



Restoring EU competitiveness

2016 updated version

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Foreword

The many years of crises that lie behind us – the financial crisis, the euro area sovereign debt crisis and now the migration crisis – have put Europe to the test. National interests of Member States have regained prominence and policy debates are often dominated by questions of distribution rather than efficiency. However, today maybe even more than ever, Europeans share a common destiny. The paramount scale of our challenges exceeds the capacity of any single EU Member State.

The integrated market is the backbone of Europe's prosperity. In order to preserve its strength, the EU economy needs to be at the global innovation frontier. Investments into today's innovation only make sense if they can rely on access to a vast integrated market. Integration inevitably leads to higher interdependence between Member States' economic developments. The links are no longer just trade links but also include European value chains, financial markets, fiscal contagion, etc. As unwinding integration would come with unbearable economic and societal costs, we will need a European approach to economic policy.

Decisive measures are needed to raise Europe's competitiveness in order to support higher levels of productivity, employment and prosperity. The effects of the crisis have exacerbated structural weaknesses and contributed to a legacy of economic and policy challenges that need to be tackled. These challenges have been made more pressing by the unprecedented rise in migration witnessed over the past year, and which – in all likelihood – will continue in the near future. The way to tackle these challenges is through deeper European market integration, further cohesion and convergence, strengthening and developing markets and stepping up efforts to make Europe

stronger and more competitive. Openness, innovation, skills development and the free movement of goods and services, labour, and capital are the drivers of Europe's competitiveness, growth and prosperity.

But Europe's competitiveness and long-term, sustainable growth potential suffer from a history of underinvestment in important areas, inefficient and fragmented financial markets, and institutional barriers. Seven years of crisis undermined confidence, lowered aggregate investment, and further aggravated structural investment gaps. At the same time, constrained fiscal space and the necessary regulatory response to the banking crisis are significantly limiting the ability of Member States and the European banking sector to take risks and catalyse valuable investment.

As the EU bank, the European Investment Bank (EIB) remains fully committed to strengthening Europe's competitiveness. During the crisis – at a time when investment was falling across the EU – the EIB stepped in to help shoulder some of the burden. In 2007, EIB disbursements as a percentage of Gross Fixed Capital Formation (GFCF) stood at 1.3% in the EU; by 2014 this number had reached 2.2% (a 70% increase). The EIB provided EUR 70 billion in finance to European projects and companies in 2015 in four priority areas: SMEs and Midcaps, Innovation, Infrastructure and Environment. This supported investment of over EUR 208 billion (1.4% of EU GDP). In addition, the European Investment Fund (EIF) – a member of the EIB Group – committed a further EUR 7 billion to SMEs and midcaps, bringing EIB Group financing in the EU up to EUR 77 billion.

The EUR 315 billion Investment Plan for Europe (IPE) launched in 2015 has been designed to further tackle Europe's challenges. The new European Fund for Strategic Investments (EFSI) – one of the IPE's three components – will enable the EIB Group to step up its provision of much needed risk-bearing financial products and further improve its capacity to perform its catalytic function. Through EFSI, the EIB will encourage the launch of economically valuable projects, making them attractive for wary investors, and giving recovery a boost at a critical junction. Even more importantly, this plan will help speed up and intensify our efforts to address the structural challenges that Europe faces. Without this joint effort by EU Institutions and Member States, any short-term push will be just that: short-term.

The EIB has been involved in the preparation of the investment plan from the start. As part of its preparation, we examined the interlinked causes of the long-term decline in Europe's competitiveness and productivity.

The first version of this report was based on the findings of an internal EIB study prepared in July 2014. It focused on key enablers that require long-term investment and are critical to our future well-being. It provided an overview of some of the main investment gaps – relative to global benchmarks and EU targets – that clearly demand our attention. It deliberately did *not* set out a plan for addressing resulting needs. Its purpose was to inform the identification of strategic priorities and show why action needs to be stepped up at the European level to revitalise long-term, competitiveness-enhancing investment in the EU.

For this updated January 2016 version, we have revised the report and slightly expanded its scope. However, the main findings remain valid.

It is of fundamental importance that EIB Group's efforts to mobilise additional finance for strategic investments is flanked by decisive action on the regulatory front, at national and EU-wide levels, to create an environment more conducive to private investment. Likewise, an enhanced focus on technical assistance is essential to make sure that funds are used effectively and where they are most needed. In the implementation of the investment plan we will ensure that investments are only channelled to sound, economically viable projects in sectors that are critical to Europe's competitiveness, such as energy; transport and telecommunications infrastructure; research and development; education; the financing of young, innovative companies; and the adoption of advanced technologies and practices by business, including SMEs, which constitute Europe's economic backbone.

Europe has ample strengths: the diversity of its people, an abundance of intellectual, scientific and technological capacities, a rich history of intellectual and business endeavour, and even its climate. Unfortunately, our ability to compete globally has declined. Since the onset of the financial and then economic crisis, we have focused primarily on the short-term. Now we also need to take a longer-term view. It is the only way for us to successfully address the economic and societal challenges that Europe faces.



Werner Hoyer

President of the EIB

Summary

Europe has experienced a two-decade long decline in competitiveness

With the advent of the digital revolution in the 1990s, productivity growth in the EU began to slip behind that in the US and other leading trading partners. This trend has undermined the comparative ability of European firms to compete and to provide rewarding jobs and a high standard of living.

Low comparative productivity and misallocation of investment, alongside many structural weaknesses, help explain why the global crisis hit Europe so hard, and why EU-wide recovery still presents such a challenge.

- ⇒ Since 1990, the inflation-adjusted absolute GDP per capita gap between the EU and US has increased by around 50%.
- ⇒ In absolute terms, the GDP per capita of EU regions has diverged since 1990, not converged.
- ⇒ Productivity growth in the EU has trailed the US since the mid-1990s and was hit harder during the crisis than in other regions.

EU firms trail behind in their capacity to innovate and absorb new technologies and know-how

In terms of research intensity and patenting activity the EU persistently falls behind comparable economies. Investment in advanced EU countries trailed that in the US and Japan already before the crisis. It declined sharply in the crisis and remains depressed.

The EU economy is still very strong in sectors like transport, energy and environmental technologies and it is still able to capture a significant share of global value chains in advanced manufacturing. Nonetheless, additional investment is needed to defend this position and to avoid falling further behind in weaker but crucial sectors like life sciences, semiconductors and software.

- ⇒ An additional EUR 130bn a year needs to be invested in R&D to meet the EU target of 3% of GDP.
- ⇒ More than 30% fewer patents are filed per EU citizen than per US citizen.
- ⇒ EU firms are slow at absorbing new technology. Keeping up with latest technologies in the advanced manufacturing sector will require an estimated additional EUR 90bn a year.
- ⇒ The share of fast-growing firms is more than 25% lower in the EU than in the US.

Young, innovative and modernising firms face financial constraints in the EU

Europe's largely bank-based and fragmented financial sectors face challenges in financing young innovative firms. Banks' deleveraging needs following the economic crisis have exacerbated this problem.

In particular, the availability of finance for start-ups and growth-stage firms is more limited in Europe than in the US. European SMEs also often lack access to finance for innovation and for absorbing new technologies and know-how.

- ⇒ Matching US levels of venture capital financing as a share of GDP would require around EUR 35bn a year in additional venture capital activity in the EU.
- ⇒ Stock market capitalisation in the EU is not only about half the US size, markets are also highly fragmented.
- ⇒ In the euro area, around 28% of SMEs are faced with difficulties of getting access to finance.

Europe's infrastructure is increasingly unfit to provide the foundations for EU competitiveness

In the EU, years of underinvestment, exacerbated by the crisis, mean that many infrastructure assets are reaching the end of their economic life, creating an investment backlog.

At the same time, infrastructure needs to be upgraded to meet the demands of the future, such as the need to ensure the security and sustainability of energy supply, to ensure efficient and sustainable mobility and logistics, to meet demand for digital services and to remain resilient to the effects of climate change and resource scarcity.

Annual investment shortfalls include:

- ⇒ EUR 100bn to upgrade energy networks to integrate renewables, improve efficiency and ensure security of supply;
- ⇒ EUR 80bn to upgrade transport networks to reduce congestion costs and trade bottlenecks;
- ⇒ EUR 65bn to reach the EU's Digital Agenda standards in broadband, data centre capacity, and cyber security;
- ⇒ EUR 10bn for state-of-the-art education facilities in addition to EUR 90bn increased operational spending, to reach US-standards, mostly in higher education;
- ⇒ EUR 90bn to rehabilitate environmental services and ensure water security in the face of climate change.

Public policy can foster competitiveness by addressing market inefficiencies

Investments in risky R&D, human capital, basic infrastructure, research and the growth of young and innovative firms all have positive spill-overs for the wider economy, which cannot always be fully captured by private investors.

Almost all of the gaps that are identified by this paper do *not* constitute projects that are ready for implementation and just need financing. In fact, most of the highlighted investment needs still have to be translated into concrete investment projects.

⇒ *Structural reforms* to ensure efficiency, flexibility, competition and further integration of Europe's internal market are key to generating an environment conducive to investment.

- ⇒ Most of the projects will have to come from the private sector. In order to catalyse private investment and to maximise the impact of scarce public funds, public investment policy needs to be *well-targeted* at market inefficiencies.
- ⇒ Turning needs into well-defined and efficiently structured projects often requires *advice on project preparation* and technical expertise.
- ⇒ In light of the inherent riskiness of single investments in competitiveness and current bottlenecks in European financial markets, public support for investments will in many cases be more valuable if it emphasises the facilitation of *higher risk taking* rather than liquidity provision.

Restoring EU competitiveness – the contribution of the EIB and the Investment Plan for Europe

A vital player in EU infrastructure sectors, the EIB Group is also the leading EU investor in venture and growth capital funds and plays a key role in financing SMEs and R&D in Europe. Under the proposed Investment Plan for Europe, additional resources from the EU budget, alongside the EIB's own funds, will strengthen the EIB Group's ability

to step up the provision of much needed risk-bearing financial products to unlock investments in areas vital to restoring the competitiveness of the EU. These tailor-made products are flanked by intensified advisory services to prepare projects and catalyse the investment Europe needs.

Introduction: About this report

This report examines the challenge of restoring the long-term competitiveness of economic activity within the EU. It also briefly discusses the part that public involvement is playing and could play to meet this challenge. It draws on a range of important recent contributions to this subject, including European Commission reports and academic studies, as well as research by the EIB's Economics Department and Projects Directorate. It aims to synthesise some of the most important findings to give an overview of the challenges the EU faces at the present time. It seeks to be complementary, balancing the focus of work by other institutions by paying special attention to structural issues rather than cyclical aspects of competitiveness.

The competitiveness of EU economies depends on the capacity of firms and industries to drive and adapt to change through innovation, raising productivity and achieving a presence in key strategic sectors. To sustain high income levels, Europe needs to excel in high value-added activities within globalised systems of production. This capacity depends in turn upon certain enabling factors: long-term investments in human capital and strategic infrastructure, the capacity of the financial sector to support innovation, and an appropriate framework of competitive markets and institutions.

While Europe has many strengths and EU industry remains strong in many sectors, it is weak in others and risks being further squeezed out of key future markets. EU productivity growth has fallen behind that in the US since the mid-1990s. The economic and financial crisis exposed this weakness and has aggravated it, contributing to the loss of income and jobs in many sectors and regions. Restoring competitiveness is at the

heart of ensuring long-term, sustainable economic recovery throughout the EU. This means recreating an enabling environment for efficient resource allocation, innovation, modernisation and productivity growth by EU firms.

Given the long-term focus of this paper, the analysis examines *productivity-driven, long-term* competitiveness.¹ Its overall objective is to inform and stimulate a debate about the structural competitiveness challenges faced by Europe. To this end, for various aspects of competitiveness, the paper assesses the EU against a number of different benchmarks. In most cases, the US is taken as the comparator, not least since amongst the large advanced economies it remains the country with the highest per capita GDP and holds leadership positions in research and technology.

Key questions:

- ***How much is Europe falling behind its potential for wealth creation?***
- ***What gaps exist in European investment in innovation and in key strategic sectors?***
- ***What constraints does the capacity of the financial sector place on innovation, the growth of innovative firms and the efficient reallocation of resources?***
- ***Are we investing what we need to in human capital and strategic infrastructure to sustain European competitiveness over the long-term?***

¹ Accordingly, we do not discuss aspects of *price* competitiveness in this paper. This well-covered concept is relevant for the crisis-related, cyclical discussion of real exchange rate misalignments. Beyond the *short-term* rebalancing of unsustainable external positions through price adjustments, *long-term* competitiveness is determined by productivity growth and allocative efficiency.

1. What is competitiveness?

The ability to create wealth

Competitiveness is the ability of firms to mobilise and efficiently employ the productive resources required to successfully offer their goods and services in a global economic environment.

Competitiveness is important for achieving a high standard of living and long-term sustainable gross domestic product (GDP) growth built on real gains in productivity. This depends on the efficient allocation of resources and the ability of millions of firms to excel in activities where their comparative advantage is greatest. It depends on their ability to make the most of global trade opportunities, maximising value added within integrated global production chains. Public policy and institutions are important for creating an environment that supports this dynamism.

The ability to drive and adapt to change through innovation

Achieving and maintaining competitiveness requires continuous improvements in productivity levels and constant adaptation to a changing economic environment. This innovation has different facets:

Product and process innovation – advancing the technological production frontier by developing new and better goods and services that capture market share, and by improving ways of working, including management, to increase value added for given inputs of labour and capital.

Catching-up – the adoption of improved technologies and practices by firms and the incorporation of product innovations, moving production to the technological frontier.

Growth of innovators – the growth of innovative, high-value-added firms and sectors, allowing for a substitution of firms that are no longer competitive.

Almost all innovation involves investment and requires appropriate and sufficient financing: for research and development of new products and processes; for adopting new technologies like Information and Communication Technologies (ICTs) and for workforce retraining; for innovative start-ups, small and medium-sized enterprises (SMEs) and larger companies that want and need to expand.

The ability to drive and adapt to change also means achieving strategic positioning with regard to key enabling technologies and future opportunities. A vibrant advanced manufacturing sector remains important to competitiveness, along with presence in key sectors such as life sciences, digital technologies, and green technologies.

The need for an enabling environment

The ability of firms to drive and adapt to change, and to create high-value jobs depends on a large range of contextual factors. This report identifies four key groups of enablers:

Human capital – High standards of education and health ensure that employees have the necessary skills, knowledge and capacity throughout their working lives especially in knowledge-intensive sectors. The attainment of these standards depends on adequate investment.

Strategic infrastructure – structures, often public, that enhance the productivity of people and firms throughout the economy, by lowering the costs of combining different

productive inputs and accessing markets and by increasing mobility and competition. Achieving and maintaining efficient transport, ICT, energy and environmental infrastructure depends on sustained long-term investment.

Climate change and environment – the ability to facilitate the transition to a low-carbon, environmentally-friendly and climate-resilient economy.

Financial sector capacity – the ability of the financial sector to foster an efficient allocation of resources by providing adequate finance adapted to the investment needs of innovative and growing firms, including through instruments such as bank loans, venture capital, credit guarantees and securitisation.

Institutions and markets – a wide range of factors including competitive and flexible input and product markets, well-designed regulatory and taxation regimes and property rights that give firms the incentives to innovate at the same time as allowing for an efficient dissemination of innovation, including in the service sector.

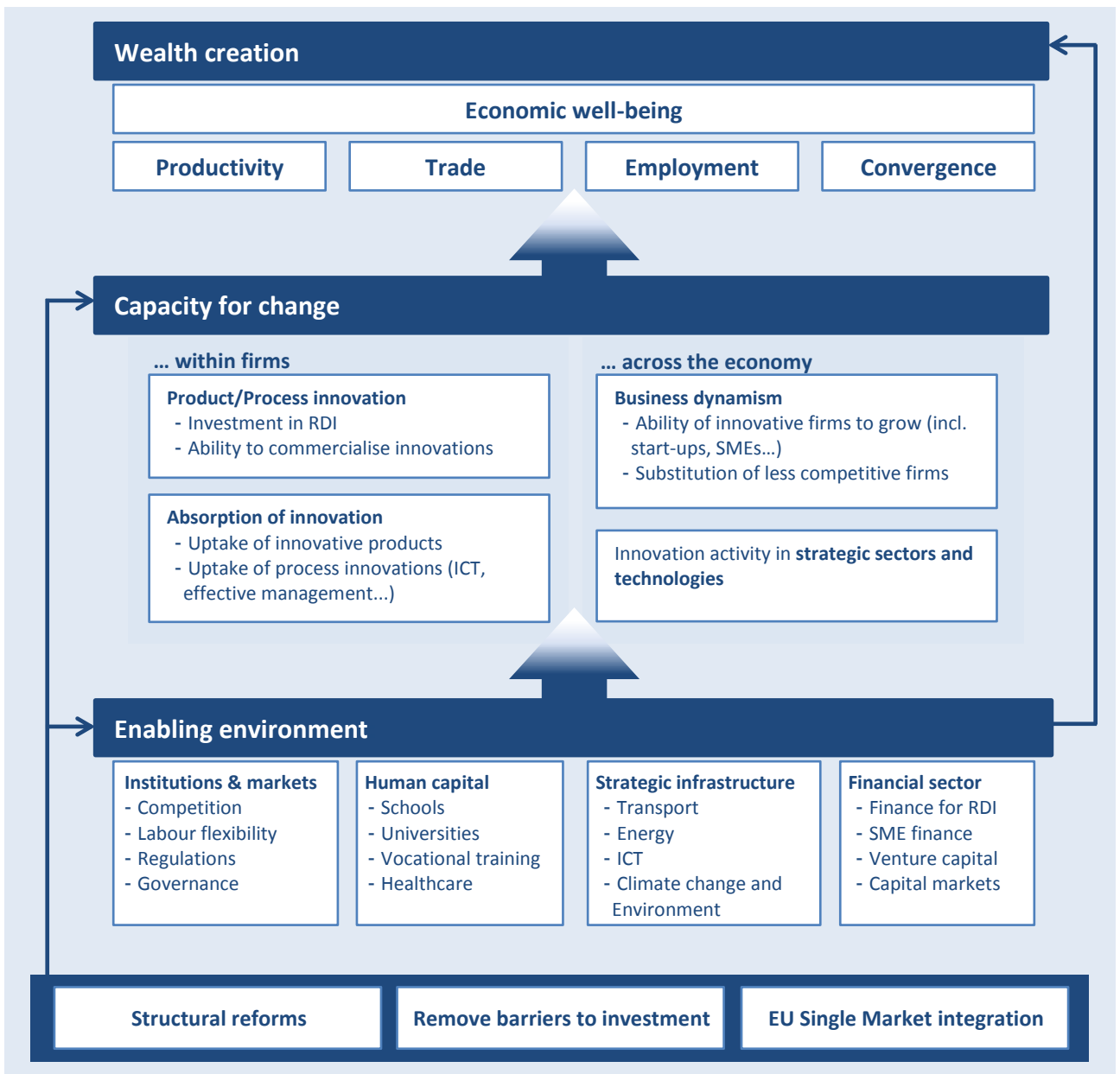
The potential benefits of EU Single Market

The Single Market is a key driver of EU competitiveness. By removing internal barriers, economic integration furthers internal trade and facilitates market entry, increasing competition and enabling economies of scale, which in turn improve efficiency and a better allocation of resources. Market integration leads to higher growth, job creation and welfare gains. Optimizing the EU Single Market and maximizing ‘European Added Value’ is key to creating a healthier, more prosperous and competitive European economy.

Conceptualising competitiveness

The EU’s competitiveness needs to be understood at three levels: the enabling environment, the ability of firms to drive and adapt to change, and the ultimate results in terms of productivity growth, trade performance and economic well-being. This can be underpinned by structural reforms, the removal of barriers to investment and EU Single Market integration (Figure 1). The following section will draw together the information we have on where the gaps lie.

Figure 1: Conceptualising competitiveness



2. The challenge for Europe

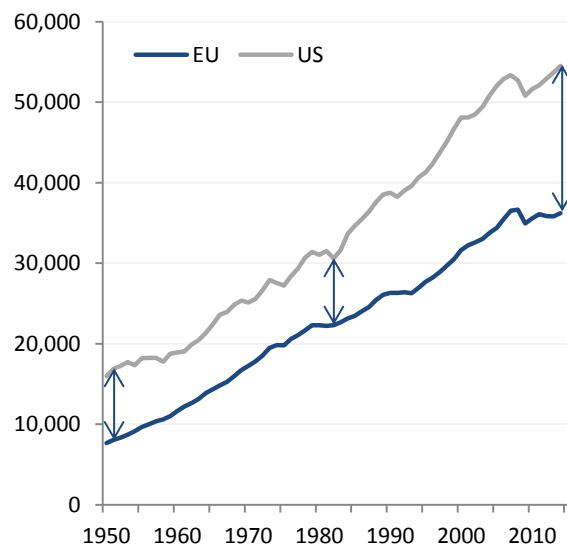
2.1 Wealth creation: Is Europe achieving its potential?

The ultimate test of whether a country or region is competitive is the economic well-being it can achieve and the prospects that it has to keep growing this potential. Competitiveness is *not* a zero-sum game: just looking at measures such as developments in the share of world exports or world GDP can be misleading as lower-income countries catch up. Instead, country comparisons of GDP per capita, productivity and growth can show us the unachieved potential that exists for Europe as a whole and shine a light on the state of convergence within Europe. While not an indicator of competitiveness per se, measures of trade performance help us to further define the competitive positioning of different countries and regions in the world.

The GDP per capita gap and convergence

Comparing European GDP per capita with that of the United States provides the simplest indication of Europe's unachieved potential. In the post-war period, the EU's GDP per capita – while converging in the early decades – has always been lower than that of the US. What is even more concerning is the fact that since the mid-1980s, the catch-up process has come to a halt and the GDP per capita gap has roughly doubled in absolute terms (Figure 2).

Figure 2: GDP per capita, comparison between the EU28 and the US, PPP (constant 2014 USD)

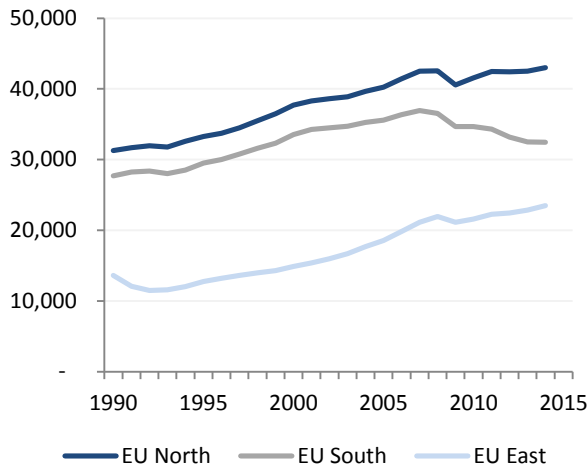


Source: The Conference Board Total Economy Database, May 2015

Income disparities within Europe are also a concern, with different regions showing divergent trends (Figure 3):

- *The “North-South” gap* – GDP per capita growth is much lower in the group of EU South countries than in their EU North counterparts, and has stalled since the crisis, allowing a large gap to open up.
- *The “North-East” gap* – Growth rates are encouraging in the EU East countries. Nonetheless, the absolute gap relative to the Northern Member States has widened, not shrunk.

Figure 3: GDP per capita in different parts of the EU, PPP (constant 2014 USD)



Source: The Conference Board Total Economy Database, May 2015
 Note: Averages are GDP weighted. EU North: AT, BE, DE, DK, FI, FR, IE, LU, NL, SE, UK; EU South: CY, ES, GR, IT, MT, PT; EU East: BG, CZ, EE, HR, HU, LT, LV, PL, RO, SI, SK.

Convergence in the EU has lost some momentum. Several low income countries are falling behind, particularly in EU South (Figure 4). The crisis has also enlarged the gap between poor and rich regions within the same countries. Between the years 2000 and 2008 regions with a lower GDP per capita were growing at a stronger pace than more developed ones. This was not the case in 2008-2013 (Figure 5), with many less-developed and medium-developed regions struggling in terms of output.

Figure 4: GDP per inhabitant, in PPS, 2013 (% of the EU28 average, EU28 = 100)

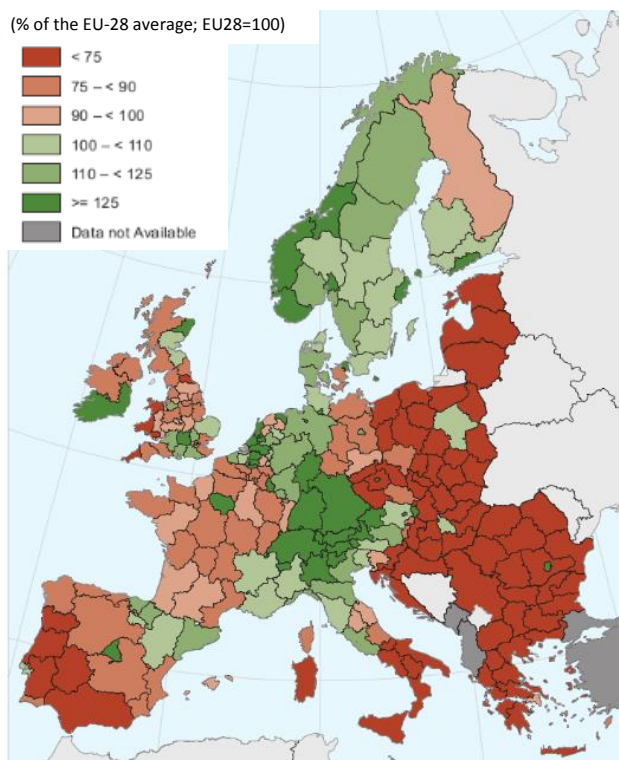
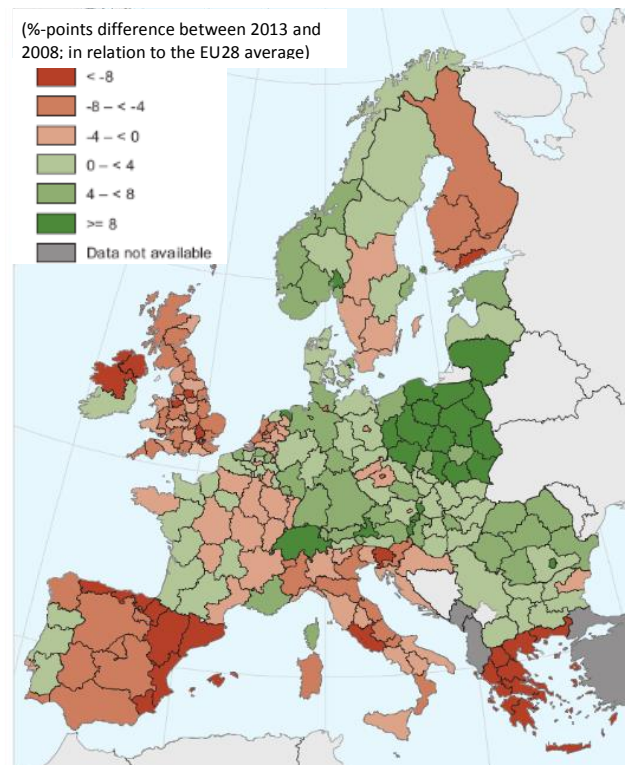


Figure 5: Change of GDP per inhabitant, in PPS, 2008–13 (percentage points difference between 2013 and 2008; in relation to EU28 average)

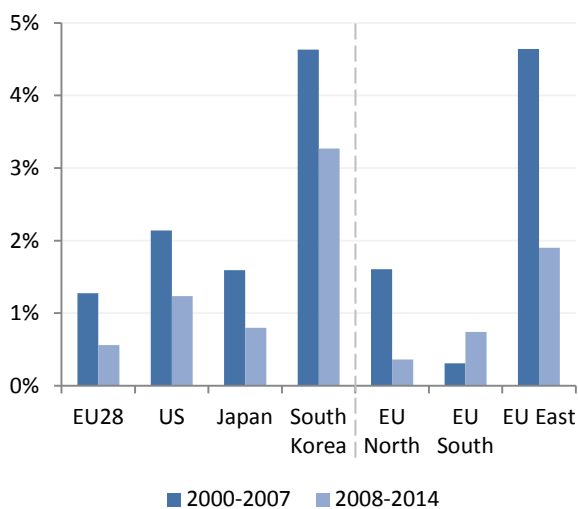


Source: Eurostat, Data at regional NUTS 2 level

The productivity gap

Comparing productivity growth in Europe with that in the US helps to explain why the GDP gap exists and is widening. Figure 6 shows how Europe's **labour productivity** growth (measured in GDP per hour worked) was already lagging behind the US, Japan and South Korea during the years preceding the crisis.

Figure 6: Labour productivity, compound annual growth rate (%), 2000-2007 and 2008-2014



Source: The Conference Board Total Economy Database, May 2015
 Note: EU averages are weighted by GDP. For definitions of EU regions see note Figure 3.

Since the mid-1990s the most important contributor to the labour productivity growth gap between the US and the EU has been in market services, such as wholesale and retail trade or financial and business services, which make extensive use of ICT. This reflects both the growing size of the sector and the high productivity growth in services in the US.

The EU was not able to benefit from new technology to the same extent as the US mainly because of insufficient investments in skills and organisational changes.

The financial crisis has had a strong negative effect on productivity growth, and more so in the EU than in the US. The largest decline in the EU came from various manufacturing sectors, probably reflecting a higher exposure to global demand fluctuations than the services sector. The EU sectors showing the most resilience were financial and insurance activities, where productivity growth outperformed the US.

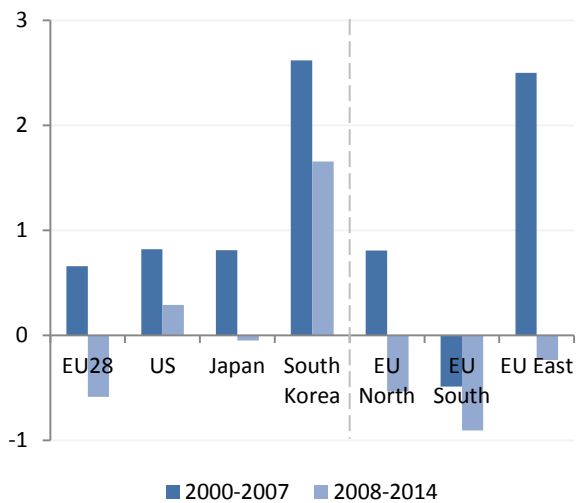
Northern Europe was closing the gap with US labour productivity until the mid-1990s, but has since lost significant ground, with annual growth slowing to as little as 0.4% since 2008 (Figure 6). From a low starting point, Southern Europe was able to avoid a fall in productivity growth during the crisis. But this was mainly due to a massive reduction in employment, mostly concentrated in low-skill sectors, which resulted in a slight overall increase in labour productivity. Labour productivity growth in Eastern Europe fell dramatically after the beginning of the crisis. While the labour productivity growth rate is still relatively high in this region, absolute labour productivity levels are still significantly lower than in the US or the rest of Europe, and the gap is now being closed more slowly.

Total Factor Productivity (TFP) is a measure of the efficiency and effectiveness with which different labour and capital inputs are used. Conceptually, it represents the extent to which the value of goods and services cannot be explained by varying quantities of labour and capital alone, but must be explained by *how* efficiently these inputs are used.

TFP estimates for 2000-2007 indicate that European efficiency grew more slowly than in the US and Japan before the crisis (Figure 7). In the context of the crisis, EU TFP dropped by far more than in the other major economies. This has been the case throughout the EU (North, South, and East).²

² TFP is computed as a residual and so will reflect the different ways and speeds with which capital (utilisation) and labour input adjust in a

Figure 7: Total factor productivity, average annual growth rate (%), 2000-2007 and 2008-2014



Source: The Conference Board Total Economy Database, May 2015
 Note: EU averages are weighted by GDP. For definitions of EU regions see note Figure 3.

Europe's international trade performance

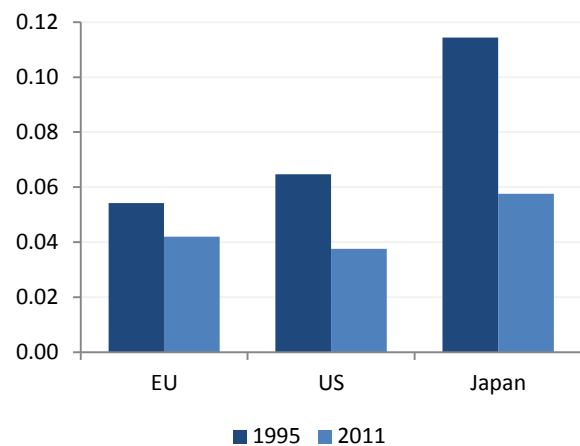
International trade has become increasingly complex over the last decades, especially as specialisation patterns are increasingly granular (i.e. the range of products in which a country shows particular strengths has become narrower). With trade costs declining and production being more and more spread out across different locations, the analysis of trade flows is becoming more complex. Looking only at traditional trade flow measures such as gross exports and imports is easily misleading. The importance of trade in intermediate goods inflates trade figures and the contribution of each country in the production process is not properly reflected. One way to overcome these shortcomings is to look at the value added of exports, a measure which captures the value added generated domestically in the production of goods destined for export and excludes the foreign value added associated with imported intermediary goods.

downturn. As such it is too early to say to what extent this decline reflects a trend decline in overall efficiency of the production process.

While services contribute to around 75% of EU GDP, their share in trade is still some 25%. In light of the growing importance of services within the tradable sector, more analyses will be required to better understand productivity and trade developments in the service sector.³

Figure 8 shows the shares of global value added *manufacturing* exports per capita for the EU and its peers, the US and Japan. By this measure, Europe has a competitive position comparable to that of the US. The most important sectors in which the EU has a large market share in global value added exports are machinery and transport equipment.⁴

Figure 8: Shares in global value added exports of manufactured goods per capita (%)



Source: WIW
 Note: Excluding Intra-EU Trade. Per 1 million inhabitants. EU represents EU27.

This is in line with the evidence that points to a comparable content of domestic value added of gross manufacturing exports between the EU and the US (Figure 9). Traditionally, the EU had a relatively higher content of domestic value added compared to the US. One reason for this is that

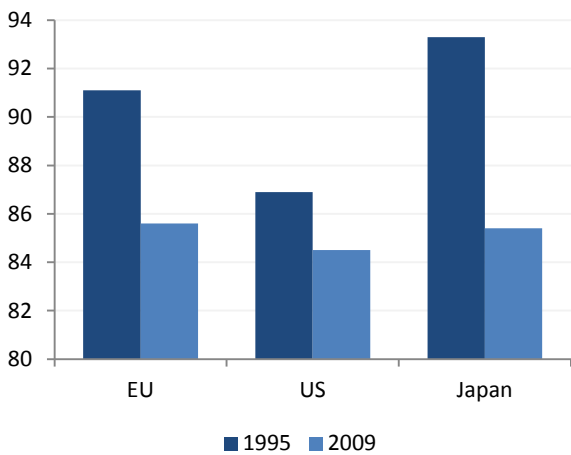
³ Uppenberg. (2011). Economic growth in the US and the EU: a sectoral decomposition. EIB Papers, Vol 16 (1). Uppenberg finds a significant gap in the contribution of market serviced to productivity growth between the EU and the US 1995-2008.

⁴ Stöllinger, Foster-McGregor, Holzner, Landesmann, Pöschl, Stehrer. (2013). A 'Manufacturing Imperative' in the EU – Europe's Position in Global Manufacturing and the Role of Industrial Policy, *WIW Research Report 391*.

most of the value chains in which EU firms participate are regional, meaning that many European firms produce in different locations in Europe to optimise their production process.

However, during the 2000s the domestic value added content of manufacturing exports of the EU has come closer to that of the US. Going forward, further EU integration offers European firms the unique possibility to take advantage of the diversity of the EU economy and organise a significant part of their value chains within the region, thus avoiding higher coordination and transportation costs compared to global value chains.

Figure 9: Domestic value added content of gross manufacturing exports

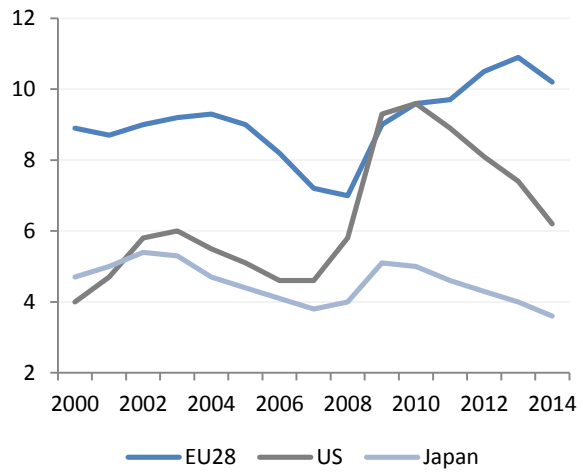


Source: EC European Competitiveness Report 2013

Employment

To help restore growth and competitiveness, Europe needs to focus on job creation. While the unemployment rate in the EU has been above the US and Japan for a long time (Figure 10), one can observe how the EU and US converged in 2009. However, since 2010, the US has been far more successful in reducing its unemployment figures.

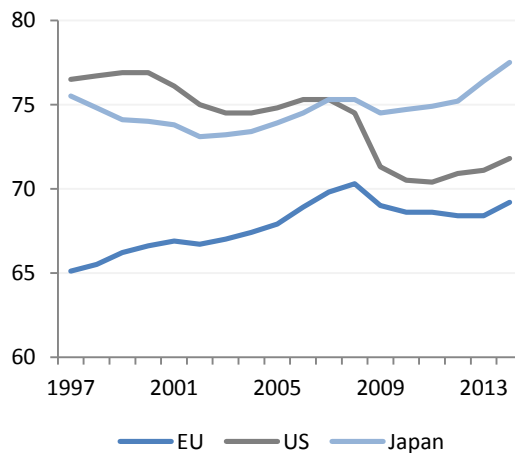
Figure 10: Unemployment rate (% of the labour force, 15-74 years)



Source: Eurostat

The EU2020 employment target aims at having 75% of the working age population (20-64 years) in work. In 2014, however, EU employment rate stood at 69.2%, below the US (71.8%) and well-below Japan (77.5%) (Figure 11).

Figure 11: Employment rate, EU and leading economies (% of population 20-64 years)

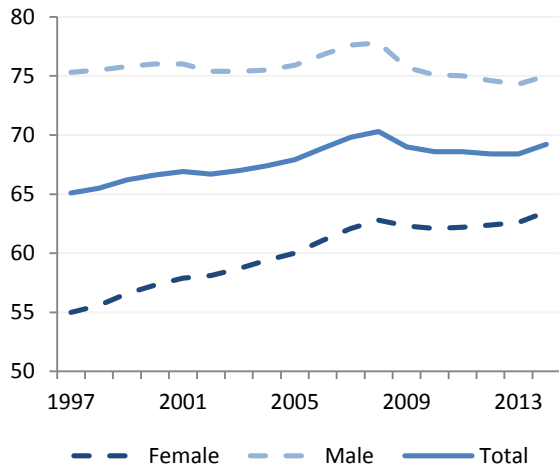


Source: Eurostat

Although the female employment rate in the EU has increased over time (Figure 12), it is still far below corresponding rate for males (63.5% compared to

75.0%). Much potential could be unlocked by bringing more women into the labour force.⁵

Figure 12: Employment rate, EU28 by sex (% of population 20-64 years)

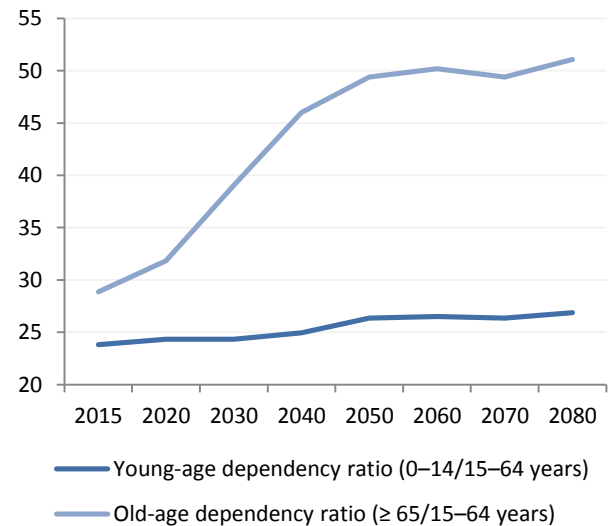


Source: Eurostat

Moreover, the impact of demographic ageing within the EU – like in many other leading economies worldwide – will be a major economic and fiscal issue in the coming decades. Consistently low birth rates and higher life expectancy will transform the shape of the EU28's age pyramid, leading to a transition towards a much older population structure. In 2015, the old-age dependency ratio (population above the age of 65 relative to the population aged 15-64) stood at 29%. By 2050, this figure is projected to reach almost 50%.

As the proportion of the working age population continues to shrink and the relative number of those retired increases, a higher burden will be placed on those working. Therefore, Europe needs to increase its productivity and move closer to the innovation frontier (Figure 13).

Figure 13: Projected age dependency ratios, EU28 (%)



Source: Eurostat

Note: 2015-2080: projections, European Population Projections, base year 2013 (EUROPOP2013).

⁵ Notable differences in female employment rate exist across EU Member States; ranging from very high levels in countries such as Sweden (77.6), Germany (73.1), Denmark (72.2) and Finland (72.1); to substantially lower levels in Greece (44.3), Italy (50.3), Malta (51.9), Croatia (54.2) and Spain (54.8).

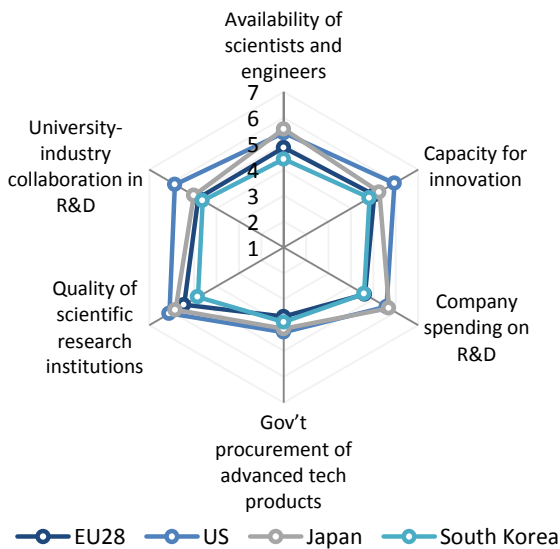
2.2 Europe's capacity for change – innovation and adaptation

Productivity is enhanced in two main ways: innovation that advances the frontier in terms of product sophistication and production efficiency; and the absorption of innovations, a process of adaptation and catching-up with the technological frontier as it advances.

Europe's R&D gap

Improving the environment for innovation is a key challenge for Europe. Indicators assessed by the World Economic Forum (WEF) suggest that the EU performs worse than the US, Japan or South Korea across a range of innovation environment dimensions (Figure 14). The largest gaps with respect to the US are in company spending on research and development (R&D) and university-industry collaboration.

Figure 14: Innovation environment, EU and leading economies

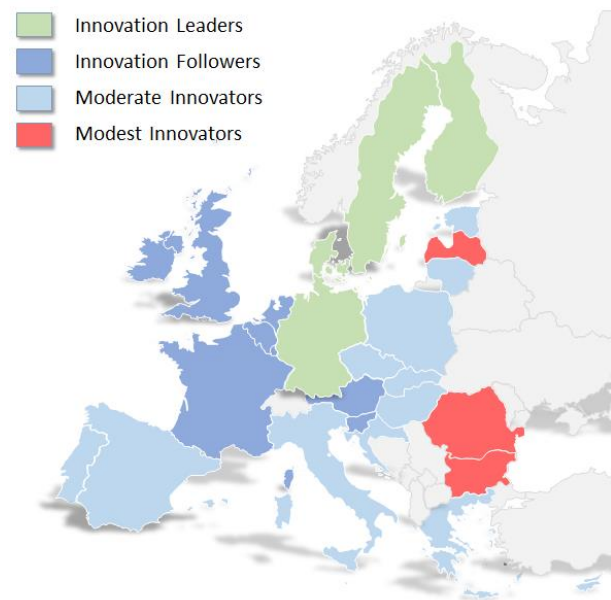


Source: World Economic Forum, Global Competitiveness Report 2015-2016
 Note: Innovation Pillar (12th Pillar). Scores from 1(worst) to 7(best).

Large variations in the performance of innovation also exist across the EU. While Finland, Germany and Sweden reach scores similar to that of the

US, the innovation environment is much weaker in many Southern and New Members States (Figure 15). Moreover, as the experience of countries like Finland has shown, even for those that invest heavily in innovation, external shocks can still have a large impact on individual countries; and particularly on small ones, which operate in a compartmentalized innovation environment in the EU.

Figure 15: EU Innovation Union Scoreboard



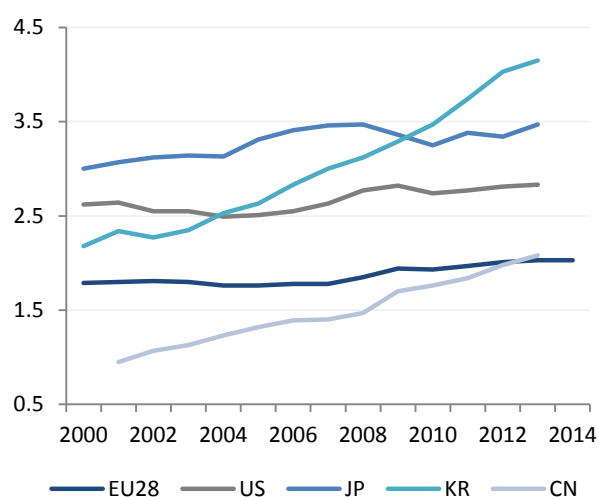
Source: Innovation Union Scoreboard, 2015

Europe's weaker innovation performance comes to a large extent from relatively weak industry-science links, poor commercialisation of research results and inefficient exploitation of knowledge created elsewhere. Over recent years the European innovation performance has been additionally undermined by three factors: the slow recovery from the crisis; increasing competition from innovation in emerging

economies; and the strength of US policies aimed at regaining a leading position.⁶

R&D intensity is much lower in Europe than in the US, Japan or South Korea (Figure 16). There are two reasons for this gap: first, Europe's high-technology sectors are in comparison (much) smaller; secondly, the R&D intensity in many sectors is lower. Within Europe, declining R&D expenditure in fiscally constrained countries has been mostly offset by expenditure in countries like Germany, France and the UK. Nonetheless, achieving the EU's objective of 3% GDP expenditure on R&D will require an additional EUR 130bn of annual R&D spending above current levels.

Figure 16: Gross domestic expenditure on R&D (% of GDP)



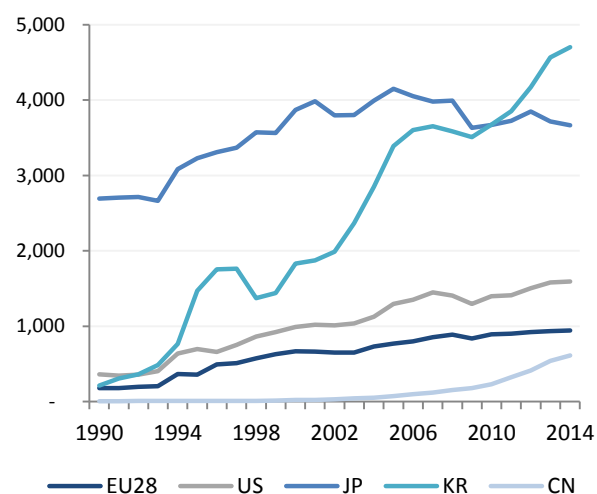
Source: Eurostat

Of this total, approximately EUR 70bn is accounted for by a gap in private sector R&D spending. In virtually all manufacturing industries where the EU plays a large role, there is still a substantial transatlantic R&D gap (Table 1).

Public sector R&D is about 1% of GDP in the EU: around EUR 50bn less than in the US in absolute terms and EUR 60bn less than is required to meet the 3% target. In line with its remit to provide the research infrastructure and institutions for basic and applied research, public-sector R&D expenditure is primarily concentrated on the cost-intensive natural sciences and engineering disciplines.

Patent applications provide one approximate indicator of the effect of divergent R&D investment levels on innovation performance (Figure 17). The EU is clearly lagging behind not only Japan and the US, but also South Korea in terms of per capita patent applications. The EU-US gap has widened over the last two decades.

Figure 17: Patent applications (per 1 million inhabitants)



Source: World Intellectual Property Organization

Note: Comparability across countries is limited due to differing patenting systems. EU represents EU28.

⁶E.g. American Recovery and Reinvestment Act of January 2009, in which the US government made available USD 787 billion in funding for innovation.

Table 1: Investment needs in R&D

Investment needs/objective	Annual investment (EUR billions)		
	Required ²	Current ³	Gap
Achieving 3% GDP target for annual R&D investment: ¹	370	240	130
• Private sector:	200	130	70
• Public sector:	170	110	60
Private/public R&D investment by key strategic sectors:			
• Transport equipment	55	30	25
• Machinery and equipment, including ICT and electronics	75	40	35
• Life sciences/pharmaceuticals	40	15	25
• Renewable energy and eco-innovation			20
• Other sectors			25
Total:			EUR 130bn

¹ Split based on comparing actual public and private R&D intensities with OECD average composition.

² EIB calculations based on Eurostat data.

³ Estimates for EU28, 2013.

R&D needs in key strategic sectors

In order to regain competitiveness, the EU will **need to catch up** with developments in the US and, to a lesser extent, Japan in a number of key technology areas that will form the basis of future products and services⁷. These are:

- **Life sciences:** an additional EUR 15bn of annual public sector investment in basic research is needed, alongside an extra EUR 10bn of private sector R&D investment mostly in pharmaceuticals and diagnostics/personalised medicine.
- **Semiconductors:** closing the gap will require EUR 5bn of additional annual public sector support, mostly for co-financing industrial scale pilot plants, and EUR 15bn of private sector R&D, mostly for bespoke chips for industrial applications.

⁷ EIB estimates based on industry data and publications; comparison in all three sectors with the US as benchmark, given their leading position in a broad range of sectors. Alternatively, South Korea could have been used as benchmark in semiconductors – with similar results.

- **Software:** an additional EUR 20bn is required annually mostly for developing business process and cloud computing software, principally from the private sector as these areas are closer to commercialisation.

The EU displays competitive strengths in the areas of advanced manufacturing, transport equipment and green energy and water and waste technologies.⁸ However, its position is increasingly being challenged. Additional investments are required in order for Europe to remain at the frontier of these key technologies. Examples include:

- **Transport equipment:** to maintain its leading position, Europe needs to respond to challenges including the development of clean alternative fuels (electricity, hydrogen and bio-based synthetic fuels, vehicle adaptation and refuelling/recharging), digitalisation (integration of transport infrastructure and equipment into communication systems) and improving transport system interoperability. The vast majority of these

⁸ As evidenced by world market shares and specialisation profiles.

investments will have to be financed by the private sector. However, in total public sector support of around EUR 8bn until 2020 will be required particularly for the co-development and financing of pilot infrastructure and lead markets for innovations.

- **Energy technology:** sustained R&D investment in renewable energy technologies, including storage, is required to meet long-term European climate targets, as well as to maintain Europe's lead in this field. Public support is particularly required for emerging low carbon technologies that are still at an early stage of development. According to the European Strategic Energy Technology Plan (SET-Plan), annual expenditures of up to EUR 70bn until 2020 are required in the fields of bioenergy, carbon capture and storage, smart grids, fuel cells and hydrogen, nuclear, energy efficiency, solar and wind. Finally, European manufacturers are significant global players in energy network equipment. In some specific sectors, such as for instance high voltage direct current (HVDC) electricity transmission, they have developed innovative technologies that have further strengthened the competitive advantage over non-EU manufacturers.
- **Water technology:** adequate investment in RDI that enhances the competitiveness of water services through smarter and lower-cost technologies is key to maintaining EU leadership in the global water sector and particularly its technology segment, where Europe is at the forefront (over 40% of patents worldwide). Current annual private sector R&D in this sector is around EUR 4bn. Optimal levels to maintain leadership are estimated at over EUR 7bn per annum by 2020, i.e. a gap of EUR 3bn per year.
- **Solid waste technologies:** Europe's competitiveness is hampered by dependence on imported materials, calling for increased RDI in materials recovery/recycling. European

waste management companies are very competitive on the global level (over 50% of patents worldwide). Hence the EU is well positioned to capture a large share of growing worldwide demand for environmental technology. Current annual R&D investment of around EUR 15bn for R&D and the acquisition of new technologies needs to be maintained.

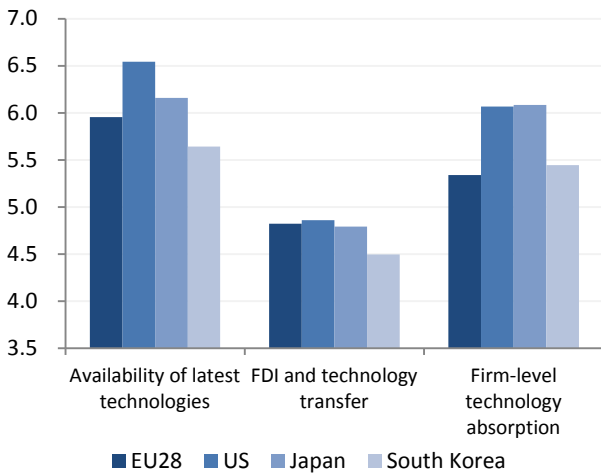
Catching-up: the absorption of innovation

An essential part of the whole innovation process is the absorption of innovation. While research and development pushes forward the frontier in terms of product and process sophistication, all firms need to keep re-investing to absorb this new technology and know-how, to maintain competitiveness.

In regions that have traditionally depended on less advanced manufacturing and services, such as Central and South Eastern Europe, as well as emerging economies, the emphasis is not so much on advancing the technological frontier as on moving towards the frontier and shifting from lower to higher value-added activities to raise standards of living.

Foreign Direct Investment (FDI) often plays an important role in bringing technology and know-how into a country with positive "spill-over" effects in the host country. The World Economic Forum provides indicators on the availability of latest technologies, firm-level technology absorption and the role of FDI in technology transfer (Figure 18). Europe performs worse than the US on all three measures and particularly with regard to firm-level technology absorption, where it lags significantly behind the US and Japan. This aspect is a particular concern in Italy, Poland, Romania and Bulgaria.

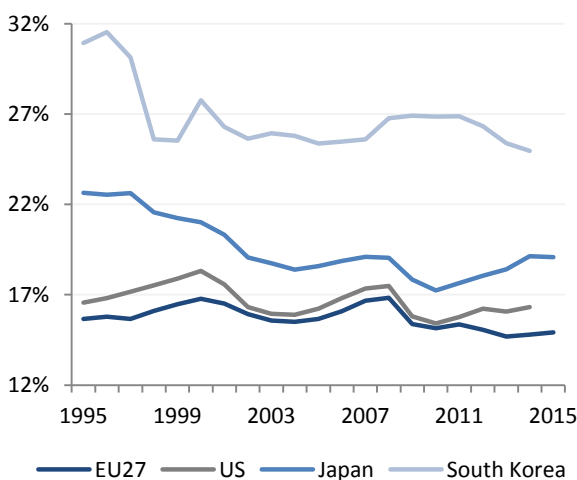
Figure 18: Technological readiness, EU and leading economies



Source: World Economic Forum, Global Competitiveness Report 2015-2016
 Note: Scores from 1(worst) to 7(best); EU28 GDP weighted average.

Europe’s poor performance in terms of technology absorption can be related to overall levels of investment, of which business investment makes up the largest proportion. Since the mid-1990s, EU Gross Fixed Capital Formation (GFCF) as a proportion of GDP, excluding residential investment, has been lower than in the US and Japan (Figure 19). Investment in Eastern Europe has been higher, but still much lower than in South Korea as an example of another emerging economy.

Figure 19: Productive investment (GFCF, excluding dwellings) as % of GDP

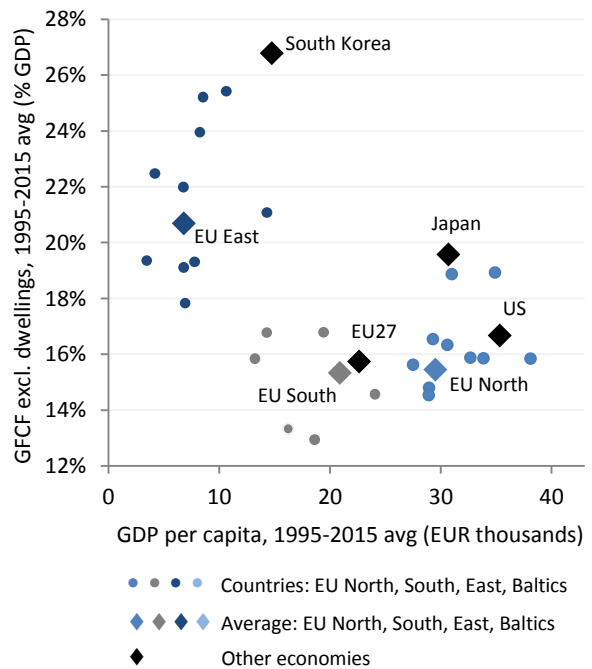


Source: European Commission, AMECO

The crisis had a strong negative effect on investment in all leading economies, creating a huge backlog of investment and loss of potential GDP. But while absolute levels of investment in the US and Japan show a recent trend of recovery, investment in the EU continues to stagnate, aggravating the EU investment gap.

Comparisons of investment performance should also take into account the relative income of different countries and regions, as successful countries with lower incomes are often characterised by high rates of investment – taking advantage of opportunities to “catch up”. Examining non-residential investment against GDP per capita (Figure 20) reveals that productive investment as a percentage of GDP in all EU regions appears to be low relative to income when compared with the US, Japan and South Korea.

Figure 20: Productive investment (GFCF, excluding dwellings) against GDP per capita



Source: European Commission, AMECO
 Note: Averages are population weighted. No data for Croatia. Luxembourg not shown in figure. No data from 2015 for US and South Korea. For definitions of EU regions see note Figure 3.

Innovation absorption is particularly critical in the manufacturing sector. Europe needs to excel in high-value-added **advanced manufacturing** if it is to preserve a viable manufacturing sector capable of supporting high living-standards. The presence of a critical mass in manufacturing is also important as manufacturing performs a “carrier function” for many associated services and is where productivity growth is concentrated.

Upgrading Europe's manufacturing industry and reversing the trend of declining global manufacturing shares will require substantial new investment in both tangible and intangible capital. Estimates put Europe's investment needs at about EUR 90bn per year, mostly funded by the business sector (Table 2).⁹

⁹ Roland Berger. (2014). Industry 4.0: The new industrial revolution – How Europe will succeed. Studies of other consultancy firms have arrived at comparable values.

Table 2: Investment needs in industry

Investment needs/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Adoption of latest generation technology in advanced manufacturing sector	320	230	EUR 90bn

¹ Estimation based on Roland Berger (2014) “Industry 4.0: The new industrial revolution – How Europe will succeed”, for the period until 2020.

² Estimate for EU 28, 2013.

A dynamic business environment

In a dynamic, innovative economy it is important that firms have a constant ability to reinvent themselves or replace each other. Recent ECB-led research has shown that the ability to reallocate resources *between* firms significantly contributes to overall productivity.¹⁰ New firms bring new ideas, products, services and processes into the economy. For an economy to be dynamic, old inefficient firms need to make place for younger more innovative ones and free up valuable labour and capital resources.

The business environment in the EU is characterised by a detrimental lack of dynamism, a factor which can be expected to facilitate the commercialisation and spread of innovation throughout the economy. This partly originates from a large share of stable firms (firms which grow less than 5% or shrink less than 5% a year in terms of employment) and low share of fast-growing firms, in particular compared to the US.¹¹ This points to a less experimental environment in the EU and a slower pace of resource reallocation, two fundamental drivers of productivity growth. In addition, competition policy in Europe has historically been more focused on incumbent firms while neglecting the role of entry, exit and turnover.¹² Indeed, higher entry cost and lower firm turnover in Europe relative the US have been an important explanation of the rising EU-US gap since the 1990s.

SMEs (<250 employees) are considered the backbone of the European economy, representing 99.8% of all enterprises and accounting for almost 60% of value added.¹³ However, while some may claim that start-ups and SMEs tend to be more growth generating than large enterprises, it is not the size per se that is associated with greater dynamism, but the youth of the firm¹⁴. This in turn is directly linked to the 'creative destruction' for firms – something particularly lacking in Europe's business environment (Figure 21). A higher turnover of firms (i.e. a larger degree of creative destruction) is typically associated with faster productivity growth, since high productive firms stay in the market while less productive ones are forced to exit.¹⁵ Thus, improving the business dynamism can help in getting the EU ready to generate innovative, transformative and world-shaping companies.

However, the base for a sound and efficient EU business environment is largely in place (Figure 22 and Figure 23). European institutions are in general of comparable quality to those of the US. In the World Bank's Ease of Doing Business ranking, eight EU Member States place among the top 20, while the majority place between 20 and 40 and some even below 60. The overall procedure of starting a business is more difficult in the average EU country than in the US. Another concern in the EU is related to getting credit. The performance of EU15 is overall better than EU13.

¹⁰ CompNet Task Force. (2014). Micro-based Evidence of EU Competitiveness – The CompNet Database. ECB Working Paper No. 1634, February 2014.

¹¹ Bravo Biosca, A. (2010). Firm growth dynamics across countries: Evidence from a new database. Mimeo, Nov. 2010. London: NESTA.

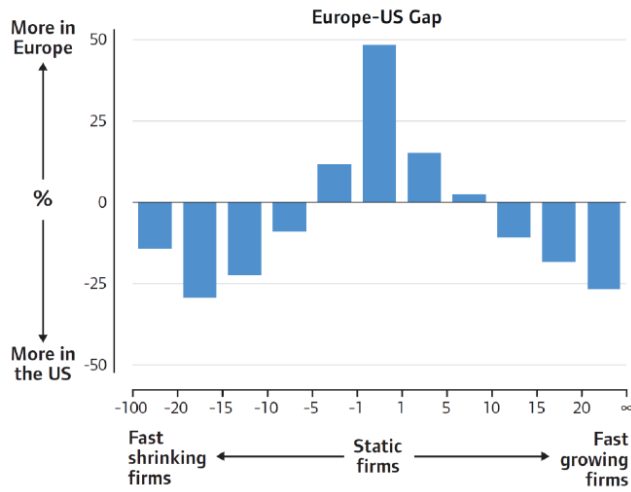
¹² For example: Aghion, Bloom, Blundell, Griffith and Howitt. (2005). Competition and Innovation: an Inverted U Relationship. *The Quarterly Journal of Economics*, 120(2), p. 701-728.

¹³ Based on data from OECD, Entrepreneurship at a Glance 2015.

¹⁴ CAF. (2013). Economy and Development Report, RED 2013, Discussion about productivity in Latin America vs. US and EU.

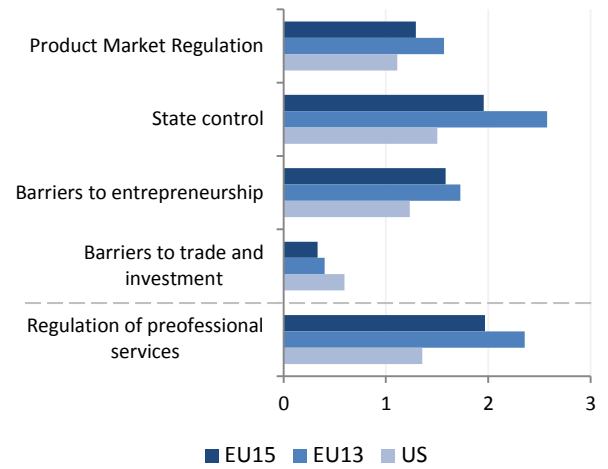
¹⁵ Aghion and Howitt. (2009). *The Economics of Growth*.

Figure 21: Share of firms by growth bracket, comparison between the EU and the US



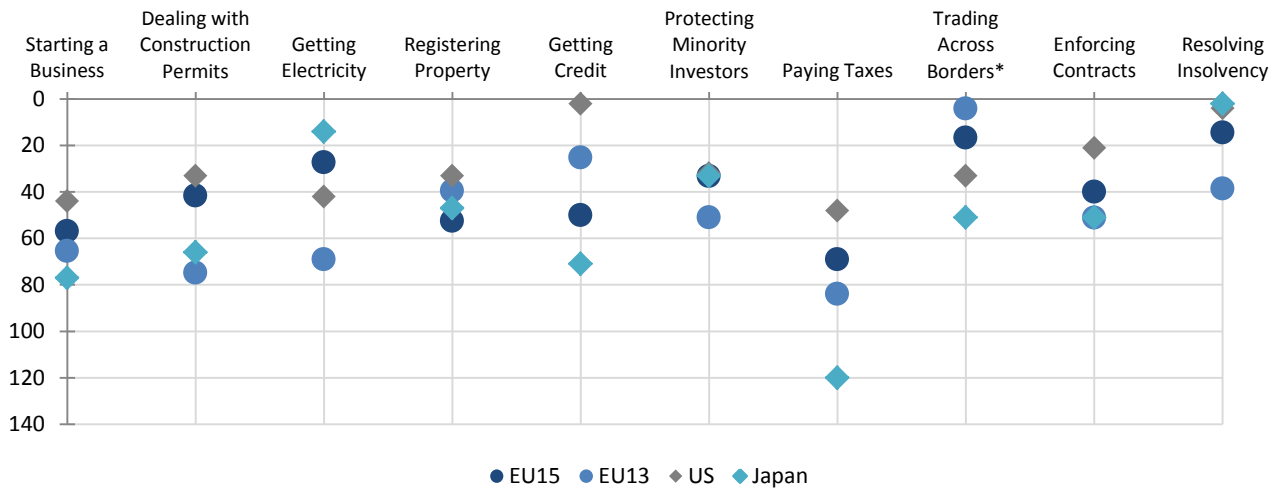
Source: Bravo-Biosca, Crisculo, Menon. (2014). What drives the dynamics of business growth, Nesta Working Paper 14/03. Note: Europe corresponds to the average of AT, DK, IT, NL, ES, NO, UK.

Figure 22: Regulation of product market and professional services



Source: OECD, Product Market Regulation (PMR) indicators. Note: Index scale 0 (least) to 6 (most) restrictive; * US values 2008; EU values 2013; GDP weighted averages for EU, EU15, and EU13.

Figure 23: Performance on the ten components of Ease of Doing Business



Source: World Bank, Ease of Doing Business. Note: Rank 1-189 (best to worst); GDP weighted averages for EU15 and EU13; *Does not differentiate between intra-EU and extra-EU trade

2.3 An enabling environment for competitiveness

The efficient movement of people, goods, services and information is a prerequisite for competitiveness, and so is access to an adequate quantity and quality of markets and resources, including finance. The common thread amongst those topics lies in their positive external effects on the whole economy that makes them a key area for public policy.

It is possible to identify many gaps between the investment that takes places in Europe in these

2.3.1 Human capital: education

Should current trends persist, Europe's economy will face a significant shortage of highly skilled workers, conservatively estimated at 5 to 8 million people in 2020.¹⁶ The largest gaps are anticipated in college/university education and advanced vocational training, and more specifically in the engineering, natural sciences, IT and healthcare sectors.

Given that Europe's competitiveness will remain based on knowledge-intensive manufacturing and related services, the demand for young people with excellent post-secondary training and a skill-set that fits the needs of future jobs will increase. This indicates a need for more and better vocational training. Skills in high demand will likely be found in a number of areas that support the application of new technologies such as IT, mechatronics, robotics, or medical technology.

¹⁶ Hence the estimated gaps are differences from an 'investment frontier' in each sector. We deliberately refrain from estimating socially optimal levels of investment, as those estimates would depend on investments in other sectors and on assumptions as to the exogeneity of other structural features of the economy.

¹⁷ McKinsey Global Institute. (2012). The world at work: Jobs, pay, and skills for 3.5 billion people, June 2012.

areas, and the investment that would be necessary to reach certain benchmarks. In this report, these investment gaps are estimated by calculating against different benchmarks.¹⁰ In most cases, like infrastructure, we look at gaps in investment in the narrow sense of the word. In other areas like education and R&D we find a broader concept of investment more appropriate and also include certain current spending items.

Capital and operational expenditure

The EU spends about 6% of its GDP (2011) on education, almost all financed by the public sector. Current expenditure accounts for 90% of this, mostly for teaching and the operation of facilities. Another 9% is invested in facilities (mostly school buildings and equipment). By comparison, US education spending is 7.3% of GDP with a 30% private sector contribution, in particular for higher education. The latter provides incentives for greater business orientation of higher education and research. Expenditure per pupil in the US is 30% and 40% higher for pre-primary and school education and double for tertiary education.

Closing the gap with US funding levels would require a conservatively estimated additional EUR 100bn per year – mostly for university-level education. Given the large maintenance backlog in education facilities, around EUR 10bn of this total would be required for education infrastructure, including the upgrading of equipment to modern IT standards for teaching. A comparison with South Korea or Singapore, where the educational attainment of pupils is better than in the US and Europe, leads to similar conclusions.

Table 3: Investment needs in education and basic research

Investment need/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Matching US investments in education:			
• Operating expenditure (mostly teaching staff)	880	790	90
• Capital expenditure on education infrastructure, including IT equipment	80	70	10
Total:	960	860	EUR 100bn

1 EIB estimate, based on OECD data.

2 Estimate for EU28, 2013, based on Centre for European Policy Studies (CEPS), How to keep s competitive edge in the talent game, Brussels, 2014.

The university gap

While the educational attainment of pupils at European schools remains relatively good, the US has a clear lead in top-ranked research universities and other research facilities. There are only five European universities amongst the global top 20;¹⁸ most lack the resources to match their ambitions.

Since 2009, many EU Member States have reduced budgets for tertiary education. At the same time, this education segment is continuously becoming more expensive. As the public sector

is the most important source of funding in the EU, the funding gap is expected to widen – with negative long-term implications for the competitiveness of the university sector and downstream R&D intensive sectors.

This means that Europe is becoming less attractive for elite academics, researchers and students. Efforts at the EU level to create a more attractive environment for researchers, such as through better funding for the European Institute of Technology (EIT) or the Joint Research Centre (JRC), help to mitigate the widening gap in excellent public research, but fail to address the lack of top-notch training facilities for students.

¹⁸ Times Higher Education World University Rankings 2015-2016; Within Europe: four universities in the UK and one in Switzerland.

2.3.2 Strategic infrastructure

Transport and logistics

The development of efficient, integrated and reliable logistics networks increases the competitiveness of businesses by reducing trading costs and widening markets for products and inputs including labour. Transport and storage services account for about 10-15% of the cost of finished products in the EU, while traffic congestion costs the EU approximately 1% of GDP every year.¹⁹ The cities with the most modern and efficient

public transport systems are also the most successful at attracting high-skilled workers and the most innovative businesses, linking people to jobs and key services.

Urban transport

The ability to deliver goods and services efficiently and on time is disproportionately dependent on the so-called “last mile” of supply chains. This urban portion of supply chains accounts for around one third of overall transport costs and most of the cost of congestion. With more than 70% of the EU population living in urban areas, any deterioration in urban productivity has a significant impact on Europe’s competitiveness

¹⁹ See for example, www.ec.europa.eu/transport/themes/urban/urban_mobility

through the time lost to travel, shortages of qualified workers, and health-related impacts resulting from poor quality of life.

More than half of all transport investment will be required to address urgent urban challenges including traffic congestion and deteriorating road safety. Most urgent is the upgrading and extension of public transport networks, the roll-out of alternative fuel distribution systems and the application of technology in the efficient management of travel and logistics. Cities in new Member States and second tier cities in the rest of Europe require major start-up investments to initiate efficient mass transit networks, and should be a key focus.

Completing the internal market

The smooth functioning of the internal market – and thereby the full realisation of the efficiency and competitiveness gains from integration – requires strengthening of seamless transport chains for passengers and freight across the continent, removing gaps, bottlenecks and technical barriers. The most urgent needs include critical inter-urban road and rail links, seaports, airports, and inland waterway connections.

International gateways

European seaports receive 90% of all EU external trade, and investment in larger and more automated facilities, capable of handling the new generation of Post-Panamax ships, is essential for European industry to remain competitive on a global basis. Investment is mixed, with the private sector providing the operation and equipment and the public sector supplying common user infrastructure. Airport capacity is critical for the transport of high value goods and the ability of EU companies to travel for business. There is a need to keep up with rising demand and maintain Europe's privileged position as an international hub for air travel.

Europe's transport investment backlog

The crisis has negatively affected transport infrastructure investment in Europe. In 2008, annual investment in transport infrastructure of EUR 130bn was broadly consistent with historical levels of about 1% of GDP. However, investment fell during the crisis, creating a EUR 120bn backlog. It is therefore estimated that investment now needs to rise to EUR 160bn a year until 2020 as a minimum to address the backlog and regain historic investment levels (Table 4).²⁰

Table 4: Investment needs in transport and logistics infrastructure²⁰

Investment need/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Modernising urban transport to meet global benchmarks: Including urban rapid transit systems, ports and airports, multi-modal logistics, platforms, safety, traffic management and alternative fuel networks.	80	40	40
Ensuring sufficient capacity in interurban traffic: Including Trans-European Transport Networks, core network corridors, and cross border connections.	80	40	40
Total:	160	80	EUR 80bn

¹ EIB estimate based on OECD/ITF (2014) Statistics: Investment in Transport Infrastructure, (accessed February 2014). Estimates are for 2015-2020.

² Eurostat (2014) GDP and main components - Current prices [nama_gdp_c], (accessed February 2014).

²⁰ Estimates made by the European Commission refer to "required investments", in contrast to the broader concept of "investment gaps".

Energy

The secure supply of energy at reasonable prices to industry and households is crucial to Europe's competitiveness. Rising retail prices and risks of supply interruptions are increasingly perceived as threatening Europe's long-term competitiveness. Sustained and well-targeted investment is required to put downward pressure on prices, and (excluding RDI) can be broken down into three main areas: energy security, networks and efficiency.²¹

Securing EU energy supply

The European Commission has identified 33 priority projects as crucial for EU's energy security in the short to medium term. These focus on increasing gas storage capacity, increasing capacity to transport gas from Western to Eastern Europe and completing electricity interconnections to the Baltic States.

In the longer term, in addition to investing in renewable energy sources and energy efficiency, supply security can be further enhanced through investments in domestic hydrocarbon production, including potentially from unconventional sources where this can be done in accordance with appropriately high environmental and social standards. Further investments are required to diversify gas suppliers (notably through the Southern Gas Corridor) and increase liquefied natural gas (LNG) imports and production. These investments may lower prices in part by improving the EU negotiating position with existing suppliers, boosting relatively low cost indigenous production and, in the case of gas storage, helping to smooth seasonal price fluctuations.

Modernising energy networks

Where currently constrained, investments in energy networks can offer high productivity gains. As described in the Annex, increasing interconnection between markets helps create gains from trade, and reduce average generation costs. These potential gains are likely to increase as the share of local renewable generation increases in the generation mix.

In the electricity sub-sector, the European Commission has identified investment needs for onshore and offshore transmission lines, smart grids and storage. In addition to these projects of European significance, additional investment is needed for upgrading distribution networks and domestic transmission lines. In the gas sub-sector, additional investment is needed for EU priority projects as well as the general modernization of gas distribution networks.

Achieving greater energy efficiency

There is a large potential for investments in the building and industry sector to improve energy efficiency – helping to reduce energy bills and mitigating risks of supply interruptions. With energy prices expected to rise over time, delivering these investments is likely to become even more central to ensuring long-term sustainable growth. Indeed, Europe's high energy efficiency standards (e.g. for engine emissions) may become a source of first-mover competitive advantage.

The large potential in Europe is largely unrealised. Barriers to cost-effective investment include poor information, split incentives for rental buildings and lack of access to finance. Subsidies also weaken incentives in some parts of the EU. As shown in Table 5, a large portion of the identified investment gap in energy relates to energy efficiency in buildings and industry.

²¹ The investment gap in energy is assessed against the needs identified by the European Commission; however, while the Commission's plans foresee implementation until 2020, the EIB's analysis assumes that the required investments are only completed by 2030.

Table 5: Investment needs in the energy sector

Investment need/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Upgrading energy networks (gas and electricity)	64	47	18
Energy efficiency savings in buildings and industry	112	42	70
Power generation, including renewables	53	41	12
Total:	230	130	EUR 100bn

¹ EC estimates of average annual investment in EU28 over the period 2016 to 2030, supplemented on occasion by EIB estimates. The scenario assumes compliance with all existing EU legislation, plus adoption of a 40% GHG target by 2030.

² EC estimates of average annual investment in EU28 over the period 2001 to 2015, supplemented on occasion by EIB estimates.

Telecommunications

In the past decade, broadband has contributed an estimated 20% to total productivity growth in EU.²² Next generation high-speed broadband networks are likely to have a similar effect, potentially adding 0.5-1.5% to EU GDP.

Broadband

Traffic on EU telecommunication lines (voice, data and video) has risen five-fold since 2008 alone. Nonetheless, forecasts suggest that the growth of data traffic in Europe may increasingly lag behind that in Asia and North America. One reason is the relatively slow extension of broadband infrastructure, with Europe trailing the US, South Korea and Japan in terms of both penetration and speed. Estimates show that for the EU as a whole the broader economic benefits of such broadband investments outweigh their cost. In the base case, the cumulative economic gains from universal high-speed broadband deployment are 32% above the total EU investment cost.²³

For broadband, the investment gap with the leading regions in the world is estimated in the range of EUR 30bn a year until 2020, taking the targets of the EU's Digital Agenda as the benchmark. Around 65-80% of this investment is

needed for a combination of different technologies (fixed-line, broadband and mobile) in rural and suburban areas which lack financial viability.

Data centres

Data centres have emerged as an even faster growing market than data transmission, providing high processing speeds and secure data handling to complement the expansion of data traffic. EU competitiveness would be enhanced by matching the US in terms of current data centre capacity. This would require an estimated annual investment of EUR 50bn in around 1,500 new data centres by 2020; the current rate of investment is, however, only around half as high.²⁴

Cyber-Security

Europe's economy and society is increasingly dependent on the proper functioning of its digital infrastructures and processes. The strong growth of cyber-attacks in recent years has demonstrated the vulnerability of digital assets and highlighted the need to protect them against threats. This is why Europe has made cyber-security one of seven priority areas under the Digital Agenda. While information about investments in cyber-security remains fragmented, ample evidence of successful cyber-attacks suggests that investments should be increased. Estimates put the additional annual investment need in Europe at about EUR 10bn, if Europe wants to catch-up with the security standards in the US by 2020.

²² Estimates by DG Connect and OECD.

²³ Gruber, Hätönen and Koutroumpis. (2014). Broadband access in the EU: An assessment of future economic benefits, *Telecommunications Policy*, Vol.38 (11), p. 1046–1058.

²⁴ Assessed against the current data centre infrastructure in the US.

Table 6: Investment needs in the telecommunications sector

Investment need/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Reaching global benchmark for broadband services	75	45	30
Matching US data centre capacity	50	25	25
Matching US investments in cyber-security	35	25	10
Total:	160	95	EUR 65bn

¹ EIB estimates for 2014 to 2020; EIB. (2011). "The Economic Impact of Fixed and Mobile High-Speed Networks", EIB Papers (Vol. 16, No. 2, pp. 30-60). See also: WEF/Accenture. (2011). "Advancing Cloud Computing: What to do now? Priorities for Industry and Governments"; Analysis of EU Cyber-Security Markets, Report to the EIB, March 2015.

² Estimates for EU28, 2013.

Water and waste

The water and waste sectors are critical to Europe's competitiveness. While many have taken these vital environmental services for granted in the past, it is predicted that they will pose significant challenges for Europe in the future.

One challenge arises from the dual risks of water scarcity and flooding in the context of climate change. Another is our aging water supply and treatment infrastructure. Materials recovery and recycling is an area of strategic importance for the future in which Europe needs to invest to stay ahead.

Water Security: Managing the risk of scarcity and floods²⁵

Industries are becoming increasingly aware of water-related risks in their value chain. This is particularly relevant for firms in water dependent sectors where water-related risks could cause a substantive change in business, operations, revenue or expenditure – mostly within the next five years.²⁶

Floods are the largest source of GDP losses from natural disasters in Europe (EUR 150bn in 2002-2013), while their frequency has increased. Europe remains largely unprepared. Even relatively small investment in flood risk management could help avoid annual damages estimated at EUR 5.5bn under current conditions, but exceeding EUR 23bn by 2050 if climate and economic changes are considered.²⁷ Special efforts are needed to support coordinated flood management in trans-boundary basins.

At the other end of the spectrum, **droughts** have caused EUR 86bn in damages over the last 30 years. While the situation has improved in the last 20 years thanks to water efficiency measures, one fifth of Europe's population lives in water-stressed countries.²⁸ A changing climate makes matters worse by reducing precipitation and increasing its variability.

In Europe, water security affects energy security, as 44% of water abstraction is for energy production, mainly for cooling processes. Water shortages and increased water temperature are expected to reduce Europe's hydropower, coal and nuclear power generating capacity by up to

²⁵ Water security refers to water resources; to be distinguished from water services that are typically provided by utilities at municipal level.

²⁶ CDP. (2014). Safeguarding Europe's water resources, CDP Policy Briefing.

²⁷ Jongman et al. (2014). Increasing stress on disaster-risk finance due to large floods. *Nature Climate Change*, 4, p. 264-268.

²⁸ EEA. (2010). *Use of freshwater resources* (CSI 018). Based on the Water Exploitation Index (abstraction vs. long-term availability), Belgium, Cyprus, Italy, Malta, and Spain are water stressed. Germany, Poland and France are just below the 20% threshold

20% between 2030 and 2060. Industry other than energy accounts for 15% of water use, and agriculture for 24%, although this can reach up to 80% in some Southern regions. The most urgent infrastructure needs for achieving water security by 2030 include water cycle management, flood risk management, increased efficiency, demand management, and the development of new resources including desalination and wastewater reuse.

Rehabilitating Europe's water infrastructure

Europe's people and industries, particularly SMEs, need well-functioning environmental infrastructure, which is deteriorating. Today, much of Europe's vital drinking water supply and wastewater management infrastructure is reaching the end of its economic life. Investment in this sector has been unsustainably low. Average annual EU investment in 2007-2013 in municipal and industrial water/wastewater totalled about EUR 30bn. The most recent projections by the Global Water Intelligence indicate small annual increases (2-5% range) in investment to 2020, resulting in an average expected yearly investment of EUR 33bn. Such increases would still be inadequate to make up for historical underinvestment in the sector. They also do not cover the investment needed in water security and flood risk management, as well as

investments to make water infrastructure resilient to climate change. Actual investment needs to upgrade and renew Europe's water and wastewater systems are estimated at EUR 90bn a year for the period 2014 to 2020.

Enhancing materials recovery

Advanced waste management, materials recovery and recycling will reduce dependence on imported materials and increase the competitiveness of materials-dependent industries, as well as the sustainability of Europe's economy as a whole. European companies active in this sector are innovation world leaders with massive export potential. Capital investment needs are estimated to amount to EUR 8bn per year.

Resilience of urban areas beyond water/waste

Cities need to remain attractive places for people to live and work. Declining services can affect public health, increasing medical costs and reducing labour productivity. Ensuring the resilience of cities to climate change impacts (e.g. rising temperatures) will require additional investment. It is estimated that a three-fold increase in investment in urban development and resilience to about EUR 40bn would be needed to keep urban areas attractive to European people and economic activities.

Table 7: Investment needs in water and waste sectors

Investment need/objective	Annual investment (EUR billions)		
	Required ¹	Current ²	Gap
Water security, including flood risk management	15	2	13
Compliance and rehabilitation of Europe's water infrastructure	75	30	45
Enhancing waste management/materials recovery	8	3	5
Additional needs for resilient and efficient urban infrastructure	40	13	27
Total:	138	48	EUR 90bn

¹ EIB estimates based on various sources (available upon request from the authors), average annual 2014-2020.

² Estimates for EU28, annual average 2007-2013.

2.3.3 Financial sector capacity

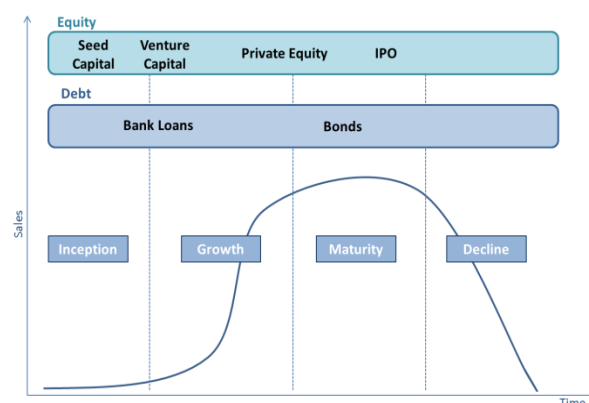
Competitiveness depends on the capacity and efficiency of the financial sector in allocating and reallocating the resources available in the economy to the most productive uses. Financial sector capacity is therefore a key enabler for the establishment and growth of innovative firms, allowing them to replace firms that have become uncompetitive. It is a key enabler for firms of all sizes to invest in the latest technologies and absorb the latest process innovations in order to raise productivity and maintain their ability to compete.

Finance needs and financial systems

The financing needs of firms change through their life cycle (Figure 24):

- **Start-ups** are typically characterised by large financing needs, high risk, no track record and little collateral. They often have difficulty accessing finance and rely mostly on seed money from investors such as family, business angels and early-stage venture capital. Bank loans play a lesser role, particularly for riskier projects.
- **Growth phase** firms – Late-stage venture capital is important for young firms with high growth potential and innovative products. Such firms may also get financing through bank loans and raise capital through private equity markets and may later decide to offer their stock to the public through an initial public offering (IPO).
- **Mature phase** firms generally have smaller external financing needs which are typically covered by bank loans and bond financing, as well as equity. Increased retained earnings usually allow for a larger share of internal funding.

Figure 24: External financing needs along the life cycle of firms



Source: EIB

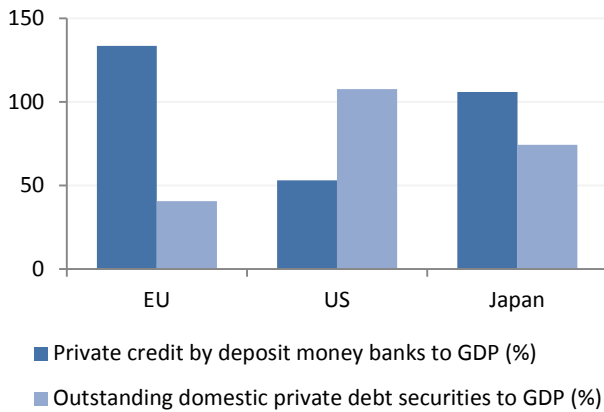
Within Europe, and between Europe and other major economies, there are significant differences in terms of how these different financing needs are served. Europe and Japan are said to have bank-based financial systems while the US – and some EU countries, such as the UK,²⁹ are more market-based. In the latter, markets for tradable securities (such as stocks or bonds) play a much bigger role (Figure 25).

While neither of these systems is inherently better than the other (they offer different ways of addressing the same needs), a number of gaps have emerged in their ability to meet different financing needs, particularly in the aftermath of the crisis.

²⁹ Bijlsma, Gijsbert, Zwart. (2013). The changing landscape of financial markets in Europe, the US and Japan. *Bruegel Working Paper*.

Figure 25: Bank loans and debt securities

(% of GDP)



Source: World Bank, Global Financial Development Database
 Note: 2008-2013 average.

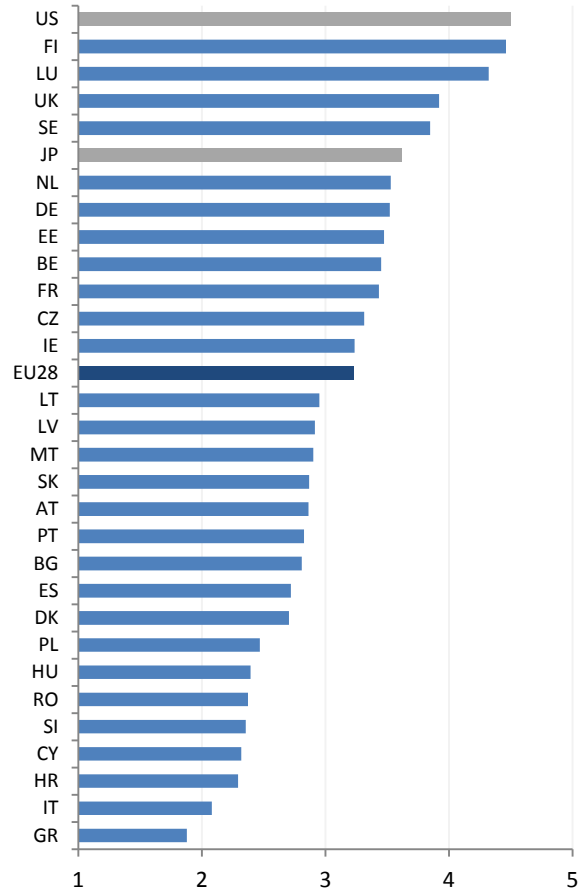
Financing start-ups and growth-stage firms

The EU lags behind the US in access to finance for start-ups. Without an established relationship with a bank, start-ups need to look for alternatives to bank lending and these are often less developed in bank-based systems.

Venture capital (VC) financing as a share of GDP is significantly lower in Europe than in the US. Over the last couple of years, VC investments averaged 0.20% of GDP in the US but only 0.03% in the EU (Figure 26). This gap increased even further in 2014; reaching almost EUR 35bn.

The World Economic Forum’s indicator of venture capital availability shows that while countries such as Finland, Luxembourg, the UK and Sweden almost approach US levels, many Southern and Eastern Member States lag far behind (Figure 27).

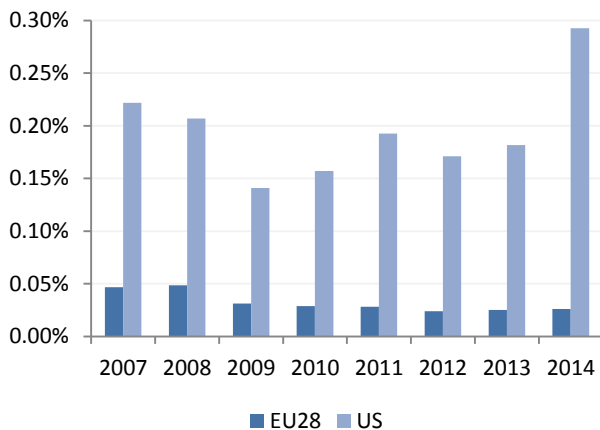
Figure 27: Venture capital availability



Source: World Economic Forum, Global Competitiveness Report 2015-2016
 Note: Scores from 1(worst) to 7(best); EU28 weighted by GDP.

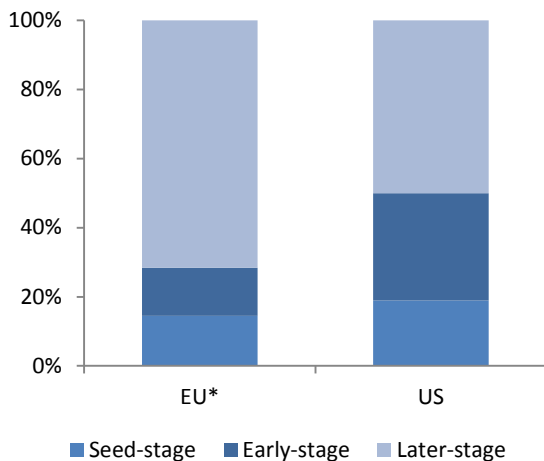
Not only is the absolute size of venture capital financing in Europe disadvantageous, but so is its composition (Figure 28). The gap is largest for early-stage needs, where only about half as many firms receive VC funding in Europe compared to the US. The amounts of risk capital required at this stage are too large for most business angels, while the European venture capital industry has performed badly in this sector in recent years, leading to a focus on the growth stage.

Figure 26: Venture capital investments (% of GDP)



Source: EVCA; NVCA

Figure 28: Venture capital, share of firms receiving VC Funding in Europe and the US (%)



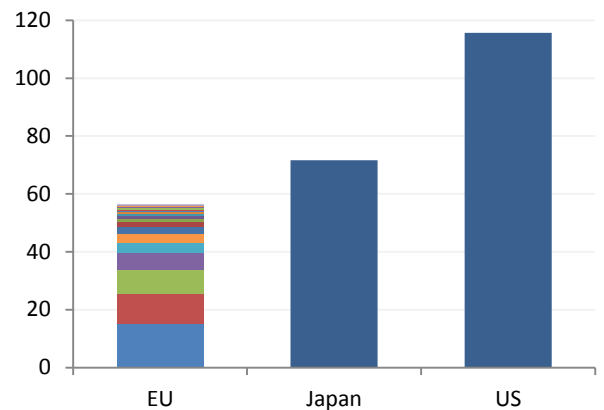
Source: Kraeusl and Krause. (2011). *Has Europe been catching up? An industry level analysis of venture capital success over 1985-2009*. Document de Travail 327, Banque de France.

Note: 1985-2009 data. EU* includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, UK.

One important factor hampering the development of early and growth-stage financing in Europe is the greater difficulty venture capital investors may have in selling successful investments to outsiders through equity markets. Stock market capitalisation is much higher in the US than in most European countries, as is IPO activity.³⁰ European exit markets are not only smaller but also fragmented along national lines, reducing liquidity and venture capitalists' exit possibilities (Figure 29).

³⁰ Bijlsma, Gijsbert, Zwart. (2013). The changing landscape of financial markets in Europe, the US and Japan. *Bruegel Working Paper*.

Figure 29: Stock market capitalization (% of GDP)



Source: World Bank, Global Financial Development Database

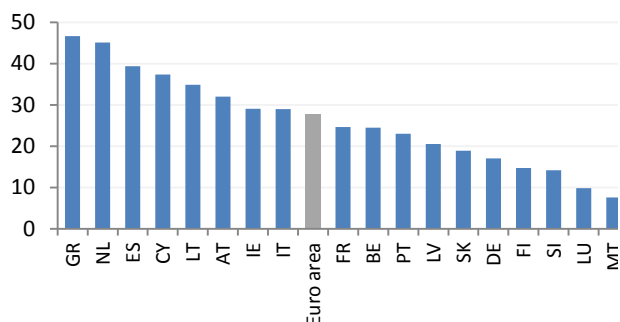
Note: 2008-2014 average. Different colours in the EU column indicate the shares of the 28 different EU countries, respectively.

Financing SMEs

Whether young or mature, SMEs experience more difficulty accessing finance than larger corporates. Within the SME sector, younger SMEs face the most difficulty.³¹ The latest ECB Survey on Access to Finance (SAFE) reveals that access to finance remains an important concern of SMEs in some EU Member States. Even with low demand for bank loans in the current post-crisis environment, the percentage of SMEs in the euro area reporting access to finance as their main problem stands at 11%. In addition, approximately 28% of firms in the euro area still face access to finance difficulties (Figure 30).

³¹ E.g. Öztürk and Mrkaic. (2014). SMEs' Access to Finance in the Euro Area: What Helps or Hampers?. *IMF Working Paper WP/14/78*.

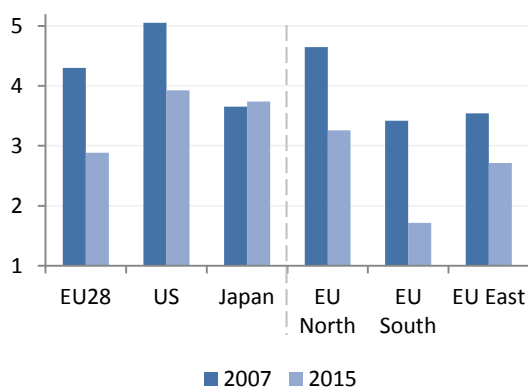
Figure 30: Access to finance difficulties in the euro area



Source: ECB, Survey on Access to Finance (SAFE), Apr-Sep 2015
 Note: % of SMEs that applied for a bank loan, Apr-Sep 2015; Difficulties defined as the sum of 'Applied but was rejected', 'Applied but only got a limited part', 'Applied but only got a part of it', 'Applied but refused because cost was too high'.

The access to finance problem is more pronounced in the EU than in other leading economies, according to WEF's indicator on access to loans (Figure 31). In addition, there is a remarkable difference in the magnitude of the drop in score from 2007 to 2015, in particular for the EU South (from 3.4 to 1.7).

Figure 31: Access to loans, comparison between 2015 and 2007



Source: World Economic Forum, Global Competitiveness Report 2007-2008 and 2015-2016
 Note: Scores from 1(worst) to 7(best); EU averages are weighted by GDP. For definitions of EU regions see note Figure 3.

The strong dependency of European SMEs on bank financing has made them more prone to the post crisis weaknesses and deleveraging needs of the EU banking sector leading to low risk-taking capacity. One factor limiting the European banks'

ability to take risks is their difficulty in securitising SME loans due to a very shallow market. The ECB, EC, IMF and European Council have all called for action to facilitate expanded SME securitisation in Europe to promote innovation, productivity growth and job creation in this vitally important segment.³²

Another factor is the inability of SMEs to access bond markets. Several initiatives such as German Mittelstand bonds and the Italian Minibond market, are being developed to help address this gap, but their effectiveness is yet to be proven.

The impact of the crisis on financial capacity

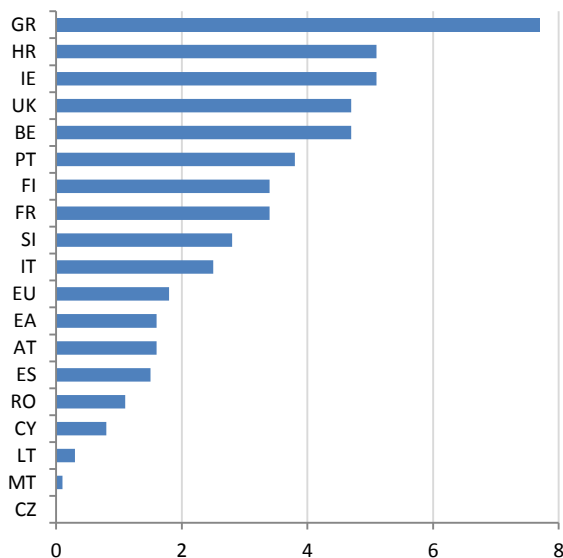
During the global financial crisis the financing situation worsened significantly for European firms, particularly SMEs (larger mature firms have actually become net savers). In a difficult economic and regulatory environment that is still finding the right balance between constraining excessive risk-taking and allowing efficient risk allocation, capital-constrained banks have begun a process of deleveraging that is ongoing, and that has meant a reduction in bank lending. The situation has been exacerbated in many of the countries hardest hit by the crisis as European financial markets have become increasingly fragmented along national lines, hampering the reallocation of resources from one country to investment opportunities in another.

Going forward, two key bottlenecks in the provision of risk bearing capacity required to catalyse investment have emerged as a consequence of the crisis. Firstly, many Member States and sub-sovereigns, which are classical providers of risk-bearing capacity for socially desirable projects through equity or guarantees, find themselves with less fiscal space for direct

³²Kraemer-Eis, Passaris, Tappi. (2013). SME Loan Securitisation 2.0: Market Assessment and Policy Options. *EIF Working Paper 2013/19*.

funding through budgets or government risk-taking in Public-Private Partnership schemes (Figure 32).

Figure 32: Medium-term fiscal constraints: required fiscal adjustments (% of GDP)

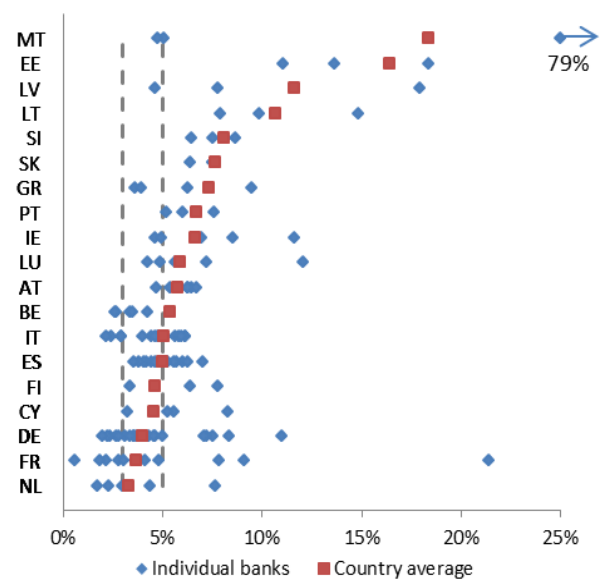


Source: Commission services
 Note: Fiscal adjustment required to reach 60% public debt-to-GDP. Only showing Member States in which required fiscal adjustments are positive.

Secondly, following the regulatory response to the financial crisis, European banks face significant capital constraints. The ECB Asset Quality Review and stress tests showed that European banks are generally well capitalised in terms of CET1 capital ratios. However, this review assumed a static balance sheet, without

increased lending to support economic recovery. Many banks also only barely meet the Basel III minimum leverage ratio of 3%, and would currently fail higher standards like the 5% threshold that was recently introduced by the Federal Reserve for systemically important banking groups (Figure 33). The space for European banks to expand their balance sheets or to shift from low risk sovereign holdings to higher risk corporate lending when demand picks up is limited.

Figure 33: Bank leverage ratios



Source: ECB 2014 AQR
 Note: Country averages for SSM-covered banks

2.3.4 Institutions and markets

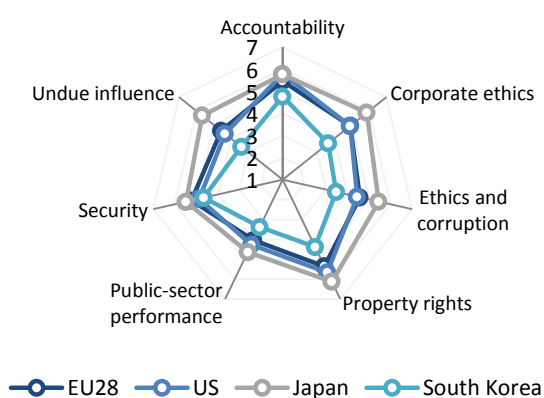
Effective institutions and efficient markets underpin an economy's foundation for firms to be competitive. Structural and institutional reforms are essential elements of EU's response to the challenge of competitiveness. However, because this area lies largely outside the EIB's mandate, it will be examined only briefly here.

Institutions

In the context of competitiveness, important institutions include factors such as property rights, transparency, accountability, the effectiveness of corporate governance, the efficiency of government spending and the effectiveness of regulations including the regulation of markets.

The Global Competitiveness indicators on institutions suggest that there is little or no overall gap between the general quality of EU institutions and those of the US. However, in comparison with Japan the EU lags behind in all indicators (Figure 34). In addition, these indicators also suggest that institutions are overall significantly weaker in Southern Europe than in some Northern European countries.

Figure 34: Institutional environment, EU and leading economies



Source: World Economic Forum, Global Competitiveness Report 2015-2016.

Note: Institutions Pillar (1st Pillar). Scores from 1(worst) to 7(best). EU28 weighted by GDP.

Markets

The efficient functioning of markets is driven by their regulation, size and openness. It allows economies to produce products and services most appropriate to their particular supply-and-demand conditions. Sound domestic and foreign market competition is important in driving market efficiency. Market efficiency in turn drives productivity in the economy by allowing the most efficient firms to be those that thrive. An efficient and flexible labour market is also important to ensure that labour is allocated to its most efficient use. Rigid labour markets can make it harder for firms to react to changing market conditions.

According to the World Economic Forum indicators, the EU lags behind both the US and Japan in terms of labour market efficiency. This is particularly true for the Southern Member States. They all show difficulty in retaining and attracting talent, two essential ingredients for building a strong pool of skilled workers that can generate ideas and in turn power innovation. The indicators suggest that the efficiency of EU and US goods markets are similar, albeit with room for improvement in both.

2.4 EU Single Market

One area in which the EU has a great opportunity to further increase its competitiveness is through the strengthening of the EU Single Market. This can give EU firms the access to a large internal market like US firms and thereby incentivise innovation.

The European Parliament study, “Mapping the cost of non-Europe, 2014-2019”, brings together a series of estimates of the efficiency gains that could be achieved. These include:

- Delivering and completing the existing single market for goods and services could achieve efficiency gains worth EUR 615bn (1.8% of EU28 GDP) a year between 2014 and 2019;
- Implementing a digital single market could be worth a further EUR 415bn;
- Implementing a Banking Union to avert a new financial crisis could be worth EUR 21bn per year;
- Creating fully integrated and effectively regulated EU-wide financial markets could achieve EUR 82bn per year in interest savings alone, principally reducing financing costs for SMEs; and
- A more economically and physically integrated single market in energy could result in annual efficiency gains of around EUR 250bn.
- Total potential gains amount to approximately 12% of EU GDP, equivalent to EUR 1.6 trillion.³³

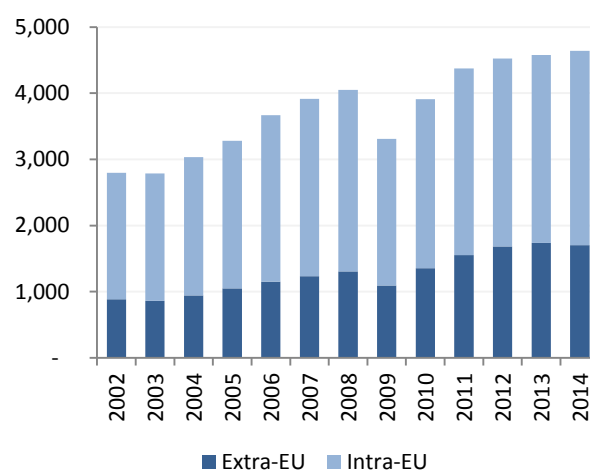
The Single Market is at the very essence of the European Union. By removing internal barriers,

economic integration boosts internal trade and facilitates market entry. It increases competition and enables economies of scale, which in turn improve innovation incentives, efficiency and attract more external investors. Market integration leads to higher growth, job creation and welfare gains. Optimizing the EU Single Market and maximizing ‘European Added Value’ is vital to creating a healthier, more prosperous and competitive Europe.

We have already gained a lot from integration ...

The European Commission estimates that the Single Market has increased trade within the EU by about 15% per year over the past 10 years. It has generated additional growth of 1.8% and created around 2.5 million more jobs, while reducing differences in income levels between Member States.³⁴

Figure 35: Intra and extra-EU exports of goods (EUR bn)



Source: European Commission, AMECO

³³ European Parliament, EPRS, European Added Value Unit. (2015). *Mapping the Cost of Non-Europe 2014 -19*. Third edition: April 2015.

³⁴ European Commission. (2015). Factsheet on the European Union, The Internal Market – General principles.

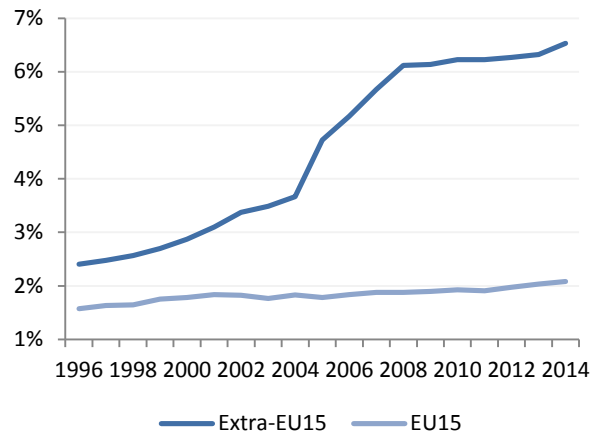
... but there is still a vast untapped additional potential

The services sector is still too nationally dominated. The Single Market Strategy³⁵ adopted by the European Commission in October 2015, includes a set of ambitious actions that will make the Single Market better suited for the 21st century. This suggests a much greater focus on the increasing share of services in the EU economy – which have grown to almost 75% of GDP. But despite its large added value, services account for less than 25% of intra-EU trade. The argument that many services are non-tradable is not always valid and cannot fully account for this. Indeed, the composition of the services sector is changing and new communication technologies can make previously non-cross-border tradable services tradable. The Digital Single Market³⁶ can make a particularly lasting impact on Europe’s productivity and competitiveness.

Labour mobility

EU labour market integration is evolving only very slowly. A decade ago, 1.6% of EU15 citizens were working in another Member State; by 2014 this share had increased to a mere 2.1% (Figure 36). Intra-EU28 mobility has however more than doubled since the 1990s and in 2014, it accounted for 3.4% of the total EU work force. Comparing with intra-US state mobility, the annual flow in the EU is less than one-tenth of the US flow.³⁷

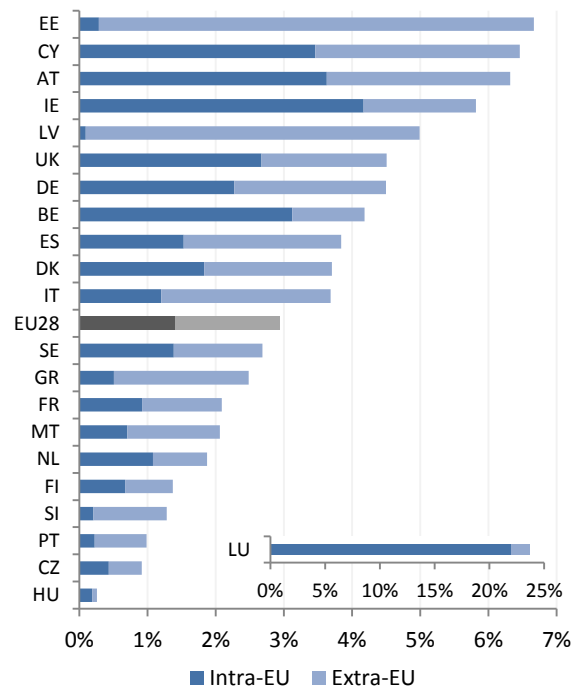
Figure 36: Share of workers from other EU15 Member States (%)



Source: Eurostat

The share of workers from other EU Member States differs significantly from country to country; noting exceptionally 22% in Luxembourg and Ireland around 4%. EU average stands at approximately 1.5% for intra-EU and extra-EU, respectively (Figure 37).

Figure 37: Employment of foreign citizens, intra and extra EU-citizens (% of total population)



Source: Eurostat

Note: SK, PL, BG, HR, RO not shown in figure; both intra and extra-EU mobility <0.1%.

³⁵ European Commission. (2015). A deeper and fairer Single Market: Commission boosts opportunities for citizens and business.

³⁶ European Parliament, EPRS. (2015). Tracking European Commission priority initiatives in 2015 – No.3, A Digital Single Market Strategy for Europe, September 2015.

³⁷ EU Business. (2014). Labour mobility in the EU.

Cross-border capital flows

The capital flows across EU are sub-optimal and too reliant on banks. Free flows of capital allocate financial resources to the most productive investments. Financial integration should increase intra-EU FDI (and extra-EU FDI as EU firms become more competitive), reduce volatility in market returns and provide greater portfolio diversification. Efficiency gains are realised through risk diversification.³⁸ However, many barriers between cross-border investors and companies still remain. The Capital Markets Union represents an important step towards building an EU single market for capital from the bottom up, identifying barriers and knocking them down one by one, creating a sense of momentum and helping to spark growing confidence in investing in Europe's future.

³⁸ Berger, Hasan, Korhonen and Zhouf. (2010). Does Diversification Increase or Decrease Bank Risk and Performance? Evidence on Diversification and the Risk-Return Tradeoff.

3. Responding to the challenge

Following the Second World War and the divisions of the cold war, Europe has re-emerged as one of the most competitive regions of the world, steadily closing the gap with the US and building on its ample strengths: its people, an abundance of intellectual, scientific and technological capacities, its climate, as well as a rich history of intellectual and business endeavour.

But since the 1990s, Europe has not kept pace with other leading economies, and its ability to compete has declined. The economic and financial crisis has significantly aggravated this trend. Areas of weakness include high structural unemployment, fragmented internal markets, and wide variations in economic performance with a widening North-South and West-East divide.

Investment in areas that are crucial for competitiveness – whether in research and development in key sectors and technologies, in education or in the renewal and expansion of Europe’s infrastructure – has fallen far behind what we need to preserve and strengthen the EU’s competitive position. This holds true not only for areas where the EU lags behind but also for current areas of excellence, which need to grow in order to remain competitive.

Europe’s mainly bank-based financial system and the institutional foundations of EU integration have suffered systemic blows. Repairing and regrouping these systems will require many years, during which these important enablers of competitiveness will remain impaired.

The challenge that Europe faces is not only one of keeping up with and driving change in the global market place, but in many areas also one of *catching up* – clearing a backlog of investment to

rebuild our former strength and to spur processes of innovation. This needs to happen alongside processes of structural reform to ensure competitive, flexible and efficient markets for products, labour and finance. Further deepening of the EU Single Market will be crucial.

The need for a comprehensive policy response

Rebuilding the competitiveness of Europe’s economy requires a concerted approach that looks at enabling factors as well as direct innovation performance and sufficient access to finance for economically desirable modernisation investments. Structural reforms and appropriate regulation to ensure competitive, flexible and efficient markets for goods and services, labour and finance – including action to deepen Europe’s internal market – is one essential part of this approach. Public intervention that addresses market failures and catalyses private sector investment is another.

Public promotion of investment can enhance welfare wherever the private sector is not facing the right incentives to provide sufficient finance needed to enhance and sustain competitiveness. Such market inefficiencies occur, for example, where the positive economic impacts of investment go beyond the revenue that can be captured by private enterprises. We can see such positive externalities and high returns to society in areas such as:

- **Basic research and Research, Development and Innovation (RDI)** that is still far from commercialisation, particularly in strategic technologies and sectors;
- **Innovative start-ups and SMEs** that face financing constraints;

- **Investment in human capital**, including education, health and research infrastructures or facilities; and
- **Investment in strategic infrastructure** as a public good that enhances long-term productivity and competition across the economy, as well as driving innovation in strategic sectors.

One part of the challenge that we face is that meeting the very large structural investment gaps identified in this report is not just a matter of providing appropriate financial resources. Important bottlenecks also exist in terms of prioritisation and planning, in capacity for implementation and in the technical preparation and structuring of a pipeline of sound projects. Such bottlenecks are also partly holding up the leveraging of private finance.

Supporting competitiveness – the EIB’s track record

Responding to the challenge of restoring EU competitiveness is already an integral aspect of what the EIB does. The Bank’s approach of combining financing – the blending of loans with grant finance – and the provision of technical assistance is critical in maximising the impact of public intervention and in ensuring a timely pipeline of sound investment opportunities. By offering tailor-made products covering the whole range of risk profiles, the EIB Group can target its intervention to specific needs and thereby maximise its impact.

The EIB Group has a track record of supporting sound investments and having a major impact in many of the areas that are critical to restoring Europe’s competitiveness. These include:

- **Innovation:** In 2015, the EIB financed EUR 18.68 billion in innovation. This included 4.9 billion in finance of private sector RDI,

backing 50 innovative companies, mobilising EUR 11 billion in investment.

- **SME access to finance:** In 2015, the EIB Group financed EUR 29.24 billion for SMEs and mid-caps to support access to finance, of which over 90 percent was in the EU. This represents support to 240,000 SME’s and mid-caps through intermediated loans, guarantees, equity and securitisation products;
- **Equity financing:** The EIF has established itself as a leading European investor in seed, venture and growth capital funds, with a strong focus on ICT, life sciences and clean technology. In 2015, it undertook new equity commitments of EUR 2.18 billion. In addition, the EIB is developing instruments for direct equity financing for mid-caps, e.g. InnovFin;
- **Education, skills and healthcare:** EIB operations in 2015 will result in an estimated 1.45 million students with improved educational facilities and 9.8 million people with better healthcare;
- **Strategic infrastructure:** In 2015, the EIB financed EUR 18.92 billion in strategic infrastructure, of which about 90 percent for projects in the EU. This included direct lending, complemented by innovative products like the Europe 2020 Project Bond initiative to catalyse capital market financing. Some expected results of projects financed by the EIB in 2015 include: time savings for 380 million passenger trips per year; 15.3 million new and upgraded digital connections; 30,904 km of power lines constructed/upgraded; electricity generation capacity of about 2,828 MW – of which 94% from renewables; provision of power to 2.34 million households; and 13 million smart metres installed;

- **Climate action:** The Bank strongly supports the EU transition towards a circular economy and is one of the leading investors globally in climate action. In 2015, the EIB provided financed of EUR 22.65 billion for climate action related projects.

The Bank's entire product range is complemented by technical advisory services to develop, unlock and improve economically and financially viable investment projects.

The EIB and the Investment Plan for Europe – making a difference

The scale of the structural challenge that Europe faces should not be underestimated. Although it is impossible to specify exactly what interventions and how much investment is needed in each sector, this report takes the step of presenting best estimates based on reasonable global benchmarks and common EU objectives. These estimates should not be seen as setting out an investment plan per se, but as an indication of the need for action. Indeed, the scale of the challenge revealed by this report makes clear that concerted efforts will be needed across the EU Member States, and for an extended period, going beyond any one initiative.

The Investment Plan for Europe, that was launched last year, represents a well-targeted response to this challenge that can make a substantial contribution to Europe's competitiveness and long-term economic potential.

Working alongside the other policy priorities of structural reforms and fiscal responsibility, the Investment Plan has three strands of action to address the needs identified by this report:

- **Improving the institutional and market environment for investment**, including the deepening of the EU Single Market;

- A new **European Investment Advisory Hub** to help public authorities and project promoters in Member States to identify, prioritise, prepare and implement strategic projects and to make more efficient use of EU funds, bringing together specialist advisory services currently successfully delivered by the EIB and the European Commission; and
- The new **European Fund for Strategic Investments (EFSI)**,³⁹ to mobilise EUR 315 billion of investment in strategic infrastructure and companies, helping to address key market gaps and structural weaknesses to build a more competitive, sustainable and prosperous EU economy.

EFSI is a dedicated account, managed and hosted by the EIB and jointly funded by the European Commission and the EIB. It focuses on financing sectors of key structural importance to the EU where the EIB Group has proven expertise and capacity. These include strategic digital, transport and energy sector investments; investments in education, research and innovation; investments to help small, medium-sized and mid-cap companies to modernise, grow and boost employment; and environmentally sustainable projects. The Fund complements the EIB Group's existing activities by focusing on higher risk-bearing financial products to address the bottlenecks identified by this report and have a greater catalytic effect on private finance in the current low-confidence macro-environment.

Despite the governance structure only just being finalised, through transitory arrangements, EFSI and the European Investment Advisory Hub are already up and running. The EIB Group has to date already approved more than 100 projects under EFSI, which will mobilize EUR 50 billion of investments in Europe.

³⁹ <http://www.eib.org/invest-eu>

Member States have pledged contributions totaling more than EUR 42 billion to projects supported by EFSI through National Promotional Banks and Institutions.

EFSI comes on top of 'normal' EIB activity. All EIB projects need to fulfill the same strict criteria on economic and technical viability. Our annual financial commitments in the EU in 2015, excluding EFSI, amounted to almost EUR 70 billion, mobilizing investment in the EU corresponding to 1.4 percent of EU GDP.

Together with other European institutions we are committed to restore confidence, stimulate investment and promote recovery. Our engagement is not only about addressing short-term needs, but is focused on targeted interventions to address the structural challenges that Europe faces.

Restoring EU competitiveness is central to re-embarking on the EU success story of cohesion and prosperity.





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