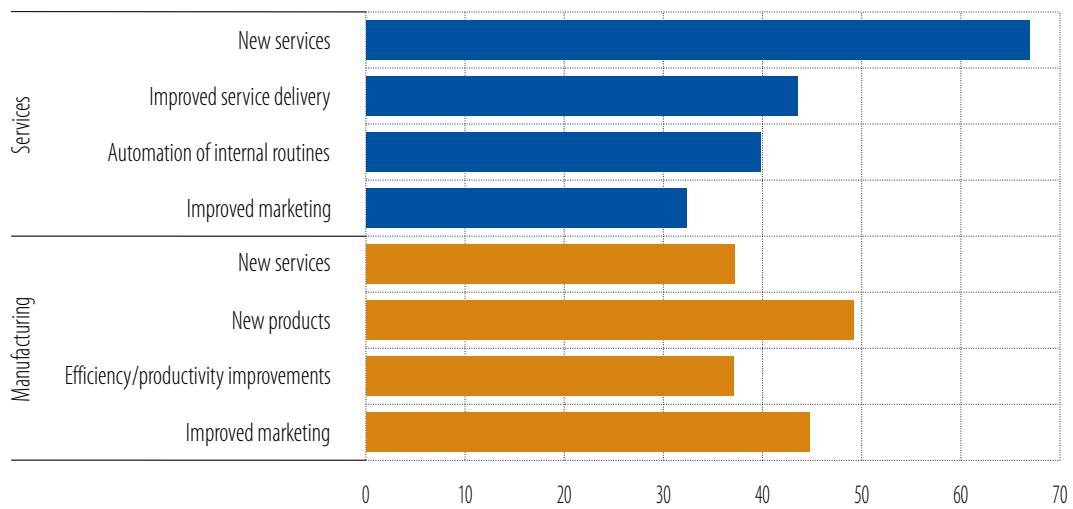
Source: EIBIS 2018.

Early investment in appropriate skills could help steer firms from focusing on labour-saving automation towards the creation of new products and services, and therefore jobs. A lack of staff with the right skills may not only be a barrier to the adoption of digital technologies by firms, but may also distort firms' decision-making on the type and purpose of digitalisation they pursue. Firms investing in digital technology to provide customers with new services (in the service sector) or products (in manufacturing) are significantly more likely to see lack of skills as a barrier than firms using digital technology to automate or otherwise find efficiencies in the production of existing products and services (Figure 14). This suggests two things:

- innovation involving the introduction of new products and services to the market is likely to be constrained by the availability of skills, while a focus on labour-saving automation is likely to be less sensitive to skills availability, and may relieve some of the need to recruit workers with particular skills;
- a lack of workers with required skills may not only be a result of changing technology and changing skill requirements, but may also influence the direction of innovation and the adoption of technology. Skill constraints may make firms more likely to direct investment towards the automation of existing production processes, in a way that saves labour or reduces skill requirements, and less likely to engage in skill-intensive innovation.

The adoption of digital technologies for the automation and simplification of tasks is not a bad thing as it raises productivity. However, it needs to be complemented by the generation of new jobs creating previously unavailable goods and services, as has happened historically with the shifts from agriculture and manufacturing. If automation is principally driven by skills constraints, it will have negative implications for employment and for labour's share of income, exacerbating inequality. Policies targeting skills development should not just be reactive, but pro-active. Frontloading support for investment in skills could create an enabling environment for new product innovation, helping to forestall negative impacts of automation on employment and inclusion.

Figure 14
EU firms reporting a lack of staff with the right skills, by purpose of digitalisation (% of firms)



Source: EIBIS 2018.

Growing well-being within ecological limits

The global environment is changing at an unprecedented speed. Average temperatures are already 1°C above pre-industrial levels, with a 1.5°C rise already effectively locked-in.⁷ Extreme weather events, such as severe heatwaves in Europe, already appear to be much more frequent.⁸ Meanwhile, the impacts of uncontrolled resource extraction and pollution on marine and land ecosystems, as well as on human health, are a cause of growing global concern.

It is clear that time to act is running out. The European Union has embraced the Paris Agreement and set an ambitious target of achieving carbon neutrality by 2050.⁹ The European Union is on course to reach its 2020 climate targets, and has taken necessary steps to achieve its 2030 targets (-40% in emissions). Yet, worryingly, current policies are projected to achieve no more than a 60% reduction in emissions by 2050.

As climate change accelerates, the window of opportunity to avoid disastrous disruptions to both ecosystems and human societies is rapidly closing. Decarbonisation will require far-reaching changes in technology, infrastructure, business models and mindsets. The longer action is delayed, the steeper the slopes for reducing emissions in the future. Decisive action now makes the transition less disruptive and reduces the risk of reaching irreversible tipping points. It provides forward-looking guidance, allows for the development of long-term local and national decarbonisation strategies, reduces the risk of coordination failures and the escalation of future costs, as well as of further investment in carbon-intensive economic activities, industrial equipment and durable goods that may end up becoming stranded assets.

Decarbonisation has the potential to create both winners and losers. It has the potential to create and exacerbate economic injustice. Moreover, the resistance spurred by such exclusion could make success unattainable. The transition to a zero-carbon economy needs to be a just transition: one that is socially sustainable, that commands popular support and that does not shift burdens on to those least able to carry them. It will also require large-scale cooperation and coordination – a common mission driving innovation and forward-looking investment. In fact, decarbonisation is an opportunity to re-establish the European economy as one that is not only carbon-neutral, but competitive, inclusive and prosperous.

The transition to a zero-carbon, circular economy

The European economy is exceeding planetary boundaries with respect to the impact per capita that can be safely sustained. Human activity can push natural systems beyond stable states, causing abrupt and possibly irreversible damage. Because of uncertainty about when such “tipping points” are reached, the planetary boundaries framework identifies three zones: safe, increasing risk and high risk. Stabilising global temperature at no more than 2 °C above pre-industrial levels is estimated to imply a safe emissions limit for greenhouse gases (GHGs) per capita globally that is just one sixth of current EU consumption-based emissions per capita (Figure 15). Moreover, the European Union’s throughput of raw materials still takes place at a globally unsustainable level, despite progress towards a circular economy, and phosphorus and nitrogen run-off from agriculture is at levels that already contribute to oxygen-depleted “dead-zones” in the world’s oceans. Freshwater scarcity, notably in Southern Europe, may be starkly exacerbated by climate change.¹⁰

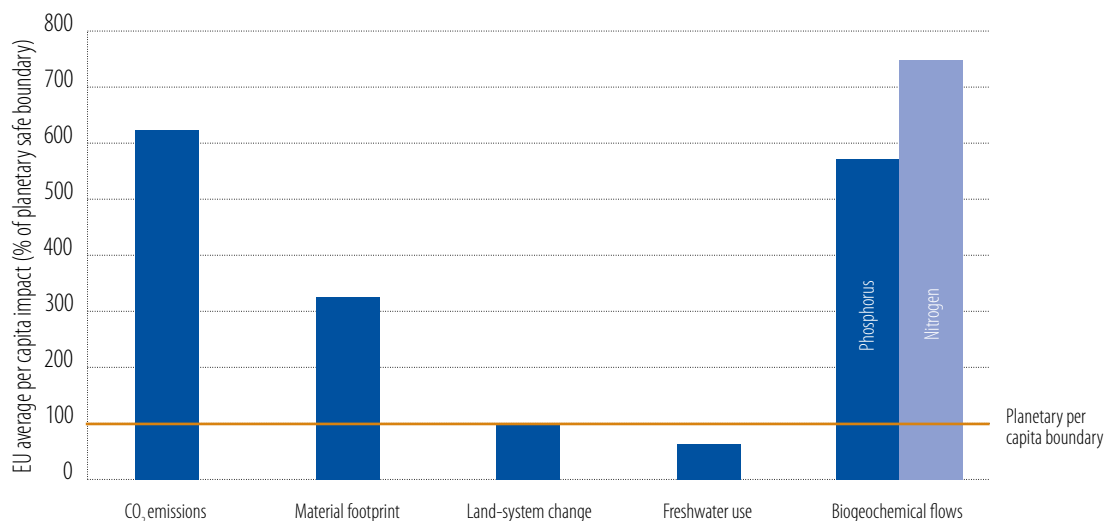
7 IPCC, 2018, “Global warming of 1.5°C. An IPCC Special Report on the impact of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty”, Masson-Delmotte, V. et al (eds).

8 Extreme heatwaves were recorded in Europe in 2014, 2015, 2017 and 2018. Source: European Environment Agency.

9 The Paris Agreement sets all countries the goal of keeping global warming “well below 2°C” above pre-industrial levels, and pursuing efforts to limit the increase to 1.5°C (United Nations (2015), The Paris Agreement. To achieve even the less ambitious goal, global emissions need to be halved from their 1990 level by 2050, and reduced to net zero by the end of the century. To reduce the risk of massive disruptions from extreme weather events, the +1.5°C goal would require close to net-zero global GHG emissions by 2050, particularly if the massive deployment of still-unproven negative emissions technology in the latter half of the century is to be avoided.

10 OECD (2017), “Water Risk Hotspots for Agriculture”, *OECD Studies on Water*, OECD Publishing, Paris.

Figure 15
The European economy and planetary boundaries



Note: EU average is weighted by population. Source: O'Neill, D.W., Fanning, A.L., Lamb, W.F., and Steinberger, J.K. (2018). *A good life for all within planetary boundaries*. *Nature Sustainability* 1, 88-95. <https://www.nature.com/articles/s41893-018-0021-4>. For data see: <https://goodlife.leeds.ac.uk/download-data/>.

Sustainability requires a comprehensive shift from “linear” to “circular”. Europe has to achieve a general shift away from linear extraction-to-pollution pathways, towards a more “circular” economy, both in the narrower sense of enhanced cyclical reuse and recovery of materials, and in the wider sense of an economy founded on sustainable, regenerative interactions between human society and global ecosystems. The transition to a zero-carbon economy could facilitate such a shift, as should climate change adaptation.

The European Commission has now set out scenarios for achieving the Paris Agreement objectives in its communication *A Clean Planet for All* and the supporting analysis.¹¹ Against a baseline scenario that forecasts the impact of existing policies and expected trends, the analysis explores how major additional investment in the development and deployment of different energy carriers, energy efficiency or the circular economy could support the limiting of temperature rises to 2°C (Table 1). It further lays out scenarios for pursuing a 1.5°C temperature rise with a focus on either technology-centred solutions or on lifestyle changes and enhancing natural carbon sinks.

¹¹ European Commission, “In-depth analysis in support of the Commission communication COM(2018) 733”, November 2018.

The decarbonisation scenarios entail wide-ranging actions across multiple sectors, as set out in *A Clean Planet for All*:

- **Decarbonisation of the electricity supply** is already under way, with greenhouse gas-free sources already making up more than half of Europe’s electricity supply (56% including nuclear energy). This trend needs to continue, with renewables (mainly solar and wind) expected to contribute 80% of electricity by 2050, supplemented by 15% from nuclear. The development and deployment of further electrification and battery storage, or of alternative energy carriers such as hydrogen and synthetic e-fuels, will be required for hard-to-decarbonise sectors. Storage capacity and system flexibility will need to be strengthened.

Table 1
A Clean Planet for All: emissions reduction scenarios

		Greenhouse gas reduction by 2050*
Baseline scenario	Impact of current policies and existing trends: <ul style="list-style-type: none"> • EU policies already agreed/proposed by 2018; • cost of low-carbon technologies assumed to fall over time; • fossil fuels assumed to become more expensive. 	-64%
Scenarios for “well below +2°C”	Different scenarios evaluate potential impact, beyond the baseline, of alternative technologies/approaches: <ul style="list-style-type: none"> • electrification and battery storage; • hydrogen as energy carrier/store; • synthetic fuels as energy carrier/store; • maximising energy efficiency to reduce demand; • maximising circular economy processes to reduce demands for primary materials and energy. 	-85% to -89%
Scenarios for “pursuing efforts to achieve +1.5°C”	Two scenarios for achieving net-zero emissions by 2050: <ul style="list-style-type: none"> • 1.5TECH: strong reliance on technology options, with significant carbon capture and storage and some incentives for land-use carbon sinks; • 1.5LIFE: assumes a significant drive by businesses and households towards a more circular economy and lower-carbon consumption patterns (incl. transport and diet), with stronger incentives for land-use carbon sinks. 	-100%

*From 1990 levels, including sinks.

Source: European Commission, “In-depth analysis in support of the Commission communication COM(2018) 733”, November 2018.

- **Reducing energy demand through greater energy efficiency** in industry, services and housing will be no less important than decarbonising the energy supply. While new buildings will need to meet “nearly zero-energy” standards, the great majority of buildings in 2050 will still be older stock. The renovation rate will need to more than double with renovation also going deeper. Further shifts to more energy-efficient equipment and smart building technology will be needed.
- **Expanding the circular economy** through materials reuse, recycling and other forms of recirculation and increased product efficiency could reduce emissions in heavy industry by up to 60% by 2050.¹² This will increase competitiveness, reduce reliance on vulnerable imports and mitigate the other environmental challenges of over-extraction and pollution.
- **A shift to clean and connected mobility** will need a range of measures including modal shifts to rail and urban public transport, greater electrification of cars, more use of advanced biofuels, hydrogen or e-fuels (particularly for heavy vehicles and aircraft). This will require significant investments in local and Europe-wide infrastructure to integrate alternative fuels, facilitate shifts in consumer behaviour and promote synergies between transport, digitalisation and electricity networks.
- **Enhancing land use sustainability** is vital to reduce greenhouse gas emissions from agriculture, to enhance carbon sinks in forests and soils, and to increase the supply of biofuels. Digitalisation and smart technologies have an important role to play, such as in the precision application of fertilisers, which can reduce greenhouse gas emissions.

¹² From 1990 levels. Material Economics Sverige AB (2018), “The Circular Economy: a Powerful Force for Climate Mitigation”.

- **Negative emissions technology** will be needed to balance out residual hard-to-abate emissions from sources such as industry and agriculture. Concerted efforts to develop and deploy carbon capture and storage options will be needed alongside the protection and enhancement of natural sinks.
- **Climate change adaptation and resilience** needs to move to the centre of planning. In a high emissions scenario, weather-related disasters could annually affect about two thirds of the EU population,¹³ with losses from flooding alone expected to exceed EUR 1 trillion per year by the end of the century.¹⁴ Even in a more moderate scenario, and without investment in adaptation, damage to Europe’s critical infrastructure could increase tenfold, to EUR 34 billion per year.¹⁵ In this context, there is a need to both accelerate investment in specific adaptation measures such as flood defences and drought adaptation, and ensure that resilience to changing climatic conditions is integral to all interventions. There is also a need for actions that have strong mitigation/adaptation synergies such as afforestation, the creation of urban green spaces and the preservation and restoration of natural marine and terrestrial ecosystems (such as natural wetlands that are effective for both carbon sequestration and flood mitigation).

Decarbonisation will require investment to rise considerably. Today, EU countries invest around 2% of GDP in energy systems, energy efficiency and related infrastructure. This investment has already put us on a moderate decarbonisation pathway, and such efforts already benefit from Member State and EU-level public support. However, to achieve zero-net emissions by 2050, the capital stock needs to be renewed and relevant investment will need to increase to around 2.8% of GDP over the 2030-2050 period, or EUR 576 billion per year on average in the most tech-intensive scenario (Table 2). While investments of around EUR 200 billion will be needed in power generation and the electricity grid, even larger investment is required in energy efficiency, particularly for residential buildings. Investments in new vehicles (cars, trains, aircraft, etc.) are expected to rise by as much as EUR 120 billion per year over recent levels. Investments in transport infrastructure, including in systems to facilitate the sharing of vehicles, are not included in these estimates, and neither are investments specifically for climate change adaptation and resilience.

Table 2

Average annual investment requirement by scenario (EUR billion, 2013 prices)

	Baseline		"Well below +2°C" scenarios	"Pursuing efforts to achieve +1.5°C"	
	2021-2030	2031-2050	Min-max range	1.5TECH	1.5LIFE
			2031-2050	2031-2050	2031-2050
Energy supply	115	113	133-233	246	201
Power grid	59	71	81-110	103	90
Power plants and boilers	56	42	52-109	121	95
New energy carriers	0.1	0.3	0.9-28.9	22	17
Energy use (excl. transport)	281	264	270-335	330	318
Industry	18	11	13-36	28	22
Residential	199	199	198-235	226	228
Services	64	54	57-67	76	68
Total excluding transport	396	377	438-522	576	519
Transport (vehicles)	685	813	837-907	904	847
Total	1 081	1 190	1 276-1 402	1 480	1 366

Source: European Commission, "In-depth analysis in support of the Commission communication COM(2018) 733", November 2018.

13 Forzieri et al. (2017), "Increasing risk over time of weather-related hazards to the European population: a data-driven prognostic study", *The Lancet Planetary Health*, 5(1): 200-208.

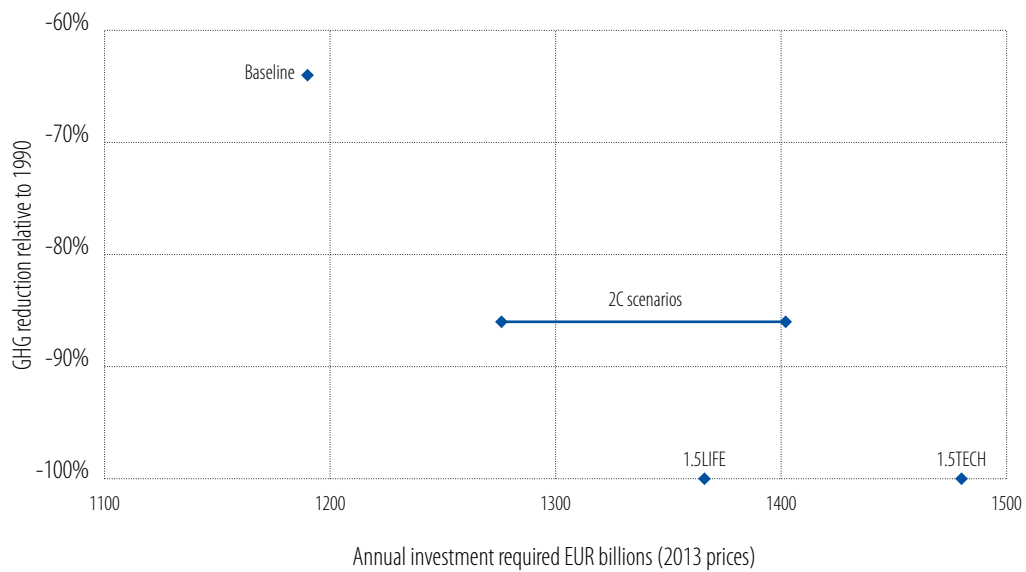
14 Alfieri et al. (2018), "Multi-Model Projections of River Flood Risk in Europe under Global Warming", *Climate*, 6 (1) : 6.

15 Forzieri et al (2018), "Escalating impacts of climate extremes on critical infrastructures in Europe", *Global Environmental Change* 48, 97-107.

Most of this investment will be carried out by businesses and households, but European vision and support will be essential. This investment will definitely be worthwhile, particularly compared to the huge potential costs of climate change. Under a high emissions scenario, the effects of climate change could cost the European Union around 2% of GDP per year by 2100.¹⁶ If sufficient action is taken, the likely improvements in human health from reduced pollution alone have been valued at EUR 200 billion or more per year.¹⁷ Yet these are positive externalities not reflected in financial returns. Public action is needed to ensure that these positive outcomes are taken into account in decision-making. Other market failures must be addressed, such as information gaps and misaligned incentives that hold back investment in energy efficiency. Perhaps most importantly, it is vital to reduce uncertainty. Businesses and households need the European Union and Member States to offer clear long-term signals to encourage forward-looking capital expenditure, to set the right course and to avoid a future of stranded assets.

The financial system has an important role to play to scale up climate finance. The required magnitude and pace of investment for efficient decarbonisation will require – alongside the public sector – a major effort by the private sector and financial institutions to build a coherent financial system to support global sustainable growth.

Figure 16
Investment requirements and greenhouse gas reductions for different scenarios



Source: European Commission, “In-depth analysis in support of the Commission communication COM(2018) 733”, November 2018.

How will the transition interact with Europe’s economic competitiveness?

The transition to a zero-carbon economy has far-reaching implications for Europe’s competitiveness, both related to energy and resource dependence and to technological leadership. While the shift away from fossil fuels creates an opportunity to improve Europe’s balance of trade and energy security, it also implies a surge of innovation and re-investment in new technologies and in their adoption throughout

¹⁶ JRC (2018), “Climate Impacts in Europe, Final report of the JRC PESETA III project.” doi:10.2760/93257.

¹⁷ IIASA (2017), “Costs, benefits and economic impacts of the EU Clean Air Strategy and their implications on innovation and competitiveness”, Table 5, p. 15.

the economy. The transition represents an opportunity for Europe to take a strategic lead position, but also a risk of being left behind.

Europe's energy trade balance will improve drastically, but emerging dependence on other raw materials is a concern. Europe's energy dependence has been on the rise, with 55% of energy imported in 2016, up from 47% in 1990. From 2005-2015, fossil fuel imports were equivalent to 2.5% of the European Union's GDP, with supply concentrated among a few external partners. Russia is the main source for crude oil (32%), natural gas (40%) and solid fuel (30%). Net-zero emissions scenarios forecast imports to fall to 20% of the energy required by 2050, representing 0.8% of GDP, or savings of EUR 3 trillion from 2030 to 2050. However, the energy transition may also trigger increased demand for certain raw materials such as lithium, cobalt and graphite, potentially creating a different map of dependency. Circular economy measures that not only reduce energy needs, but also mitigate our dependence on other strategic resources, are crucial.

Rapid technological change is making the transition possible, but innovation must accelerate. The impact of innovation can be seen in the renewable energy sector. Since 2009, the cost of solar panels has fallen by 80% and wind turbines by 30%. By 2020, the costs of all the main renewable power generation technologies are expected to have fallen within the range of fossil fuels, with some projects potentially undercutting even the most efficient carbon-based generation technologies.¹⁸

Electric mobility is another maturing area. Battery costs have declined by more than 80% since 2010¹⁹ and sales of battery electric vehicles increased 73% in 2018 alone (to 1.5% of the global car market).²⁰ However, timely decarbonisation will require a much faster pace of innovation in areas such as alternative energy carriers, circular zero-carbon industry, and the bio-economy. While relatively young technologies such as Li-ion electric vehicles and battery storage are already established as viable solutions, many other technologies still need basic and applied research efforts to be adopted as alternatives to carbon-based technologies, especially in transport and industry.

Leadership in innovation will determine which countries reap the most benefits in terms of competitiveness from the energy transition. As technology evolves quickly, innovation and proactive policy are paramount to achieve global competitiveness in fields likely to be dominated by early movers. To capture and spread the benefits of the energy transition, Europe needs to be a technological leader, achieving high value-added participation in key zero-carbon technology value chains, including in advanced manufacturing. In the energy sector, most of the top innovators and leaders in the field of renewables are European.²¹ However, the European Union holds only 14% of energy patents in the world, lagging behind China (29%) and the United States (18%).

China has quickly emerged as a world leader in clean tech. Supported by booming domestic demand, China has achieved a dominant position in added value created during the manufacturing of photovoltaic modules and wind turbines, as well as other clean energy technologies such as LED packages and batteries. The total manufacturing value added of these four technology products in China is more than six times higher than in Germany: China is particularly dominant in wind turbines (46% of global production) and photovoltaic (PV) modules (70%), and is set to dominate battery cell manufacturing (with around 70% of global production by 2020). The Chinese market is also leading in battery electric vehicle sales, with 61% of global sales. Almost one in 20 cars sold in China is of the battery electric or plug-in hybrid type, versus one in 50 in the European Union.²²

18 International Renewable Energy Agency (2018), "Renewable Power Generation Costs in 2017".

19 International Energy Agency (2018) "Global EV Outlook 2018".

20 <https://www.jato.com/wp-content/uploads/2019/02/2018-Full-Year-Global-Sales-Release-Final.pdf>, accessed 27 October 2019.

21 In the top 2500 innovating companies in the world, nine focus specifically on alternative energy sources and five of those are European. Out of the Top 100 Energy Companies in the world, five are in the renewable energy sector and three of those are European.

22 Source: IHS, ACEA.

Europe needs a mission-oriented approach to making key breakthroughs for decarbonisation. The successful breakthrough of renewable energy technologies as a competitive alternative for power generation, with steep falls in installation and operating costs, provides lessons for the future. Coordinated efforts are needed to support innovation from basic research to market upscaling. At the same time, national and European policies need to create enabling conditions for upscaling: through an effective, single internal market, timely infrastructure investment and measures such as standard-setting, product labelling and the strategic use of public procurement. Instruments used to develop the market (such as feed-in tariffs in the case of renewable energy) can play a critical role in bridging the “valley of death,” or the difficulty in upscaling faced by many new technologies. The “valley of death” is particularly pronounced in sectors such as energy and manufacturing, which are characterised by large, long-term, infrastructure-sensitive investments. To galvanise action, Europe needs to set itself ambitious goals for 2050 such as the full integration of renewables into the energy system, the full decarbonisation of the steel and chemical industries and the achievement of a natural net carbon sink.²³

Towards a just transition

The transition to a zero-carbon economy could spur growth and job creation overall. Economic modelling suggests that decarbonisation will have a moderate effect on GDP, potentially raising GDP 2% by 2050. Similarly, the effect on employment is expected to be moderate but positive (below +1%). The impact is different for different sectors, however. While mining and extraction are expected to decline significantly, jobs will be created in construction, agriculture and power generation and distribution. Skilled technical jobs in the middle of the wage distribution are expected to be created, countering the trends of wage polarisation and hollowing-out.²⁴ A general increase in demand for digital skills is anticipated as well.

The economic impact will be different for different regions, however, underlining the importance of EU support for regional adaptation and diversification. Mining and extractive industries and related support services are highly concentrated in certain regions, notably in Poland, Romania and Scotland. These are the only industries in which the fall in employment is expected to outpace normal retirement rates. A wider effect will be felt in the automotive sector and energy-intensive industries such as steel, cement and chemicals. For these industries, the challenge is to remain competitive while undergoing a technological shift and dealing with the more general challenges of digitalisation and automation. Improving employees’ skill sets will be paramount. These industries tend to be located in Central and Eastern Europe, or in countries with a relatively lower GDP per capita. Energy costs are projected to rise significantly, but as a percentage of income they will begin to fall after 2030. Energy costs have been rising steeply and will continue to rise towards 2050, driven in part by the investment needed. However, this progression will slow as technologies become cheaper (as has been happening with solar and wind) and as expenditure on imported fuels declines. Moreover, electricity prices for final users will eventually peak as costs under the Emissions Trading Scheme fall in line with emissions.²⁵ Assuming GDP grows steadily, and that households benefit fully from that growth, energy-related expenses per household are expected to peak by 2030.

23 High-Level Panel of the European Decarbonisation Pathways Initiative (2018), “Interim Recommendations”.

24 Eurofound (2019), “Energy scenario: Employment implications of the Paris Climate Agreement”, Publications Office of the European Union, Luxembourg.

25 Under net-zero emissions scenarios, a price of 350 EUR/tCO₂ is expected by 2050, but falling emissions mean falling costs.

Figure 17
Share of employment in fossil fuel extraction and mining

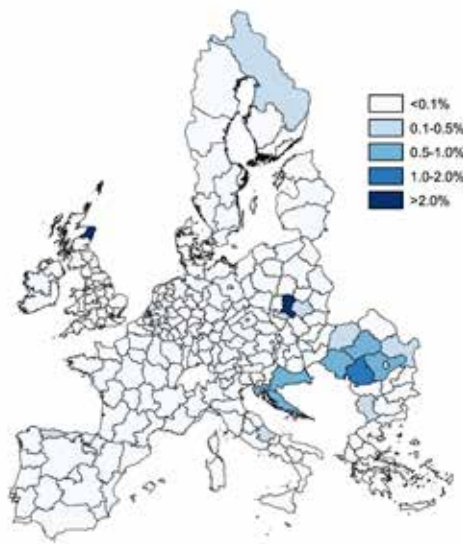
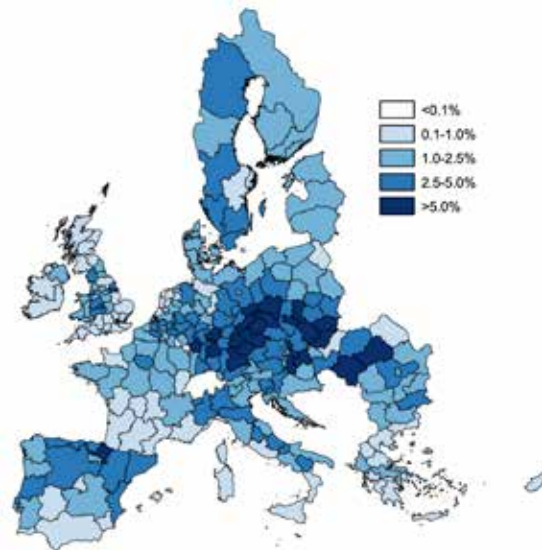


Figure 18
Share of employment in energy-intensive and automotive industries



Source: European Commission, "In-depth analysis in support of the Commission communication COM (2018) 733", November 2018.

Nonetheless, energy costs are not borne equally across income groups. While the average household in the European Union spends around 7.3% of its income on energy needs, this figure rises to over 10% for the lowest income decile, and is even higher in some countries.²⁶ This gap is partly the result of energy taxes, which are mildly regressive.²⁷ Even though higher-income households tend to have more cars, larger cars, larger houses and so on, the fact that lighting, heating and transport are basic necessities means that price increases weigh more heavily on lower-income families. Lower-income households are also more likely to drive older, less efficient cars (if they own cars at all), or to live in homes in need of renovation.

Low-income households are likely to face greater adjustment challenges, but have a lower capacity to do so. This is due to a range of factors:

- lower incomes tend to coincide with lower savings and a greater likelihood of borrowing constraints. Lower and middle-income households are less well-placed to carry out the enormous investment that is foreseen in home renovations and newer vehicles. They are more likely to be late-adjusters, particularly exposed to rising costs that make adjustment more difficult, while higher-income households might avoid these costs by investing early;
- regulatory emissions standards can also be regressive, raising the prices of less-efficient new and used vehicles preferred by people with lower income;²⁸

²⁶ European Commission, "In-depth analysis in support of the Commission communication COM(2018) 733", November 2018.

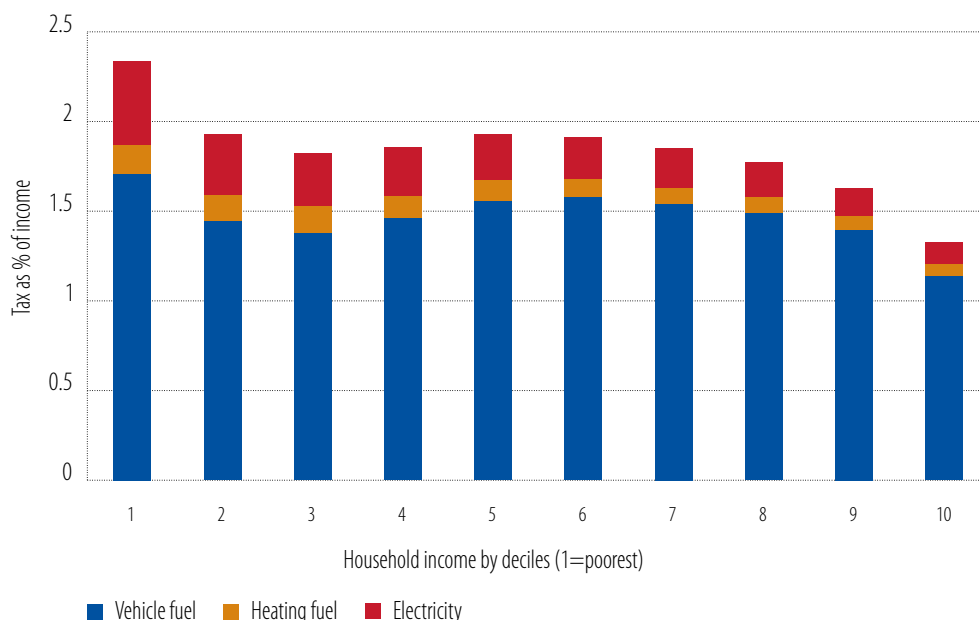
²⁷ Studies have revealed different results on this point, and there is between-country variation. For the 17 EU countries covered by Figure 19, fuel taxes are regressive on average, although slightly progressive from the 3rd to 5th deciles.

²⁸ Zachmann, G., Fredriksson, G. and Claeys, G., 2018, "The distributional effects of climate policies", Bruegel Blueprint Series, Volume 28.

- low-income households are twice as likely (50% vs 27%) to rent their home²⁹ and are therefore less likely to be able to renovate to reduce energy costs than other households. They are also more likely to pay the price of split incentives between tenants and landlords that deter renovation;
- reducing carbon consumption may also be more difficult for poorer households. Those in the bottom 30% in terms of income are much more likely to report that access to public transport is “very difficult” (Figure 20), although this pattern is less apparent in Northern Europe. One reason for this difference appears to be urban-rural demographics, with lower-income households being more likely to live in rural areas in countries with a lower per capita GDP. Another reason may be that the development of public transport systems varies across countries, and policies in some countries to promote universal access to public transport are effective in mitigating inequalities.

Energy poverty is not just a risk; it is a reality for many people in Europe, and must be addressed in any successful transition. Following the 67% rise in household energy-related expenditure from 2005 to 2016, evidence suggests that around 20% of the poorest fifth of households are late on utility bills and unable to keep their home adequately warm (Figure 21). Europe’s decarbonisation strategy needs to address this problem and not make it worse. This will require different, complementary approaches: strengthened social policy and welfare systems, which could benefit from revenue raised from energy taxes; technical and financial support to households/property owners to undertake the long-term investments needed; and investment in the universal provision of infrastructure and public services to support the populace in making the necessary lifestyle changes.

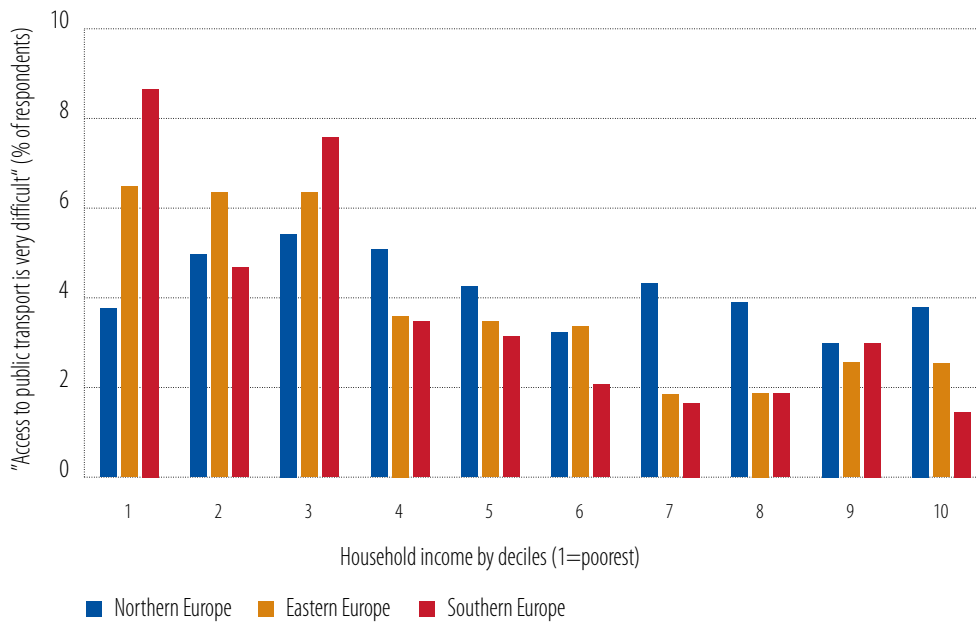
Figure 19
Lower-income households spend more of their income on energy, making energy taxes mildly regressive



Note: Data covers 17 EU Member States with available data (Austria, Belgium, Czech Republic, Germany, Estonia, Finland, France, Greece, Hungary, Ireland, Luxembourg, Netherlands, Poland, Slovenia, Slovakia, Spain and UK). Source: Flues, F. and Thomas, A. (2015), “The distributional effects of energy taxes”, OECD Taxation Working Papers, No. 23, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5js1qwkqrbv-en>.

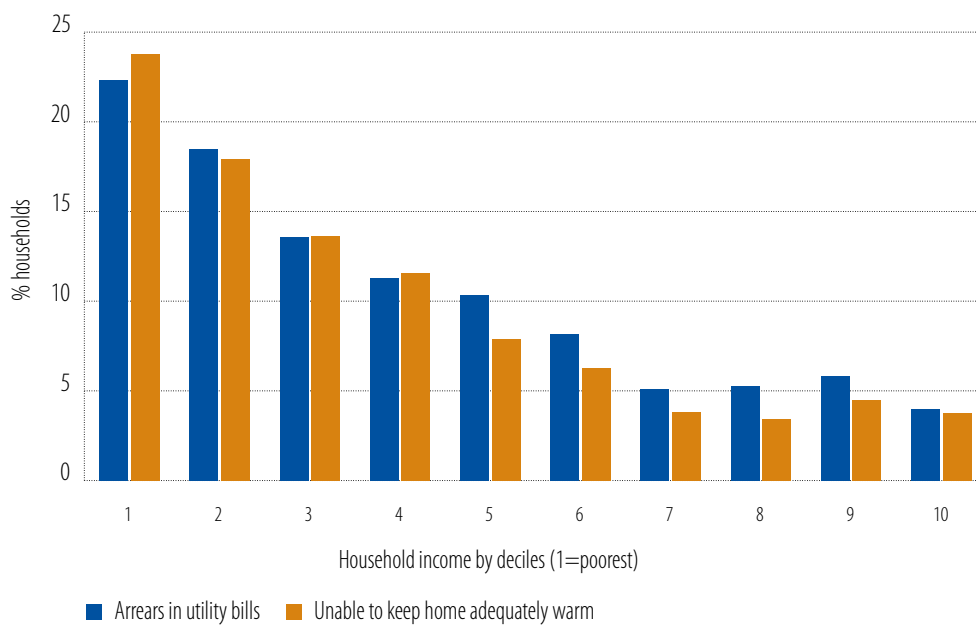
²⁹ “Low income” in this case refers to less than 60% of national median income. Data source: Eurostat EU-SILC survey.

Figure 20
... but have less access to public transport as an alternative



Note: Data for EU-28. For country groups, see footnote 3. Source: Eurofound, European Quality of Life Survey 2016.

Figure 21
... and are already struggling with energy costs



Note: Data for EU-28. Source: Eurofound, European Quality of Life Survey 2016.

Ensuring that Europe works for everyone

Europe's social model has been one of its strengths. Relatively contained levels of income inequality have helped the majority of Europeans feel that they have a stake in the economic future of their societies. Strong social safety nets have mitigated the fear of personal misfortune and structural economic change. A mixed economy has helped address many market failures and to provide public goods and services in an efficient and inclusive way, raising the quality of life. This support has also underpinned progress towards equality of life chances and greater social mobility, while poorer regions of Europe have been able to look forward to a progressive convergence in incomes with the wealthier. These factors have helped Europeans to feel they have a stake in Europe's future, promoting the solidarity that is the foundation of our ability to take common action to solve common problems.

Europe's social model, however, is showing increasing signs of strain. Progress towards convergence across regions is proving to be uneven, and income inequality within countries has been on the rise. Progress towards equal life chances for all has been mixed. The social model is centred on redistribution to fix socially unsustainable market outcomes, rather than on creating conditions for more inclusive market outcomes. Opportunities to better allocate resources, which would support greater productivity and competitiveness, are squandered. Since the crisis, the cost of trying to compensate for undesirable market outcomes has become less sustainable.

Europe's social model needs to be reinforced, if not reinvented given the challenges ahead. The previous chapters have already outlined some of the impact that digitalisation and decarbonisation may have on inclusion. In addition, Europe faces the challenge of ageing. Ageing populations raise concerns about fiscal sustainability. They also mean lower potential growth. According to Eurostat's baseline projection (which actually assumes significant net immigration), there will be 44 million fewer working-age people in Europe by 2080.³⁰

This chapter will provide a brief overview of the state of social inclusion in Europe:

- economic convergence (or divergence) across countries and regions;
- income inequality between individuals, recognising that this dwarfs the inequalities between the countries and regions;
- quality of life for Europeans, going beyond monetary outcomes, with particular reference to issues of work-life balance and public services; and
- how these inequalities affect equality of opportunity, and the knock-on effects this has on economic performance.

Drawing these threads together, this chapter will discuss how Europe's social model could be reinvented with a new focus on getting the structural-institutional conditions right to ensure fairer, more socially sustainable outcomes from the market economy. Improving the framework conditions of the market has the potential to reduce the risk of over-reliance on income redistribution, and can help to create an economy that is also ecologically sustainable and globally competitive.

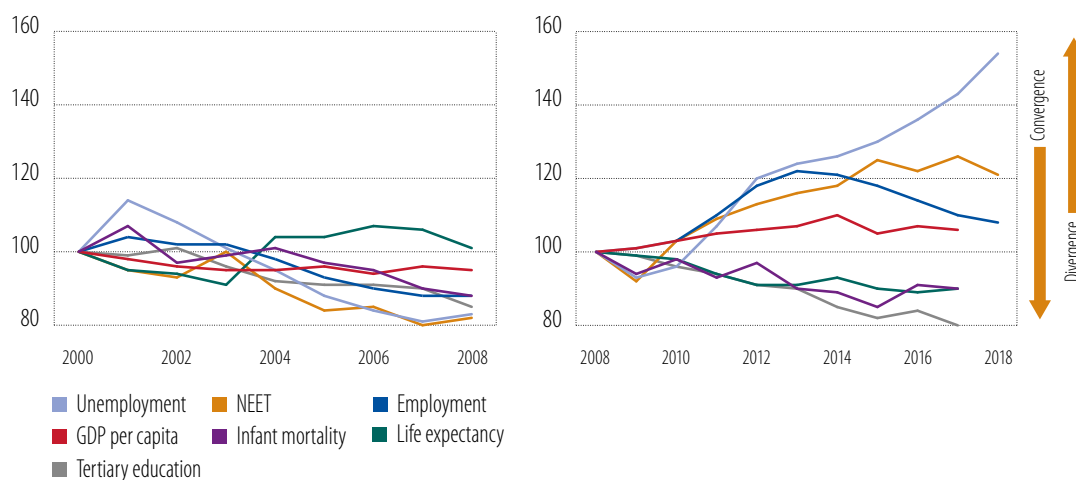
³⁰ Source: Eurostat.

The state of convergence across Europe

The European Union has been a motor of social and economic convergence across its Member States, but in the last decade, new worrying divergence trends have emerged. Some of the main trends are:

- **Member States with lower GDP per capita have been catching up.** In 1998, the GDP per capita of the 13 Member States that joined the European Union from 2004 or later was on average only 53% of that of the countries that make up the EU-28 today. This figure reached 69% by 2008 and 76% by 2018;³¹
- **Member States in the south have started to fall behind.** The average GDP per capita levels of Italy, Greece, Portugal and Spain fell from 95% of the EU-28 level in 2008, to 83% in 2018. Before the crisis, all the countries except Italy were catching up;
- **national GDP levels mask strong inequalities between sub-national regions.** Regional GDP per capita varies from 626% of the EU average in West Inner London to 31% of the average in North-West Bulgaria. Fourteen out of the 20 regions with the highest GDP per capita are capital cities, a group that includes Central and Eastern European capitals like Prague, Bratislava and Warsaw;
- **at the regional level, disparities in GDP per capita, unemployment and youth unemployment have grown since the crisis, but social development indicators show continued convergence.** Regional GDP per capita diverged from 2008 to 2014, and has converged only slightly since. Rates of unemployment and young people not in employment, education and training (NEET) continue to show a strong divergence trend since the crisis. By contrast, disparities in tertiary education, life expectancy and health have continued to narrow (Figure 23);
- **a gap is opening between large metropolitan regions and middle-income ones, with only the poorest regions tending to catch up.** Capital cities and large metropolitan regions not only tend to have a much higher income than other regions but also have maintained or enhanced their lead relative to average regional GDP per capita. The poorest decile have also moved substantially closer to the average. However, middle-income regions have tended to fall behind relative to the average: while the median region had almost exactly average GDP per capita in 2003, this fell to 90% of the average by 2017. While there are many exceptions, these middle-income regions are often relatively rural or “post-industrial”, giving rise to a sense of being “left behind” by dynamic metropolitan regions.

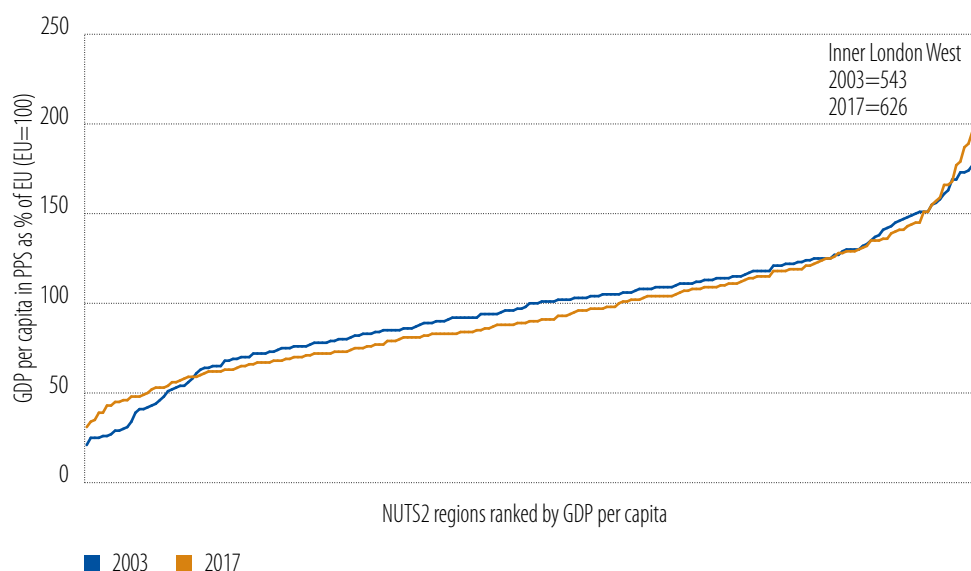
Figure 22
Regional coefficient of variations, 2000-2018



Note: Values normalised at 2000 for 2000-2008 and at 2008 for 2008-2018. NEET is 15 to 24 year-olds not in employment, education or training. Source: Eurostat.

31 In Purchasing Power Standards (PPS), unweighted average. Source: AMECO.

Figure 23
Distribution of EU regions by GDP per capita, 2003 and 2017



Note: Regions in PL, NL, FR and LT are not shown because of missing 2013 data. Source: Eurostat.

Structural change and the agglomeration effects of cities seem to be creating a regional middle-income trap. Metropolitan areas have shown greater capacity to offer an attractive environment for firms, particularly in sectors such as advanced services. They have gained higher shares of high-wage jobs and created positive spillover effects for neighbouring areas. Regions with a particularly low GDP per capita, meanwhile, may have been able to exploit cost advantages, witnessing higher employment and productivity growth. By contrast, middle-income regions and rural regions, far from metropolitan and economically thriving centres, have arguably been less able to compete either on cost or on sophistication and innovation performance. In many cases, middle-income regions may have been affected by structural shifts away from “traditional” manufacturing towards more footloose services and high-tech sectors, although local conditions such as innovation capacity, availability of skills and quality of institutions should also be seen as playing a role.³²

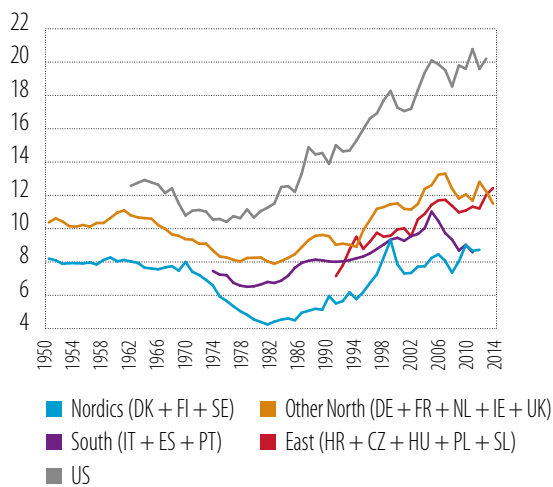
The concentration of growth in metropolitan areas has upsides for global competitiveness, but it also comes at a cost. Differences in income, job opportunities and the availability of services drive migration between and within EU countries. High-skilled workers have tended to benefit the most from mobility, moving to areas that offer the highest incomes. From 2005 to 2015, population increased by 7% in the metropolitan areas that include national capitals, compared to 2% in other regions. This process of agglomeration provides support for competitiveness, through the creation of globally competitive locations offering firms a large pool of highly skilled labour and a concentrated ecosystem that supports innovation. However, metropolitan growth also contributes to a number of negative externalities such as worsening transport congestion and air pollution. Rising house prices in urban areas are an increasingly important driver of social inequality and exclusion, while rising land rents in urban areas represent a growing deadweight loss on economic activity. An economic model that is over-reliant on labour mobility can also worsen inequality of opportunity and the efficient allocation of labour. Given the inevitable personal costs of migration, divergent regional growth trends imply missed and missing opportunities in left-behind regions.

³² European Commission (2017), “My region, my Europe, our future - seventh report on economic, social and territorial cohesion”.

Income inequality within EU countries

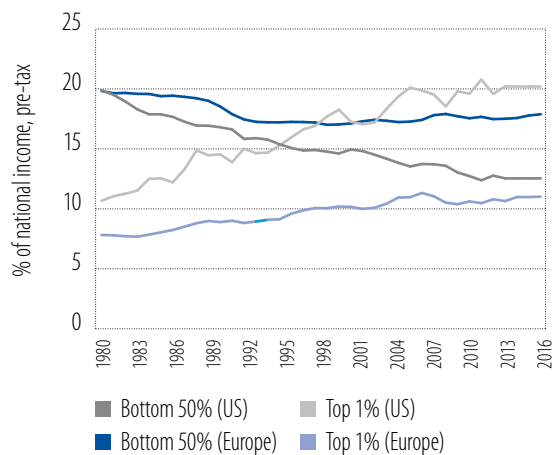
While more contained than in other world regions, economic inequality has nonetheless been on the rise in Europe since the 1980s. In Western Europe, the post-war social model saw a reduction in income inequality – before taxes and transfers – to historically low levels. However, this trend was reversed in the 1980s. In Central and Eastern Europe, income inequality also rose markedly after the disintegration of the Warsaw Pact (Figure 24). While incomes for the bottom 80% of the European population have grown about 40% on average since 1980, the top percentile have seen their pre-tax income more than double, a trend that is driven by the growth of inequality within countries, rather than between them (Figure 26). The top 1% are estimated to have captured some 17% of European income growth over this period, more than the entire bottom 50%.³³ This growth of inequality can be seen as relatively constrained, however, in comparison to the trend in the United States where the top 1%’s share of pre-tax income overtook the share of the bottom 50% in the mid-1990s (Figure 25). Recent research suggests that while the decline in labour’s share of income in the United States is largely driven by changes in manufacturing, apparent declines in labour’s share of income in some EU countries are accounted for by the effect of rising house prices and rents.³⁴ The financial crisis also had an impact on income inequality in Europe, denting top percentile incomes, while also increasing hardship among lower-income groups.

Figure 24
Top 1% – share of income
(% of gross national income, pre-tax)



Source: World Inequality Database, WID.world.

Figure 25
Top 1% and bottom 50% – pre-tax
income shares, Europe and United States



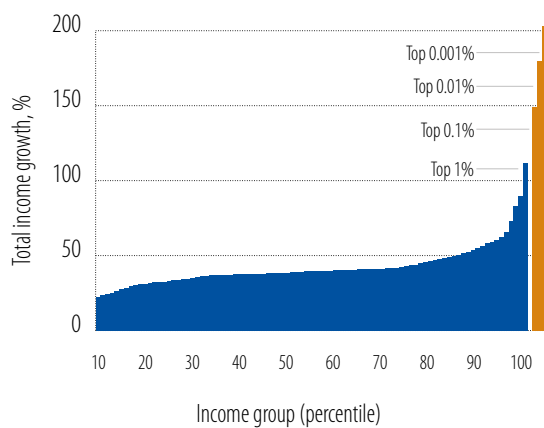
Note: Europe, including EU-28, Western Balkan countries and Moldova. Source: Blanchet, T. Chancel, L. and Gethin, A. (2019), "How Unequal Is Europe? Evidence from Distributional National Accounts, 1980–2017", WID.world Working Paper 2019/06.

33 Blanchet, T. Chancel, L. and Gethin, A. (2019), "How Unequal Is Europe? Evidence from Distributional National Accounts, 1980–2017", WID.world Working Paper 2019/06.

34 Gutiérrez, G. and Pitony, S., "Revisiting the Global Decline of the (Non-Housing) Labor Share", unpublished working paper: <https://drive.google.com/file/d/1RMTqNNJFUSxeMx9UsObAggUeb3HU2K8i/view>, accessed 27 October 2019.

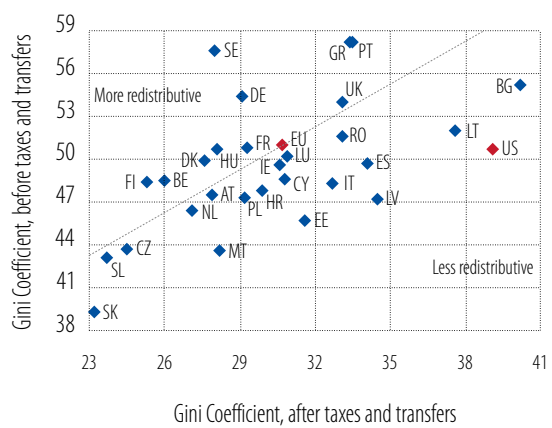
European tax and welfare systems have moderated, but not eliminated, the rise in market inequality. Inequality in household disposable incomes after tax has risen, particularly in the 1990s.³⁵ Taxes and transfers have served to moderate income inequality, and contribute to much greater equality in disposable incomes in most EU countries, compared to the United States (Figure 27). However, redistribution has been lessened by the trend away from the taxation of top incomes and profits, and towards indirect taxation (such as VAT), which imposes a disproportionate burden on lower-income groups.

Figure 26
Distribution of income growth in Europe, 1980-2017, by percentile



Note: Europe, including EU-28, Western Balkan countries and Moldova. Source: Blanchet, T. Chancel, L. and Gethin, A. (2019), "How Unequal Is Europe? Evidence from Distributional National Accounts, 1980–2017", WID.world Working Paper 2019/06.

Figure 27
Income inequality, before and after taxes and transfers



Note: Data for EU Member States refers to 2017, for the US, to 2015. Source: For EU, Eurostat; for US, OECD.

Persistent inequalities in income also exist along gender lines. Women are still less likely to be in paid work than men, although the employment gap in the European Union has been cut in half since 1992, from 21.6% to just below 10%. Because women are less likely than men to progress in their careers and more likely to be employed in lower-paid occupations, there is also a persistent (though narrowing) gender pay gap. Among full-time employees in 2014 in the European Union, women earned 13% less than men (Figure 28). The gender wage gap is driven by many factors and shows no clear regional pattern. High unemployment levels in some countries have tended to reduce the gap as female workers with higher qualifications are more likely to remain in the workforce.

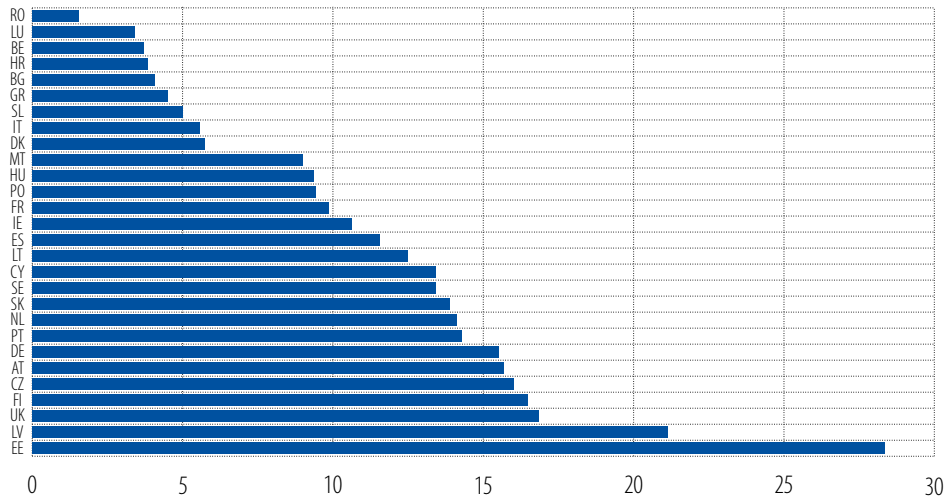
Inequality matters: 39% of European residents say they have difficulties making ends meet. The proportion of people saying that their households face at least "some difficulties" varies from 11% in Sweden to 86% in Greece. France also stands out, with 43%, roughly double the average for the rest of Northern Europe (Figure 29). The likelihood of reporting such difficulties is strongly affected by income distribution, reaching 58% for households below national median incomes.³⁶ Age is also a determining factor, although with strikingly different patterns across Europe. Across Member States in Northern Europe with more developed welfare and pension systems, it is young people who are more likely to struggle, whereas in Eastern Europe and Italy, economic stress appears to rise with age. Intergenerational divides are also reflected in saving statistics. Median saving rates are very low for the under-30 group, and even

³⁵ Op. cit.

³⁶ Eurofound (2017), "European Quality of Life Survey 2016: Quality of life, quality of public services and quality of society", Publications Office of the European Union, Luxembourg.

negative in Southern Europe and some other countries. While economic theory suggests that people should start to spend their savings upon retirement, median saving rates are actually highest among the over-60s, notably in Italy and France (Figure 30).

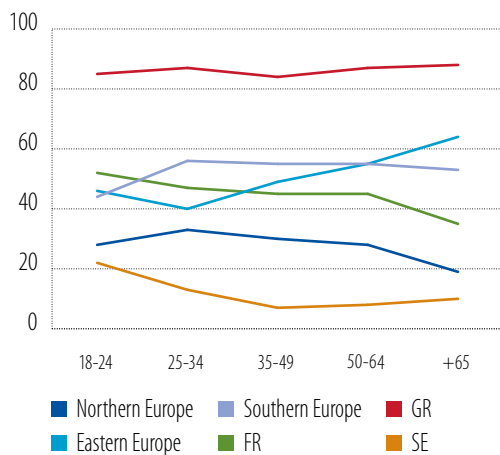
Figure 28
Gender gap in median earnings of full-time employees (%)



Note: The gender wage gap is defined as the difference between median earnings of men and women, as a % of the median earnings of men. Data are for 2016 or latest available.

Source: OECD (2019), Gender wage gap (indicator). doi: 10.1787/7cee77aa-en.

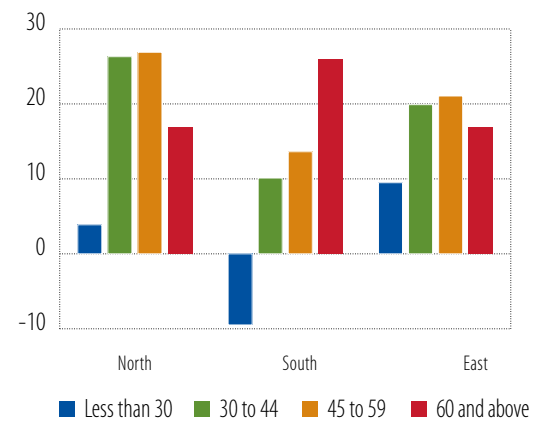
Figure 29
Europeans facing difficulties making ends meet (%)



Note: Sum of responses "with some difficulty", "with difficulty" and "with great difficulty" with regard to whether the respondent's household is able to make ends meet, by age of respondent.

Source: Eurofound, European Quality of Life Survey, 2016: Quality of life, quality of public services and quality of society, Publications Office of the European Union, Luxembourg.

Figure 30
Median saving rate by age group and region, 2015 (%)



Note: Regional averages are population-weighted. Data missing for FR, DK and UK.

Source: Eurostat.

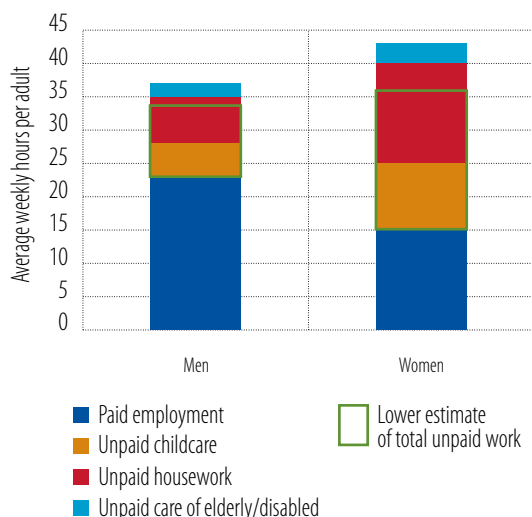
Beyond money outcomes: work, unpaid work and public goods

To get a full picture of inequality, social inclusion and social sustainability in Europe, it is not enough to focus only on formal employment and monetary compensation. Well-being derives from many factors that include social connectedness and supportive communities, a healthy living environment, the availability of public goods and services, security, and the ability to balance formal employment with other demands on our time such as our responsibilities to care for others.

The burden of unpaid work is enormous, unequally shared, and will rise with demographic change. Household survey data suggests that men in the European Union (18+ years old, including retired, unemployed, etc.) spend on average 23 hours per week in paid employment and 11 to 14 hours in unpaid housework, childcare and other care work. Women spend on average 15 hours per week in paid employment and 20 to 27 hours in unpaid work (2 to 6 hours of total work per week longer than the average man) (Figure 31). In total, unpaid work by men and women, if it were valued at the EU median wage, would be worth some EUR 4.4 to EUR 5.9 trillion, or 30 to 40% of EU GDP. Aside from gender inequality, there are obviously great differences in the care responsibilities faced by households, with parents of dependent children (especially single parents), and adults caring for other adults, potentially facing great difficulties managing different demands on their time.

Care responsibilities are set to grow with demographic change. Already in the medium term, according to Eurostat's baseline projection, the ratio of working-age persons to persons aged over 64 will decrease rapidly: from 3.5 to 1 in 2015 to 2.5 to 1 in 2031, eventually stabilising around 2 to 1 by 2046. Relative to the working-age population, this will mean a significant increase in demand for healthcare and long-term care, and a further increase in responsibilities for many households.

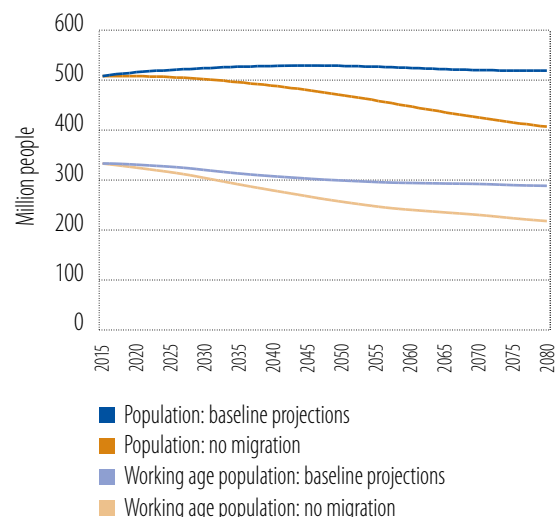
Figure 31
Average paid and unpaid work per adult, per week



Note: Upper estimates assume no overlap in hours mentioned by survey respondents (i.e. childcare hours reported do not overlap with housework hours reported). Lower estimate assumes maximum overlap possible between different activities for each respondent.

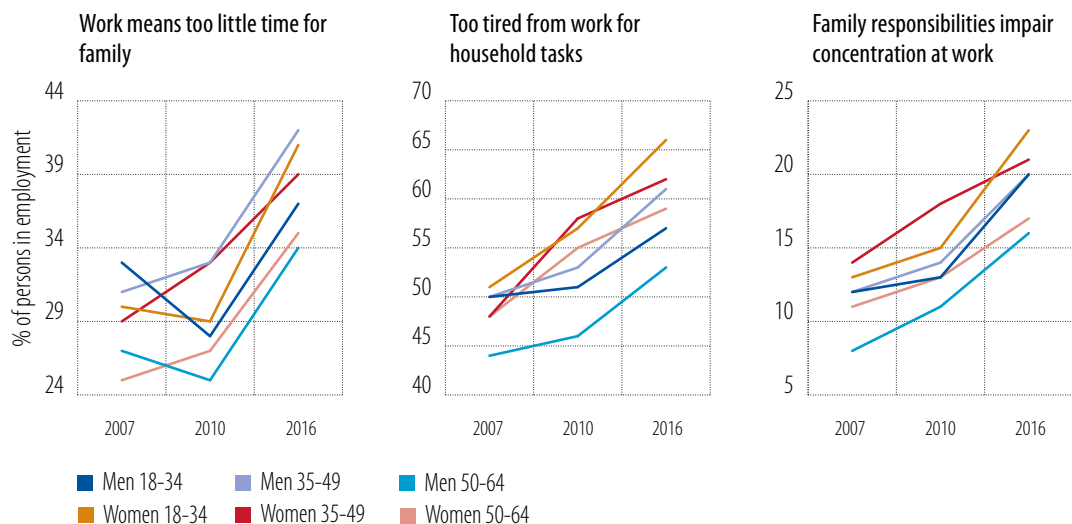
Source: European Quality of Life Survey and European Working Conditions Survey.

Figure 32
Projected changes in total EU population and working-age population



Source: Eurostat.

Figure 33
Work-life balance in the European Union by gender and age

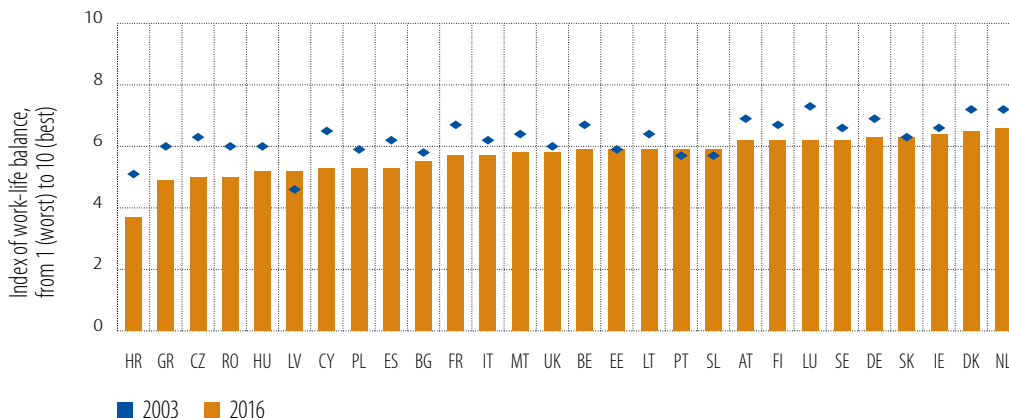


Note: Questions: a) "It has been difficult for me to fulfil my family responsibilities because of the amount of time I spend on the job"; b) "I have come home from work too tired to do some of the household jobs which need to be done"; c) "I have found it difficult to concentrate at work because of my family responsibilities". Values shown for "Several times a month" and more frequent.

Source: Eurofound, European Quality of Life Survey, 2016: Quality of life, quality of public services and quality of society, Publications Office of the European Union, Luxembourg.

Work-life balance in the European Union is deteriorating, with negative implications for well-being and productivity. Indicators of how well people are able to combine paid work and other responsibilities show several clear patterns (Figure 33). Overall, women face greater difficulties than men, although middle-aged men are still the most likely to find that work leaves too little time for family responsibilities. Work-life balance is generally worse for the middle-aged, although the situation seems to be notably deteriorating for younger women. Most strikingly, work-life balance appears to have deteriorated across all genders and age groups over the last decade. Across Europe, the situation is better in Northern Europe, particularly Nordic countries, but there are very few countries that have not seen a deterioration (Figure 34). Time spent in paid work clearly impinges upon many people's ability to perform care work. At the same time, hard-to-manage family responsibilities increasingly impair concentration at work, something that is likely to have a material impact on labour productivity.

Figure 34
Work-life balance index, by country



Note: Summary indicator constructed from the responses to the three indicators presented in Figure 33, and normalised to a scale of 1 to 10.

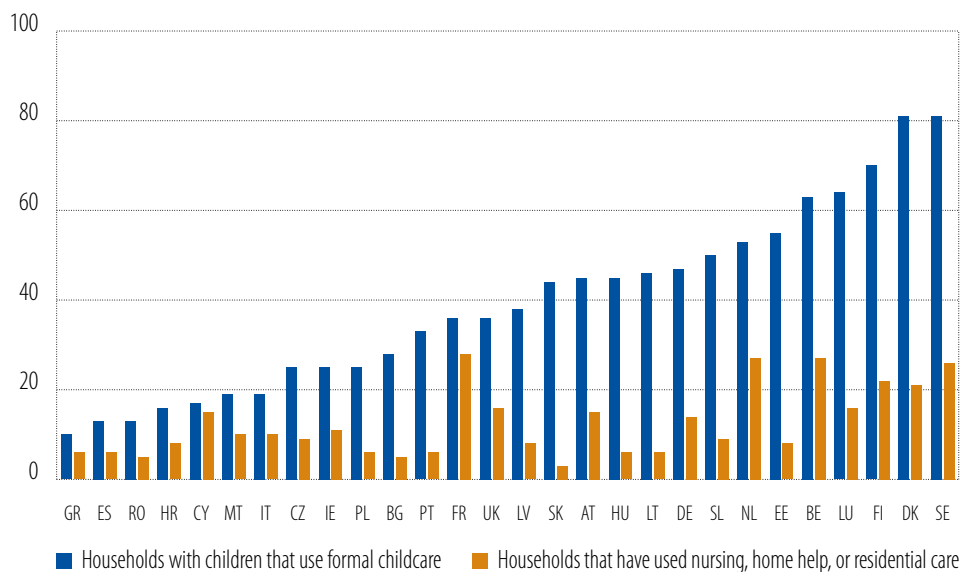
Source: Eurofound, European Quality of Life Survey, 2016: Quality of life, quality of public services and quality of society, Publications Office of the European Union, Luxembourg.

Public goods and services make a huge difference to households, directly contributing to well-being or helping households to manage different and conflicting demands. Social transfers such as childcare allowances and public pensions are obviously immensely important in easing the burden of care for overloaded households, while others, such as unemployment insurance, are vital in mitigating risks caused by macroeconomic conditions that are beyond the control of individual households. Similarly, public (or publically subsidised) services, such as public healthcare, education, childcare, long-term (elderly) care and social housing, provide in-kind benefits to all who need them and use them. Those public services alleviate the burden of care and insure all households against risks.

The provision of basic services in the European Union is far from equal. Public perceptions of the quality of various public services show a gradual improvement since 2007 in most EU countries, despite the crisis. However, there are nonetheless notable differences in perceived quality, mostly between higher and lower-income Member States. There are also significant differences in coverage and accessibility:

- across the EU, 17% of people report some difficulty in covering primary healthcare care expenses (formal or informal). This rises to 42% for the bottom income quartiles and to more than 75% for the bottom quartile in Croatia, Greece and Cyprus;
- the use and provision of long-term care for the elderly and disabled across Europe varies greatly. The proportion of people who have used long-term care services, or have experienced their use by someone close to them, ranges from 3% in Slovakia to 28% in France. In general, there is a clear relationship between reported use of long-term care and public spending;³⁷
- the proportion of households with children mainly using formal childcare (including crèches and kindergartens, through to after-school care) ranges from more than 80% in Denmark and Sweden to below 20% in much of Southern and South-Eastern Europe. In the latter regions, family members – particularly grandparents – provide the main source of care. Even though 65% of people who use formal childcare report that it is free or partially funded, 39% report at least some difficulty in covering the cost, suggesting that cost and lack of public funding is a significant limitation on more widespread use and provision.

Figure 35
Households using formal childcare and long-term care, by country (%)



Note: "Formal childcare" refers to care in a facility (kindergarten, crèche, etc.), after-school care or child-minding under a formal contract, with reference to the youngest child of the household. Use of nursing, home help/personal services and residential care is by the respondent or a household member.

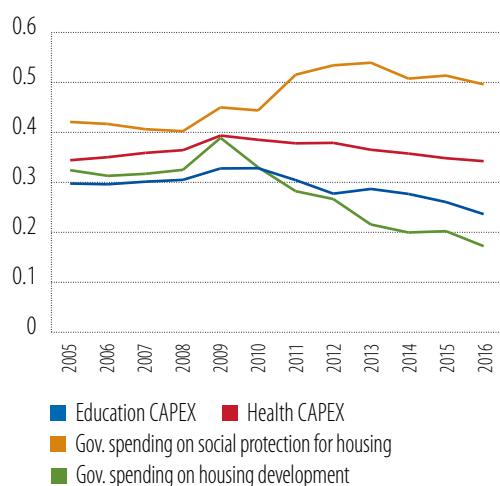
Source: European Quality of Life Survey, 2016.

³⁷ European Commission (2014), Adequate social protection for long-term care needs in an ageing society, Publications Office of the European Union, Luxembourg.

The crisis triggered a shift in public social spending towards current expenditure and away from investment, with worrying implications for future capacity. At the EU level, public current expenditure rose through the crisis as social protection needs increased and governments sought to shield politically sensitive public spending. Public current expenditure in 2017 was still around 3 percentage points of GDP higher than the long-term average (1995-2016). Public capital expenditure was down by more than 1 percentage point across the European Union, and by around 4 percentage points in Eastern and Southern European Union countries.³⁸ Social infrastructure was not spared this trend. Investment in health facilities fell by 6% and in education facilities by 22% from 2008 to 2016 (Figure 36). Public capital spending on housing development – which fell by 47% - can be contrasted with social transfers related to housing needs, which rose by 34% by 2013, before easing slightly with the recovery. The change also reflects a shift in housing policy away from interventions in housing supply towards targeted income redistribution.³⁹

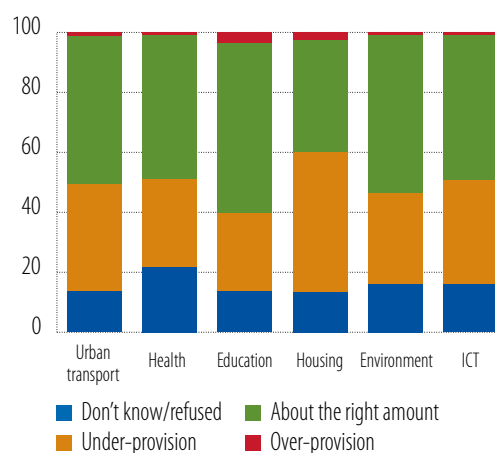
Investment in social infrastructure appears insufficient, particularly in the context of ageing and urbanisation trends. No evidence exists that social expenditure fell because there was no longer a need. Instead, these investment trends can be linked to data on infrastructure quality and the ability of firms to respond to growth opportunities.⁴⁰ In addition, among the 555 municipalities across the European Union surveyed by the EIB Municipalities Survey 2017, a large proportion reported insufficient investment in recent years across different sectors (with less than 1% reporting over-investment). Notably, around one half of municipalities say that there has been too little investment in housing (Figure 37).

Figure 36
Investment in social infrastructure in the European Union (% of GDP)



Source: Education and health CAPEX: EIB Investment Report 2018/2019. Housing: Eurostat (COFOG).

Figure 37
Sufficiency of past investment in local infrastructure (% of EU municipalities surveyed)



Source: EIBIS Municipalities Survey 2017.

38 EIB Investment Report 2018/2019.

39 National Housing Federation (2017), Public expenditure on housing: the shift from capital spend to housing allowances. A European trend? Research Briefing.

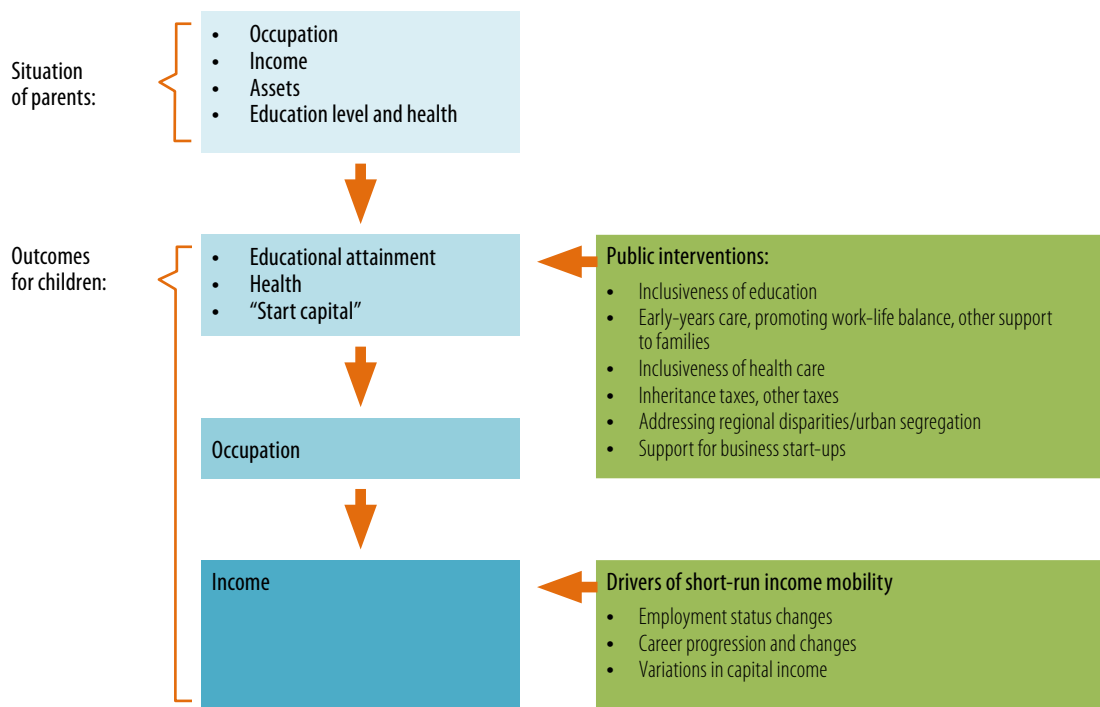
40 EIB Investment Report 2018/2019.

From unequal outcomes to unequal opportunities

There are growing concerns that opportunities are narrowing for younger generations in Europe. Alongside inequalities in income and wealth, inequality of opportunity is something that drives perceptions of the fairness and inclusiveness of the economic system. Fairness of opportunities is reflected in social mobility, particularly across generations. This is the degree to which the situation of parents – factors such as the education level, income and household assets – determines the economic prospects of their children (Figure 38). Measuring such intergenerational social mobility is challenging and requires a long-term perspective, but there is evidence that progress towards greater social mobility in Europe has slowed or stalled in recent decades.

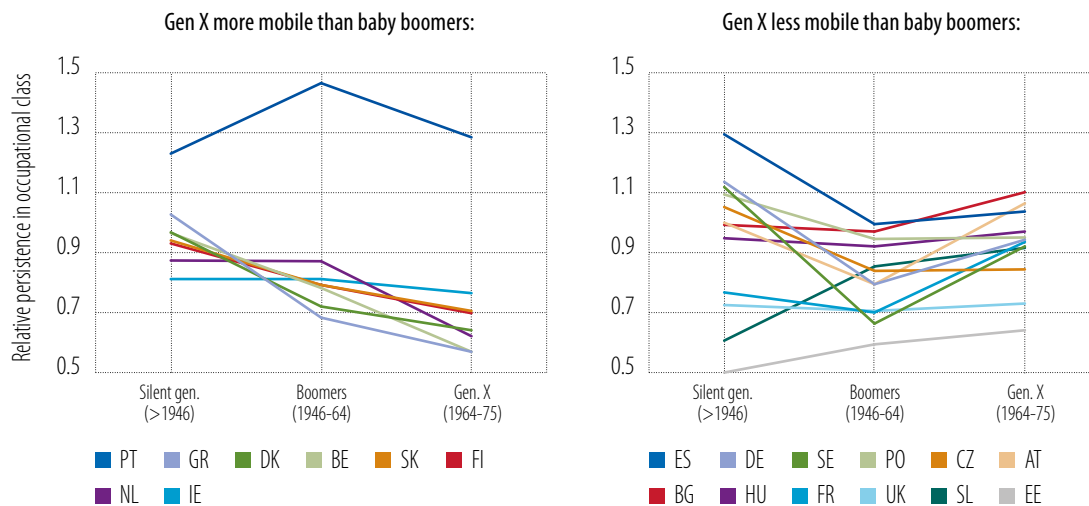
Equality of opportunity increased for the post-war baby-boomer generation, but progress was reversed in many countries for Generation X. The ability of people to adopt a different type of occupation from that of their parents – such as supervisory work, self-employment or a liberal profession in contrast to manual or routine work – is central to social mobility. It provides the link between enablers such as educational attainment and other outcomes such as income. The baby-boomer generation that entered the labour market in mid-1960s to mid-80s experienced greater occupational mobility than their parents in nearly all EU countries (for which there is data). However, experiences have varied between countries for members of Generation X that entered the labour market in the mid-80s to mid-90s. Mobility appears to have further increased in some, such as the Netherlands and Greece, declined in some cases, such as France, Germany and Austria, and stabilised in others (Figure 39). These aggregate statistics also hide important differences with regard to men and women. In Germany and Spain, mobility for women notably seems to have declined, while it has increased for men. By contrast, there seems to have been a notable decline in mobility for men of Generation X in the United Kingdom, France, Sweden, Austria, Estonia, and Bulgaria.⁴¹

Figure 38
Social mobility – main drivers and outcomes



⁴¹ Eurofound (2017), "Social mobility in the EU", Publications Office of the European Union, Luxembourg.

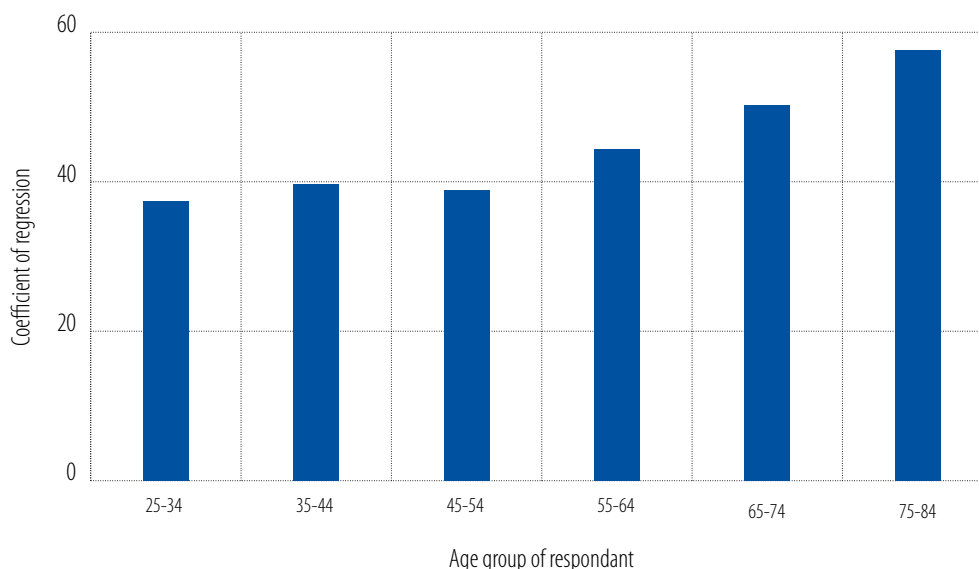
Figure 39
Relative intergenerational persistence in parents' occupational class



Note: Values are Unidiff coefficients expressing the relative likelihood of survey respondents being in a different occupational category from their parents, thereby abstracting from structural changes in the economy.
Source: Eurofound (2017), *Social mobility in the EU*, Publications Office of the European Union, Luxembourg.

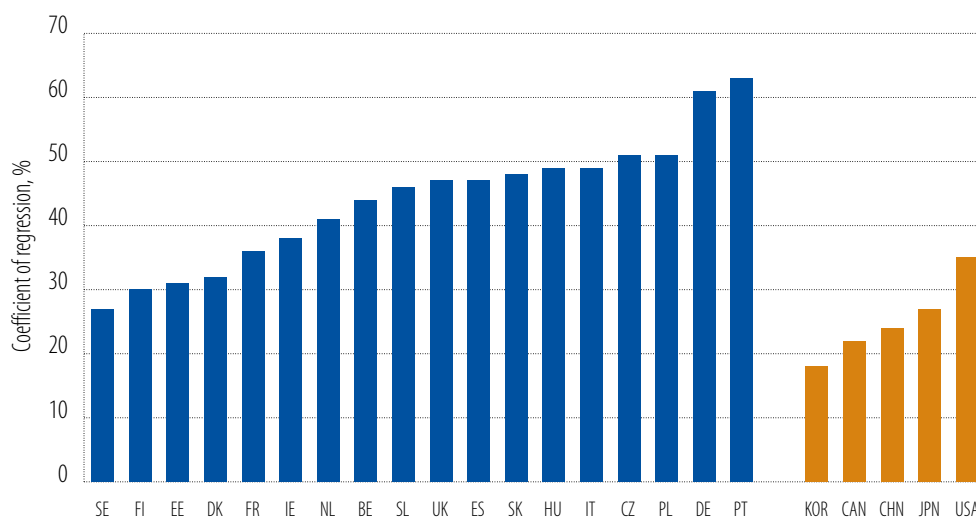
Mobility in educational outcomes has shown little improvement in recent decades, while country comparisons suggest room for improvement. Social mobility was supported by improved mobility in educational outcomes in the post-war period. The educational attainment of parents (proxied by years in education) was a progressively weaker predictor of children's ultimate level of education for age groups now aged 45 or over. Since then, however, little improvement is apparent (Figure 40). Comparisons across countries suggest that there is still room to delink educational attainment from parents' backgrounds, with wide disparities across EU countries and better performance in some non-EU peers (Figure 41).

Figure 40
Intergenerational persistence in educational outcomes in Europe, by age group



Note: Persistence is expressed as the regression coefficient between parental and children's years of schooling.
Source: OECD calculations based on the European Social Survey. OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*.

Figure 41
Intergenerational persistence in educational outcomes, by country



Note: Persistence is expressed as the regression coefficient between parental and children's years of schooling for respondents aged 30-55.

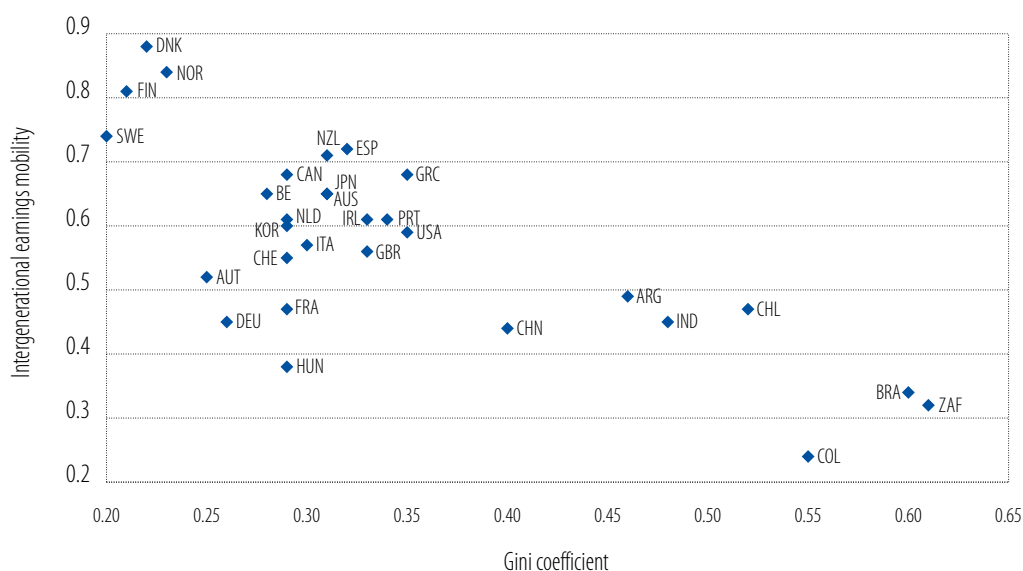
Source: OECD calculations based on the European Social Survey. OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*.

Equality of opportunity is vital for growth and competitiveness, and is partly driven by inequalities in income and wealth. In economic terms, barriers to intergenerational mobility in educational outcomes and occupation are barriers to the efficient allocation of labour and skills. With the availability of skills being a major constraint for firms, particularly innovative ones, greater equality of opportunities could provide a competitive edge, maximising the impact of investment in skills and training. This is also the most recognised channel through which income and wealth inequality can affect growth and competitiveness.⁴² Factors such as household spending on education, nepotism and transfers of wealth for housing, work experience or starting (or inheriting) a business help to pass privilege from one generation to another and to lock others out from educational and career opportunities. Rising prices of housing and other assets, alongside wealth concentration, have potentially exacerbated this issue. Across countries, high-income inequality is associated with low social mobility, notwithstanding the effect of different national policies (Figure 42).

Alongside income and wealth inequality, social mobility is driven by many factors that offer additional opportunities for policy interventions. These include:

- universality of access to high-standard public services, particularly education, healthcare and childcare;
- conditions for working families, including access to childcare, provision of social support for children and working-time flexibility and work-life balance;
- regional disparities that exclude less mobile workers, trends towards class segregation in urban areas, and universal access to affordable housing close to employment opportunities;
- conditions for entrepreneurship, particularly the availability of financing for start-ups;
- institutional barriers to occupational choice, including discrimination and nepotism.

Figure 42
Intergenerational earnings mobility and income inequality



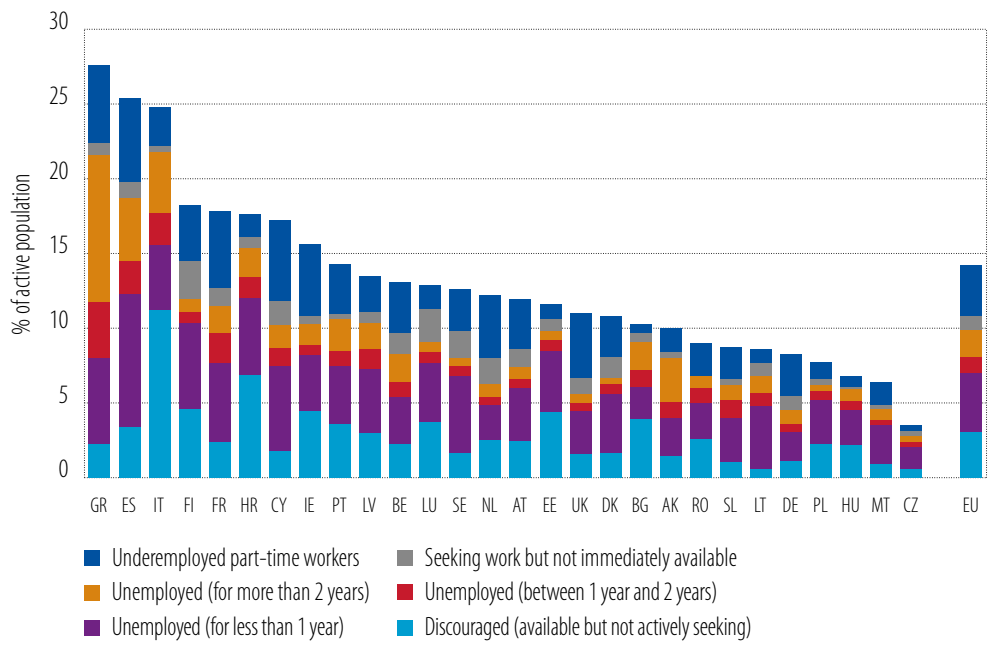
Note: Intergenerational earnings mobility is estimated on the basis of education and occupation of different parent and child generations. Gini coefficients are from the mid-1980s to early 1990s.

Source: OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*.

Labour market conditions can also have a dramatic impact on equality of life chances, particularly for young people affected by unemployment. Unequal access to employment is a significant driver of income inequality. A major concern that arose from the economic crisis is that exposure to extended unemployment may have a lasting negative effect on workers' careers and earnings. Particularly vulnerable are older workers that may have difficulty re-entering the workforce, or young people who may feel they have been stigmatised.

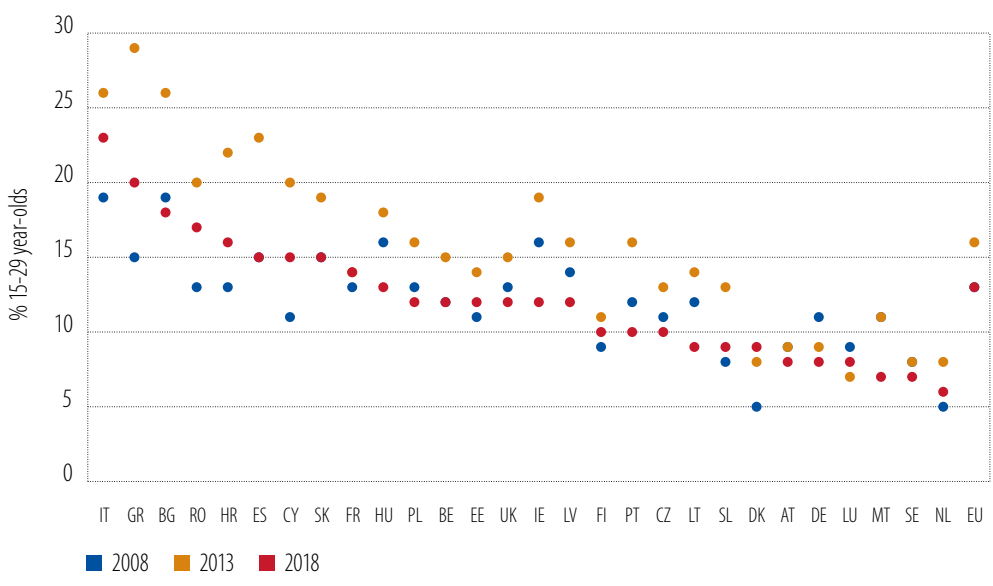
Employment has reached record levels in the European Union, easing concerns, but significant differences remain between EU countries. The EU unemployment rate fell to 6.7% in 2018, just below its level in 2008. At the same time, employment and labour participation has grown, with an apparent shift from inactivity to part-time work. This could signal a positive effect of greater working-time flexibility. On a less positive note, varying rates of unemployment within Europe highlight the extent to which 2008 levels do not necessarily represent a good benchmark and leave room for improvement. When we include discouraged potential workers and part-time workers who would like to work more, the proportion of affected working-age persons reaches 14% across the European Union, and around 25% in Greece, Spain and Italy (Figure 43). Some countries have high levels of discouraged potential workers (Italy) and long-term unemployed (Greece). The prevalence of part-time work as a "second best" option tends to reflect unemployment levels, but it plays a proportionately more significant role in many northern countries, including France and Germany. In the Netherlands and United Kingdom, the number of underemployed part-time workers is higher than unemployed workers. Proportions of young people not in employment, education or training have also largely returned to pre-crisis levels, but they remain elevated in Southern Europe. This is also the case in some Central and Eastern Member States with otherwise low unemployment (e.g. Poland, Hungary, Bulgaria and Romania), an issue that may require particular attention (Figure 44).

Figure 43
Unemployment, underemployment and discouraged potential workers, 2018



Source: Eurostat.

Figure 44
Young people not in employment, education or training



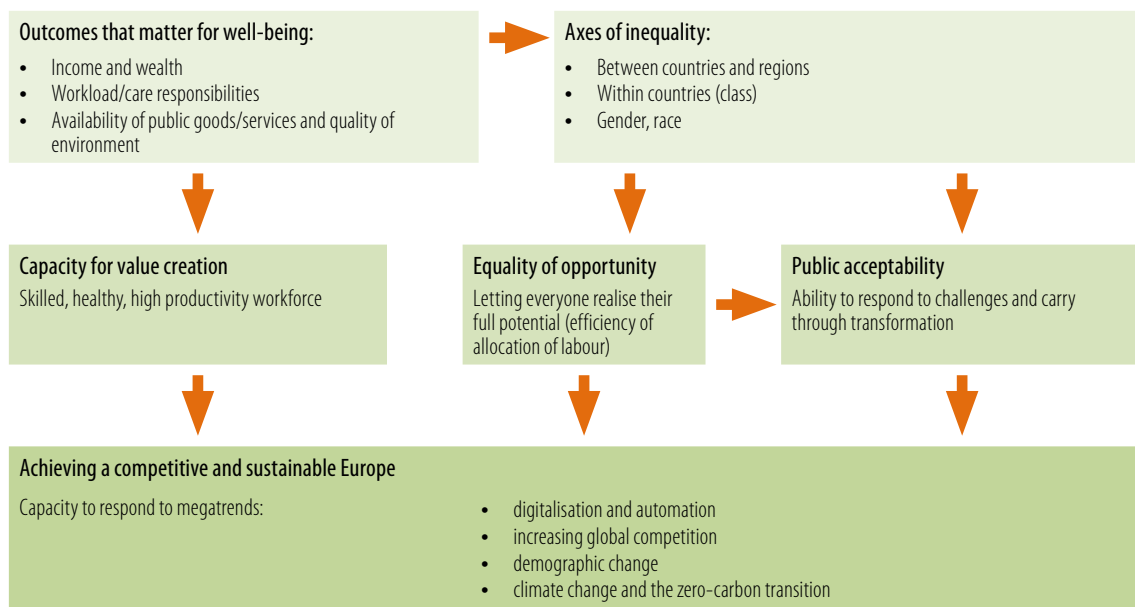
Note: Includes formal and informal employment, education and training.
 Source: Eurostat.

Social sustainability matters for competitiveness and the zero-carbon transition

Europe needs to invest in social inclusion to create a competitive and sustainable economy. The ability of the European economy to generate well-being, and to do so in a way that is seen as fair, is valuable in its own right. This social sustainability, however, is also necessary for an economy to be competitive and ecologically sustainable. The most important transition mechanisms are arguably the creation of a skilled, healthy and productive workforce, ensuring efficient allocation of labour through equal opportunities, and by ensuring public support for the dramatic changes that will grip society.

Figure 45

Social inclusion contributes to achieving a competitive and sustainable economy



Universal public services and work-life balance matter for productivity. As the previous chapters made clear, skills availability is becoming a critical constraint for European businesses, and both technological change and decarbonisation will only enhance the need for new skills. In this context, public support for universal access to high-quality education, early-years childcare and life-long learning is a vital public investment. At the same time, to maximise productivity we need to get the balance right between paid work, unpaid work in the home, and rest. With demographic change set to place growing demands on working-age adults, over-burdening risks weighing even more on productivity.

Inequality of outcomes has an impact on equality of opportunity, which also matters for productivity. In the context of intensifying competition and skill constraints, equality of opportunity is not just an issue of fairness. It is about the efficient allocation of resources – allowing everyone to contribute in a role that makes optimal use of their abilities – without which EU firms cannot hope to gain and maintain a competitive edge. Inequality of opportunity matters, along whatever axes it occurs, including class, gender and geography (given inevitable costs of movement). In the context of ageing, immigration represents a tremendous opportunity, but only if immigrants and their children are ensured the same opportunities to contribute as everyone else. As discussed above, inequality of outcomes (along lines of geography, class, gender, race, etc.) are one of the main drivers of inequality of opportunity, particularly through the channels of parental wealth, income and education. Inequality in access to services such as education and childcare also have a huge impact.

Inequality weighs on solidarity and consent, without which collective responses to common challenges become impossible. Tackling challenges like decarbonisation and the reinvention of the European economy takes great collective efforts and coordination. Such collective action demands solidarity. It requires a widespread sense that “We’re all in the same boat”, that change will not just enable some to gain at the expense of others, and that everyone has an equal chance to be heard and to participate in the decision-making process. If electorates are susceptible to scapegoating and unrealisable promises, it is because the reality of the need for change is not accompanied by a convincing vision of how that change will be fair – or of how potential losers will be supported and protected.

Redistributive social policy is structurally important, particularly in reducing inequality of opportunity. Social transfers and universal services play a vital role in breaking the cycle of limited opportunities from one generation to the other. They provide people with economic security, ensure that basic needs are met, and facilitate participation in the workforce. A well-designed tax system can provide further support to reducing inequality and enhancing growth.⁴³ Many experts are calling for redistribution to be strengthened in response to rising inequalities.⁴⁴

However, we need to think beyond laissez-faire economics and over-reliance on income redistribution. One of the characteristics of recent decades, particularly before the crisis, was a strong faith in a laissez-faire approach to the market, with a focus on the use of taxation and public spending to address unequal economic outcomes ex-post. However, a combination of factors – the global economic crisis, climate change and the success of active industrial policies in peer economies – are contributing to a shift in thinking: namely that the outcomes of the market are only as good as the inputs, including framework conditions that inevitably shape market outcomes in one direction or another. At the same time, compensating for the limitations of market outcomes, notably during the crisis, has proven to be a political challenge.

We need to focus more on getting the institutional conditions right to achieve market outcomes that are better – more inclusive, sustainable and competitive – from the start. While ex-post redistribution remains a vital part of the policy mix, Europe’s reliance on it could eventually be reduced by a greater focus on “pre-distribution”. This would target institutional conditions, such as labour markets and corporate governance, that facilitate job search and job-candidate matching, fair remuneration and the fair sharing of the gains of productivity growth. Adequate spending and investment for public infrastructure and services is vital to efficiently provide public goods and support equal opportunities.

Europe is still a global leader in social inclusion, but our social model needs to be renewed to meet new challenges. Comparison with the United States shows how much the social divide could have grown in Europe were it not for our social model. However, this model needs a new boost, particularly given the new challenges of digitalisation, decarbonisation and demographic change. The potential of these megatrends to create strong divides between winners and losers is precisely what makes an adequate political response so difficult, and why that response must have social justice at its heart.

43 Akgun, O., Cournède, B. and Fournier, J. (2017), “The effects of the tax mix on inequality and growth”, OECD Economics Department Working Papers, No. 1447, OECD Publishing, Paris.

44 Blanchet, T. Chancel, L. and Gethin, A. (2019), “How Unequal Is Europe? Evidence from Distributional National Accounts, 1980–2017”, WID.world Working Paper 2019/06.

Conclusions

Europe faces a historic opportunity. By acting together, we can turn a moment of jeopardy into a unique chance for renewal. We need to reimagine European unity as a collective endeavour, as the only way in which we can turn threats to our way of life into the possibility to create a better life for all. This report has focused on three core areas where EU-wide political ambition and investment are truly necessary:

- **rapid technological change amid increasing global competition**, with digital technologies set to have a dramatic impact across all sectors of the economy. Europe needs to become more competitive through innovation and the fast adoption of new technologies if it is to reap the benefits of this wave of change;
- **increasing breakdown of the global climate and other ecosystems as a result of our economic system**, making mitigation and adaptation action now incredibly urgent. The urgency is due partly to the lag times built into natural systems and partly to the unavoidable path dependency and pace of our own response;
- **growing threats to social cohesion and social sustainability from multiple trends**, including how we manage technological change and automation, the climate transition, and an ageing society. These trends are taking place against a backdrop of stalling convergence across Europe, several decades of rising income inequality, increasing burdens on households and persistent inequalities of opportunity that are also a drag on economic performance.

With global changes accelerating, the window of opportunity to avoid potentially disastrous disruptions to our economy, ecosystem and society is rapidly closing. Europe cannot afford to delay the necessary adjustment to cope with these concerns and cannot afford to be a slow-moving follower in key sectors. Europe should take a lead, determining the future direction. And it should do this efficiently, frontloading reforms and investment in a way that ensures the transition works for all. The decisions we make today, including investment in different technologies and infrastructure, will determine whether we succeed in protecting and enhancing the well-being of future generations of Europeans.

Three challenges, one process of renewal

Europe's future must be competitive, sustainable and inclusive; success depends on all three. There is a danger that our response to the challenges we face could remain compartmentalised or selective. In reality, they are interdependent and a holistic approach is needed. It will be impossible to address each challenge successfully without a keen awareness of both the trade-offs and the potential synergies between them:

- **competitiveness/sustainability synergies** – the zero-carbon transition will depend on a dynamic economy capable of carrying out a new wave of innovation and large-scale technological change. At the same time, this transition is an opportunity for the European Union to enhance its technological competitiveness and to become a global leader in key technologies. The deadline, 2050, is well within the time horizon of many investments we are launching and planning today. Sound investment now means planning to be competitive in a net-zero carbon world, avoiding the trap of stranded assets. Seen narrowly, there are trade-offs between the internalisation of environmental costs and the global competitiveness of domestic firms. But these trade-offs are overwhelmed by the benefits of acting fast to avoid massive disruption to our ecosystem;

- **sustainability/social inclusion synergies** – the zero-carbon transition will be impossible if it is not also inclusive. Many households are already under strain from energy costs, and have limited capacity to invest to renew assets based on out-dated technology. Many regions of Europe have an economic model based on carbon-heavy sectors, with greater need to adapt. Cities can improve the quality of life of their inhabitants through innovative and near-zero carbon solutions. The transition will only succeed if all social groups, and all cities and regions across Europe, have the support they need to adapt to structural change and to thrive. A strong consensus is vital, underpinned by increased participation and a high social dividend. If we allow the transition to trigger widespread social conflict, it will fail;
- **social inclusion/competitiveness synergies** – to keep a competitive edge in the global economy, Europe cannot afford to waste any opportunity. That means making the best of the talents of all Europeans, making sure that everyone can gain the skills they need and the employment that allows these skills to be used. This requires a society in which opportunities are equal, where income and wealth inequalities are moderated, and in which less successful regions are not sidelined. It requires investment in universal access to affordable and high-quality public goods and services – from health and childcare to public transport and social housing – that help to give everyone a good start in life and the chance to participate to the best of their ability. In turn, boosting the competitiveness of the EU economy will be essential for ensuring access to employment and enhancing economic well-being for all.

Solidarity matters. Europe can only rise to the challenge of global competition and ecological breakdown if, as Europeans, we can all feel that we are “in this together”, that we all have a fair stake in the future we are working towards, and if we all feel heard and included in the process. This requires solidarity and a commitment that no one will be left behind, within each Member State and across the European Union.

We must create a society that is productive, sustainable and inclusive by design

We need to get the environment right for innovation and competitiveness. In the past, that meant not just support for research and the development of new technologies, but industrial policy that was interventionist and even protectionist. In a more open market context, the challenge is how to create an enabling, supportive environment for firms to be born, to scale up, to adopt new technologies and to become top competitors at a global level. We still need to invest more in R&D, but we also need to place much greater emphasis on making sure that all the conditions are in place to make sure that investment bears fruit. We need to focus more on the operating environment: skills, institutions, infrastructure and market opportunities. We must not lose sight of the investment through which innovations spread, such as investment in skills, new machinery and equipment and – particularly critical for digital technology adoption – intangibles like software, data, training and business processes.

Decarbonisation now requires society-wide transformation. Thus far, Europe has been picking low-hanging fruit. Change has been largely restricted to the decarbonisation of electricity generation, aided by falling technology costs and de-industrialisation (off-shoring the emissions associated with our consumption). Full decarbonisation by 2050 implies radical shifts, with deeper, wider and much faster transformation of the economy and the way we live. The focus has to shift to low-carbon technology in industry and services, to more sustainable practices in agriculture, to the circular economy, to household investments in energy efficiency, and to changes in the way we get around and consume. This is why systemic interventions like carbon pricing have to be complemented by wider institutions, regulations, social policy and investment support that enables all regions, businesses and households to adapt and to play their part. It is why popular engagement in the design and implementation of the decarbonisation strategy, through representation and active participation, will be essential.

We need to get the institutional conditions right for more inclusive economic outcomes. While redistribution remains a necessary part of the policy mix, we have arguably relied on it too much to fix the negative externalities of the market. We need to focus more on “pre-distribution”: on designing the framework conditions that inevitably shape market outcomes in one direction or another. Labour market institutions and policies need to facilitate re-skilling and the optimal matching of jobs to candidates, while enhancing security in a rapidly changing economy. Alongside investment in skills, we need to recognise the immense importance of work-life balance, the distribution of care work and other unpaid labour, and the provision of quality public goods and services, such as childcare and long-term care and affordable public transport and housing, in enabling as many people as possible to participate in employment and realise their full economic potential. Such considerations have proved particularly important for women’s economic chances.

We must work together as Europeans

Scale and coordination matter. Renewing Europe will require action at all levels: from local communities and municipalities, through regional and national governments, to the European Union and, notably in the case of climate action, globally. Working together as Europeans is an indispensable complement to action at other levels:

- **Innovative firms need a deeper single market.** Innovative firms are being held back by the costs of operating across EU Member States, making it more difficult to reach a globally competitive scale and making the European Union a less attractive location for high-growth-potential firms, particularly in digital services.
- **The transformation of our energy and transport systems needs continental-scale collaboration** on harmonised technology standards and network infrastructure.
- **Rapid innovation and scaling-up of key strategic technologies need to be driven by the concerted, coordinated efforts of EU countries.** We need to agree common missions focused on the zero-carbon transition and in areas like artificial intelligence. Scale will be vital to achieving the cost reductions that will make new technologies viable.
- **Deeper coordination on skills and training** is needed to extend opportunities and better match workers’ skills to market needs, supporting innovation and industrial transformation all over Europe.
- **Policy action is needed to ensure that EU savings get to where they are needed across the continent to finance the tremendous investment required.** We need to address the financial fragmentation that imposes constraints on many EU firms and projects. Gaps in risk-absorbing finance for innovation and for long-term strategic objectives need to be filled.

We must invest

Europe must be ambitious and make up for lost time. That includes getting the conditions right for rapid and inclusive transformation. It includes setting the priorities and policies needed to enable and guide businesses and households, giving direction and ensuring that transformation is just and inclusive, with everyone getting the support needed to play a part. It also means investing, carefully but urgently, to prepare ourselves for the coming decades: in skills, in new technologies, in new equipment and better buildings, and in infrastructure fit for the challenges ahead.

Europe needs an ambitious programme of investment. While there is no simple figure that can be given for the scale of the investment required, it is worth noting the range of investment needs highlighted in this report: business and government R&D; skills and other intangible and tangible assets for the adoption of new technologies; digital, transport and social infrastructure; and all the investments by businesses, governments and households to achieve a transition to a zero-carbon economy. Many of these competencies rest at the Member State-level (particularly for education), and the role of the private sector is crucial for filling investment gaps. However, the magnitude of the challenge and the positive Europe-wide spillovers from investment call for European intervention.

The European Investment Bank (EIB) is the dedicated EU institution for promoting strategic investment on behalf of all Europeans. It brings together technical expertise and the ability to mobilise tremendous financial resources with the overarching vision of how competitiveness, sustainability and inclusion must be tackled together at a European scale. Some EIB initiatives provide good examples of such pro-active, large-scale investment promotion for competitiveness, sustainability and inclusion:

- **Creating a critical mass for battery technology.** Comprehensive financing is critical to the success of European missions such as the Strategic Action Plan on Batteries that aims to put Europe on a path towards leadership in lithium-ion batteries, a cornerstone technology for electric vehicles and the integration of renewable energy. The EIB is already supporting R&D and deployment all along the battery supply chain, including battery manufacturing and management systems, raw materials recycling and production, battery storage and electric vehicle charging infrastructure.
- **Strengthening innovation ecosystems and innovation finance.** Successful innovation depends on factors like the business environment, the quality of institutions and intangible interactions as much as on infrastructure and finance. Infrastructure and finance, though, represent two of the key bottlenecks for innovation in Europe. The European Investment Fund and the EIB Group have a very prominent role in equity financing, with a wide scope of activities and range of partners, although this is not sufficient on its own to fill the huge financing gap we face.
- **Scaling-up sustainable finance.** The magnitude of the investment gap requires a rapid scaling-up of sustainable finance. The EIB issued the first-ever green bond in 2007. It has since been one of the largest issuers of the product and has visibly contributed to the build-up of best practices within the intra-market platform on Green Bond Principles. The EIB's Climate Awareness Bond (CAB) funds are earmarked to match disbursements to EIB lending projects contributing to climate action in the fields of renewable energy and energy efficiency. With the EU Taxonomy in the making, eligibility will be expanded into other climate change mitigation areas. The EIB is ready to build on its experience as a climate finance innovator and pioneer to support the tremendous investment that is now required.
- **Unblocking and accelerating digitalisation in European firms.** The EIB Group supports the financing needs of firms throughout their life stages, from start-ups onwards, through tailored debt, equity and guarantee products. Further, it is exploring how to complement its existing financing of small businesses and mid-caps through the provision of technical assistance and advice to identify unrealised opportunities and design effective digitalisation strategies, in partnership with financial intermediaries around the European Union.
- **Supporting investments in energy efficiency.** A drastic increase in energy efficiency investment is a necessary pre-condition for the achievement of the goals set in the Paris Agreement. A crucial dimension for improvement is the contribution of firms in this process. Energy efficiency should become part of firms' mindset for investment decisions, as well as product and process design. This can be facilitated by the development of incentives and actions (e.g. promoting energy audits) that help to unlock energy efficiency benefits for firms. The EIB is increasing its focus on sustainability and climate action, ensuring that all operations, by 2020, take climate change into consideration and are compatible with the Paris Agreement.

- **Tackling skills gaps.** EIB support for education and skills (some EUR 43 billion since 2000) addresses not just brick-and-mortar needs but also, increasingly, the quality of education (e.g. modernisation of curricula, information and communications technology equipment in schools, in-service computer training for teachers). Training needs are also financed alongside new infrastructure and equipment, such as for investment in advanced manufacturing technologies where extensive digital skills training is essential.

In such ways we need to take every opportunity to pro-actively lead change through investment, achieving the potential and synergies of acting together across the European Union. Such examples also show the existing capabilities – and great potential – of the EIB as the bank of the European Union. We can provide a holistic approach to tackling sustainability, competitiveness and inclusion together.

We must be pro-active to ensure that structural investment needs are met. Across the European Union, investment has returned to average, long-term, pre-crisis levels. But we must not be complacent. Investment has slowly returned with the help of policy support. This has included EU funds, EIB lending – lately augmented by the EIB-implemented European Fund for Strategic Investment – and not least by extraordinarily accommodative monetary policy. We are not yet in a position to remove any of these supports. Instead, we need to do much more if we are to address the backlog from the European Union’s lost decade of investment. We need to do even more if we are to address the urgent additional needs for long-term, strategic investment to transform Europe’s economy. We need to act in a smart, comprehensive way, taking an EU-wide perspective to maximise the positive spillovers of this transformation process.

We must be rigorous to ensure that investment is sound and support effective. To maximise the impact of the resources available, we need to tear down barriers to investment, and close gaps in investment finance and in the technical capacity to better plan and implement high-quality projects. We need to target gaps in risk-absorbing finance for innovative and high-growth firms and in long-term funding for infrastructure with a high social and economic return. We need to overcome the fragmentation that exists in Europe’s financial system, addressing the financing constraints of households, firms and public authorities where they occur and ensuring that there is no financing barrier to the upward convergence of regions across the European Union. Europe’s economy and society will be transformed in coming decades, whether we want it or not. We need to invest now for a future that is sustainable, and that offers prosperity to all.

About the European Investment Bank

The European Investment Bank is the bank of the European Union. It is the European Union's dedicated institution for catalysing investment to achieve the policy objectives agreed by Member States, both inside the European Union and around the world. Owned by the 28 Member States, the EIB raises money on the international capital markets and lends these funds for investment projects that address systemic market failures, passing on the favourable conditions it is able to obtain as a low-risk AAA borrower. It targets four priority areas in support of smart and sustainable growth: innovation and skills, small and medium-sized businesses, climate action and strategic infrastructure.

The world's largest multilateral lender, the EIB has provided some EUR 1.2 trillion of funding over the last 60 years. In 2018, the EIB provided EUR 56 billion in long-term finance to support public and private productive investment, with the EIF – the EIB's risk-financing arm – providing EUR 10 billion. These funds helped to attract additional investment that resulted in projects worth EUR 230 billion (an initial estimate).

The EIB Group supports innovation, skills and small businesses through instruments tailored to different risk profiles and stages of the firm life cycle. The EIF targets enterprises at early stages of growth via equity, guarantee schemes and other risk-sharing instruments. The EIB's products are more tailored to small businesses and mid-caps in growth or mature stages, supporting the spread of innovations through existing businesses. The Bank also funds innovative projects from large-scale research to small, specialised spin-outs and digital networks.

The EIB is committed to helping deliver on the Paris Agreement, already devoting more than 25% of its lending to this goal. The Bank's development of innovative financial instruments helps to attract private sector finance, in particular from institutional investors who would otherwise not be able to support such types of climate-related investment. The EIB also played a critical role as the issuer of the first green bond, and of around EUR 24 billion in green bonds in 11 currencies, helping to create what is now a USD 500 billion market for these instruments.

The EIB delivers sound operations to the highest standards. Projects must not only be bankable, but also comply with strict economic, technical, environmental and social standards to yield tangible results, improving lives. Alongside lending, the Bank's blending activities can help leverage available resources, e.g. helping to transform EU funds into financial products such as loans, guarantees and equity. Advisory activities and technical assistance can help projects to get off the ground and maximise value-for-money.



Three foundations

A competitive, sustainable,
inclusive Europe