



# BDI

Bundesverband der  
Deutschen Industrie e.V.

## INDUSTRIAL POLICY DOSSIER

# Productivity growth in Germany.

## Finding a way out of the deadlock

November 2016

- **The declining growth in labour productivity is causing huge problems for Germany and many other industrialised nations.** The low growth potential is particularly putting social security systems under pressure.
- **The unfavourable demographic trend is set to worsen the situation in the medium term.** An ever decreasing labour force is set against a growing proportion of economically not active persons. Migration and labour market policy can only make these problems less severe, but are not a solution.
- **Policymakers must consistently make increasing labour productivity their top priority if these challenges are to be overcome.** This means increasing the quantity and quality of the capital stock through investments as well as increasing total factor productivity.
- **Moderate increases in income of one percent per year will require labour productivity to increase by more than two percent per year until 2060 to offset demographic change.** Since the turn of the century, labour productivity has grown by less than one percent per year. The danger of real incomes decreasing in the long term is very real.
- **The greatest potential to change this situation lies in spreading the innovations and productivity increases achieved by companies at the technological forefront to the midfield.** Key elements to achieve this include stepping up efforts in research and development, more flexibility on goods and labour markets and pushing integration in global value chains.

## Content

<b>Medium- and long-term challenges facing German industry .....</b>	<b>3</b>
Demographic pressure is putting German economic and social model under strain .....	3
Migration and labour market policy can make the problems less severe, but are not a solution in themselves .....	4
Productivity growth must be top priority for economic policy .....	4
<b>Labour productivity is plummeting in industrialised nations.....</b>	<b>5</b>
Lower investments dampen productivity growth .....	6
The puzzle of weak total factor productivity is still unsolved .....	7
R&D is becoming increasingly important as the main driver of productivity.....	9
Productivity growth in industry still higher than in services .....	10
Productivity in information and communications technology: manufacturers on top, but users flop .....	14
Small is beautiful – but not always very productive.....	15
Potential of globalisation is not yet fully exploited .....	16
<b>An economic policy agenda for strengthening productivity in Germany.....</b>	<b>16</b>
Investment, investment and more investment .....	16
Promoting R&D and education instead of early retirement .....	17
A unified industrial policy across the board.....	17
Flexible product and labour markets with opportunities for all .....	17
Tapping the advantages of international trade.....	17
<b>Sources .....</b>	<b>18</b>
<b>Imprint .....</b>	<b>19</b>

## Medium- and long-term challenges facing German industry

The German economy and particularly the industrial sector is currently surprisingly buoyant. Growth is strong, unemployment low and the initial shock of the Brexit vote has been overcome. Private consumption remains the main driver of the economy (Deutsch and Hüne 2016).

Despite the rosy short-term situation, there are medium- and long-term challenges on the horizon. Firstly, Germany is embedded in the European Economic and Monetary Union, the architecture of which is incomplete and has serious faults. This point is discussed in more detail in another BDI publication (Eichert 2015). Secondly, Germany will undergo dramatic demographic change in the 21st century. Not only is the population on the decline, but the average age is set to increase substantially. If we want to continue increasing our standards of living in the face of these changes, we will need, above all, higher investments, a larger deployment of the factor labour (primarily through a higher labour market participation of groups who currently have an under-proportional participation rate), an increase in labour productivity (i.e. gross value added per hour) and technical progress. A failure to turn the long-term trend of significantly lower productivity growth around will culminate in major problems for economic, financial and social policy (Deutsch 2015).

This publication investigates the issue of declining productivity growth, the ensuing challenges and possible ways to increase productivity growth.

### Demographic pressure is putting German economic and social model under strain

The European Commission (2015) predicts the following developments for Germany:

- The fertility rate in the country is 1.4 children per woman, compared, for example, with two children in the United States.
- If the current trends continue, the population will shrink from currently 80 million to 70 million by 2060.
- The working-age proportion of the population (between 15 and 64) is set to drop from its current level of 65 percent to 50 percent by 2060.
- Public pension spending as a percentage of GDP is projected to increase from ten to 12.7 percent based on current trends.
- Total age-related expenditure is expected to increase from 25.8 percent in 2014 to between 29.1 percent (more favourable scenario) and 32.7 percent (pessimistic scenario) by 2060 (BMF 2016: 15).

These developments will have consequences for the German economy, particularly in three areas:

- **Labour input and investment:** The shortage of skilled labour already apparent in many industries will worsen dramatically, making it increasingly unlikely that companies will move to or invest in Germany and more likely that companies will move their operations away from Germany.
- **Public spending on consumption:** The pressure on public budgets will greatly restrict the scope for forward-looking spending on research, education and investments. Despite the current balanced federal budget, German fiscal policy will face considerable difficulties in the medium and long term.
- **Productivity growth:** The trend in productivity growth is already negative. Demographic change will lead to a further shift in sectors with low productivity growth (particularly healthcare and nursing services).

This scenario is based on the current trends and policies remaining largely constant and as such are by no means set in stone. Sensible policies at a national and European level can still decisively impact the future path of the German economy and society. The two obvious areas of action are measures to counter the unfavourable

demographic change on the one hand and tools to increase labour productivity on the other. In other words, we need to both make the drop in the working population less steep and increase the productivity of these workers.

### **Migration and labour market policy can make the problems less severe, but are not a solution in themselves**

The impact of public policy on the natural development of the population (excluding migration) tends to be minor. Fertility rates have dropped in all member states of the European Union since the baby boom of the 1960s from an average of 2.5 children per woman to about 1.6 (European Commission 2015: 14). This trend is the outcome of increasing incomes, cultural developments and numerous other factors. In Germany, early childcare institutions and all-day schools could certainly be improved to achieve a better balance between family and work and encourage the labour market participation of women. Countries with a comprehensive provision of nurseries, such as the Scandinavian countries and France, have substantially higher fertility rates of between 1.7 and 2.0. But merely expanding childcare facilities will not have a sufficient impact to stabilise the natural demographic trend in Germany. An overall approach is required.

The opportunities provided by migration are therefore very important. Above all, (highly) skilled migrants would make the problems described above less severe. However, only a minor percentage of the current influx of asylum seekers falls into this category. According to the European Commission (2016b), around one million refugees entered Germany in 2015, 440,000 of which have applied for asylum. A European Commission survey (Rich 2016: 5) determined the following levels of education among these refugees: 18 percent have a university education, but have not necessarily completed a degree; 20 percent have a high school education; 32 percent a lower secondary school education; and 30 percent a primary school education or no education at all. Even factoring in fluctuation in these levels of education, it is clear that this is not the skilled labour we need. The European Commission (2016b) puts the proportion of migrants of working age to have integrated in the labour market within five years throughout the past few decades at around 50 percent. In view of the uncertain level of qualification and the linguistic and cultural differences among the current influx of migrants, integration in this case could take longer. The high demand for unskilled labour in construction and some services as well as the high proportion of young people are positive aspects. Current studies have not yet given a clear picture of the situation.

Potential to turn these trends around is not just to be found through the improved integration of migrants into the labour market. In Germany, the labour market participation rate (proportion of working population to overall population aged between 15 and 64) is around 78 percent (European Commission 2015). For the 55 to 64 year age group, this percentage is only around 67 percent. Among women, the percentage is 73 percent, considerably lower than the percentage among men, which is at 83 percent. As well as increasing the labour market participation of these groups, adjusting the retirement age should not be considered taboo as a way of keeping the pension system sustainable given the rising life expectancy. In 2013, the remaining life expectancy for women and men aged 65 was another 21 and 18 years respectively. The European Commission expects these figures to increase by another five years by 2060 to make 26 and 23 years respectively. This corresponds to an increase of around one quarter in the period of retirement.

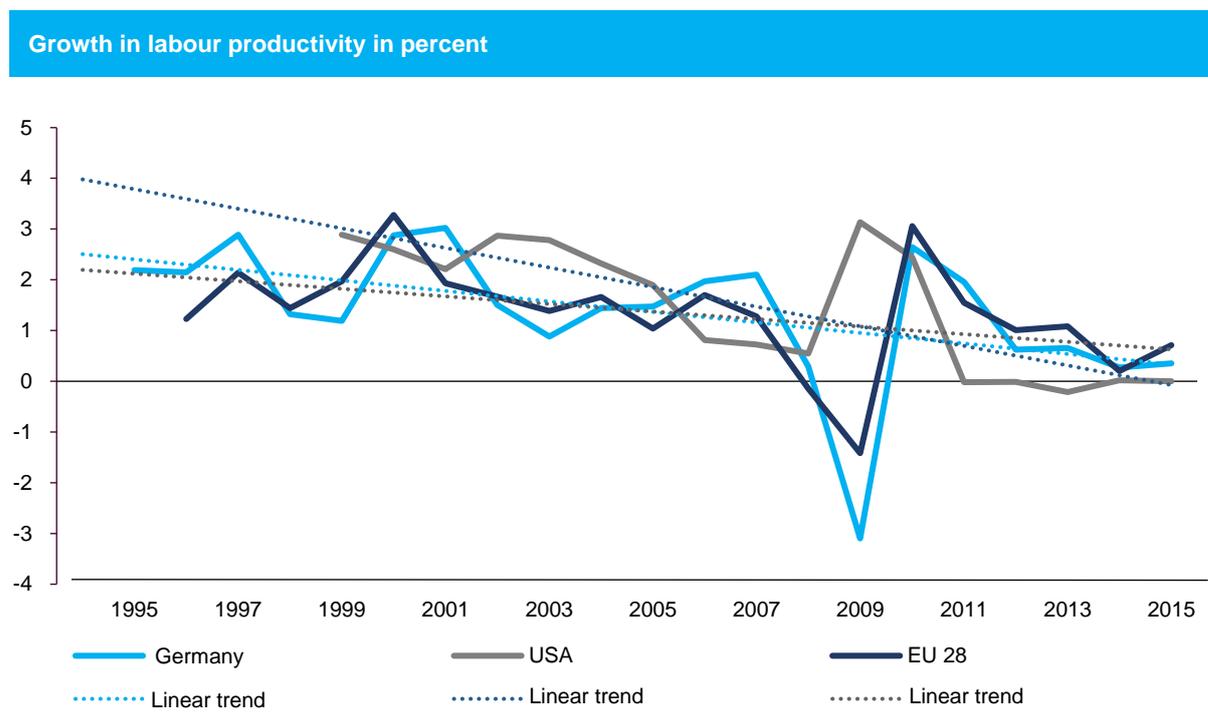
### **Productivity growth must be top priority for economic policy**

The challenges we face cannot be overcome by policy measures in demographics, migration and the labour market alone. While targeted reforms can reduce the pressure on the German welfare system, they must be supported by a constant, substantial and sustained increase in productivity. A shrinking working population can only sustain a growing group of non-working persons if the output per employee increases to the same extent. A simplified calculation serves to clarify this connection. The so-called old-age dependency rate (the ratio of persons aged over 64 to persons aged between 15 and 64, i.e. the working-age population) is set to almost double by 2060, rising from currently 32 percent to 59 percent. Productivity would have to increase by around 1.3 percent only to sustain the current level of incomes for employees and pensioners. And yet productivity growth has been declining continuously for decades. While labour productivity growth from the 1970s to the mid-1990s was

around three percent, productivity has increased by less than one percent since the mid-2000s. If this trend continues or becomes even more pronounced, it will be seriously detrimental for the German economic and social system.

## Labour productivity is plummeting in industrialised nations

Germany is by no means the only country where increases in labour productivity (measured in gross value added per hour) have been getting smaller. The growth in labour productivity has been trending downward in almost all developed economies for the last twenty years or so. Long before the crisis developed in 2008, productivity increases were levelling off successively. While this phenomenon was certainly aggravated by the crisis, it cannot explain it fully.



Source: OECD



The increase in labour productivity is generally broken down into two different factors. The first factor that increases labour productivity is capital deepening, an increase in capital stock per labour hour. The second factor that drives growth is rising total factor productivity (TFP), that is, technological progress, human capital and the improved interplay between labour and capital. The dwindling growth in gross value added per hour can be investigated by examining these two factors.

### Lower investments dampen productivity growth

Numerous factors are responsible for the downward trend in productivity growth. The weakness of the global economy since the crisis years starting in 2008 has also pulled growth down. Low global demand has kept capacity utilisation low, thus reducing corporate efficiency. This also has a negative impact on productivity growth.

The declining productivity increases in developed economies can be explained partly by the already very high capital ratios and consequent saturation. Additional investment in a capital stock that is already very high per employee only generates low marginal returns and therefore has less impact on the gross value added per labour hour. The low level of global demand since 2008 has also taken the steam out of investment activity. The lower level of investment is therefore also reflected in lower productivity gains. The correlation between the growth of gross fixed capital formation and labour productivity between 1995 and 2014 are shown in the table below.

Correlation between the growth of gross fixed capital formation and labour productivity	
Germany	0.51
France	0.42
Italy	0.49
Spain	-0.85
United Kingdom	0.54
USA	-0.16

Sources: OECD, AMECO, own calculations 

With the exception of Spain and the United States, these two factors are clearly positively correlated with rates between 0.4 and 0.55: the steeper the increase in investment, the greater the growth in labour productivity. The exception of Spain can be explained by the massive investments in construction leading up to the property bubble. These investments did not necessarily trigger productivity increases. Until 2007, Spain had the highest growth rates in gross fixed capital formation among all the countries investigated. These investments turned out to be a misallocation of capital that did not result in an increase in productivity. The slightly negative correlation in the United States was probably caused by other factors than in Spain. The value is close to zero, which indicates that there is no significant correlation between investment and productivity growth in this case. While this equation seems rather implausible in theory, it can be explained in part by the fact that the transformation from physical to intangible investment is already further advanced than in the other countries investigated. These intangibles or knowledge-based capital (KBC) are not accurately factored into the conventional calculation of the impact of investment as their measurement and evaluation is much more difficult than with traditional investment. A second factor behind the lack of correlation is that the increase in labour productivity in the United States is triggered more by technological progress than an acceleration in capital deepening.

The dwindling productivity growth has certainly been caused in part by the fall-off in investment activity. This has played out differently in different countries. The following table shows the annual growth rates in gross fixed capital formation and the impact of capital deepening on productivity between 1995 and 2014.

Gross investment and capital deepening 1995 – 2014 in percent		
	Annual growth of gross investment	Capital deepening's impact on productivity
Germany	1.0	0.5
France	1.8	0.7
Italy	0.2	0.6
United Kingdom	1.7	0.7
USA	2.9	0.9

Sources: OECD, AMECO, own calculations 

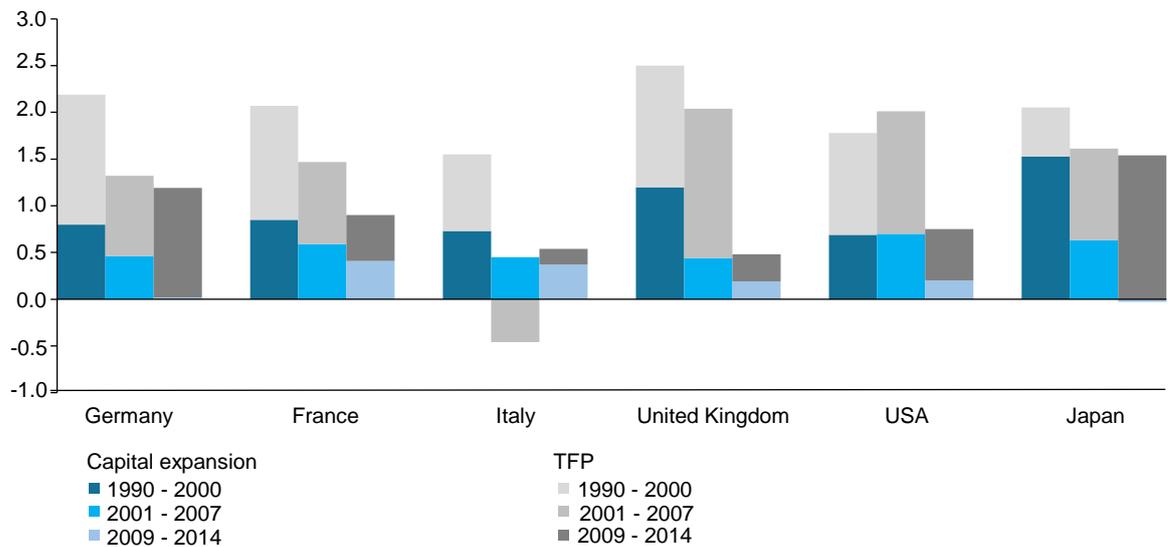
The correlation between the two columns is 0.89, which is distinctly positive. The countries that experienced stronger growth in investment also had a bigger increase in productivity through greater capital deepening. In view of these findings, the Juncker plan of the European Commission to stimulate investments is certainly a step in the right direction. And yet Europe needs more than the provision of liquidity by the European Fund for Strategic Investment (EFSI). Above all, Europe needs to dismantle non-financial barriers to investment. These aspects are discussed in another BDI publication (Eichert and Kudiß 2015). Many measures to boost investment, such as product market reforms, would also have a positive effect on productivity growth.

### The puzzle of weak total factor productivity is still unsolved

The sluggish investment activity and the slow expansion of capital stock are only part of the puzzle surrounding the development of productivity. It is still unclear why other factors that increase labour productivity are running out of steam. Other positive factors alongside an increased capital stock include technological progress, better educated employees and organisational innovation. These components are subsumed under the term total factor productivity and, until recently at least, most economists agreed that these factors still increase productivity growth in very advanced economies as well. The most recent developments have cast doubt on this assumption.

The following figure illustrates the different factors across three periods between 1990 and 2014. In all countries investigated, the positive impact of capital deepening has declined. In the extreme case of Germany and Japan, greater capital deepening has failed to trigger an increase in labour productivity since 2009. In view of the declining or stagnating investment levels this decrease is more than plausible. The development of TFP shows a mixed picture across the board. While TFP decreased in the United States, the United Kingdom and France, it increased, particularly in the last period between 2009 and 2014, in Italy, Germany and Japan.

**Contribution of capital expansion and TFP to labour productivity in percent**

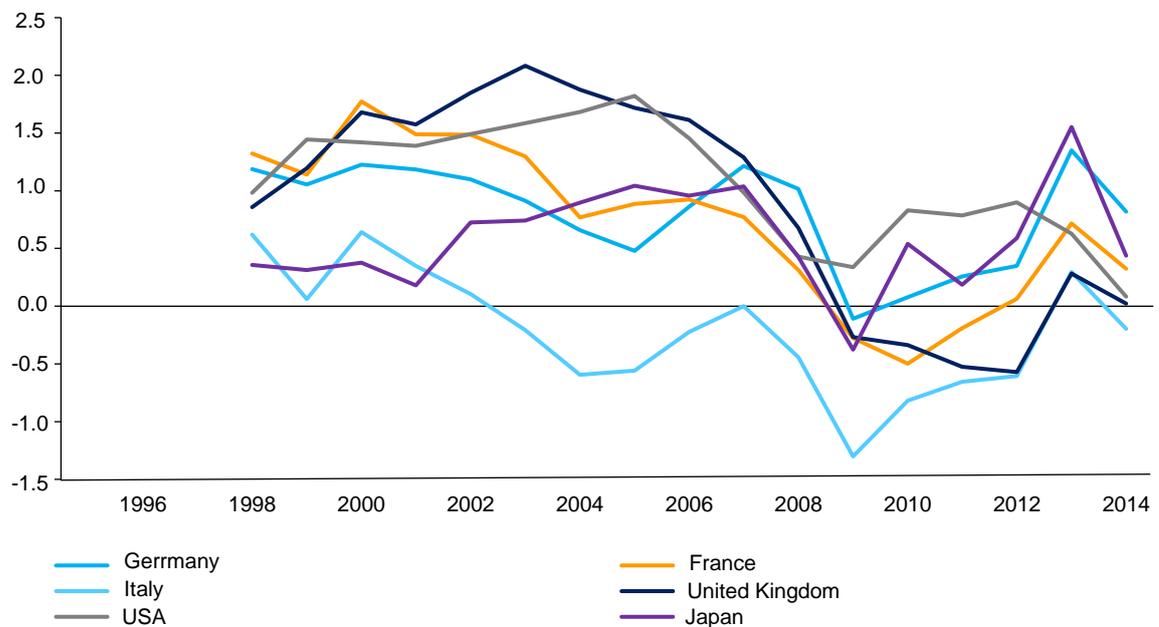


Source: OECD (2008 is not included due to the dominating influence of the crisis.)



While TFP growth trended similarly in the six countries throughout the last decades, there were considerable differences in the respective levels. In Italy, TFP has been going down almost constantly since the 2000s. The TFP curves for the three other European countries were on average one percentage point above Italy but with a similar dynamic. All countries recorded massive drops in 2009.

**Development of TFP in selected countries in percent**



Rolling average over four periods

Source: OECD



On account of the numerous factors that affect TFP, it is more difficult to interpret than the impact of a more intensive utilization of capital on labour productivity. The extensive literature (Andrews et al. 2016, OECD 2015a, 2015b, 2016a, 2016b) identifies the following factors, among others, that affect TFP:

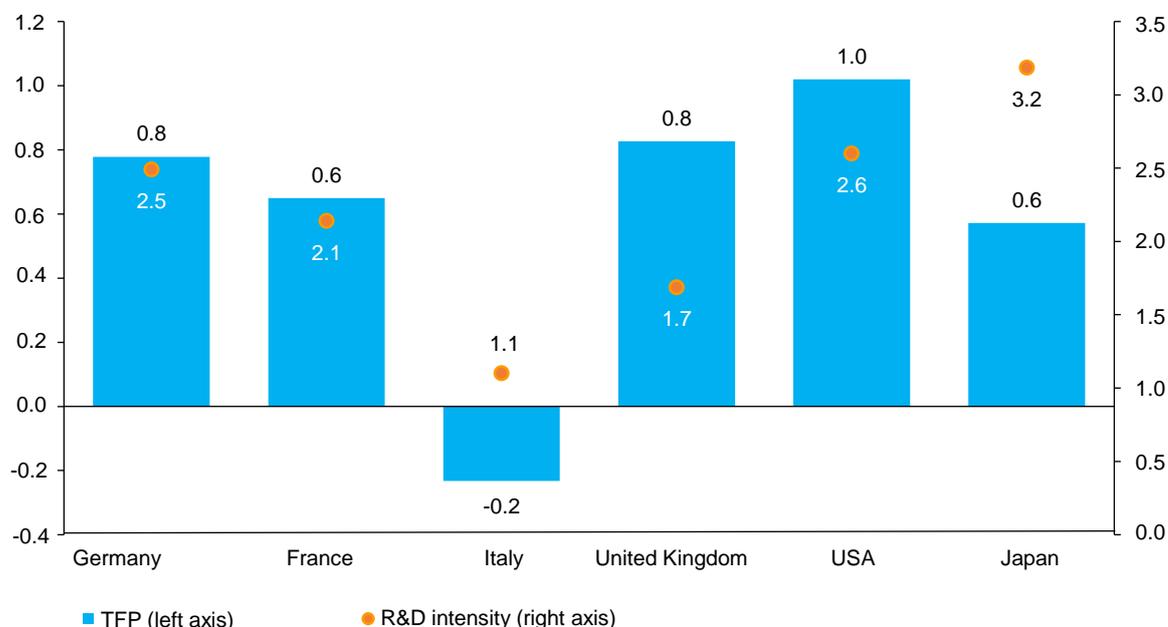
- R&D and innovation
- Quality of public institutions
- Flexibility of labour markets
- Competition and quality of product and service market regulation
- Openness to international trade
- Structure of the economy
  - Sectoral division between industry and services
  - SMEs vs large corporations

This non-exclusive list of partly qualitative indicators reveals the complexity of the factors determining TFP.

### R&D is becoming increasingly important as the main driver of productivity

A relative clear driver of TFP both theoretically and empirically is technological progress. While TFP is difficult to measure by its very nature, other indicators can be used to approximate TFP growth. The most common indicator is the level of R&D expenditure expressed as a percentage of GDP. A further indicator is the number of patents, although the comparability here is somewhat limited given the large differences in patenting behaviour between the different countries. The following figure shows the average growth of TFP and the median share of R&D between 1995 and 2014. The correlation here is visible at a glance.

TFP growth and R&D intensity 1995-2014 in percent



Source: OECD

The correlation of the two factors is 0.62 and reinforces the interconnection between the two. Looking at the period from 2001 to 2007, the correlation is lower at 0.52. Between 2009 and 2014 it increases to 0.87, showing that R&D and TFP have become more interdependent in the last few years. The implications of this correlation for economic policy are clear. As one of the Europe 2020 targets, the European Union has set itself the objective of increasing its R&D intensity to three percent. The overall R&D intensity for EU28 is currently at just over two percent, still far below the target set. In Germany, R&D intensity stood at 2.9 percent in 2014, which is close to the target, but still behind the innovation leaders Sweden, Finland and Denmark, all of whom are already above the three percent threshold. According to OECD figures, Japan's R&D intensity for 2015 was at around 3.5 percent and South Korea at over four percent.

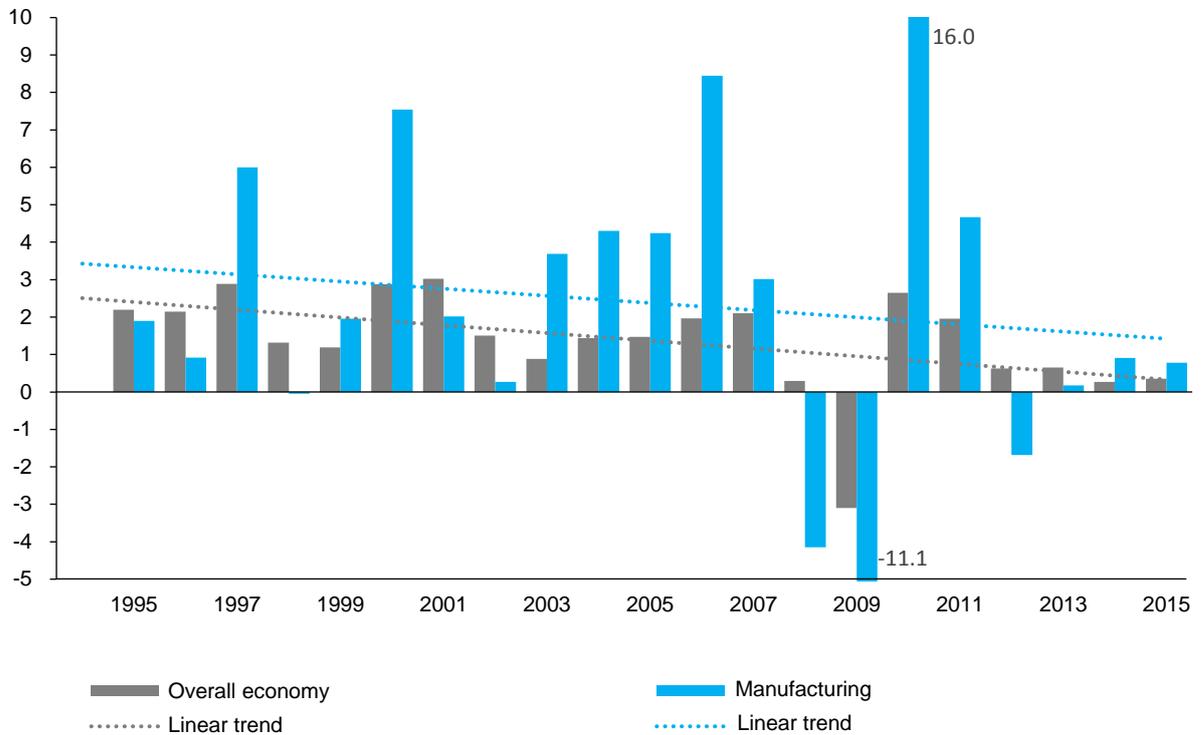
R&D intensity measures the inputs in the innovation process but not the outputs. To achieve prosperity and productivity gains with R&D, it needs to be implemented in concrete innovations and these innovations must then be diffused. Many studies (including Andrews et al. 2016) in the last few years have examined the diffusion of innovation and shown it to take place only at a moderate pace. The technology leaders among the companies are highly innovative and record high productivity gains. These developments do not, however, spread to companies in the midfield. Andrews et al. (2016: 14-15) calculated that while the top five percent of innovation leaders in industry recorded annual productivity gains of 2.8 percent between 2001 and 2013, the mean annual productivity gain was only 0.6 percent. In services, the difference between the productivity gains is even more marked at 3.6 and 0.4 percent respectively.

Alongside increasing the level of innovation in general, there is thus also considerable potential to further improve the diffusion of innovations. The current debate on the digitisation of the economy and industry 4.0 is an attempt to harness this potential. The Digital Single Market targeted by the European Union would be an opportunity to step up the diffusion of technologies from pioneers to the midfield. If only a limited number of companies jump on the bandwagon of digitisation, the divergence in the development of productivity is set to increase further.

### **Productivity growth in industry still higher than in services**

The sectoral structure of an economy has a considerable impact on its productivity profile. A high share of industry is favourable to the growth of labour productivity, above all due to the fact that manufacturing offers greater possibilities to increase capital stock than services. The following figure for Germany shows that labour productivity both in the economy overall and in manufacturing has been trending downward for two decades. Labour productivity growth in industry is on average one percentage point above the average productivity growth for the economy overall.

**Growth of labour productivity in Germany in percent**



Source: OECD



An international comparison reveals that the size of a country's industrial sector is closely related to its productivity growth. Between 1995 and 2015, the share of manufacturing dropped across the board in all six countries investigated. The United Kingdom experienced the greatest degree of deindustrialisation. Its share of manufacturing dropped from around 19 percent in the mid-1990s to just over ten percent in 2015. This corresponds to a reduction in industrial capacity of 45 percent. According to OECD figures, the share of manufacturing in Germany has remained relatively constant at over 22 percent. The following table shows the relative changes between 1990 and 2014.

## Change in share of manufacturing, productivity growth and TFP in percent

	Share of manufacturing	Productivity growth	Capital deepening	TFP
<b>Germany</b>	- 1	-45	-27	-15
<b>France</b>	-31	-56	-85	-59
<b>Italy</b>	-24	-65	-89	-79
<b>United Kingdom</b>	-45	-81	-84	-77
<b>USA</b>	-26	-58	-78	-50
<b>Japan</b>	-16	-26	+66	+192
<b>Correlation to the change in share of manufacturing</b>		0.75	0.55	0.44

Source: OECD

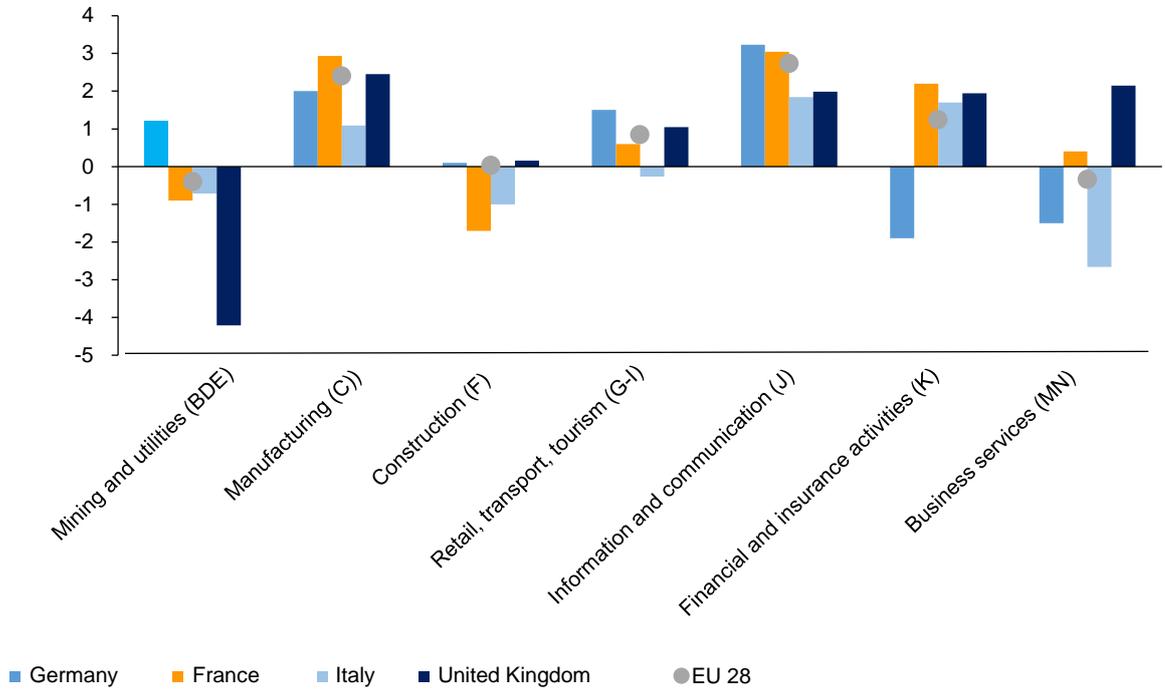


These correlations illustrate that those countries with a large decrease in industrial capacity have also experienced a greater reduction in productivity growth. The correlation between the relative change in the share of manufacturing and labour productivity is 0.75. The correlation between the individual components of capital deepening and TFP is not as strong but still clearly positive. A higher share of manufacturing is not a standalone guarantee for stronger productivity growth. Italy, for example, has a relatively high share of manufacturing in European comparison of just under 16 percent but has the lowest growth in value added of all the large economies. Ehmer (2016) has shown that in Italy, the proportion of large companies and the degree of integration in global value chains is very small. Both of these factors foster productivity gains. Ehmer (2016: 7) has calculated that if the Italian manufacturing sector had the same productivity as the euro area manufacturing average, the average growth of the Italian economy since 1995 would have been around one percentage point higher. In the case of Spain, a euro area average productivity would have increased total economic productivity by about half a percentage point.

A more detailed division than the broad division between industry, services and agriculture is also possible. Deutsche Bank Research (2016), for example, breaks overall labour productivity growth down into two components. The first is the productivity growth of the individual sector and the second is the interconnection between the sectors. Employees changing from less productive to more productive industries also positively impact overall labour productivity growth. For Germany the first component is the dominant one, just as it is for France. In Spain the productivity increase in the early 2000s was shaped to a large extent by the allocation of employees to more productive industries. This effect has levelled off in the last few years. In Italy the sectoral mobility in the early 2000s likewise drove up productivity growth. This effect has turned around in the last two years with employees moving increasingly into sectors with low growth rates.

The following figure shows the average increase in the sectoral labour productivity between 2001 and 2014 for four European countries and the EU28.

Average increase in sectoral labour productivity 2001-2014 in percent

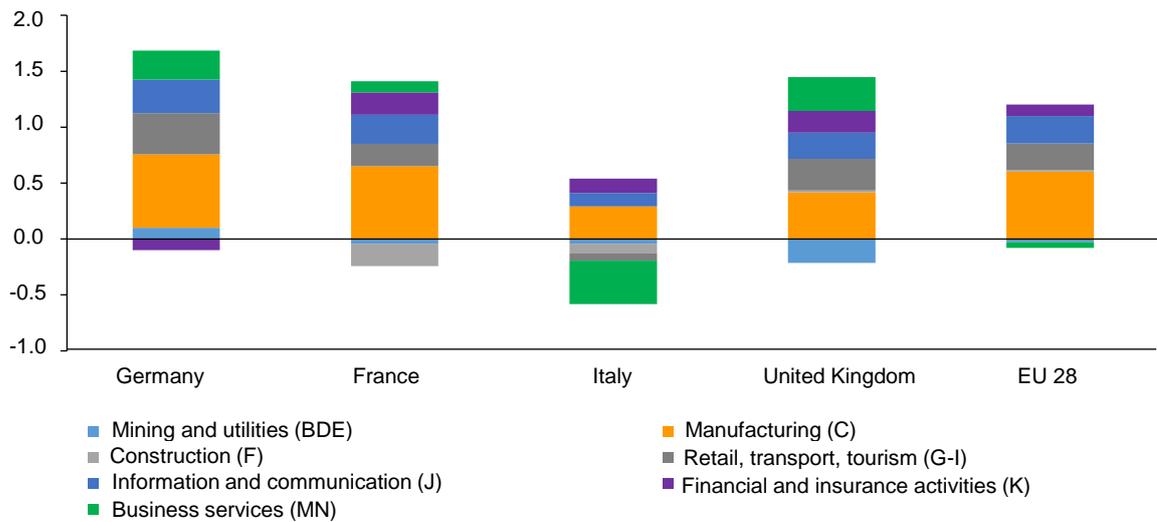


Source: OECD



The manufacturing and information and communications sectors have recorded the largest productivity gains. On account of the much higher share of manufacturing in GDP compared with information and communications services, the contribution of manufacturing to overall productivity growth is correspondingly higher. This is illustrated in the following figure.

Average sectoral contribution to labour productivity growth 2001-2014 in percent



Source: OECD



The manufacturing sector accounts for around one-half of the productivity growth in all individual countries and in the EU28 overall. The target set by the Juncker Commission to bring the share of industry back to 20 percent across the EU is a step in the right direction. In order to meet this target, Europe needs to adopt an industrial policy focused on increasing productivity.

### Productivity in information and communications technology: manufacturers on top, but users flop

There are large differences in the growth of productivity in the application of information and communications technology (ICT). For Germany, the German Council of Economic Experts (2015: 331) reports a mixed performance among ICT-producing industries, ICT-intensive industries and other economic sectors. While ICT-producing industries recorded annual productivity gains of over seven percent between 2010 and 2013, the ICT-intensive industries only managed to increase productivity by just over 0.1 percent. Other economic sectors registered an annual productivity growth of 1.2 percent. This figure is slightly above overall economic productivity growth of 1.1 percent per year for this period. The following table shows these and other interrelationships:

**Shares of the different economic sectors in labour productivity in percent**

	Share in gross value added	Growth of labour productivity	Contribution to growth of labour productivity in the overall economy
<b>ICT-producing industries</b>	4.9	7.7	0.4
<b>ICT-intensive industries</b>	39.1	0.1	0.0
<b>Other economic sectors</b>	56.0	1.3	0.7
<b>Overall economy</b>		<b>1.1</b>	<b>1.1</b>

Source: German Council of Economic Experts

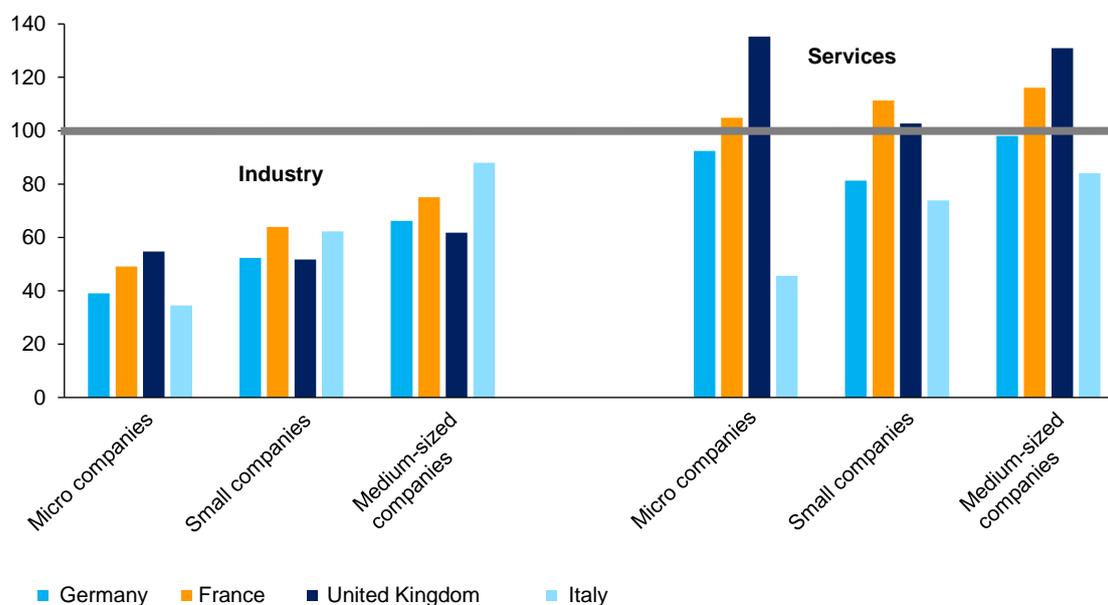


Measuring the influence of ICT on the innovation capacity and productivity growth of ICT-using industries is extremely complex and very disputed among academics. New products and services are often brought to market in the form of different business models and do not always have measurable market prices. The productivity increases of open source services, for example, are very difficult to calculate using conventional methods. The empirical evidence, especially when compared internationally, nonetheless clearly shows that Germany has some catching up to do in the application of ICT (OECD 2016b: 57). The average impact of ICT capital on productivity growth in Germany between 2009 and 2014 was a meagre 0.07 percentage points. For the United States, this figure is 0.17, for France 0.15 and for Switzerland 0.28. This illustrates the potential for Germany to increase overall economic productivity by reallocating resources to ICT-producing industries on the one hand, and by improving diffusion to ICT-using industries on the other. Digitisation and Industry 4.0 need to be pursued vigorously and not be allowed to become empty buzzwords. The right conditions need to be in place (gigabyte network, supporting investments in ICT, customised financing options from development banks, etc.) to better integrate, above all, SMEs into this process of transformation.

### Small is beautiful – but not always very productive

Economies of scale are a central component of economics. Adam Smith already identified the advantages of the division of labour and its impact on productivity. Especially in manufacturing, companies need to be of a certain size in order to be cost efficient. In extreme cases, the degression of fixed costs and the ensuing advantages of scale are so steep that monopolies emerge. The formation of monopolies and the exploitation of this market power can then have a detrimental effect on productivity, which is why there are comprehensive provisions to prevent the formation of monopolies in national and European legislation. The key point of interest to this analysis, however, is the differences displayed by micro, small and medium-sized enterprises compared with mid-caps (companies with 250 to 3,000 employees) and larger companies. The biggest differences are in manufacturing. The next figure shows labour productivity in 2013 according to company size compared to companies with 250 or more employees. Industry is shown on the left-hand side, with services on the right. Micro companies are companies with up to nine employees, small companies means those with between ten and 49 employees and medium-sized companies those with between 50 to 249 employees.

Labour productivity in comparison to large companies (=100) in 2013



Source: OECD



The industrial sector has the largest economies of scale in all countries. These figures corroborate the good performance of the German Mittelstand and family businesses that are mostly in the mid-cap category with 250 or more employees. The picture is more mixed for services. In the case of Germany, specialised micro companies up to nine employees and medium-sized companies with 50 or more employees are registering similar levels of productivity as large corporations. Only small companies with ten to 49 employees are slightly less productive on average. In France the size of companies in the service sector does not play a significant role, with SMEs even slightly outperforming large corporations on productivity. In Italy, the larger the size of the company is, the greater its productivity. The small and medium-sized service providers in the United Kingdom tend to be more productive than large companies, and, similar to Germany, micro and medium-sized companies do better overall than small companies.

The implications of these findings for economic policy are divergent. In industry, new companies should be able to grow quickly in order to reach the threshold values they need to be internationally competitive. Growth financing is an important component in this regard, as well as an efficient insolvency law that allows entrepreneurs to fail and try again. The OECD (2016b) shows that countries with high start-up and churn rates tend to be more productive. The churn rate is composed of the rate of new companies plus the rate of companies leaving the market. As such, it indicates the momentum in a market, or Schumpeter's "creative destruction".

The same goes for the services sector. In Germany (and in the United Kingdom), support should be targeted at small companies (ten to 49 employees) in particular. These companies are in a difficult stage, sandwiched between specialised micro companies and broader medium-sized companies. The IMF (2016) proposes an interesting idea regarding the support of innovative companies in the form of tax concessions. Basically, the idea is that public funds should be provided according to the age and not the size of the company. Highly innovative micro companies often operate more productively than small companies, as shown by the respective figures for Germany and for the United Kingdom. If these companies do not continue to grow after receiving initial funding, then it may prove to be more efficient for them to stay in their niche and continue operating at a high level of productivity. Further support for these companies will not increase their productivity.

### Potential of globalisation is not yet fully exploited

A company's size often plays a very important role in its participation in global trade. This is particularly true for manufacturers, whose goods have a much larger presence on the global market than services do. Depending on the industry, companies need to be of a certain size in order to participate efficiently in global trade. Being embedded in global value chains is beneficial for several reasons. Firstly, technology leaders usually operate on the global market, and innovations spread more easily and faster as a result of supplier or buyer relations with these productivity leaders. The OECD (2015: 57) estimates that Germany has the potential to increase its TFP by around two percentage points if it becomes more integrated in global value chains. Secondly, participation in global trade leads to a greater allocation of resources to productive companies that can hold their own on the global market. At the same time, the market share of less productive companies will decrease.

## An economic policy agenda for strengthening productivity in Germany

The analysis presented here outlines a broad scope for action aimed at increasing productivity growth in Germany. Not all, but many roads lead to Rome. The following points will be key to getting the country on the right track.

### Investment, investment and more investment

The pattern of investment in German industry has undergone deep structural change over the last 25 years. Investment in equipment, but above all in R&D and software, has increased substantially while investment in buildings and facilities has stagnated or even declined. The big high-quality technology industries have recorded positive real trends in investment in equipment and installations and in capital stock. The supplier industries have experienced stable development. Unfortunately, that has not been the case for most other industries, particularly those industries that are energy or labour-intensive, or that have been subjected to a changing global competitive environment.

We welcome the steps that have been decided on to step up public investment at the federal, state and municipal levels and increase public gross fixed capital formation by four percent per year until 2019. The weak investment at the municipal level seen in recent years has been the key cause of the negative public net fixed capital formation. Beyond this, the federal government needs to make further efforts, for example, to expand the digital infrastructure. Future federal governments should in particular avoid placing additional burdens on the private sector and the labour market and, among other things, pursue a coherent energy and climate policy that provides companies with the reliable and dependable parameters they need.

### Promoting R&D and education instead of early retirement

Both basic research and applied R&D need to be stepped up in order to increase labour productivity. These two areas are complementary in that an increase in state-financed basic research will also lead to an increase in private investment. On the one side, funds for basic research at universities and research institutes need to be stocked up. These funds can be drawn from other items in the public budget that are less growth-friendly and forward-looking. On the other side, the direct support of research needs to be supplemented by indirect support in the form of tax concessions for research activities if we are to fully exploit the synergies between basic and applied research. In the field of education, further education and life-long learning, the opportunities available to migrants need to be expanded rapidly to accelerate their integration into German society and the labour market.

### A unified industrial policy across the board

Increasing the share of industry in GDP and thereby increasing overall economic productivity will require a unified industrial policy approach. Businesses need stable conditions, above all in energy and climate policy, that do not disadvantage Germany as a business location in comparison to other countries. There can be no question that the global obligations to reduce carbon emissions need to be met. A national go-it-alone approach and golden plating, in contrast, will only distort competition. Excessive regulation that prompts companies to relocate to countries with lower standards will not benefit either the environment or Germany as a business location.

### Flexible product and labour markets with opportunities for all

Companies and workers both need to become more flexible in this age of digital transformation. Increased flexibility will also open up large potential to increase the productivity of labour. To tap this potential, we need to get away from the concept of workers having a single full-time job at the same company from the time they start work until they retire. The lifespan of companies will get shorter, business models will become obsolete more quickly and the momentum on product markets will gather pace. Starting up a business needs to be simplified on the one hand and insolvencies accelerated on the other. A “culture of failing” cannot be politically regulated but could nonetheless be promoted by adopting an effective and efficient insolvency law.

Policymakers should also prepare workers for this changed environment. Along the lines of the Scandinavian principle of “flexicurity”, workers should be able to change jobs quickly. To increase productivity, employees need to be able to move into high-growth sectors rather than staying trapped in stagnating industries on account of labour regulations. Further training and retraining will prove useful in many cases. The objective must be to cut down the period of individual unemployment in order to keep productivity up.

### Tapping the advantages of international trade

Integration in global value chains is key to generating productivity gains. German companies, particularly SMEs, stand to benefit greatly from the global technology leaders. Foreign trade needs to be supported to fully tap its potential. The federal government must therefore work towards trade partnerships and creating stable conditions for all sides. Protectionism and nationalistic trends in trade policy are not expedient to increasing productivity. Almost a quarter of all jobs in Germany are directly or indirectly dependent on exports. With investment and trade agreements, we can export the high standards of German quality to all over the world. This will increase our productivity and also contribute to the transfer of technology to other countries. Foreign trade is a win-win situation.

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